
The Norfolk County Council (Norwich Northern Distributor Road (A1067 to A47(T))) Order

1.1 Introduction to the Application

Planning Act 2008

Infrastructure Planning

The Infrastructure Planning (Applications: Prescribed Forms and Procedure)
Regulations 2009

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INTRODUCTION

This document is submitted in relation to the application for a proposed Development Consent Order by Norfolk County Council to the Secretary of State, under the Planning Act 2008.

The application is for the Norfolk County Council (Norwich Northern Distributor Road (A1067 to A47(T))) Order, to grant development consent for the construction of a new highway running west to east, to south, between the A1067 Fakenham Road and the A47 Trunk Road at Postwick, including improvements to the existing highway network to the north and north east of Norwich.

This document comprises part of the application documents and relates to Regulation 5(2)(q) of the Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009.

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1 Introduction

1.1 Introduction to the Applicant and the Application

1.1.1 This document provides information on the Applicant for the Norwich Northern Distributor Road project (the NDR or the Scheme), Norfolk County Council (NCC), on the roles of other planning and highway authorities, and provides an introduction to the form and content of the application for a development consent order (DCO) for the NDR which is made pursuant to section 37 of the Planning Act 2008.

1.1.2 Background information on the DCO application process is also provided.

1.1.3 The Scheme is of national significance pursuant to a direction made by the Secretary of State for Transport under section 35 of the Planning Act 2008 (see further below). NCC is therefore submitting this application for a DCO under the Planning Act 2008. Further information on the DCO consenting process is provided below.

1.2 Scheme Background

1.2.1 As part of the consultation on a revised Norwich Area Transportation Strategy (NATS) undertaken in 2003, the public were asked if they supported a NDR. The consultation indicated strong local support for the NDR with 78% of respondents being in favour.

1.2.2 The overall strategy for the revised NATS was agreed in 2004. It recognised the Norwich Area as a centre where growth would be focussed and therefore the strategy looked to provide the essential infrastructure needed to accommodate this growth, including a Northern Distribution Road.

1.2.3 Further consultations have been carried out on the route and other aspects since the NDR's adoption as a key part of delivering sustainable transport for the Norwich area, including formal pre-application consultation pursuant to the Planning Act 2008. Background to NATS and the NDR consultation is included in the Consultation Report, sections 2.3 and 3 (Document 5.1).

1.3 Proposed Scheme

1.3.1 The Scheme is a dual carriageway all-purpose strategic distributor road, which would link the A1067 Fakenham Road, near Attlebridge, to the A47 Trunk Road at Postwick. This will be over a length of approximately 20.4km. NCC is also seeking consent for other highways improvements and development - a full description of the Scheme can be found in the

Environmental Statement Volume I, Chapter 2 (Document 6.1). Schedule 1 to the Draft Development Consent Order (Document 3.1) sets out the formal description of the Scheme for which consent is sought, which is shown on the plans and drawings submitted with the application, including in particular the Works Plans (Document 2.3).

1.4 Consenting Process

- 1.4.1 Prior to 25 July 2013, the Scheme was within the thresholds in Section 22 of the Planning Act 2008, and was therefore a highways Nationally Significant Infrastructure Project (NSIP) under that section and Section 14(1)(h). On the bringing into force of the Highway and Railway (Nationally Significant Infrastructure Project) Order 2013 on 25 July 2013, the Scheme was no longer a NSIP within the terms of sections 14(1)(h) and 22 of the Planning Act 2008.
- 1.4.2 As noted above in the introduction, the Scheme once again became a scheme for which development consent is required following a direction made by the Secretary of State for Transport under Section 35 of the Planning Act 2008 dated 9 August 2013 (the Section 35 Direction). A copy of NCC's request for a Section 35 direction (dated 25 July 2013) is appended to this document at Appendix B and the Section 35 Direction itself is appended to this document at Appendix C.
- 1.4.3 As the Scheme requires a development consent pursuant to the Planning Act 2008, NCC has carried out pre-application consultation on the Scheme in accordance with Part 5, Chapter 2 of the Planning Act 2008, including the consultation required under Sections 42, 47 and 48 and the notification and other duties under the Planning Act 2008 and applicable Regulations. In addition, NCC had regard to and complied with relevant guidance issued by the Secretary of State and the Planning Inspectorate (PINS) in carrying out its pre-application consultation. The DCO application is accompanied by a Consultation Report (Document 5.1) which fully explains the pre-application consultation carried out, as well as the regard NCC has had to consultation responses in formulating the DCO application for the Scheme.
- 1.4.4 As stated in the Direction, NCC requires a DCO in order to construct the Scheme, and the draft DCO (Document 3.1) also includes powers to operate and maintain it. The Explanatory Memorandum (Document 3.2) sets out further information on the powers and other provisions contained in the draft DCO.

- 1.4.5 Applications for DCOs are made to the Planning Inspectorate, which examines and then reports on the proposals to the relevant Secretary of State. In the case of the NDR, the Planning Inspectorate will examine the Scheme and report to the Secretary of State for Transport, who will then decide whether or not to make the DCO.
- 1.4.6 Further information on the processes that the Planning Inspectorate follows after submission of the DCO application by NCC are provided in section 3 below, and reference should be made to the information available on the Planning Inspectorate's website.

2. The Roles of the Applicant and Other Parties

2.1 Norfolk County Council (the applicant)

2.1.1 The applicant is responsible for operating, maintaining and improving the local highway road network in the County of Norfolk as the local highway authority under the Highways Act 1980 and other relevant statutes. NCC, in its capacity as local highway authority only, is the applicant for this DCO application and throughout this DCO application, the applicant is referred to as either "the applicant" or as "NCC".

2.1.2 The Scheme is managed by the NCC's NNDR project team, whose contact details are:

Northern Distributor Road

Norfolk County Council

Room 321

County Hall

Martineau Lane

Norwich

Norfolk

NR1 2DH

2.1.3 NCC has appointed Mott MacDonald to provide professional services to progress the Scheme. Mott MacDonald's role includes carrying out the Environmental Impact Assessment and traffic modelling, as well as writing various other reports and documents.

2.1.4 NCC has awarded the contract to construct the Scheme to Birse. The contract has been awarded under NCC's Early Contractor Involvement (ECI) initiative, which brings the construction contractor into a project at an early stage of design development to add expertise, value and innovation to on-going design development.

2.2 Other Parties/Authorities

- 2.2.1 The Highways Agency is an Executive Agency of the Department for Transport and is responsible for operating, maintaining and improving the strategic road network in England on behalf of the Secretary of State for Transport. As the A47(T) is a trunk road, the Highways Agency is the highway authority in respect of that highway, not NCC. NCC is however able to seek (and has sought in this application) development consent for works to the A47(T) within the Scheme.
- 2.2.2 As Norfolk County is a 'two tier' local government area, as well as being within NCC's area, the Scheme is also within the administrative area of Broadland District Council, and in respect of very small areas of the Scheme is also within Norwich City Council's administrative area (close to Norwich International Airport) and the Broads Authority's administrative area (at Postwick). These and various other local authorities were involved in NCC's pre-application consultation processes, and will continue to be involved in the examination of the DCO application. Further information on the identity of the relevant local authorities and their involvement in the pre-application consultation processes can be found in the Consultation Report (Document 5.1).

3. The Application

3.1 History to the Scheme's Planning Process

3.1.1 The NDR route is between the A1067 Fakenham Road and the A47(T) at Postwick, and the Scheme includes an altered junction arrangement with the A47(T) and other works and road improvements in this area. NCC has already promoted a scheme which included these works at Postwick. That earlier scheme was the subject of a planning application for a business park along with improvements to the A47/A1042 trunk road junction, for which planning permission was granted by Broadland District Council in October 2011. A further planning permission for an infiltration lagoon and new access track was also granted separately by Broadland District Council.

3.1.2 As the A47 at Postwick is a trunk road, the Highways Agency is responsible for promoting the Side Road and Slip Road Orders relating to the above planning permission. A public inquiry was held in July 2013 to consider the these Orders. It is understood that the Inspector that held the public inquiry has made his recommendations to the Secretary of State for Transport - as yet no decision has been made by the Secretary of State.

3.2 The DCO Application Documents and their Compliance with Legislative Requirements

3.2.1 Table 3.1 below provides a guide to the documents that NCC is submitting as part of this application. As well as providing a list of the main application documents, it also identifies where documents are submitted in order to comply with a relevant legislative or policy requirement.

3.2.2 The legislative requirements for applications for development consent are principally contained in the Planning Act 2008, the Infrastructure Planning (Applications: Prescribed Forms and Procedures) Regulations 2009 (the Application Regulations) and the Infrastructure Planning (Environmental Impact Assessment) Regulations 2009 (the EIA Regulations).

3.2.3 Regulation 5 in the Application Regulations sets out the documents that all development consent applications must include and Regulation 6 sets out the documents that particular types of development consent applications must include – those relating to highways development are relevant to the Scheme. References in Table 3.1 below such as "Reg. 5(2)(b)" are to the Application Regulations and those such as "S.37(3)(c)" are to the Planning Act 2008.

3.2.4 Regulation 5 of the Application Regulations includes a category described as "any other documents considered necessary to support the application" (Reg. 5(2)(q)). Similarly Regulation 5 also allows NCC to submit other plans, drawings and sections which are necessary to describe the Scheme (Reg. 5(2)(o)). The documents provided by NCC and marked as relating to those two paragraphs of the Application Regulations are therefore not statutorily required but are those which NCC considers necessary to support the application for a DCO.

3.2.5 The DCO application submitted for the Scheme complies with the requirements of the Planning Act 2008, the Application Regulations, the EIA Regulations and applicable Secretary of State and PINS guidance including in particular PINS Advice Note 6 (Preparation and submission of application documents, June 2012).

Table 3.1, Guide to the DCO Application Documents

Application Document Reference	Application Document Name	Statutory / Other Requirement for Document
Category 1	Application Form	
1.1	Introduction to the Applicant and the Application (<i>this document</i>)	Reg. 5(2)(q)
1.2	Application form	S.37(3)(b) and Reg. 5(1)
1.3	Copies of newspaper notices	Reg. 5(2)(q) and PINS Advice Note 6
Category 2	Plans / Drawings / Sections	
2.1	Location plan	Reg. 5(2)(o)
2.2	Land plans	Reg. 5(2)(i)
2.3	Works plans	Reg. 5(2)(j)
2.4	Street plans	Reg. 5(2)(k)
2.5	Speed limit orders and proposed clearways	Reg. 5(2)(o)

Application Document Reference	Application Document Name	Statutory / Other Requirement for Document
2.6	General arrangement plans	Reg. 5(2)(o)
2.7	Bridge plans and elevations	Reg. 5(2)(o)
2.8	Detailed landscape planting plans	Reg. 5(2)(o)
2.9	Indicative sections	Reg. 5(2)(o)
2.10	Section plans	Reg. 5(2)(o), Reg. 5(2)(p) and Reg.6(2)(a)
2.11	Drainage and surface water management plans	Reg. 5(2)(o), Reg. 5(2)(p) and Reg.6(2)(a)
2.12	Crown land plan	Reg. 5(2)(n)
2.13	Classification of highways plan	Reg. 5(2)(o)
Category 3	<i>Draft Development Consent Order</i>	
3.1	Draft development consent order	Reg. 5(2)(b)
3.2	Explanatory memorandum	Reg. 5(2)(c)
Category 4	<i>Compulsory Acquisition Information</i>	
4.1	Statement of reasons	Reg. 5(2)(h) This also includes information to accompany the Crown land plan (Reg. 5(2)(n))
4.2	Funding statement	Reg. 5(2)(h)
4.3	Book of reference	Reg. 5(2)(d) and Reg. 7
Category 5	<i>Reports / Statements</i>	
5.1	Consultation report	S.37(3)(c)

Application Document Reference	Application Document Name	Statutory / Other Requirement for Document
5.2	Flood risk assessment	Reg. 5(2)(e)
5.3	Environmental Protection Act statement	Reg. 5(2)(f)
5.4	Details of other consents and licences	Reg. 5(2)(q) and PINS Advice Note 6
5.5	Transport assessment	Reg. 5(2)(q)
5.6	Traffic forecasting report	Reg. 5(2)(q)
5.7	Economic appraisal report	Reg. 5(2)(q)
5.8	Report of surveys (traffic)	Reg. 5(2)(q)
5.9	Highway Local Model Validation Report	Reg. 5(2)(q)
5.10	Public Transport Local Model Validation Report	Reg. 5(2)(q)
Category 6	<i>Environmental impact assessment and habitats regulations information</i>	
6.1	Environmental statement	<p>Reg. 5(2)(a) and Infrastructure Planning (Environmental Impact Assessment) Regulations 2009.</p> <p>Document 6.1 includes within it the following:</p> <p>(i) Environmental impact scoping report and scoping opinion at ES Vol 1, Appendix 4 and Appendix 5 (Reg.5(2)(a));</p> <p>(ii) Assessment of any effects</p>

Application Document Reference	Application Document Name	Statutory / Other Requirement for Document
		<p>on sites or features of nature conservation (etc), at ES Volume 1, Chapter 8 (Reg.5(2)(l)); and</p> <p>(iii) Assessment of any effects on sites or features of the historic environment, at ES Volume 1, Chapter 6 (Reg.(5)(2)(m)).</p>
6.2	Environmental statement appendices	<p>Reg. 5(2)(a) and Infrastructure Planning (Environmental Impact Assessment) Regulations 2009.</p> <p>Document 6.2 includes within it the following:</p> <p>(i) Habitats Regulations Assessment at ES Volume II, Chapter 17 (Reg.5(2)(g));</p> <p>(ii) Plans showing sites or features of nature conservation (etc) at ES Volume II, Chapter 8 (Reg.5(2)(l)); and</p> <p>(iii) Plans showing sites or features of the historic environment at ES Volume II, Chapter 6 (Reg.5(2)(m)).</p>
6.3	Environmental statement non-technical summary	<p>Reg. 5(2)(a) and Infrastructure Planning (Environmental Impact Assessment) Regulations 2009.</p>

Application Document Reference	Application Document Name	Statutory / Other Requirement for Document
Category 7	Photographs	
7.1	Photographs and photomontages	Reg.5(2)(q)
7.2	Plans identifying locations and directions of photographs	Reg. 5(2)(q)
7.3	Index of photographs	Reg. 5(2)(q)
Categories 8 and 9	Not Used	
-	Documents were removed from categories 8 and 9 and redistributed within the other categories.	-
Category 10	Other Documents	
10.1	Road safety audits and briefs	Reg. 5(2)(q)
10.2	Departures report	Reg. 5(2)(q)
10.3	Land use and economic development report	Reg. 5(2)(q)
10.4	Consent from the HA to include Crown Land in the DCO	Reg. 5(2)(q)

3.3 The DCO Application and Examination Process

- 3.3.1 After NCC has submitted this DCO application, the outline process considering it is as follows.
- 3.3.2 The Planning Inspectorate has 28 days from the date that the application is submitted in which to decide whether to accept it for examination.
- 3.3.3 Following acceptance by the Planning Inspectorate, NCC will carry out its post-acceptance consultation and notification duties. This includes site notice and advertisements in a local newspaper, a national newspaper and the

London Gazette, all confirming certain details including that the DCO application has been accepted and how representations can be made about it, as well as notices to various statutory consultees.

- 3.3.4 The Planning Inspectorate will then appoint one or more 'examining inspectors' (known as the examining authority) to examine the application. The examining authority will consider the application documents and the representations and invite all parties to attend a 'preliminary meeting', setting out what the examining authority considers to be the principal issues relating to the Scheme, and a draft timetable for examining it;
- 3.3.5 At or before the preliminary meeting, participants may make submissions about how the application should be examined. The preliminary meeting does not consider issues of substance relating to the application;
- 3.3.6 Following the preliminary meeting, the examining authority will issue an examination timetable and it is also likely to issue an initial set of written questions. The timetable will give details of deadlines for submitting written representations, commenting on others' representations, answering the examining authorities' questions and commenting on others' answers. Hearings may be scheduled at this point, or these may be programmed at a later time, and further questions and requests for information may be issued by the examining authority. Further information on participating in the examination of the application can be found on the Planning Inspectorate's website including in the Advice Notes it has issued;
- 3.3.7 The examination period (which includes the submission of all written material as well as holding hearings and site visits) starts from the date of the preliminary meeting and must take no more than six months. This can only be extended with the authorisation of the Secretary of State.
- 3.3.8 Following the end of the six month examination period, the examining authority must submit a report to the Secretary of State for Transport within three months, who then has a further three months to determine the application.
- 3.3.9 NCC welcomes correspondence from interested parties in relation to the Scheme - questions relating to the examination process should be directed to the Planning Inspectorate.

Appendices

4.1 Appendix A – Location Plan

4.2 Appendix B – S35 Application

4.3 Appendix C S35 Direction

5. Glossary

DCLG	Department for Communities and Local Government
DfT	Department for Transport
DMRB	Design manual for Roads and Bridges
EA	Environment Agency
GNDP	Greater Norwich Development Partnership
HA	Highways Agency
JCS	Joint Core Strategy
LTP	Local Transport Plan
NATS	Norwich Area Transportation Strategy
NCC	Norfolk County Council
NIP	National Infrastructure Plan
NDR	Norwich Northern Distributor Road
NPPF	National Planning Policy Framework
NPS	National Policy Statement
TEN-T Routes	Trans-European Network of transport routes
WebTAG	Web-based Transport Appraisal Guidance produced by the Department for Transport

The Norfolk County Council (Norwich Northern Distributor Road (A1067 to A47(T))) Order

3.1 Draft Development Consent Order

Planning Act 2008
The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

PINS Reference Number: TR010015

Document Reference: 3.1

Regulation Number: 5(2)(b)

Author: Norfolk County Council

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INTRODUCTION

This document is submitted in relation to the application for a Development Consent Order by Norfolk County Council to the Secretary of State, under the Planning Act 2008.

The application is for the Norfolk County Council (Norwich Northern Distributor Road (A1067 to A47(T))) Order, to grant development consent for the construction of a new highway running west to east, to south, between the A1067 Fakenham Road and the A47 Trunk Road at Postwick, including improvements to the existing highway network, to the north and north east of Norwich.

This document is the draft Development Consent Order (or draft DCO), comprises part of the application documents and is provided as required under Regulation 5(2)(b) of the Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009.

Norfolk County Council has also submitted an Explanatory Memorandum (document 3.2), which explains the terms of the draft DCO.

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STATUTORY INSTRUMENTS

201[●] No. [●]

INFRASTRUCTURE PLANNING

The Norfolk County Council (Norwich Northern Distributor Road (A1067 to A47(T))) Order 201[●]

Made - - - - - [●] 201[●]

Coming into force - - - [●] 201[●]

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An application has been made to the Secretary of State in accordance with the Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 and Part 5 of the 2008 Act for an Order under sections 37, 114, 115, 117(4), 120, 122 and 123 of the 2008 Act.

The application was examined by the Examining authority appointed by the Secretary of State pursuant to Chapter 4 of Part 6 of the 2008 Act.

The Secretary of State is satisfied, in accordance with section 131(3)(a) and section 131(4) of the 2008 Act, that the fuel allotment first replacement land and fuel allotment second replacement land will be given for the fuel allotment land and that such replacement land will vest in the prospective seller and subject to the same rights, trusts and incidents as attach to the fuel allotment land.

The Secretary of State is satisfied –

- (a) in accordance with section 131(3)(a) and section 131(4) of the 2008 Act, that the Marriott's Way replacement open space land will be given for the Marriott's Way open space land and that such replacement land will vest in the prospective seller and subject to the same rights, trusts and incidents as attach to the Marriott's Way open space land; and
- (b) in accordance with section 132(2)(a) and section 132(3) of the 2008 Act, that that part of the Marriott's Way open space land over which rights are to be compulsorily acquired (being plots 2/26, 2/28 and 2/29 in the book of reference and which are so numbered and shown delineated and coloured blue and stippled black on the land plans) when burdened with the Order right and will be no less advantageous than it was before to the following persons –
 - (i) the persons in whom it is vested,
 - (ii) other persons, if any, entitled to rights of common or other rights, and
 - (iii) the public.

The Secretary of State, in accordance with section 105(2) of the 2008 Act, has had regard to the local impact report submitted by [●] and those matters which the Secretary of State thinks are both important and relevant to his decision.

The Secretary of State, having considered the representations made and not withdrawn and the application with the documents that accompanied the application, has determined to make an Order giving effect to the proposals comprised in the application.

The Secretary of State's determination was published on [●].

Accordingly, the Secretary of State, in exercise of the powers conferred by sections 103, 114, 115, 117, 120, 122 and 123 of the 2008 Act, makes the following Order-

PART 1 PRELIMINARY

Citation and commencement

1. This Order may be cited as the Norfolk County Council (Norwich Northern Distributor Road (A1067 to A47(T))) Order 201[●] and shall come into force on [●] 201[●].

Interpretation

2.—(1) In this Order—

“the 1961 Act” means the Land Compensation Act 1961;

“the 1965 Act” means the Compulsory Purchase Act 1965;

“the 1980 Act” means the Highways Act 1980;

“the 1984 Act” means the Road Traffic Regulation Act 1984;

“the 1990 Act” means the Town and Country Planning Act 1990;

“the 1991 Act” means the New Roads and Street Works Act 1991;

“the 2008 Act” means the Planning Act 2008;

"address" includes any number or address used for the purposes of electronic transmission;

“apparatus” has the same meaning as in Part 3 of the 1991 Act;

“authorised development” means the development described in Schedule 1 (authorised development) and any other development authorised by this Order, which is development within the meaning of section 32 of the 2008 Act;

“the book of reference” means the book of reference certified by the Secretary of State as the book of reference for the purposes of this Order;

"bridleway" has the same meaning as in the 1980 Act;

“building” includes any structure or erection or any part of a building, structure or erection;

“carriageway” has the same meaning as in the 1980 Act;

“compulsory acquisition notice” means a notice served in accordance with section 134 of the 2008 Act;

“cycle track” has the same meaning as in the 1980 Act;

“electronic transmission” means a communication transmitted –

(a) by means of an electronic communications network; or

(b) by other means but while in electronic form;

“environmental impact assessment” means the assessment of the environmental impact of the authorised development, the findings of which are recorded in the environmental statement;

“the environmental statement” means the environmental statement submitted under regulation 5(2)(a) of the Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 and certified as such by the Secretary of State for the purposes of this Order;

“footpath” and “footway” have the same meaning as in the 1980 Act;

“fuel allotment first replacement land” means that land numbered as plot 10/41 in the book of reference and which is so numbered and shown delineated, and coloured green and stippled black on the land plans;

“fuel allotment land” means that land numbered as plot 10/45 in the book of reference and which is so numbered and shown delineated, and coloured pink and stippled black on the land plan;

“fuel allotment second replacement land” means that land numbered as plot 10/42 in the book of reference and which is so numbered and shown delineated, and hatched orange and green and stippled black on the land plans;

“highway” and “highway authority” have the same meaning as in the 1980 Act;

“the highway classification plans” means the plans certified as the highway classification plans by the Secretary of State for the purposes of this Order;

“the land plan(s)” means the plan(s) certified as the land plan(s) by the Secretary of State for the purposes of this Order;

“the landscaping plans” means the plans certified as the landscaping plans by the Secretary of State for the purposes of this Order;

“limits of deviation” means the limits of deviation for each numbered work shown on the works plans and as set out in article 5;

“maintain” includes inspect, repair, adjust, alter, remove, clear, refurbish, reconstruct and improve, and any derivative of “maintain” is to be construed accordingly;

“Marriott’s Way open space land” means:

(a) plot 2/27 in the book of reference and which is so numbered and shown delineated and hatched pink on the land plans;

(b) plots 2/23, 2/25, 2/34 and 2/37 in the book of reference and which are so numbered and shown delineated and hatched pink and green and stippled black on the land plans; and

(c) plots 2/26, 2/28 and 2/29 in the book of reference and which are so numbered and shown delineated and coloured blue and stippled black on the land plans;

"Marriott's Way replacement open space land" means:

(a) that land numbered as plot 2/27a in the book of reference and which is so numbered and shown delineated and coloured green and stippled black on the land plan;

(b) plots 2/23, 2/25, 2/34 and 2/37 in the book of reference and which are so numbered and shown delineated and hatched pink and green and stippled black on the land plans; and

(c) plots 2/26, 2/28 and 2/29 in the book of reference and which are so numbered and shown delineated and coloured blue and stippled black on the land plans;

"numbered work" means each numbered work comprised in the authorised development and to be located within the corresponding numbered area shown on the works plan and "work number" shall be construed accordingly;

"National Grid" means National Grid plc (Company No. 04031152) whose registered office is at 1-3 Strand, London, WC2N 5EH;

"the NDR classified road" means the highway which the undertaker proposes to construct, as the A1270 Principal Road, as described in Part 2 of Schedule 5 to this Order;

"Network Rail" means Network Rail Limited (Company No. 04402220) whose registered office is at Kings Place, 90 York Way, London, N1 9AG;

"Order land" means the land shown on the land plan(s) which is within the limits of land to be acquired or used permanently or temporarily and described in the book of reference;

"the Order limits" means the limits shown on and described as "The Development Consent Order (DCO) Boundary" on the works plans and within which the authorised development may be carried out;

"owner", in relation to land, has the same meaning as in section 7 of the Acquisition of Land Act 1981;

"relevant planning authority" means the County planning authority for the area in which the land to which the provisions of the Order apply is situated;

"requirements" means those matters set out in Schedule 2 to this Order;

"restricted byway" has the same meaning as in Part 2 of the Countryside and Rights of Way Act 2000;

"Secretary of State" means the Secretary of State for Transport;

"the sections" means the sections shown on the plans certified as the section plans by the Secretary of State for the purposes of this Order;

"statutory undertaker" means any person falling within section 127(8) of the 2008 Act;

"street" means a street within the meaning of section 48 of the 1991 Act, together with land on the verge of a street or between two carriageways, and includes any footpath and "street" includes any part of a street;

"street authority", in relation to a street, has the same meaning as in Part 3 of the 1991 Act;

"the street plans" means the plans certified as the street plans by the Secretary of State for the purposes of this Order;

"tree preservation order" has the meaning given in section 198 of the 1990 Act;

“the tribunal” means the Lands Chamber of the Upper Tribunal;

“trunk road” means a highway which is a trunk road by virtue of—

- (a) section 10 or 19(1) of the 1980 Act; or
- (b) an order or direction under section 10 of the 1980 Act; or
- (c) an order granting development consent; or
- (d) any other enactment;

“undertaker” means the person who has the benefit of this Order in accordance with article 6;

“watercourse” includes all rivers, streams, ditches, drains, canals, cuts, culverts, dykes, sluices, sewers and passages through which water flows except a public sewer or drain; and

“the works plan(s)” means the plan(s) certified as the works plan(s) by the Secretary of State for the purposes of this Order.

(2) References in this Order to rights over land include references to rights to do or to place and maintain anything in, on or under land or in the air-space above its surface.

(3) All distances, directions and lengths referred to in this Order are approximate and distances between points on a work comprised in the authorised development shall be taken to be measured along that work.

(4) All areas described in square metres in the book of reference are approximate.

(5) References in this Order to numbered works are references to the works as numbered in Schedule 1.

(6) References in this Order to points identified by letters or numbers shall be construed as references to points so lettered or numbered on the works plans, the land plans or the street plans (as specified in each case).

(7) The expression "includes" shall be construed without limitation.

PART 2

PRINCIPAL POWERS

Development consent etc. granted by the Order

3.—(1) Subject to the provisions of this Order and to the requirements, the undertaker is granted development consent for the authorised development to be carried out within the Order limits.

(2) Subject to article 5, the numbered works shall be constructed in the lines or in the situations shown on the works plans or within the limits of deviation and, subject to the provision of the requirements, in accordance with the drawings specified in the requirements.

(3) In constructing or maintaining the authorised development, the undertaker may deviate from the lines or situations shown on the works plans within the limits of deviation.

Maintenance of authorised development

4.—(1) Except to the extent that this Order or an agreement made under this Order provides otherwise and subject to the provisions of this Order and to the requirements, the undertaker is authorised to and may at any time maintain the authorised development.

(2) Maintenance shall include, so far as is necessary or expedient for the purposes of, or purposes ancillary to, the construction or operation of the authorised development, carrying out works to alter the position of apparatus below ground level, including mains, sewers, drains and cables including below ground structures associated with that apparatus within the Order limits.

(3) This article only authorises the carrying out of maintenance works within the Order limits.

Limits of deviation

5.—(1) In carrying out the authorised development, the undertaker may deviate vertically and laterally within the limits of deviation specified in paragraphs 2 and 3 below.

(2) Except as provided for specifically in paragraph 3 below, the undertaker may deviate vertically and laterally within the following limits of deviation:

<i>(1)</i> <i>Numbered work</i>	<i>(2)</i> <i>Elements of numbered work to which limits apply</i>	<i>(3)</i> <i>Upwards vertical limit of deviation</i>	<i>(4)</i> <i>Downwards vertical limit of deviation</i>	<i>(5)</i> <i>Horizontal limit of deviation</i>
Work numbers 1 to 24 (inclusive)	Carriageway and adjacent verges, footways, footpaths, bridleways and cycle tracks	Zero	-0.25 metres	Within Order limits
Work numbers 1 to 24 (inclusive)	Earthworks, bunds and banks (and including any associated footways, footpaths, bridleways and cycle tracks)	+0.25 metres	Zero	Within Order limits

(3) The undertaker may deviate vertically within the following limits of deviation:

<i>(1)</i> <i>Numbered work</i>	<i>(2)</i> <i>Elements of numbered work to which limits apply</i>	<i>(3)</i> <i>Vertical limit of deviation</i>
Work numbers 2, 3 and 4	<p>Carriageway and other non carriageway features such as adjacent verges, footways, footpaths, bridleways and cycle tracks in work numbers 2 and 4 that are within 550 metres of the centre point of work number 3(ii) (Fir Covert Roundabout).</p> <p>Carriageway and other non carriageway features such as adjacent verges, footways, footpaths, bridleways and cycle tracks within work number 3.</p> <p>Earthworks, bunds and banks (and including any associated footways, footpaths, bridleways and cycle tracks) in work numbers 2 and 4 that are within 550 metres of the centre point of work number 3(ii).</p> <p>Earthworks, bunds and banks (and including any associated footways, footpaths, bridleways</p>	+ or - 0.5 metres

<i>(1)</i> <i>Numbered work</i>	<i>(2)</i> <i>Elements of numbered work to which limits apply</i>	<i>(3)</i> <i>Vertical limit of deviation</i>
	and cycle tracks) within work number 3.	
Work numbers 4, 5 and 6	<p>Carriageway and other non carriageway features such as adjacent verges, footways, footpaths, bridleways and cycle tracks in work numbers 4 and 6 that is within 250 metres of the centre point of work number 5(ii) (Reepham Round Roundabout).</p> <p>Carriageway and other non carriageway features such as adjacent verges, footways, footpaths, bridleways and cycle tracks within work number 5.</p> <p>Earthworks, bunds and banks (and including any associated footways, footpaths, bridleways and cycle tracks) in work numbers 4 and 6 that are within 250 metres of the centre point of work number 5(ii).</p> <p>Earthworks, bunds and banks (and including any associated footways, footpaths, bridleways and cycle tracks) within work number 5.</p>	+ or - 0.5 metres
Work numbers 6, 7 and 8	<p>Carriageway and other non carriageway features such as adjacent verges, footways, footpaths, bridleways and cycle tracks in work numbers 6 and 8 that is within 250 metres of the centre point of work number 7(ii) (Drayton Lane Roundabout).</p> <p>Carriageway and other non carriageway features such as adjacent verges, footways, footpaths, bridleways and cycle tracks within work number 7.</p> <p>Earthworks, bunds and banks (and including any associated footways, footpaths, bridleways and cycle tracks) in work numbers 6 and 8 that are within 250 metres of the centre point of work number 7(ii).</p> <p>Earthworks, bunds and banks (and including any associated footways, footpaths, bridleways and cycle tracks) within work number 7.</p>	+ or - 0.5 metres
Work numbers 10, 11 and 12	<p>Carriageway and other non carriageway features such as adjacent verges, footways, footpaths, bridleways and cycle tracks in work numbers 10 and 12 that is within 550 metres of the centre point of work number 11(ii) (Airport Roundabout).</p> <p>Carriageway and other non carriageway features such as adjacent verges, footways, footpaths, bridleways and cycle tracks within work number 11.</p> <p>Earthworks, bunds and banks (and including any associated footways, footpaths, bridleways and cycle tracks) in work numbers 10 and 12</p>	+ or - 0.5 metres

<i>(1)</i> <i>Numbered work</i>	<i>(2)</i> <i>Elements of numbered work to which limits apply</i>	<i>(3)</i> <i>Vertical limit of deviation</i>
	<p>that are within 550 metres of the centre point of work number 11(ii).</p> <p>Earthworks, bunds and banks (and including any associated footways, footpaths, bridleways and cycle tracks) within work number 11.</p>	
<p>Work numbers 14, 15 and 16</p>	<p>Carriageway and other non carriageway features such as adjacent verges, footways, footpaths, bridleways and cycle tracks in work numbers 14 and 16 that is within 250 metres of the centre point of work number 15(ii) (Wroxham Road Roundabout).</p> <p>Carriageway and other non carriageway features such as adjacent verges, footways, footpaths, bridleways and cycle tracks within work number 15.</p> <p>Earthworks, bunds and banks (and including any associated footways, footpaths, bridleways and cycle tracks) in work numbers 14 and 16 that are within 250 metres of the centre point of work number 15(ii).</p> <p>Earthworks, bunds and banks (and including any associated footways, footpaths, bridleways and cycle tracks) within work number 15.</p>	<p>+ or - 0.5 metres</p>
<p>Work numbers 16, 17 and 18</p>	<p>Carriageway and other non carriageway features such as adjacent verges, footways, footpaths, bridleways and cycle tracks in work numbers 16 and 18 that is within 250 metres of the centre point of work number 17(ii) (Salhouse Road Roundabout).</p> <p>Carriageway and other non carriageway features such as adjacent verges, footways, footpaths, bridleways and cycle tracks within work number 17.</p> <p>Earthworks, bunds and banks (and including any associated footways, footpaths, bridleways and cycle tracks) in work numbers 16 and 18 that are within 250 metres of the centre point of work number 17(ii).</p> <p>Earthworks, bunds and banks (and including any associated footways, footpaths, bridleways and cycle tracks) within work number 17.</p>	<p>+ or - 0.5 metres</p>
<p>Work number 18</p>	<p>Roundabout circulatory carriageway and other non carriageway features such as adjacent verges, footways, footpaths, bridleways and cycle tracks in work number 18(iii) (Plumstead Road Roundabout North).</p> <p>Carriageway and other non carriageway features such as adjacent verges, footways, footpaths, bridleways and cycle tracks within 120 metres of the centre point of Plumstead</p>	<p>+ or - 0.5 metres</p>

<i>(1)</i> <i>Numbered work</i>	<i>(2)</i> <i>Elements of numbered work to which limits apply</i>	<i>(3)</i> <i>Vertical limit of deviation</i>
	Road Roundabout within work number 18(iii). Earthworks, bunds and banks (and including any associated footways, footpaths, bridleways and cycle tracks) in work number 18 within 120 metres of the centre point of Plumstead Road Roundabout within work number 18(iii).	
Work number 21	Roundabout circulatory carriageway and other non carriageway features such as adjacent verges, footways, footpaths, bridleways and cycle tracks within work number 21(iv) (Postwick North East Roundabout). Carriageway and other non carriageway features such as adjacent verges, footways, footpaths, bridleways and cycle tracks within 135 metres of the centre point of the roundabout within work number 21(iv). Earthworks, bunds and banks (and including any associated footways, footpaths, bridleways and cycle tracks) within work number 21(iv). Earthworks, bunds and banks (and including any associated footways, footpaths, bridleways and cycle tracks) within 135 metres of the centre point of the roundabout within work number 21(iv).	+ or - 0.5 metres

Benefit of the Order

6.—(1) Subject to article 6(2) and article 7 (consent to transfer benefit of the Order), the provisions of this Order shall have effect solely for the benefit of Norfolk County Council.

(2) Paragraph (1) does not apply to numbered works for which consent is granted by this Order for the benefit of statutory undertakers.

Consent to transfer benefit of the Order

7.—(1) The undertaker may—

- (a) transfer to another person (“the transferee”) any or all of the benefit of the provisions of this Order and such related statutory rights as may be agreed in writing between the undertaker and the transferee; or
- (b) grant to another person (“the lessee”) for a period agreed between the undertaker and the lessee any or all of the benefit of the provisions of this Order and such related statutory rights as may be so agreed.

(2) Where an agreement has been made in accordance with paragraph (1) references in this Order to the undertaker, except in paragraph (3), shall include references to the transferee or the lessee.

(3) The exercise by a person of any benefits or rights conferred in accordance with any transfer or grant under paragraph (1) is subject to the same restrictions, liabilities and obligations as would apply under this Order if those benefits or rights were exercised by the undertaker.

(4) The consent of the Secretary of State is required for the exercise of the powers of paragraph (1) except where—

- (a) the transferee or lessee is—
 - (i) a statutory undertaker (including National Grid);
 - (ii) a highway authority responsible for the highways within the Order land;
 - (iv) a person having security over any part of the authorised development in relation to contractual arrangements relating to a contract between the undertaker and a person referred to in sub-paragraph (i);
 - (b) the time limits for claims for compensation in respect of the acquisition of land or effects upon land under this Order have elapsed and—
 - (i) no such claims have been made;
 - (ii) any such claim has been made and has been compromised or withdrawn;
 - (iii) compensation has been paid in final settlement of any such claim;
 - (iv) payment of compensation into court in lieu of settlement of any such claim has taken place; or
 - (v) it has been determined by a tribunal or court of competent jurisdiction in respect of any claim that no compensation shall be payable.
- (5) Where a person who is the transferee or lessee as referred to in paragraph (1)—
- (a) is liable to pay compensation by virtue of any provision of this Order; and
 - (b) fails to discharge that liability.
- the liability is enforceable against the undertaker.

PART 3

STREETS

Power to alter layout, etc., of streets

8.—(1) The undertaker may for the purposes of the authorised development alter the layout of or carry out any works in the street specified in column (1) of Schedule 3 (streets subject to alteration of layout) in the manner specified in relation to that street in column (2).

(2) Regardless of the specific powers conferred by paragraph (1) but subject to paragraph (3), the undertaker may, for the purposes of constructing and maintaining the authorised development, alter the layout of any street within the Order limits and, without limitation on the scope of this paragraph, the undertaker may—

- (a) increase the width of the carriageway of the street by reducing the width of any kerb, footpath, footway, cycle track or verge within the street;
- (b) alter the level or increase the width or any kerb, footway, cycle track or verge;
- (c) reduce the width of the carriageway of the street; and;
- (d) make and maintain passing place.

(3) The undertaker must restore any street that has been temporarily altered under this article to the reasonable satisfaction of the street authority.

(4) The powers conferred by paragraph (2) shall not be exercised without the consent of the street authority.

(5) If a street authority which receives an application for consent under paragraph (4) fails to notify the undertaker of its decision before the end of the period of 28 days beginning with the date on which the application was made, it is deemed to have granted consent.

(6) Paragraphs (3), (4) and (5) shall not apply where the undertaker is the street authority for a street in which the works are being carried out.

Street works

9.—(1) The undertaker may, for the purposes of the authorised development, enter on so much of any of the streets specified in Schedule 4 (streets subject to street works) as is within the Order limits and may—

- (a) break up or open the street, or any sewer, drain or tunnel under it;
- (b) tunnel or bore under the street;
- (c) place apparatus in the street;
- (d) maintain apparatus in the street or change its position; and
- (e) execute any works required for or incidental to any works referred to in sub-paragraphs (a), (b), (c) and (d).

(2) Where the undertaker is not the street authority, the provisions of sections 54 to 106 of the 1991 Act apply to any street works carried out under paragraph (1).

(3) The undertaker shall restore any street that has been temporarily altered under this article to the reasonable satisfaction of the street authority.

(4) The powers conferred by paragraph (1) shall not be exercised without the consent of the street authority, but such consent shall not be unreasonably withheld.

Construction and maintenance of new, altered or diverted streets and other structures

10.—(1) Subject to paragraph (2) and article 11 (classification of roads), the streets authorised to be constructed, altered or diverted under this Order are to be public highways and are to be maintained by and at the expense of the highway authority.

(2) Where a street which is not and is not intended to be a public highway is constructed, altered or diverted under this Order, the street (or part of the street as the case may be) shall, when completed to the reasonable satisfaction of the street authority, unless otherwise agreed, be maintained by and at the expense of the undertaker for a period of 12 months from its completion and at the expiry of that period by and at the expense of the street authority.

(3) In any action against the undertaker in respect of loss or damage resulting from its failure to maintain a street to which paragraph (2) applies, section 58 of the 1980 Act applies as if that street were a highway maintainable at the public expense.

(4) The undertaker shall maintain at its expense the following parts of the authorised development:

- (a) the structure of the bridge over the NDR classified road comprised in work number 4(ii);
- (b) the structure and surface of the bridge over the NDR classified road comprised in work number 6(iii); and
- (c) the structure and surface of the bridge over the NDR classified road comprised in work number 16(vii).

Classification of roads

11.—(1) The roads described in Part 1 of Schedule 5 (classification of roads) (referred to in this article as “the New A47 Trunk Road Postwick Interchange Slip Roads”) shall from the date the undertaker notifies the Secretary of State that they are completed and open for traffic –

- (a) become trunk roads as if they had become so by virtue of an order under section 10(2) of the 1980 Act specifying that date as the date on which they were to become trunk roads; and
- (b) the Secretary of State shall be the highway authority for the New A47 Trunk Road Postwick Interchange Slip Roads.

(2) On the date on which the road described in Part 2 of Schedule 5 is completed and open for traffic it shall be classified as the A1270.

(3) On the date on which the road described in Part 4 of Schedule 5 is completed and open for traffic it shall be classified as the A140.

(4) Each of the roads described in paragraphs (2) and (3) shall, from the respective dates in those paragraphs, be classified -

- (a) as a principal road for the purpose of any enactment or instrument which refers to highways classified as principal roads; and
- (b) as a classified road for the purpose of any enactment or instrument which refers to highways classified as classified roads,

as if such classification had been made under section 12(3) of the 1980 Act.

(5) On the:

- (a) day before the date on which the road described in Part 2 of Schedule 5 is completed and open for traffic, the road described in Part 3 of Schedule 5 shall be removed of its B1149 classified road status and number and shall become an unclassified road; and
- (b) date on which the road described in Part 2 of Schedule 5 is completed and open for traffic, the road described in Part 3 of Schedule 5, shall be classified as the A1270 and will be classified -
 - (i) as a principal road for the purpose of any enactment or instrument which refers to highways classified as principal roads; and
 - (ii) as a classified road for the purpose of any enactment or instrument which refers to highways classified as classified roads,

as if such classification had been made under section 12(3) of the Highways Act 1980.

(6) On the:

- (a) day before the date on which the road described in (a) of Part 5 of Schedule 5 is completed and open for traffic, the road described in (b) of Part 5 of Schedule 5 shall be removed of its C829 classified road status and number and shall become an unclassified road; and
- (b) date on which the road described in (a) of Part 5 of Schedule 5 is completed and open for traffic both it, and the road described in (b) of Part 5 of Schedule 5, shall together be classified as the A1194 and will be classified –
 - (i) as a principal road for the purpose of any enactment or instrument which refers to highways classified as principal roads; and
 - (ii) as a classified road for the purpose of any enactment or instrument which refers to highways classified as classified roads,

as if such classification had been made under section 12(3) of the Highways Act 1980.

Stopping up of streets and private access

12.—(1) Subject to the provisions of this article, the undertaker may, in connection with the carrying out of the authorised development, stop up each of the streets and private access specified in columns (2) and (3) of Parts 1, 2 and 3 of Schedule 6 (streets and private accesses to be stopped up) to the extent specified in column (4) of those Parts of that Schedule.

(2) No street or private accesses specified in columns (2) and (3) of Parts 1 and 2 of Schedule 6 (being a street or private access to be stopped up for which a substitute is to be provided) shall be wholly or partly stopped up under this article unless—

- (a) the new street or private access (as applicable) to be substituted for it, which is specified in column (5) of Parts 1 and 2 of Schedule 6, has been completed to the reasonable satisfaction of the street authority and is open for use; or
- (b) a temporary alternative route for the passage of such traffic as could have used the street or private access (as applicable) to be stopped up is first provided and subsequently maintained by the undertaker, to the reasonable satisfaction of the street authority, between the commencement and termination points for the stopping up of the street or private access (as applicable) until the completion and opening of the new street or private access (as applicable) in accordance with sub-paragraph (a).

(3) No street or private access specified in columns (2) and (3) of Part 3 of Schedule 6 (being a street or private access to be stopped up for which no substitute is to be provided) shall be wholly or partly stopped up under this article unless the condition specified in paragraph (4) is satisfied in relation to all the land which abuts on either side of the street or private access (as applicable) to be stopped up.

(4) The condition referred to in paragraph (3) is that—

- (a) the undertaker is in possession of the land; or
- (b) there is no right of access to the land from the street concerned; or
- (c) there is reasonably convenient access to the land otherwise than from the street or private access concerned; or
- (d) the owners and occupiers of the land have agreed to the stopping up.

(5) Where a street or private access has been stopped up under this article—

- (a) all rights of way over or along the street or private access (as applicable) so stopped up shall be extinguished; and
- (b) the undertaker may appropriate and use for the purposes of the authorised development so much of the site of the street or private access (as applicable) as is bounded on both sides by land owned by the undertaker.

(6) Any person who suffers loss by the suspension or extinguishment of any private right of way under this article shall be entitled to compensation to be determined, in case of dispute, under Part 1 of the 1961 Act.

(7) This article is subject to article 33 (apparatus and rights of statutory undertakers in land acquired or used).

Public rights of way

13. (1) Subject to paragraph (2) the undertaker may in connection with the carrying out of the authorised development stop up the sections of the public rights of way, which are each a section of a restricted byway, described in (a) of Parts 1, 2 and 3 of Schedule 7 (public rights of way) and with effect from the date that each of those sections of the public rights of way described in (a) of Parts 1, 2 and 3 of Schedule 7 are physically stopped up by the undertaker in connection with the carrying out of the authorised development, the public rights of way over each of those sections will be extinguished.

(2) If the undertaker stops up the public rights of way described in (a) of Parts 1, 2 and 3 of Schedule 7, it will construct alternative replacement sections of public rights of way, as described in (b) of Parts 1, 2 and 3 of Schedule 7 and with effect from the date of opening of each alternative replacement

section of public right of way to the public following the completion of the works relating thereto, public rights of way of that same type, namely of a restricted byway, over each of the alternative sections so constructed will be deemed to be created.

Temporary prohibition or restriction of use of streets

14.—(1) The undertaker, during and for the purposes of carrying out the authorised development, may temporarily stop up, alter, divert, prohibit or restrict any street and may for any reasonable time—

- (a) divert the traffic from the street; and
- (b) subject to paragraph (3), prevent all persons from passing along the street.

(2) Without prejudice on the scope of paragraph (1), the undertaker may use any street where the use has been prohibited or restricted under the powers conferred by this article and within the Order limits as a temporary working site.

(3) The undertaker shall provide reasonable access for pedestrians going to or from premises abutting a street affected by the temporary stopping up, alteration, diversion prohibition or restriction of a street under this article if there would otherwise be no such access.

(4) Without prejudice to the generality of paragraph (1), the undertaker may temporarily stop up, alter, divert prohibit or restrict the use of the streets specified in columns (1) and (2) of Schedule 8 (temporary prohibition or restriction of the use of streets) to the extent specified in column (3) of that Schedule.

(5) The undertaker shall not temporarily stop up, alter, divert, prohibit or restrict the use of—

- (a) any street specified in paragraph (4) without first consulting the street authority; and
- (b) any other street without the consent of the street authority which may attach reasonable conditions to any consent.

(6) Any person who suffers loss by the suspension of any private right of way under this article shall be entitled to compensation to be determined, in case of dispute, under Part 1 of the 1961 Act.

(7) If a street authority fails to notify the undertaker of its decision within 28 days of receiving an application for consent under paragraph (5)(b) that street authority shall be deemed to have granted consent.

Access to site during construction

15. The undertaker may, for the purposes of the construction of the authorised development—

- (a) form and lay out means of access, or improve existing means of access, in the location specified in columns (1) and (2) of Schedule 9 (construction access to and from works); and
- (b) with the approval of the relevant planning authority after consultation with the highway authority, form and lay out such other means of access or improve existing means of access, at such locations within the Order limits as the undertaker reasonably requires for the purposes of the authorised development.

Agreements with street authorities

16.—(1) A street authority and the undertaker may enter into agreements with respect to—

- (a) the construction of any new street including any structure carrying the street;
- (b) the strengthening, improvement, repair or reconstruction of any street under the powers conferred by this Order;
- (c) the maintenance of the structure of any bridge or tunnel carrying a street;

- (d) any stopping up, alteration, diversion, prohibition or restriction (in respect of all cases either temporary or permanent) of a street authorised by this Order; or
 - (e) the carrying out in the street of any of the works referred to in article 9(1) (street works).
- (2) Such an agreement may, without prejudice to the generality of paragraph (1)—
- (a) make provision for the street authority to carry out any function under this Order which relates to the street in question;
 - (b) include an agreement between the undertaker and street authority specifying a reasonable time for the completion of the works; and
 - (c) contain such terms as to payment and otherwise as the parties consider appropriate.

PART 4

SUPPLEMENTAL POWERS

Discharge of water

17.—(1) The undertaker may use any watercourse or any public sewer or drain for the drainage of water in connection with the carrying out or maintenance of the authorised development and for that purpose may lay down, take up and alter pipes and may, on any land within the Order limits, make openings into, and connections with, the watercourse, public sewer or drain.

(2) Any dispute arising from the making of connections to or the use of a public sewer or drain by the undertaker pursuant to paragraph (1) shall be determined as if it were a dispute under section 106 of the Water Industry Act 1991 (right to communicate with public sewers).

(3) The undertaker shall not discharge any water into any watercourse, public sewer or drain except with the consent of the person to whom it belongs; and such consent may be given subject to such terms and conditions as that person may reasonably impose but such consent shall not be unreasonably withheld.

(4) The undertaker shall not make any opening into any public sewer or drain except—

- (a) in accordance with plans approved by the person to whom the sewer or drain belongs; and
- (b) where that person has been given the opportunity to supervise the making of the opening.

(5) Except as authorised under this Order, the undertaker shall not, in carrying out or maintaining works, damage or interfere with the bed or banks of any watercourse forming part of a main river.

(6) The undertaker shall take such steps as are reasonably practicable to secure that any water discharged into a watercourse or public sewer or drain pursuant to this article is as free as may be practicable from gravel, soil or other solid substance, oil or matter in suspension.

(7) This article does not authorise the entry into controlled waters of any matter whose entry or discharge into controlled waters is prohibited by section 85(1), (2) or (3) of the Water Resources Act 1991 (offences of polluting water).

(8) In this article—

- (a) “public sewer or drain” means a sewer or drain which belongs to the Homes and Communities Agency, the Environment Agency, a harbour authority within the meaning of section 57 of the Harbours Act 1964 (interpretation), an internal drainage board, a joint planning board, a local authority, a National Park Authority, a sewerage undertaker or an urban development corporation; and
- (b) other expressions, excluding watercourse, used both in this article and in the Water Resources Act 1991 have the same meaning as in that Act.

Protective work to buildings

18.—(1) Subject to the following provisions of this article, the undertaker may at its own expense carry out such protective works to any building lying within the Order limits as the undertaker considers necessary or expedient.

(2) Protective works may be carried out—

- (a) at any time before or during the carrying out in the vicinity of the building of any part of the authorised development; or
- (b) after the completion of that part of the authorised development in the vicinity of the building at any time up to the end of the period of 5 years beginning with the day on which that part of the authorised development is first opened for use.

(3) For the purpose of determining how the functions under this article are to be exercised the undertaker may enter and survey any building falling within paragraph (1) and any land within its curtilage.

(4) For the purpose of carrying out protective works under this article to a building the undertaker may (subject to paragraphs (5) and (6))—

- (a) enter the building and any land within its curtilage; and
- (b) where the works cannot be carried out reasonably conveniently without entering land which is adjacent to the building but outside its curtilage, enter the adjacent land (but not any building erected on it).

(5) Before exercising—

- (a) a right under paragraph (1) to carry out protective works to a building;
- (b) a right under paragraph (3) to enter a building and land within its curtilage;
- (c) a right under paragraph (4)(a) to enter a building and land within its curtilage; or
- (d) a right under paragraph (4)(b) to enter land,

the undertaker shall, except in the case of emergency, serve on the owners and occupiers of the building or land not less than 14 days' notice of its intention to exercise that right and, in a case falling within sub-paragraph (a) or (c), specifying the protective works proposed to be carried out.

(6) Where a notice is served under paragraph (5)(a), (c) or (d), the owner or occupier of the building or land concerned may, by serving a counter-notice within the period of 10 days beginning with the day on which the notice was served, require the question whether it is necessary or expedient to carry out the protective works or to enter the building or land to be referred to arbitration under article 47 (arbitration).

(7) The undertaker shall compensate the owners and occupiers of any building or land in relation to which rights under this article have been exercised for any loss or damage arising to them by reason of the exercise of those rights.

(8) Where—

- (a) protective works are carried out under this article to a building; and
- (b) within the period of 5 years beginning with the day on which the part of the authorised development carried out in the vicinity of the building is first opened for use it appears that the protective works are inadequate to protect the building against damage caused by the carrying out or use of that part of the authorised development,

the undertaker shall compensate the owners and occupiers of the building for any loss or damage sustained by them.

(9) Nothing in this article shall relieve the undertaker from any liability to pay compensation under section 10(2) of the 1965 Act (compensation for injurious affection).

(10) Any compensation payable under paragraph (7) or (8) shall be determined, in case of dispute, under Part 1 of the 1961 Act (determination of questions of disputed compensation).

(11) In this article “protective works” in relation to a building means—

- (a) underpinning, strengthening and any other works the purpose of which is to prevent damage which may be caused to the building by the carrying out, maintenance or use of the authorised development; and
- (b) any works the purpose of which is to remedy any damage which has been caused to the building by the carrying out, maintenance or use of the authorised development.

Authority to survey and investigate the land

19.—(1) The undertaker may for the purposes of this Order enter on any land shown within the Order limits or which may be affected by the authorised development and—

- (a) survey or investigate the land;
- (b) without prejudice to the generality of sub-paragraph (a), make trial holes in such positions on the land as the undertaker thinks fit to investigate the nature of the surface layer and subsoil and remove soil samples;
- (c) without prejudice to the generality of sub-paragraph (a), carry out ecological or archaeological investigations on such land; and
- (d) place on, leave on and remove from the land apparatus for use in connection with the survey and investigation of land and making of trial holes.

(2) No land may be entered or equipment placed or left on or removed from the land under paragraph (1) unless at least 14 days' notice has been served on every owner and occupier of the land.

(3) Any person entering land under this article on behalf of the undertaker—

- (a) shall, if so required entering the land, produce written evidence of their authority to do so; and
- (b) may take with them such vehicles and equipment as are necessary to carry out the survey or investigation or to make the trial holes.

(4) No trial holes shall be made under this article—

- (a) in land located within the highway boundary without the consent of the highway authority; or
- (b) in a private street without the consent of the street authority.

(5) The undertaker shall compensate the owners and occupiers of the land for any loss or damage arising by reason of the exercise of the authority conferred by this article, such compensation to be determined, in case of dispute, under Part 1 (determination of questions of disputed compensation) of the 1961 Act.

PART 5

POWERS OF ACQUISITION

Compulsory acquisition of land

20.—(1) The undertaker may acquire compulsorily so much of the Order land as is required for the authorised development or to facilitate it, or is incidental to it, or is required as replacement land for the special category land referred to in article 32 (special category land) and may use any land so acquired for the purposes authorised by this Order or for any other purposes in connection with or ancillary to the authorised development.

(2) As from the date on which a compulsory acquisition notice under section 134(3) of the 2008 Act is served or the date on which the Order land, or any part of it, is vested in the undertaker, whichever is the later, that land or that part of it which is vested (as the case may be) shall be discharged from all rights, trusts and incidents to which it was previously subject.

(3) Any person who suffers loss by the extinguishment or suspension of any private right of way under this article shall be entitled to compensation to be determined, in case of dispute, under Part 1 of the 1961 Act.

(4) This article is subject to article 24 (compulsory acquisition of rights) and article 30 (temporary use of land for carrying out the authorised development).

Compulsory acquisition of land – incorporation of the mineral code

21. Part(s) 2 and 3 of Schedule 2 to the Acquisition of Land Act 1981 (minerals) are incorporated in this Order subject to the modifications that—

- (a) paragraph 8(3) is not incorporated; and
- (b) for “the acquiring authority” substitute “the undertaker”.

Power to override easements and other rights

22.—(1) Any authorised activity which takes place on land within the Order limits (whether the activity is undertaken by the undertaker or by any of its servants or agents) is authorised by this Order for the purposes of this article if it is authorised by this Order apart from this article and is done in accordance with the terms of this Order, notwithstanding that it involves—

- (a) an interference with an interest or right to which this article applies; or
- (b) a breach of a restriction as to the user of land arising by virtue of a contract.

(2) In this article “authorised activity” means—

- (a) the erection, construction or carrying out, or maintenance of any building or work on land;
- (b) the erection, construction, or maintenance of anything in, on, over or under land; or
- (c) the use of any land.

(3) The interests and rights to which this article applies are any easement, liberty, privilege, right or advantage annexed to land and adversely affecting other land, including any natural right to support and include restrictions as to the user of land arising by the virtue of a contract having that effect.

(4) Where any interest or right to which this article applies is interfered with or any restriction breached by any authorised activity in accordance with the terms of this article the interest or right is extinguished, abrogated, suspended, overridden or discharged at the time that the interference or breach in respect of the authorised activity in question commences.

(5) In respect of any interference, breach, extinguishment, abrogation or discharge in pursuance of this article, compensation—

- (a) is payable under section 7 or 10 of the 1965 Act; and
- (b) is to be assessed in the same manner and subject to the same rules as in the case of other compensation under those sections where—
 - (i) the compensation is to be estimated in connection with a purchase under that Act; or
 - (ii) the injury arises from the execution of works on or use of land acquired under that Act.

(6) Nothing in this article is to be construed as authorising any act or omission on the part of any person which is actionable at the suit of any person on any grounds other than such an interference or breach as is mentioned in paragraph (1).

Time limit for exercise of authority to acquire land compulsorily

23.—(1) After the end of the period of 5 years beginning on the day on which this Order is made—

- (a) no notice to treat shall be served under Part 1 of the 1965 Act; and

- (b) no declaration shall be executed under section 4 of the Compulsory Purchase (Vesting Declarations) Act 1981 as applied by article 26 (application of the Compulsory Purchase (Vesting Declarations) Act 1981).

(2) The authority conferred by article 30 (temporary use of land for carrying out the authorised development) shall cease at the end of the period referred to in paragraph (1), save that nothing in this paragraph shall prevent the undertaker remaining in possession of land after the end of that period, if the land was entered and possession was taken before the end of that period.

Compulsory acquisition of rights

24.—(1) Subject to paragraph (2), the undertaker may acquire compulsorily such rights over the Order land as may be required for any purpose for which that land may be acquired under article 20 (compulsory acquisition of land) by creating them as well as by acquiring rights already in existence.

(2) In the case of the Order land specified in column (1) of Schedule 10 (land in which only new rights etc. may be acquired) the undertaker's powers of compulsory acquisition are limited to the acquisition of such wayleaves, easements or new rights in the land, as may be required for the purpose specified in relation to that land in column (3) of that Schedule.

(3) As from the date on which a compulsory acquisition notice is served or the date on which any new right is vested in the undertaker, whichever is the later, the land over which any new right is acquired shall be discharged from all rights, trusts and incidents to which it was previously subject so far as their continuance would be inconsistent with the exercise of that new right.

(4) Subject to section 8 of the 1965 Act, as substituted by paragraph 5 of Schedule 11 (modification of compensation and compulsory purchase enactments for creation of new rights), where the undertaker acquires a right over land under paragraph (1) or paragraph (2), the undertaker shall not be required to acquire a greater interest in that land.

(5) Schedule 11 shall have effect for the purpose of modifying the enactments relating to compensation and the provisions of the 1965 Act in their application in relation to the compulsory acquisition under this article of a right over land by the creation of a new right.

(6) In any case where the acquisition of new rights under paragraph (1) is required for the purposes of diverting, replacing or protecting the apparatus of a statutory undertaker, the undertaker may, with the consent of the Secretary of State, transfer the power to acquire such rights to the statutory undertaker in question.

(7) The exercise by a statutory undertaker of any power in accordance with a transfer under paragraph (6) shall be subject to the same restrictions, liabilities and obligations as would apply under this Order if that power were exercised by the undertaker.

Private rights

25.—(1) Subject to the provisions of this article, all private rights over land subject to compulsory acquisition under this Order shall be extinguished—

- (a) as from the date of acquisition of the land by the undertaker, whether compulsorily or by agreement; or
- (b) on the date of entry on the land by the undertaker under section 11(1) of the 1965 Act (power of entry),

whichever is the earliest.

(2) Subject to the provisions of this article, all private rights over land subject to the compulsory acquisition of rights under this Order shall be extinguished in so far as their continuance would be inconsistent with the exercise of the right—

- (a) as from the date of acquisition of the right by the undertaker, whether compulsorily or by agreement; or

- (b) on the date of entry on the land by the undertaker under section 11(1) of the 1965 Act (power of entry) in pursuance of the right,

whichever is the earliest.

(3) Subject to the provisions of this article, all private rights over land owned by the undertaker shall be extinguished on commencement of any activity authorised by this Order which interferes with or breaches such rights.

(4) Subject to the provisions of this article, all private right over land of which the undertaker takes temporary possession under this Order shall be suspended and unenforceable for as long as the undertaker remains in lawful possession of the land.

(5) Any person who suffers loss by the extinguishment or suspension of any private right of way under this article shall be entitled to compensation to be determined, in case of dispute, under Part 1 of the 1961 Act.

(6) This article does not apply in relation to any right to which section 138 of the 2008 Act (extinguishment of rights, and removal of apparatus, of statutory undertakers etc.) or article 33 (statutory undertakers) applies.

(7) Paragraphs (1) to (3) shall have effect subject to—

- (a) any notice given by the undertaker before—

- (i) the completion of the acquisition of the land or the acquisition of rights over land,
- (ii) the undertaker's appropriation of it,
- (iii) the undertaker's entry onto it, or
- (iv) the undertaker's taking temporary possession of it,

that any or all of those paragraphs shall not apply to any right of way specified in the notice; and

- (b) any agreement made at any time between the undertaker and the person in or to whom the right of way in question is vested or belongs.

(8) If any such agreement as is referred to in paragraph (7)(b)—

- (a) is made with a person in or to whom the right of way is vested or belongs; and
- (b) is expressed to have effect also for the benefit of those deriving title from or under that person,

it shall be effective in respect of the persons so deriving title, whether the title was derived before or after the making of the agreement.

(9) Reference in this article to private rights over land includes reference to any trusts or incidents to which the land is subject.

Application of the Compulsory Purchase (Vesting Declarations) Act 1981

26.—(1) The Compulsory Purchase (Vesting Declarations) Act 1981 shall apply as if this Order were a compulsory purchase order.

(2) The Compulsory Purchase (Vesting Declarations) Act 1981, as so applied, shall have effect with the following modifications.

(3) In section 3 (preliminary notices), for subsection (1) there shall be substituted—

“(1) Before making a declaration under section 4 with respect to any land which is subject to a compulsory purchase order, the acquiring authority shall include the particulars specified in subsection (3) in a notice which is—

- (a) given to every person with a relevant interest in the land with respect to which the declaration is to be made (other than a mortgagee who is not in possession); and

(b) published in a local newspaper circulating in the area in which the land is situated.”.

(4) In that section, in subsection (2), for ““(1)(b)”” there shall be substituted ““(1)”” and after ““given”” there shall be inserted ““and published””.

(5) In that section, for subsections (5) and (6) there shall be substituted—

“(5) For the purposes of this section, a person has a relevant interest in land if—

(a) that person is for the time being entitled to dispose of the fee simple of the land, whether in possession or in reversion; or

(b) that person holds, or is entitled to the rents and profits of, the land under a lease or agreement, the unexpired term of which exceeds one month.”.

(6) In section 5 (earliest date for execution of declaration)—

(a) in subsection (1), after ““publication”” there shall be inserted ““in a local newspaper circulating in the area in which the land is situated””; and

(b) subsection (2) shall be omitted.

(7) In section 7 (constructive notice to treat), in subsection (1)(a), the words ““(as modified by section 4 of the Acquisition of Land Act 1981)”” shall be omitted.

(8) References to the 1965 Act in the Compulsory Purchase (Vesting Declarations) Act 1981 shall be construed as references to that Act as applied by section 125 of the 2008 Act to the compulsory acquisition of land under this Order.

Acquisition of subsoil only

27.—(1) The undertaker may acquire compulsorily so much of, or such rights in, the subsoil of the land referred to in paragraph (1) of article 20 (compulsory acquisition of land) as may be required for any purpose for which that land may be acquired under that provision instead of acquiring the whole of the land.

(2) Where the undertaker acquires any part of, or rights in, the subsoil of land under paragraph (1), the undertaker shall not be required to acquire an interest in any other part of the land.

(3) Paragraph (2) shall not prevent article 28 (acquisition of part of certain properties) from applying where the undertaker acquires a cellar, vault, arch or other construction forming part of a house, building or manufactory.

Acquisition of part of certain properties

28.—(1) This article shall apply instead of section 8(1) of the 1965 Act (other provisions as to divided land) (as applied by section 125 of the 2008 Act) where—

(a) a notice to treat is served on a person (“the owner”) under the 1965 Act (as so applied) in respect of land forming only part of a house, building or manufactory or of land consisting of a house with a park or garden (“the land subject to the notice to treat”); and

(b) a copy of this article is served on the owner with the notice to treat.

(2) In such a case, the owner may, within the period of 21 days beginning with the day on which the notice was served, serve on the undertaker a counter-notice objecting to the sale of the land subject to the notice to treat which states that the owner is willing and able to sell the whole (“the land subject to the counter-notice”).

(3) If no such counter-notice is served within that period, the owner shall be required to sell the land subject to the notice to treat.

(4) If such a counter-notice is served within that period, the question whether the owner shall be required to sell only the land subject to the notice to treat shall, unless the undertaker agrees to take the land subject to the counter-notice, be referred to the tribunal.

(5) If on such a reference the tribunal determines that the land subject to the notice to treat can be taken—

- (a) without material detriment to the remainder of the land subject to the counter-notice; or
- (b) where the land subject to the notice to treat consists of a house with a park or garden, without material detriment to the remainder of the land subject to the counter-notice and without seriously affecting the amenity and convenience of the house,

the owner shall be required to sell the land subject to the notice to treat.

(6) If on such a reference the tribunal determines that only part of the land subject to the notice to treat can be taken—

- (a) without material detriment to the remainder of the land subject to the counter-notice; or
- (b) where the land subject to the notice to treat consists of a house with a park or garden, without material detriment to the remainder of the land subject to the counter-notice and without seriously affecting the amenity and convenience of the house,

the notice to treat shall be deemed to be a notice to treat for that part.

(7) If on such a reference the tribunal determines that—

- (a) the land subject to the notice to treat cannot be taken without material detriment to the remainder of the land subject to the counter-notice; but
- (b) the material detriment is confined to a part of the land subject to the counter-notice,

the notice to treat shall be deemed to be a notice to treat for the land to which the material detriment is confined in addition to the land already subject to the notice, whether or not the additional land is land which the undertaker is authorised to acquire compulsorily under this Order.

(8) If the undertaker agrees to take the land subject to the counter-notice, or if the tribunal determines that—

- (a) none of the land subject to the notice to treat can be taken without material detriment to the remainder of the land subject to the counter-notice or, as the case may be, without material detriment to the remainder of the land subject to the counter-notice and without seriously affecting the amenity and convenience of the house; and
- (b) the material detriment is not confined to a part of the land subject to the counter-notice,

the notice to treat shall be deemed to be a notice to treat for the land subject to the counter-notice whether or not the whole of that land is land which the undertaker is authorised to acquire compulsorily under this Order.

(9) Where, by reason of a determination by the tribunal under this article, a notice to treat is deemed to be a notice to treat for less land or more land than that specified in the notice, the undertaker may, within the period of 6 weeks beginning with the day on which the determination is made, withdraw the notice to treat; and, in that event, shall pay the owner compensation for any loss or expense occasioned to the owner by the giving and withdrawal of the notice, to be determined in case of dispute by the tribunal.

(10) Where the owner is required under this article to sell only part of a house, building or manufactory or of land consisting of a house with a park or garden, the undertaker shall pay the owner compensation for any loss sustained by the owner due to the severance of that part in addition to the value of the interest acquired.

Rights under or over streets

29.—(1) The undertaker may enter upon and appropriate so much of the subsoil of, or air-space over, any street within the Order limits as may be required for the purposes of the authorised development and may use the subsoil or air-space for those purposes or any other purpose ancillary to the authorised development.

(2) Subject to paragraph (3), the undertaker may exercise any power conferred by paragraph (1) in relation to a street without being required to acquire any part of the street or any easement or right in the street.

(3) Paragraph (2) shall not apply in relation to—

- (a) any subway or underground building; or
- (b) any cellar, vault, arch or other construction in, on or under a street which forms part of a building fronting onto the street.

(4) Subject to paragraph (5), any person who is an owner or occupier of land in respect of which the power of appropriation conferred by paragraph (1) is exercised without the undertaker acquiring any part of that person's interest in the land, and who suffers loss by the exercise of that power, shall be entitled to compensation to be determined, in case of dispute, under Part 1 of the 1961 Act.

(5) Compensation shall not be payable under paragraph (4) to any person who is an undertaker to whom section 85 of the 1991 Act (sharing cost of necessary measures) applies in respect of measures of which the allowable costs are to be borne in accordance with that section.

Temporary use of land for carrying out the authorised development

30.—(1) The undertaker may, in connection with the carrying out of the authorised development—

- (a) enter on and take temporary possession of the land specified in columns (1) and (2) of Schedule 12 (land of which temporary possession may be taken) for the purpose specified in relation to that land in column (4) of that Schedule relating to the part of the authorised development specified in column (5) of that Schedule;
- (b) remove any buildings and vegetation from that land; and
- (c) construct temporary works (including the provision of means of access) and buildings on that land.

(2) Not less than 14 days before entering on and taking temporary possession of land under this article the undertaker shall serve notice of the intended entry on the owners and occupiers of the land.

(3) The undertaker may not, without the agreement of the owners of the land, remain in possession of any land under this article in the case of land specified in paragraph (1)(a)(i), after the end of the period of one year beginning with the date of completion of the part of the authorised development specified in relation to that land in column (4) of Schedule 12.

(4) Before giving up possession of land of which temporary possession has been taken under this article, the undertaker shall remove all temporary works and restore the land to the reasonable satisfaction of the owners of the land; but the undertaker shall not be required to replace a building removed under this article.

(5) The undertaker shall pay compensation to the owners and occupiers of land of which temporary possession is taken under this article for any loss or damage arising from the exercise in relation to the land of the provisions of any power conferred by this article.

(6) Any dispute as to a person's entitlement to compensation under paragraph (5), or as to the amount of the compensation, shall be determined under Part 1 of the 1961 Act.

(7) Nothing in this article shall affect any liability to pay compensation under section 10(2) of the 1965 Act (further provisions as to compensation for injurious affection) or under any other enactment in respect of loss or damage arising from the carrying out of the authorised development, other than loss or damage for which compensation is payable under paragraph (5).

(8) The undertaker may not compulsorily acquire under this Order the land referred to in paragraph (1) except that the undertaker shall not be precluded from—

- (a) acquiring new rights over any part of that land under article 24 (compulsory acquisition of rights); or

- (b) acquiring any part of the subsoil (or rights in the subsoil) of that land under article 27 (acquisition of subsoil only).

(9) Where the undertaker takes possession of land under this article, the undertaker shall not be required to acquire the land or any interest in it.

(10) Section 13 of the 1965 Act (refusal to give possession to acquiring authority) shall apply to the temporary use of land pursuant to this article to the same extent as it applies to the compulsory acquisition of land under this Order by virtue of section 125 of the 2008 Act (application of compulsory acquisition provisions).

(11) Nothing in this article shall prevent the taking of temporary possession more than once in relation to any land specified in Schedule 12.

Temporary use of land for maintaining authorised development

31.—(1) Subject to paragraph (2), at any time during the maintenance period relating to any part of the authorised development, the undertaker may—

- (a) enter on and take temporary possession of any land within the Order limits if such possession is reasonably required for the purpose of maintaining the authorised development; and
- (b) construct such temporary works (including the provision of means of access) and buildings on the land as may be reasonably necessary for that purpose.

(2) Paragraph (1) shall not authorise the undertaker to take temporary possession of—

- (a) any house or garden belonging to a house; or
- (b) any building (other than a house) if it is for the time being occupied.

(3) Not less than 28 days before entering on and taking temporary possession of land under this article the undertaker shall serve notice of the intended entry on the owners and occupiers of the land.

(4) The undertaker may only remain in possession of land under this article for so long as may be reasonably necessary to carry out the maintenance of the part of the authorised development for which possession of the land was taken.

(5) Before giving up possession of land of which temporary possession has been taken under this article, the undertaker shall remove all temporary works and restore the land to the reasonable satisfaction of the owners of the land.

(6) The undertaker shall pay compensation to the owners and occupiers of land of which temporary possession is taken under this article for any loss or damage arising from the exercise in relation to the land of the provisions of this article.

(7) Any dispute as to a person's entitlement to compensation under paragraph (6), or as to the amount of the compensation, shall be determined under Part 1 of the 1961 Act.

(8) Nothing in this article shall affect any liability to pay compensation under section 10(2) of the 1965 Act (further provisions as to compensation for injurious affection) or under any other enactment in respect of loss or damage arising from the maintenance of the authorised development, other than loss or damage for which compensation is payable under paragraph (6).

(9) Where the undertaker takes possession of land under this article, the undertaker shall not be required to acquire the land or any interest in it.

(10) Section 13 of the 1965 Act (refusal to give possession to acquiring authority) shall apply to the temporary use of land pursuant to this article to the same extent as it applies to the compulsory acquisition of land under this Order by virtue of section 125 of the 2008 Act (application of compulsory acquisition provisions).

(11) In this article “the maintenance period”, in relation to any part of the authorised development, means the period of 5 years beginning with the date on which that part of the authorised development is first opened for use.

Special Category Land

32.—(1) On the giving of notice by the undertaker to the relevant planning authority pursuant to this paragraph and subject to the undertaker having first complied with paragraph (1) of requirement 24 (Alternative Route for Marriott's Way), the Marriott's Way open space land shall vest in the undertaker and shall be discharged from all rights, trusts and incidents to which it was previously subject.

(2) Prior to the opening of the NDR classified road for public use the undertaker must obtain certification from the relevant planning authority that a scheme for the provision of the Marriott's Way replacement open space land as open space has been implemented to its satisfaction, and on the provision of such certificate the Marriott's Way replacement open space land shall vest in the persons in whom the Marriott's Way open space land was vested immediately before it was vested in the undertaker and shall be subject to the same rights, trusts and incidents as attached to the Marriott's Way open space land.

(3) The fuel allotment land shall not vest in the undertaker until the undertaker has acquired the fuel allotment first replacement land and the relevant planning authority has certified that a scheme for the provision of the fuel allotment first replacement land as fuel allotment land has been implemented to its satisfaction.

(4) On the requirement of paragraph (3) being satisfied, the fuel allotment first replacement land shall vest in the persons in whom the fuel allotment land was vested immediately before it was vested in the undertaker and shall be subject to the same rights, trusts and incidents as attached to the fuel allotment land, and the fuel allotment land shall be discharged from all rights, trusts and incidents to which it was previously subject.

(5) On the giving of notice by the undertaker to the relevant planning authority pursuant to this paragraph, such notice to be given no later than the date that is three months after the date of the opening of the NDR classified road for public use, the fuel allotment second replacement land shall vest in the persons in whom the fuel allotment land was vested immediately before it was vested in the undertaker and shall be subject to the same rights, trusts and incidents as attached to the fuel allotment land.

Statutory undertakers

33.—Subject to the provisions of Schedule 13 (Protective provisions), the undertaker may—

- (a) acquire compulsorily the land belonging to statutory undertakers shown on the land plan(s) within the limits of the land to be acquired and described in the book of reference;
- (b) extinguish the rights of, remove or reposition the apparatus belonging to statutory undertakers shown on the land plan and described in the book of reference; and
- (c) acquire compulsorily the new rights over land belonging to statutory undertakers shown on the land plan and described in the book of reference.

Apparatus and rights of statutory undertakers in land acquired or used

34.—(1) Where a street is stopped up under article 12 (stopping up of streets and private accesses) any statutory utility whose apparatus is under, in, on, along or across the street shall have the same powers and rights in respect of that apparatus, subject to the provisions of this article, as if this Order had not been made.

(2) Where a street is stopped up under article 12 (stopping up of streets and private accesses) any statutory utility whose apparatus is under, in, on, over, along or across the street may, and if reasonably requested to do so by the undertaker shall—

- (a) remove the apparatus and place it or other apparatus provided in substitution for it in such other position as the utility may reasonably determine and have power to place it; or

- (b) provide other apparatus in substitution for the existing apparatus and place it in such position as described in sub-paragraph (a).

(3) Subject to the following provisions of this article, the undertaker shall pay to any statutory utility an amount equal to the cost reasonably incurred by the utility in or in connection with—

- (a) the execution of the relocation works required in consequence of the stopping up of the street; and
- (b) the doing of any other work or thing rendered necessary by the execution of the relocation works.

(4) If in the course of the execution of relocation works under paragraph (2)—

- (a) apparatus of a better type, of greater capacity or of greater dimensions is placed in substitution for existing apparatus; or
- (b) apparatus (whether existing apparatus or apparatus substituted for existing apparatus) is placed at a depth greater than the depth at which the existing apparatus was;

and the placing of apparatus of that type or capacity or of those dimensions or the placing of apparatus at that depth, as the case may be, is not agreed by the undertaker, or, in default of agreement, is not determined by arbitration to be necessary, then, if it involves cost in the execution of the relocation work exceeding that which would have been involved if the apparatus placed had been of the existing type, capacity or dimensions, or at the existing depth, as the case may be, the amount which, apart from this paragraph, would be payable to the statutory utility by virtue of paragraph (3) shall be reduced by the amount of that excess.

(5) For the purposes of paragraph (4) -

- (a) an extension of apparatus to a length greater than the length of existing apparatus shall not be treated as a placing of apparatus of greater dimensions than those of the existing apparatus; and
- (b) where the provision of a joint in a cable is agreed, or is determined to be necessary, the consequential provision of a jointing chamber or of a manhole shall be treated as if it also had been agreed or had been so determined.

(6) An amount which, apart from this paragraph, would be payable to a statutory utility in respect of works by virtue of paragraph (3) (and having regard, where relevant, to paragraph (4)) shall, if the works include the placing of apparatus provided in substitution for apparatus placed more than 7 years and 6 months earlier so as to confer on the utility any financial benefit by deferment of the time for renewal of the apparatus in the ordinary course, be reduced by the amount which represents that benefit.

(7) Paragraphs (3) to (6) shall not apply where the authorised development constitutes major highway works, major bridge works or major transport works for the purposes of Part 3 of the 1991 Act, but instead—

- (a) the allowable costs of the relocation works shall be determined in accordance with section 85 of that Act (sharing of cost of necessary measures) and any regulations for the time being having effect under that section; and
- (b) the allowable costs shall be borne by the undertaker and the statutory utility in such proportions as may be prescribed by any such regulations.

(8) In this article –

“apparatus” has the same meaning as in Part 3 of the 1991 Act;

“relocation works” means work executed, or apparatus provided, under paragraph (2); and

“statutory utility” means a statutory undertaker for the purposes of the 1980 Act or a public communications provider as defined in section 151(1) of the Communications Act 2003.

Recovery of costs of new connections

35.—(1) Where any apparatus of a public utility undertaker or of a public communications provider is removed under article 33 (statutory undertakers) any person who is the owner or occupier of premises to which a supply was given from that apparatus shall be entitled to recover from the undertaker compensation in respect of expenditure reasonably incurred by that person, in consequence of the removal, for the purpose of effecting a connection between the premises and any other apparatus from which a supply is given.

(2) Paragraph (1) shall not apply in the case of the removal of a public sewer but where such a sewer is removed under article 33 (statutory undertakers) any person who is—

- (a) the owner or occupier of premises the drains of which communicated with the sewer; or
- (b) the owner of a private sewer which communicated with that sewer,

shall be entitled to recover from the undertaker compensation in respect of expenditure reasonably incurred by that person, in consequence of the removal, for the purpose of making the drain or sewer belonging to that person communicate with any other public sewer or with a private sewerage disposal plant.

(3) This article shall not have effect in relation to apparatus to which article 34 (apparatus and rights of statutory undertakers in land acquired or used) or part 3 of the 1991 Act applies.

(4) In this paragraph –

“public communications provider” has the same meaning as in section 151(1) of the Communications Act 2003; and

“public utility undertaker” has the same meaning as in the 1980 Act.

PART 6 OPERATIONS

Felling or lopping of trees

36.—(1) The undertaker may fell or lop any tree or shrub near within or overhanging any part of the authorised development, or cut back its roots, and may enter onto any land to carry out such felling or lopping, if it reasonably believes it to be necessary to do so to prevent the tree or shrub—

- (a) from obstructing or interfering with the construction, maintenance or operation of the authorised development or any apparatus used in connection with the authorised development; or
- (b) from constituting a danger to other persons using the development.

(2) In carrying out any activity authorised by paragraph (1), the undertaker shall do no unnecessary damage to any tree or shrub and shall pay compensation to any person for any loss or damage arising from such activity.

(3) Any dispute as to a person's entitlement to compensation under paragraph (2), or as to the amount of compensation, shall be determined under Part 1 of the 1961 Act.

Trees subject to tree preservation order

37.—(1) The undertaker may fell or lop any tree described in Schedule 16 (trees subject to tree preservation orders) and identified on the environmental context plans, cut back its roots or undertake such other works described in column (3) of that Schedule if it reasonably believes it to be necessary in order to do so to prevent the tree or shrub—

(a) from obstructing or interfering with the construction, maintenance or operation of the authorised development or any apparatus used in connection with the authorised development; or

(b) from constituting a danger to persons using the authorised development.

(2) In carrying out any activity authorised by paragraph (1)—

(a) the undertaker must not cause unnecessary damage to any tree or shrub and must pay compensation to any person for any loss or damage arising from such activity; and

(b) the duty imposed by section 206(1) of the 1990 Act (replacement of trees) does not apply.

(3) The authority given by paragraph (1) constitutes a deemed consent under the relevant tree preservation order.

(4) Any dispute as to a person's entitlement to compensation under paragraph (2), or as to the amount of compensation, is to be determined under Part 1 of the 1961 Act.

PART 7

MISCELLANEOUS AND GENERAL

Application of landlord and tenant law

38.—(1) This article applies to—

(a) any agreement for leasing to any person the whole or any part of the authorised development or the right to operate the same; and

(b) any agreement entered into by the undertaker with any person for the construction, maintenance, use or operation of the authorised development, or any part of it,

so far as any such agreement relates to the terms on which any land which is the subject of a lease granted by or under that agreement is to be provided for that person's use.

(2) No enactment or rule of law regulating the rights and obligations of landlords and tenants shall prejudice the operation of any agreement to which this article applies.

(3) Accordingly, no such enactment or rule of law shall apply in relation to the rights and obligations of the parties to any lease granted by or under any such agreement so as to—

(a) exclude or in any respect modify any of the rights and obligations of those parties under the terms of the lease, whether with respect to the termination of the tenancy or any other matter;

(b) confer or impose on any such party any right or obligation arising out of or connected with anything done or omitted on or in relation to land which is the subject of the lease, in addition to any such right or obligation provided for by the terms of the lease; or

(c) restrict the enforcement (whether by action for damages or otherwise) by any party to the lease of any obligation of any other party under the lease.

Operational land for purposes of the 1990 Act

39. Development consent granted by this Order shall be treated as specific planning permission for the purposes of section 264(3)(a) of the 1990 Act (cases in which land is to be treated as operational land for the purposes of that Act).

Defence to proceedings in respect of statutory nuisance

40.—(1) Where proceedings are brought under section 82(1) of the Environmental Protection Act 1990 (summary proceedings by persons aggrieved by statutory nuisances) in relation to a nuisance falling within paragraph (g) of section 79(1) of that Act (noise emitted from premises so as to be prejudicial to health or a nuisance) no order shall be made, and no fine may be imposed, under section 82(2) of that Act if—

- (a) the defendant shows that the nuisance—
 - (i) relates to premises used by the undertaker for the purposes of or in connection with the construction or maintenance of the authorised development and that the nuisance is attributable to the carrying out of the authorised development in accordance with a notice served under section 60 (control of noise on construction sites), or a consent given under section 61 (prior consent for work on construction sites) or 65 (noise exceeding registered level), of the Control of Pollution Act 1974; or
 - (ii) is a consequence of the construction or maintenance of the authorised development and that it cannot reasonably be avoided; or
- (b) the defendant shows that the nuisance is a consequence of the use of the authorised development and that it cannot reasonably be avoided.

(2) Section 61(9) (consent for work on construction site to include statement that it does not of itself constitute a defence to proceedings under section 82 of the Environmental Protection Act 1990) of the Control of Pollution Act 1974 and section 65(8) of that Act (corresponding provision in relation to consent for registered noise level to be exceeded), shall not apply where the consent relates to the use of premises by the undertaker for the purposes of or in connection with the construction or maintenance of the authorised development.

Protective Provisions

41. Schedule 13 (protective provisions) has effect.

Certification of plans etc

42.—(1) The undertaker shall, as soon as practicable after the making of this Order, submit to the Secretary of State copies of—

- (a) the book of reference;
- (b) the land plan(s);
- (c) the works plan(s);
- (d) the landscaping plans;
- (e) the street plans;
- (f) the general arrangement drawings;
- (g) the sections;
- (h) the highway classification plan;
- (i) the environmental statement; and
- (j) any other plans or documents referred to in this Order.

for certification that they are true copies of the documents referred to in this Order.

(2) A plan or document so certified shall be admissible in any proceedings as evidence of the contents of the document of which it is a copy.

Service of notices

43.—(1) A notice or other document required or authorised to be served for the purposes of this Order may be served—

- (a) by post;
- (b) by delivering it to the person on whom it is to be served or to whom it is to be given or supplied; or
- (c) with the consent of the recipient and subject to paragraphs (6) to (8), by electronic transmission.

(2) Where the person on whom a notice or other document to be served for the purposes of this Order is a body corporate, the notice or document is duly served if it is served on the secretary or clerk of that body.

(3) For the purposes of section 7 of the Interpretation Act 1978 as it applies for the purposes of this article, the proper address of any person in relation to the service on that person of a notice or document under paragraph (1) is, if that person has given an address for service, that address and otherwise—

- (a) in the case of the secretary or clerk of that body corporate, the registered or principal office of that body, and,
- (b) in any other case, the last known address of that person at that time of service.

(4) Where for the purposes of this Order a notice or other document is required or authorised to be served on a person as having an interest in, or as the occupier of, land and the name or address of that person cannot be ascertained after reasonable enquiry, the notice may be served by—

- (a) addressing it to that person by the description of "owner", or as the case maybe "occupier" of the land (describing it) and
- (b) either leaving it in the hands of the person who is or appears to be resident or employed on the land or leaving it conspicuously affixed to some building or object on or near the land

(5) Where a notice or other document required to be served or sent for the purposes of this Order is served or sent by electronic transmission the requirement shall be taken to be fulfilled only where—

- (a) the recipient of the notice or other document to be transmitted has given consent to the use of electronic transmission in writing or by electronic transmission;
- (b) the notice or document is capable of being accessed by the recipient;
- (c) the notice or document is legible in all material respects; and
- (d) in a form sufficiently permanent to be used for subsequent reference.

(6) Where the recipient of a notice or other document served or sent by electronic transmission notifies the sender within seven days of receipt that the recipient requires a paper copy of all or any part of that notice or other document the sender must provide such a copy as soon as reasonably practicable.

(7) Any consent to the use of an electronic transmission by a person may be revoked by that person in accordance with paragraph (8).

(8) Where a person is no longer willing to accept the use of electronic transmission for any other purposes of this Order—

- (a) that person must give notice in writing or by electronic transmission revoking any consent given by that person for that purpose; and
- (b) such revocation is final and takes effect on a date specified by the person in the notice but that date must not be less than 7 days after the date on which the notice is given.

(9) This article does not exclude the employment of any method of service not expressly provided for by it.

(10) In this article "electronic transmission" means a communication transmitted—

- (a) by means of electronic communications network; or
- (b) by other means but while in electronic form.

Traffic Regulation

44.—(1) Subject to the provisions of this article, and the consent of the traffic authority in whose area the road concerned is situated, the undertaker may, for the purposes of the authorised development—

- (a) revoke, amend or suspend in whole or in part any order made, or having effect as if made, under the 1984 Act;
- (b) permit, prohibit or restrict the stopping, waiting, loading or unloading of vehicles on any road;
- (c) authorise the use as a parking place of any road;
- (d) make provision as to the direction or priority of vehicular traffic on any road; and
- (e) permit or prohibit vehicular access to any road;

either at all times or at times, on days or during such periods as may be specified by the undertaker.

(2) The power conferred by paragraph (1) may be exercised at any time prior to the expiry of 12 months from the opening of the authorised development for public use but subject to paragraph (6) any prohibition, restriction or other provision made under paragraph (1) may have effect both before and after the expiry of that period.

(3) The undertaker must consult the chief officer of police and the traffic authority in whose area the road is situated before complying with the provisions of paragraph (4).

(4) The undertaker must not exercise the power conferred by paragraph (1) unless it has—

- (a) given not less than—
 - (i) 12 weeks' notice in writing of its intention so to do in the case of a prohibition, restriction or other provision intended to have effect permanently; or
 - (ii) 4 weeks' notice in writing of its intention so to do in the case of a prohibition, restriction or other provision intended to have effect temporarily,

to the chief officer of police and to the traffic authority in whose area the road is situated; and

- (b) advertised its intention in such manner as the traffic authority may specify in writing within 28 days of its receipt of notice of the undertaker's intention in the case of sub-paragraph (a)(i), or within 7 days of its receipt of notice of the undertaker's intention in the case of sub-paragraph (a)(ii).

(5) Any prohibition, restriction or other provision made by the promoter under paragraph (1) will—

- (a) have effect as if duly made by, as the case may be—
 - (i) the traffic authority in whose area the road is situated, as a traffic regulation order under the 1984 Act; or
 - (ii) the local authority in whose area the road is situated, as an order under section 32 of the 1984 Act,

and the instrument by which it is effected may specify savings and exemptions to which the prohibition, restriction or other provision is subject; and

- (b) be deemed to be a traffic order for the purposes of Schedule 7 to the Traffic Management Act 2004 (road traffic contraventions subject to civil enforcement).

(6) Any prohibition, restriction or other provision made under this article may be suspended, varied or revoked by the undertaker from time to time by subsequent exercise of the powers of paragraph (1) within a period of 24 months from the opening of the authorised development.

(7) Before exercising the powers of paragraph (1) the promoter must consult such persons as it considers necessary and appropriate and take into consideration any representations made to it by any such person.

(8) Expressions used in this article and in the 1984 Act shall have the same meaning in this article as in that Act.

(9) The powers conferred on the undertaker by this article with respect to any road have effect subject to any agreement entered into by the undertaker with any person with an interest in (or who undertakes activities in relation to) premises served by the road.

Prohibition of entry, prohibition of motor vehicles, weight restrictions and speed limits

45.—(1) Upon completion of the relevant part of the authorised development—

- (a) No person shall drive any motor vehicle along the lengths of roads identified in part 1 of Schedule 14 at a speed exceeding that specified in relation to that length of road;
- (b) The traffic regulation measures identified in part 2 of Schedule 14 (Speed limits and traffic regulation measures) shall apply in relation to the lengths of road specified;
- (c) The traffic orders imposing speed limits identified in part 3 of Schedule 14 shall be revoked or varied (as appropriate) so that they cease to apply to the lengths of road specified in the second column;
- (d) The traffic regulation orders imposing weight restrictions identified in Part 4 of Schedule 14 shall be varied so that they only apply to the lengths of road specified in the fourth column.

(2) No speed limit imposed by this Order applies to vehicles falling within regulation 3(4) of the Road Traffic Exemptions (Special Forces) (Variation and Amendment) Regulations 2011 when used in accordance with regulation 3(5) of those Regulations.

Procedure in relation to certain approvals etc

46.—(1) Where an application is made to or request is made of the relevant planning authority, a highway authority, a traffic authority, a street authority, railway undertaker, tramway undertaker, navigation authority or the owner of a watercourse, sewer or drain for any consent, agreement or approval required or contemplated by any of the provisions of the Order or any requirement, such consent, agreement or approval shall, if given, be given in writing and shall not be unreasonably withheld.

(2) Save for applications made pursuant to Schedule 15 (Procedure for discharge of requirements) and except as provided for in paragraph (3), if, within 28 days after the application or request has been submitted to a railway undertaker, a tramway undertaker, an authority or an owner as referred to in paragraph (1) of this article, it has not notified the undertaker of its disapproval and the grounds of disapproval, it shall be deemed to have approved the application or request.

(3) Paragraph (2) shall not apply to any application or request which is accompanied by a report which concludes that it is likely that the subject matter of such application or request will give rise to any materially new or materially different environmental effects in comparison with the authorised development as approved.

(4) Schedule 15 shall have effect in relation to all consents, agreements or approvals granted, refused or withheld in relation to requirements.

Arbitration

47. Any difference under any provision of this Order, unless otherwise provided for, is to be referred to and settled by a single arbitrator to be agreed between the parties or, failing agreement, to be appointed on the application of either party (after giving notice in writing to the other) by the Secretary of State.

Signed by authority of the Secretary of State for Transport

[Name]

[Designation]

[●] 201[●]

Department for Transport

SCHEDULE 1
AUTHORISED DEVELOPMENT

In the County of Norfolk and—

in respect of the whole of Work Nos. 1 to 10, 12 to 20 and 22 to 24, and in respect of part of Work Nos. 11 and 21, in the District of Broadland; and

in respect of part of Work No. 11 only, in the City of Norwich; and

in respect of part of Work No. 21 only, in the administrative area of the Broads Authority

a development which, pursuant to a direction made by the Secretary of State on 9th August 2013 under section 35 of the 2008 Act, is development for which development consent is required, comprising:

Work No .1

- 1(i) as part of the improvement of the A1067 Fakenham Road, the construction of a roundabout junction on the A1067 Fakenham Road (known as ‘Fakenham Road Roundabout’), as the westernmost connection of the, dual carriageway, NDR classified road, including the construction of a footway/cycleway, running concentrically from the eastern tie-in of the improvement with the existing A1067 Fakenham Road, around the south and north west arcs of the Fakenham Road Roundabout, together with the realignment, north eastwards, of those lengths of the A1067 Fakenham Road carriageway and verges which extend 760 metres north west, and 140 metres south east, of the Fakenham Road Roundabout, and of the reconfiguration of a further 125 metres of the south westerly verge of the A1067 Fakenham Road, extending south eastwards from the south easterly termination point of the aforementioned works;
 - 1(ii) the construction of a 50 metres length of the, dual carriageway, NDR classified road, extending north eastwards from the Fakenham Road Roundabout;
 - 1(iii) drainage works, earthworks, pavement works, kerbing and paved area works, signing and road marking works, safety barrier works, fencing works, landscaping works and other works integral to or otherwise incidental to the improvement of the A1067 Fakenham Road, to the construction of the Fakenham Road Roundabout, or to the construction of this length of the NDR classified road, described in this Work No. 1;
 - 1(iv) the creation of grassland areas to the north and south sides of the realigned A1067 Fakenham Road carriageway; and
 - 1(v) the creation of grassland and woodland areas to the north west of the Fakenham Road Roundabout,
- all within the area identified as Work No. 1 on the Works Plan Sheet 1 of 12.

Work No. 2

- 2(i) the construction of a 1,040 metres continuing length of the, dual carriageway, NDR classified road, from that length of the NDR classified road described in 1(ii) above, extending north eastwards, then eastwards, towards the Fir Covert Road Roundabout;
- 2(ii) the construction of a combined private means of access and diverted restricted byway route (for Attlebridge Restricted Byway No.3), extending east north-eastwards, then north westwards, for 315 metres, from the Fakenham Road Roundabout, to rejoin the existing Attlebridge Restricted Byway No. 3;
- 2(iii) the construction of a length of bridleway, running alongside the north side of the NDR classified road, from the junction with Attlebridge Restricted Byway No.3, north eastwards (to junction with a continuing length or bridleway described in 3(v) below), such bridleway to be combined with a private means of access for its first 150 metres westerly length, and the construction of a diverging length of private means of access only, from that easterly end point of the combined route, north eastwards for 100 metres;
- 2(iv) drainage works, earthworks, pavement works, kerbing and paved area works, signing and road marking works, safety barrier works, fencing works, landscaping works and other works

integral to or otherwise incidental to the construction of this length of the NDR classified road, or of the construction of other streets and private means of access, described in this Work No. 2;

- 2(v) the construction of 1 drainage lagoon (No.1), and access thereto, to the east of the Fakenham Road Roundabout;
- 2(vi) the construction of 1 drainage lagoon (No.1A), and access thereto, to the north east of the Fakenham Road Roundabout;
- 2(vii) the construction of 1 drainage lagoon (No.2), and access thereto, to the north west of the Fir Covert Road Roundabout;
- 2(viii) the diversion of some 540 metres of National Grid gas transmission pipeline, so that it crosses the NDR classified road at some 90 degrees rather than at an oblique angle;
- 2(ix) the creation of grassland and woodland areas on the north side of the Fakenham Road Roundabout; and
- 2(x) the creation of grassland and woodland areas on the north and south sides of this length of the NDR classified road,

all within the area identified as Work No. 2 on the Works Plan Sheet 1 of 12 and Sheet 2 of 12.

Work No. 3

- 3(i) the construction of a 50 metres length of the, dual carriageway, NDR classified road, from that length of the NDR classified road described in 2(i) above, extending eastwards to the Fir Covert Road Roundabout;
- 3(ii) the construction of a roundabout junction as part of the NDR classified road, on and to connect with the C262 Fir Covert Road (known as 'Fir Covert Road Roundabout'), including the construction of a footway/cycleway around the south west and north west arcs of the Fir Covert Road Roundabout, leading to crossing points on the north and south arms of the C262 Fir Covert Road;
- 3(iii) the construction of a 50 metres length of the, dual carriageway, NDR classified road, extending eastwards from the Fir Covert Road Roundabout;
- 3(iv) the improvement of the C262 Fir Covert Road, by widening on its east and west sides, on its immediate southerly and northerly approaches to the Fir Covert Road Roundabout;
- 3(v) the construction of a continuing length of bridleway (extending from that length of bridleway described in paragraph 2(iii) above), running alongside the north side of the NDR classified road, skirting the north west arc of the Fir Covert Road Roundabout and then extending northwards for some 100 metres, to junction with the west side of the improved C262 Fir Covert Road at that point;
- 3(vi) the construction of a length of bridleway, from the east side of the improved C262 Fir Covert Road, at a point some 100 metres north of the Fir Covert Road Roundabout, extending southwards and then eastwards (to junction with its continuing length of bridleway described in 4(iv) below), running alongside the north side of the NDR classified road;
- 3(vii) the construction of a length of bridleway, from the east side of the improved C262 Fir Covert Road on the south side of the Fir Covert Road Roundabout, extending eastwards (to junction with its continuing length of bridleway described in 4(v) below), running alongside the south side of the NDR classified road;
- 3(viii) drainage works, earthworks, pavement works, kerbing and paved area works, signing and road marking works, safety barrier works, fencing works, landscaping works and other works integral to or otherwise incidental to the construction of the Fir Covert Road Roundabout, the improvement of the C262 Fir Covert Road, the construction of these lengths of the NDR classified road, or of the construction of other streets and private means of access to premises, described in this Work No.3; and
- 3(ix) the creation of grassland, woodland and scrubland areas to the north of the Fir Covert Road Roundabout and grassland and woodland areas to the south of the Fir Covert Road Roundabout,

all within the area identified as Work No. 3 on the Works Plan Sheet 2 of 12.

Work No. 4

- 4(i) the construction of a 970 metres length of the, dual carriageway, NDR classified road, from that length of the NDR classified road described in 3(iii) above, extending eastwards, then north eastwards, towards the Reepham Road Roundabout;
 - 4(ii) the improvement of Furze Lane (U57168), on its east side, immediately to the north of the NDR classified road, by the construction of a cul-de-sac turning head at what will become its southerly termination point on the north side of the NDR classified road;
 - 4(iii) the improvement of Breck Farm Lane (U57168), on its east side, just to the north east of Breck Farm Bungalow, by the construction of a cul-de-sac turning head at what will become its north easterly termination point on the south side of the NDR classified road;
 - 4(iv) the construction of a continuing length of bridleway (extending from that length of bridleway described in 3(vi) above), running alongside the north side of the NDR classified road, to connect with the west side of the new Marriott's Way (recreational public amenity path) Bridge crossing on the north side of the NDR classified road;
 - 4(v) the construction of a continuing length of bridleway (extending from that length of bridleway described in 3(vii) above), running alongside the south side of the NDR classified road, to its connection with both the west side of the Marriott's Way (recreational public amenity path), some 70 metres south of the NDR classified road, and with the bridleway described in 4(ix) below;
 - 4(vi) the construction of a Marriott's Way (recreational public amenity path) Bridge crossing of the NDR classified road;
 - 4(vii) the construction of a bridleway, running alongside the north side of the NDR classified road, from the east side of the new Marriott's Way (recreational public amenity path) Bridge crossing on the north side of the NDR classified road, eastwards to connect with both Furze Lane (U57168), at what is to become its southerly termination point on the north side of the NDR classified road, and with the bridleway described in 4(viii) below;
 - 4(viii) the construction of a length of bridleway, running alongside the north side of the NDR classified road, from its junction with the bridleway described in 4(vii) above, eastwards, running alongside the north side of the NDR classified road (to junction with its continuing length of bridleway described in 5(v) below);
 - 4(ix) the construction of a bridleway, to be combined in part with the private means of access described in 4(xi) below, from the south westerly termination point of stopped up Breck Farm Lane (U57168), north eastwards along that stopped up street, to a point on the east side of the existing Breck Farm Lane (U57168) bridge crossing of the Marriott's Way (recreational public amenity path);
 - 4(x) the construction of a length of cycle track (with a right of way on foot), to be combined in part with the private means of access described in 4(xi) below, from the north easterly termination point of the bridleway described in 4(ix) above, north eastwards, then eastwards, running alongside the south side of the NDR classified road (to junction with its continuing length of cycle track (with a right of way on foot) described in 5(vi) below);
 - 4(xi) the construction of a private means of access, to be combined in parts with the bridleway described in 4(ix) above and the cycle track (with a right of way on foot) described in 4(x) above, from the south westerly termination point of the stopped up Breck Farm Lane (U57168), north eastwards, then eastwards, crossing over Marriott's Way (recreational public amenity path), and continuing north eastwards, then eastwards, running alongside the south side of the NDR classified road (to junction with the improved C261 Reepham Road described in 5(iv) below);
 - 4(xii) drainage works, earthworks, pavement works, kerbing and paved area works, signing and road marking works, safety barrier works, fencing works, landscaping works and other works integral to or otherwise incidental to the construction of this length of the NDR classified road, or of the construction of other streets and private means of access, described in this Work No.4;
 - 4(xiii) the construction of 1 drainage lagoon (No.3), and access thereto, to the west of the Reepham Road Roundabout; and
 - 4(xiv) the creation of grassland, woodland and scrubland areas to the north side of the NDR classified road and grassland and woodland areas to the south side of the NDR classified road,
- all within the area identified as Work No. 4 on the Works Plan Sheet 2 of 12 and Sheet 3 of 12.

Work No. 5

- 5(i) the construction of a 50 metres length of the, dual carriageway, NDR classified road, from that length of the NDR classified road described in 4(i) above, extending north eastwards to the Reepham Road Roundabout;
- 5(ii) the construction of a roundabout junction as part of the NDR classified road, on and to connect with the C261 Reepham Road (known as 'Reepham Road Roundabout'), including the construction of a footway/cycleway around the south east and north west arcs of the Reepham Road Roundabout;
- 5(iii) the construction of a 45 metres length of the, dual carriageway, NDR classified road, extending eastwards from the Reepham Road Roundabout;
- 5(iv) the improvement of the C261 Reepham Road, by widening on its north east and south west sides, over a 250 metres length (190 metres only on its south west side) on its north westerly approach and a 250 metres length on its south easterly approach, to the Reepham Road Roundabout;
- 5(v) the construction of a length of bridleway, extending from that length of bridleway described in 4(viii) above, eastwards, alongside the north side of the NDR classified road, and around the north west arc of the Reepham Road Roundabout, then extending north westwards to connect with the south west side of the improved C261 Reepham Road, some 135 metres north west of the Reepham Road Roundabout;
- 5(vi) the construction of a length of cycle track (with a right of way on foot), combined with a private means of access, extending from those lengths of bridleway and private means of access described in 4(x) and 4(xi), respectively, above, eastwards, running along the south side of the NDR classified road, to connect with the south west boundary of the improved C261 Reepham Road, in relation to the cycle track some 50 metres south east of the Reepham Road Roundabout and in relation to the final length of independent private means of access track some 160 metres south east of the Reepham Road Roundabout;
- 5(vii) the construction of a bridleway, from a point on the north east boundary of the improved C261 Reepham Road some 130 metres north west of the Reepham Road Roundabout, extending south eastwards, then eastwards, to connect with the diverted route of Drayton Restricted Byway No.6 described in 5(viii) below, and including a short spur connection to the improved C261 Reepham Road immediately north west of the Reepham Road Roundabout;
- 5(viii) the construction of a 70 metres length of diverted route of Drayton Restricted Byway No.6, combined with a private means of access track, north eastwards off the north arc of the Reepham Road Roundabout;
- 5(ix) drainage works, earthworks, pavement works, kerbing and paved area works, signing and road marking works, safety barrier works, fencing works, landscaping works and other works integral to or otherwise incidental to the construction of the Reepham Road Roundabout, the improvement of the C261 Reepham Road, the construction of these lengths of the NDR classified road, or of the construction of other streets and private means of access, described in this Work No.5; and
- 5(x) the creation of grassland and woodland areas around the Reepham Road Roundabout,

all within the area identified as Work No. 5 on the Works Plan Sheet 3 of 12.

Work No. 6

- 6(i) the construction of a 2,205 metres length of the, dual carriageway, NDR classified road, from that length of the NDR classified road described in 5(iii) above, extending eastwards, then south eastwards, towards the Drayton Lane Roundabout;
- 6(ii) the construction of a diverted route of Horsford Restricted Byway No.5, combined with a private means of access track (known as Bell Farm Track), between the C261 Reepham Road

- and Dog Lane (U57176), together with the construction of a Bridge, midway along the routes and to the south west of Bell Farm, to carry them over the NDR classified road;
- 6(iii) the construction of a 230 metres length of private means of access track, from the C261 Reepham Road, 235 metres south east of the Reepham Road Roundabout, north eastwards, then generally eastwards, alongside grassland and woodland areas, to the retained existing woodland on the south side of the NDR classified road;
 - 6(iv) the improvement/resurfacing of Drayton Restricted Byway No.6 and Dog Lane (U57176)/Horsford Restricted Byway No.4, between the junction with diverted Drayton Restricted Byway No.6 and a point 30 metres east of Horsford Restricted Byway No.5 (Bell Farm Track);
 - 6(v) the construction of a footway/cycleway within the northern verge of the C261 Reepham Road, between its junction with Long Dale (U51249) and its junction with Horsford Restricted Byway No.5;
 - 6(vi) the construction of a length of private means of access track alongside the north side of the NDR classified road, terminating 170 metres north west of drainage lagoon No.5, and providing access to drainage lagoon No.5 off that length, and running eastwards towards the new Drayton Lane Link Road;
 - 6(vii) drainage works, earthworks, pavement works, kerbing and paved area works, signing and road marking works, safety barrier works, fencing works, landscaping works and other works integral to or otherwise incidental to the construction of this length of the NDR classified road, or of the construction of other streets and private means of access, described in this Work No.6;
 - 6(viii) the construction of 1 drainage lagoon (No.4), and access thereto, to the east of the Reepham Road Roundabout and to the north of the C261 Reepham Road;
 - 6(ix) the construction of 1 drainage lagoon (No.5) to the north of the NDR classified road 500 metres north west of the Drayton Lane Roundabout; and
 - 6(x) the creation of grassland and woodland areas to the north and south sides of this length of the NDR classified road,
- all within the area identified as Work No. 6 on the Works Plan Sheet 3 of 12 and Sheet 4 of 12.

Work No. 7

- 7(i) the construction of a 50 metres length of the, dual carriageway, NDR classified road, from that length of the NDR classified road described in 6(i) above, extending south eastwards to the Drayton Lane Roundabout;
- 7(ii) the construction of a roundabout junction as part of the NDR classified road, just to the west of the existing C282 Drayton Lane (known as ‘Drayton Lane Roundabout’), including the construction of a footway/cycleway around the north east and south east arcs of the Drayton Lane Roundabout, leading to a crossing point on the northerly arm of the roundabout
- 7(iii) the construction of a 45 metres length of the, dual carriageway, NDR classified road, extending south eastwards from the Drayton Lane Roundabout;
- 7(iv) the construction of a new Link Road, from the Drayton Lane Roundabout, north eastwards to the B1149 Holt Road;
- 7(v) the construction of a new Link Road, from the Drayton Lane Roundabout, southwards to the C261 Reepham Road;
- 7(vi) the improvement/realignment of the C261 Reepham Road on its north side, to form a T-junction with the new Link Road described in 7(v) above;
- 7(vii) the improvement of the C282 Drayton Lane (South), on its west side, by the construction of a cul-de-sac turning head at its south westerly point of stopping up, to the south of the C261 Reepham Road;
- 7(viii) the improvement of the C282 Drayton Lane (North), on its west side, by the construction of a cul-de-sac turning head at its northerly point of stopping up;
- 7(ix) the improvement of the B1149 Holt Road, over a 275 metres length south eastwards from its junction with the C253 Church Street, incorporating a 160 metres length of footway/cycleway within its north easterly boundary, south eastwards from a point 20 metres south east of its junction with the C253 Church Lane, and including the construction of a new roundabout

- (known as ‘Holt Road/Drayton Lane Roundabout’) 100 metres south west of its junction with the C253 Church Street, as a connection to the new Link Road described in 7(iv) above;
- 7(x) the construction of a cycle track (with a right of way on foot), over a length of stopped up C282 Drayton Lane (South), between the C282 Drayton Lane (South) and the C261 Reepham Road;
 - 7(xi) the construction of a cycle track (with a right of way on foot) between the C261 Reepham Road and the new Link Road described in 7(v) above;
 - 7(xii) the construction of a cycle track (with a right of way on foot) between the new Link Road described in 7(v) above and the Drayton Lane Roundabout;
 - 7(xiii) the construction of a cycle track (with a right of way on foot) between the new Link Road described in 7(iv) above and the cul-de-sac termination point of the C282 Drayton Lane described in 7(vii) above;
 - 7(xiv) the construction of a bridleway between the new Link Road described in 7(iv) above and the new cycle track (with a right of way on foot) described in 7(xiii) above;
 - 7(xv) the construction of a bridleway between the new Link Road described in 7(iv) above and the Drayton Lane Roundabout, combined with a length of private means of access track from that Link Road extending south westwards, then north westwards, to connect up with the continuing length of private access track described in 6(vi) above;
 - 7(xvi) the construction of a private means of access to ‘The Homestead’, off the new Link Road described in 7(iv) above;
 - 7(xvii) drainage works, earthworks, pavement works, kerbing and paved area works, signing and road marking works, safety barrier works, fencing works, landscaping works and other works integral to or otherwise incidental to the construction of the Drayton Lane Roundabout, these lengths of the NDR classified road, or of the construction of other streets and private means of access, described in this Work No.7;
 - 7(xviii) the construction of 1 drainage lagoon (No.6), and access thereto, to the east of the new C261 Reepham Road/Drayton Lane Link Road ‘T’ junction;
 - 7(xix) the construction of 1 drainage lagoon (No.6A), and access thereto, to the north of the new Link Road described in 7(iv) above, and immediately west of the Holt Road/Drayton Lane Roundabout described within 7(ix) above;
 - 7(xx) the creation of grassland areas at the Holt Road/Drayton Lane Roundabout; grassland and woodland areas at the Drayton Lane Link Road/C261 Reepham Road junction, and to the east and west sides of the Drayton Lane Link Road, and grassland and woodland areas around the Drayton Lane Roundabout,
- all within the area identified as Work No. 7 on the Works Plan Sheet 4 of 12.

Work No. 8

- 8(i) the construction of a 800 metres length of the, dual carriageway, NDR classified road, extending south eastwards from that length of the NDR classified road described in 7(iii) above;
- 8(ii) the construction of a Bat Gantry along this length of the NDR classified road, 390 metres south east of the Drayton Lane Roundabout;
- 8(iii) drainage works, earthworks, pavement works, kerbing and paved area works, signing and road marking works, safety barrier works, fencing works, landscaping works and other works integral to or otherwise incidental to the construction of this length of the NDR classified road; and
- 8(iv) the creation of grassland and woodland areas to the north and south sides of this length of the NDR classified road,

all within the area identified as Work No. 8 on the Works Plan Sheet 4 of 12.

Work No. 9

- 9(i) the construction of a 1,025 metres length of the, dual carriageway, NDR classified road, extending eastwards from that length of the NDR classified road described in 8(i) above, together with the construction of a new A140 Cromer Road Bridge crossing of the NDR classified road, with integral eastern footway/cycleway which extends across that bridge length

and around the north arc of the Cromer Road Roundabout North and around the south arc of the Cromer Road Roundabout South, and the construction of two NDR classified road westbound slip roads, to connect with the Cromer Road Roundabout South and the construction of two NDR classified road eastbound slip roads, to connect with the Cromer Road Roundabout North, which collective works will form a new NDR classified road/A140 Cromer Road grade separated junction;

- 9(ii) the improvement of the B1149 Holt Road, on its south west side, immediately to the north of the NDR classified road and to the south east of New Holme Farm, by the construction of a cul-de-sac turning head at what will become its south easterly termination point on the north side of the NDR classified road;
 - 9(iii) the improvement of Holly Lane (U57142), on its south side, just to the east of the private access road to Manor Farm, by the construction of a cul-de-sac turning head at what will become its easterly termination point on the south side of the NDR classified road;
 - 9(iv) the improvement of a 200 metres length of the B1149 Holt Road, north westwards off the Cromer Road Roundabout South, to provide the tie-in with the NDR classified road westbound merge slip road at the grade separated junction, including the construction of a footway/cycleway within its south west boundary and for a further 85 metres north westwards within the south west boundary of the westbound merge slip road (so as to provide a continuous footway/cycleway between the Cromer Road Roundabout South and the cycle track (with a right of way on foot) along stopped up Holly Lane (U57142) described in 9(vi) below);
 - 9(v) the construction of a cycle track (with a right of way on foot) between the south east termination point of the B1149 Holt Road, running eastwards along the north side of the NDR classified road, to junction with Cromer Road Roundabout North;
 - 9(vi) the construction of a cycle track (with a right of way on foot), from the westerly termination point of stopped up Holly Lane (U57142) just to the east of Manor Farm Bungalow, eastwards to junction with the NDR classified road westbound merge slip road at the grade separated junction, combined with a private means of access track along that part of the cycle track between the westerly termination point of stopped up Holly Lane (U57142) and drainage lagoon No. 8A;
 - 9(vii) the construction of a 140 metres cycle track (with a right of way on foot), from the Cromer Road Roundabout North, north eastwards to its junction with the Unnamed Highway (Cromer Road to West Lane) (U57647);
 - 9(viii) the construction of a 380 metres private means of access track, from the Cromer Road Roundabout North, extending eastwards running alongside the north side of the NDR classified road eastbound merge slip road at the grade separated junction;
 - 9(ix) drainage works, earthworks, pavement works, kerbing and paved area works, signing and road marking works, safety barrier works, fencing works, landscaping works and other works integral to or otherwise incidental to the construction of this length of the NDR classified road/A140 Cromer Road grade separated junction, or of the construction of other streets and private means of access, described in this Work No.9;
 - 9(x) the construction of 1 drainage lagoon (No.8), and access thereto, to the south of the NDR classified road, within the south west quadrant of the grade separated junction;
 - 9(xi) the construction of 1 drainage lagoon (No. 8A) to the south west of drainage lagoon No. 8 and to the south west of the NDR classified road westbound merge slip road at the grade separated junction;
 - 9(xii) the construction of 1 drainage lagoon (No.9), and access thereto, to the west of the A140 Cromer Road 190 metres north east of the Cromer Road Roundabout North;
 - 9(xiii) the creation of woodland and grassland areas within, and adjacent to, this length of the NDR classified road/A140 Cromer Road grade separated junction,
- all within the area identified as Work No. 9 on the Works Plan Sheet 5 of 12.

Work No. 10

- 10(i) the construction of a 1,745 metres length of the, dual carriageway, NDR classified road, from that length of the NDR classified road described in 9(i) above, extending eastwards, then north eastwards, towards the Airport Roundabout;

- 10(ii) the improvement of the C251 Bullock Hill, on its north east side, to the north of the NDR classified road and 70 metres south east of its junction with Calf Lane (U57229), by the construction of a cul-de-sac turning head, at the access point to drainage lagoon No.12, at what will become its south easterly termination point on the north side of the NDR classified road;
- 10(iii) the construction of a 130 metres length of bridleway, from the north west termination point of stopped up C251 Bullock Hill, south eastwards, and then north eastwards alongside the north side of the NDR classified road, towards the Airport Roundabout;
- 10(iv) drainage works, earthworks, pavement works, kerbing and paved area works, signing and road marking works, safety barrier works, fencing works, landscaping works and other works integral to or otherwise incidental to the construction of this length of the NDR classified road, or of the construction of the other street, described in this Work No.10;
- 10(v) the construction of 1 drainage lagoon (No.12), and access thereto, to the north of the NDR classified road, and immediately to the north east of the C251 Bullock Hill and east of Calf Lane (U57229); and
- 10(vi) the creation of grassland, woodland, and scrubland areas to the north side of this length of the NDR classified road, and grassland areas to the south side of this length of the NDR classified road,

all within the area identified as Work No. 10 on the Works Plan Sheet 5 of 12 and Sheet 6 of 12.

Work No. 11

- 11(i) the construction of a 50 metres length of the, dual carriageway, NDR classified road, from that length of the NDR classified road described in 10(i) above, extending north eastwards to the Airport Roundabout;
- 11(ii) the construction of a roundabout junction as part of the NDR classified road (known as 'Airport Roundabout'), incorporating a footway/cycleway, connecting with the bridleway described in 10(iii) above, to cross the westerly arm of the Airport Roundabout to connect with the new road described in 11(iv) below;
- 11(iii) the construction of a 45 metres length of the, dual carriageway, NDR classified road, extending south eastwards from the Airport Roundabout;
- 11(iv) the construction of a new street, a road, southwards, then westwards, off the south arc of the Airport Roundabout, and incorporating a northerly footway/cycleway off the westerly arm crossing of the Airport Roundabout (to connect with the remaining C251 Bullock Hill), to the south of the NDR classified road and providing access to the Petans Training Centre facility, the Airport Mast, and to Norwich International Airport;
- 11(v) the construction of a private means of access track, from its junction with the new street described in 11(iv) above, generally south eastwards to, and to connect with, the internal circulatory road of Norwich International Airport;
- 11(vi) the construction of a length of bridleway, extending from that length of bridleway described in 10(iii) above, skirting around the north arc of the Airport Roundabout;
- 11(vii) the construction of a length of private means of access track, from the north easterly arc of the Airport Roundabout, running south eastwards on the north east side of the NDR classified road;
- 11(viii) the construction of length of cycle track (with a right of way on foot), combined with a length of private means of access track, extending south eastwards off the new street described in 11(iv) above, running on the south west side of the NDR classified road;
- 11(ix) drainage works, earthworks, pavement works, kerbing and paved area works, signing and road marking works, safety barrier works, fencing works, landscaping works and other works integral to or otherwise incidental to the construction of these lengths of the NDR classified road, the Airport Roundabout, and of the construction of other streets and private means of access, described in this Work No.11; and
- 11(x) the creation of woodland and grassland areas around the Airport Roundabout,

all within the area identified as Work No. 11 on the Works Plan Sheet 6 of 12.

Work No. 12

- 12(i) the construction of a 2,755 metres length of the, dual carriageway, NDR classified road, from that length of the NDR classified road described in 11(iii) above, extending south eastwards, then eastwards, then north eastwards, towards the North Walsham Road Roundabout;
- 12(ii) the construction of a new street, a road, and bridge crossing of the NDR classified road, to the east of the existing C246 Buxton Road;
- 12(iii) the improvement/realignment, by widening on its east side, of its carriageway and verges, of a 240 metres length of the C246 Buxton Road on its northerly approach to the new street described in 12(ii) above, including the incorporation within its western boundary of a bridle/pedestrian path connection between the easterly termination point of the bridleway described in 12(vii) below and running down its west side to the junction of Beeston Lane (U57187), and of the layout of internal access ways leading to the existing private means of access to Nos. 318 – 324 (evens) Buxton Road and to the electricity substation to the west and rear of No.318 Buxton Road; and by widening on its west and east sides, of its carriageway and verges, of a 370 metres length of the C246 Buxton Road on its southerly approach to the new street described in 12(ii) above;
- 12(iv) the construction of a new street, a road, from the southern boundary of Quaker Lane (U57188), 40 metres west of its existing junction with the C246 Buxton Road, south eastwards to its junction with the C246 Buxton Road;
- 12(v) the construction of a length of bridleway, combined with a private means of access track, from those lengths of bridleway and private means of access track described in 11(vi) and 11(vii), respectively, above, running alongside the north east side of the NDR classified road, extending south eastwards to junction with Quaker Lane (U57188) at its westerly termination point;
- 12(vi) the construction of a length of cycle track (with a right of way on foot), combined with a length of private means of access track, from that length of cycle track (with a right of way on foot)/private means of access track described in 11(viii) above, running alongside the south west side of the NDR classified road, extending south eastwards to junction with the C251 St Faiths Road;
- 12(vii) the construction of a bridleway, from its junction with the C251 St Faiths Road and the cycle track (with a right of way on foot) described in 12(vi) above, running alongside the south side of the NDR classified road, to connect with the west side of the improved C246 Buxton Road, south of the NDR classified road;
- 12(viii) the improvement/realignment of a 30 metres length of Quaker Lane (U57188) to connect with the new street described in 12(iv) above;
- 12(ix) the improvement/widening of Quaker Lane (U57188), at its westerly termination point to the west of Nos. 1 and 2 Quaker Cottages, by way of the construction of a cul-de-sac turning head on the south side of that street, to the north of the NDR classified road;
- 12(x) the improvement of the C251 St Faiths Road at its northerly termination point, 140 metres south west of Nos. 1 and 2 Quaker Cottages, by way of the construction of a cul-de-sac turning head on the west side of that street, to the south of the NDR classified road;
- 12(xi) the construction of a bridleway, from its junction with the improved C246 Buxton Road, on the south side of the NDR classified road, extending eastwards, under the new road bridge crossing of the NDR classified road described in 12(ii) above, and then extending southwards, alongside the east side of, and connecting with, the improved/realigned C246 Buxton Road, at a point 65 metres generally north of its junction with Beeston Lane (U57187);
- 12(xii) drainage works, earthworks, pavement works, kerbing and paved area works, signing and road marking works, safety barrier works, fencing works, landscaping works and other works integral to or otherwise incidental to the construction of this length of the NDR classified road, the improvement of existing streets, or of the construction of other streets, described in this Work No.12;
- 12(xiii) the construction of 1 drainage lagoon (No.13) to the north east side of the NDR classified road and to the west of Quaker Farm;
- 12(xiv) the construction of 1 drainage lagoon (No.13A) to the south side of the NDR classified road and to the south west of Quaker Farm;
- 12(xv) the construction of 1 drainage lagoon (No.14), and access thereto, to the north side of the NDR classified road and to the east of the improved/realigned C246 Buxton Road;
- 12(xvi) the construction of 1 drainage lagoon (No.14A), and access thereto, to the south side of the NDR classified road and to the east of the improved/realigned C246 Buxton Road;

- 12(xvii) the construction of a private means of access to the gas governor, off the new street described in 12(iv) above; and
- 12(xviii) the creation of grassland, woodland and scrubland areas to the north side of the NDR classified road and grassland and woodland areas to the south side of the NDR classified road,
- all within the area identified as Work No. 12 on the Works Plan Sheet 6 of 12, Sheet 7 of 12 and Sheet 8 of 12.

Work No. 13

- 13(i) the construction of a 50 metres length of the, dual carriageway, NDR classified road, from that length of the NDR classified road described in 12(i) above, extending eastwards to the North Walsham Road Roundabout;
- 13(ii) the construction of a roundabout junction as part of the NDR classified road, on and to connect with the B1150 North Walsham Road (known as 'North Walsham Road Roundabout'), incorporating footways/cycleways around all four arcs of the roundabout;
- 13(iii) the construction of a 45 metres length of the, dual carriageway, NDR classified road, extending eastwards from the North Walsham Road Roundabout;
- 13(iv) the improvement of the B1150 North Walsham Road, by widening on its east and west sides on its immediate southerly and northerly approaches to the North Walsham Road Roundabout;
- 13(v) the construction of a length of private means of access track, from the east side of the improved B1150 North Walsham Road, 95 metres north of the North Walsham Road Roundabout, running southwards, then eastwards, along the north side of the NDR classified road;
- 13(vi) drainage works, earthworks, pavement works, kerbing and paved area works, signing and road marking works, safety barrier works, fencing works, landscaping works and other works integral to or otherwise incidental to the construction of these lengths of the NDR classified road, the North Walsham Road Roundabout, or the improvement of the B1150 North Walsham Road and the construction of private means of access, described in this Work No.13; and
- 13(vii) the creation of grassland and woodland areas around the North Walsham Road Roundabout, all within the area identified as Work No. 13 on the Works Plan Sheet 8 of 12.

Work No. 14

- 14(i) the construction of a 1,945 metres length of the, dual carriageway, NDR classified road, from that length of the NDR classified road described in 13(iii) above, extending eastwards, then south eastwards, towards the Wroxham Road Roundabout;
- 14(ii) the construction of a length of private means of access track, as a continuation of the length of private means of access described in 13(v) above, extending eastwards alongside the north side of the NDR classified road, to terminate at drainage lagoon No. 17 and with access off that length to drainage lagoon No.16;
- 14(iii) the construction of a length of bridleway, from the northern (90 degree) corner of Beeston Lane (U57186), extending northwards, and combined with a private means of access track along that northerly running length, then eastwards, alongside the south side of the NDR classified road, to junction with the north west side of the improved A1151 Wroxham Road, 80 metres south west of the Wroxham Road Roundabout;
- 14(iv) drainage works, earthworks, pavement works, kerbing and paved area works, signing and road marking works, safety barrier works, fencing works, landscaping works and other works integral to or otherwise incidental to the construction of this length of the NDR classified road, or of the construction of other streets and private means of access, described in this Work No.14;
- 14(v) the construction of 1 drainage lagoon (No.16) to the north of the NDR classified road, 170 metres north east of North Park Cottage;
- 14(vi) the construction of 1 drainage lagoon (No.17), including permanent wet area, to the north of the NDR classified road, 200 metres north east of the 90 degree corner of Beeston Lane (U57186); and
- 14(vii) the creation of grassland and woodland areas to the north side of this length of the NDR classified road and grassland, woodland and scrubland areas to the south side of this length of the NDR classified road,

all within the area identified as Work No. 14 on the Works Plan Sheet 8 of 12 and Sheet 9 of 12.

Work No. 15

- 15(i) the construction of a 50 metres length of the, dual carriageway, NDR classified road, from that length of the NDR classified road described in 14(i) above, extending south eastwards to the Wroxham Road Roundabout;
- 15(ii) the construction of a roundabout junction as part of the NDR classified road, on and to connect with the A1151 Wroxham Road (known as 'Wroxham Road Roundabout'), incorporating the construction of footways/cycleways around the west, north and east arcs of the roundabout;
- 15(iii) the construction of a 45 metres length of the, dual carriageway, NDR classified road, extending south eastwards from the Wroxham Road Roundabout;
- 15(iv) the improvement, by widening on its south east and north west sides, of 120 metres lengths of the A1151 Wroxham Road on its north easterly and south westerly approaches to the Wroxham Road Roundabout;
- 15(v) the construction of a length of bridleway, as a continuation of the bridleway described in 14(iii) above, extending south westwards to junction with the north west side of the improved A1151 Wroxham Road, 120 metres south west of the Wroxham Road Roundabout;
- 15(vi) the construction of a length of bridleway, from the south east side of the improved A1151 Wroxham Road, extending north eastwards, then skirting the south arc of the Wroxham Road Roundabout, to continue south eastwards alongside the west side of the NDR classified road;
- 15(vii) the construction of two private means of access tracks, to the sewage works and the springs, off the north arc of the Wroxham Road Roundabout;
- 15(viii) the construction of a private means of access track off the south arc of the Wroxham Road Roundabout;
- 15(ix) drainage works, earthworks, pavement works, kerbing and paved area works, signing and road marking works, safety barrier works, fencing works, landscaping works and other works integral to or otherwise incidental to the construction of these lengths of the NDR classified road, the Wroxham Road Roundabout, the improvement of the A1151 Wroxham Road, or of the construction of other streets and private means of access, described in this Work No.15; and
- 15(x) the creation of grassland and woodland areas around the Wroxham Road Roundabout,

all within the area identified as Work No. 15 on the Works Plan Sheet 9 of 12.

Work No. 16

- 16(i) the construction of a 1,655 metres length of the, dual carriageway, NDR classified road, from that length of the NDR classified road described in 15(iii) above, extending south westwards towards the Salhouse Road Roundabout;
- 16(ii) the construction of a private means of access track, off the C258 Green Lane West, lying to the south of The Close, extending south westwards and terminating at drainage lagoons No.18 and No.18A and the pumping station;
- 16(iii) the construction of a bridleway, from the junction of Newman Road (U57490) with Long's Crescent (U57852), extending south westwards to the west side of the NDR classified road, combined with part of the private means of access track described in 16(iv) below, including the construction of a bridge to carry it, and the said private means of access, across the NDR classified road;
- 16(iv) the construction of a private means of access track, from the junction of Newman Road (U57490) with Long's Crescent (U57852), extending south westwards, then generally westwards, and combined with the bridleway described in 16(iii) above over its first 265 metres length, for 550 metres, and with three main access track spurs leading off it, including the construction of a bridge to carry it, and the bridleway described in 16(iii) above, across the NDR classified road;
- 16(v) the construction of a length of bridleway, as a continuation to the bridleway described in paragraph 15(vi) above, running alongside the west side of the NDR classified road, to connect with the Newman Track bridleway/private means of access bridge;

- 16(vi) the construction of a length of cycle track (with a right of way on foot), from the junction with the bridleway described in 16(iii) above, running alongside the west side of the NDR classified road, extending south eastwards towards the Salhouse Road Roundabout;
- 16(vii) the construction of a bat underpass, combined with a drainage culvert, under the NDR classified road, west Sir Edward Stacey Road (U57538), including the provision of a natural flow ditch running from the eastern end of the culvert;
- 16(viii) the demolition of Gazebo Farm and Hall Farm buildings;
- 16(ix) the construction of 1 bat house at Gazebo Farm and 1 bat house at Hall Farm;
- 16(x) drainage works, earthworks, pavement works, kerbing and paved area works, signing and road marking works, safety barrier works, fencing works, landscaping works and other works integral to or otherwise incidental to the construction of this length of the NDR classified road, or of the construction of other streets and private means of access, described in this Work No.16;
- 16(xi) the creation of 1 drainage lagoon (No.18), including permanent wet area, to the east side of this length of the NDR classified road and 210 metres north west of Sir Edward Stracey Road (U57358);
- 16(xii) the creation of a natural flow ditch to the south and west of drainage lagoon No. 18;
- 16(xiii) the creation of 1 drainage lagoon (No. 18A) to the east side of this length of the NDR classified road and to the north of drainage lagoon No. 18;
- 16(xiv) the creation of a flood plain compensatory storage area (No.18B) to the east of this length of the NDR classified road and to the south of drainage lagoon No.18;
- 16(xv) the provision of ecological ponds to the west of this length of the NDR classified road and to north west of Newman Road overbridge; and
- 16(xvi) the creation of grassland and woodland areas to the east side of this length of the NDR classified road and grassland, woodland and scrubland areas to the west side of this length of the NDR classified road,

all within the area identified as Work No. 16 on the Works Plan Sheet 9 of 12 and Sheet 10 of 12.

Work No. 17

- 17(i) the construction of a 50 metres length of the, dual carriageway, NDR classified road, from that length of the NDR classified road described in 16(i) above, extending south eastwards to the Salhouse Road Roundabout;
- 17(ii) the construction of a roundabout junction as part of the NDR classified road, on and to connect with, the C283 Salhouse Road (known as ‘Salhouse Road Roundabout’), incorporating the construction of footways/cycleways around the north, south and east arcs of the Salhouse Road Roundabout;
- 17(iii) the construction of a 50 metres length of the, dual carriageway, NDR classified road, extending south eastwards from the Salhouse Road Roundabout;
- 17(iv) the improvement, by widening on its north west and south east sides, of a 175 metres length of the C283 Salhouse Road on its south westerly approach to the Salhouse Road Roundabout and of a 70 metres length on its north easterly approach to the Salhouse Road Roundabout, and the improvement, by widening on its south east side only, of a further 120 metres length of the C283 Salhouse Road, extending south westwards from a point 20 metres south west of its junction with the carriageway of the C258 Green Lane West/Green Lane East, and of a 55 metres length extending south westwards from a point 70 metres south west of its junction with the Salhouse Road Roundabout;
- 17(v) the construction of a length of cycle track (with a right of way on foot), as a continuation of the cycle track described in 16(vi) above, extending south eastwards, around the west arc of the Salhouse Road Roundabout, then south westwards to junction with the north west side of the improved C283 Salhouse Road, some 60 metres south west of the Salhouse Road Roundabout;
- 17(vi) drainage works, earthworks, pavement works, kerbing and paved area works, signing and road marking works, safety barrier works, fencing works, landscaping works and other works integral to or otherwise incidental to the construction of these lengths of the NDR classified road, the Salhouse Road Roundabout, or of the construction of other streets, described in this Work No.17; and

17(vii) the creation of grassland and woodland areas around the Salhouse Road Roundabout, all within the area identified as Work No. 17 on the Works Plan Sheet 10 of 12.

Work No. 18

- 18(i) the construction of a 1,205 metres length of the, dual carriageway, NDR classified road, from that length of the NDR classified road described in 17(iii) above, extending south eastwards to and including the construction of a new roundabout junction (known as 'Plumstead Road Roundabout South'), 310 metres south east of the NDR classified road crossing of the Norwich to Cromer & Sheringham Railway line, and extending 45 metres southwards of that roundabout junction;
- 18(ii) the improvement of the C258 Broad Lane, on its south west side, opposite the property 'Leighton House', by the construction of a cul-de-sac turning head at that point; and of the undertaking of other landscaping/verge works across the north west junction of the C258 Broad Lane/C874 Plumstead Road 90 metres to the south east of the aforementioned turning head, which will provide the physical works of closure at that junction;
- 18(iii) the improvement, by widening on its south east side, of a 420 metres length of the C874 Plumstead Road extending south westwards from a point 20 metres south west of its junction with the C258 Broad Lane, including the construction of a footway/cycleway within the north western boundary of that length of improved street and the construction of a roundabout junction (known as 'Plumstead Road Roundabout North') on, and as part of the improvement of, the C874 Plumstead Road, at a point 220 metres south west of its junction with the C258 Broad Lane;
- 18(iv) the construction of a new street, a road, between the Plumstead Road Roundabout North and the Plumstead Road Roundabout South;
- 18(v) the construction of a bridge to carry the NDR classified road over the C874 Plumstead Road;
- 18(vi) the construction of a bridleway, combined with the private means of access described in 18(vii) below for its first 90 metres length, running along the west side of the Norwich to Cromer & Sheringham railway, from a point on the C874 Plumstead Road just west of the gas compound, extending north westwards, then north eastwards, then northwards, to junction with the C258 Green Lane East;
- 18(vii) the construction of a private means of access track, combined with the bridleway described in 18(vi) above for its first 90 metres length, from the C874 Plumstead Road just west of the gas compound, extending north westwards, then north eastwards, then north westwards, running along the south west side of the NDR classified road;
- 18(viii) the construction of a private means of access track, from the improved C258 Broad Lane, where a turning head is to be provided opposite 'Leighton House', running in a south westerly, then south easterly, direction to junction with the C874 Plumstead Road;
- 18(ix) the construction of a bridleway, from the south east side of the improved C874 Plumstead Road, opposite 'Ladoma', extending south westwards, along the south east side of the improved C874 Plumstead Road, then southwards, along the east side of the street described in 18(iv) above, then skirting the east arc of the Plumstead Road Roundabout South, then extending 45 metres southwards of that roundabout junction, along the east side of the NDR classified road;
- 18(x) the construction of a 110 metres private means of access track, running westwards, then northwards, off the west arc of the Plumstead Road Roundabout South;
- 18(xi) the construction of a 75 metres private means of access track, running eastwards off the new street described in 18(iv) above;
- 18(xii) drainage works, earthworks, pavement works, kerbing and paved area works, signing and road marking works, safety barrier works, fencing works, landscaping works and other works integral to or otherwise incidental to the construction of this length of the NDR classified road, the improvement of the C874 Plumstead Road, the construction of the Plumstead Road Roundabout North and the Plumstead Road Roundabout South, or of the construction of other streets and private means of access, described in this work No.18;
- 18(xiii) the construction of 1 drainage lagoon (No.19), and access thereto, to the east side of this length of the NDR classified road and 250 metres south west of the C283 Salhouse Road/C258 Green Lane East junction;

- 18(xiv) the construction of 1 drainage lagoon (No.20), and access thereto, to the east side of this length of the NDR classified road and 370 metres south of the C283 Salhouse Road/C258 Green Lane East junction;
- 18(xv) the construction of 1 drainage lagoon (No.21), and access thereto, to the east side of the Plumstead Road Roundabout North and 160 metres west of the C874 Plumstead Road/C258 Broad Lane junction;
- 18(xvi) the construction of 1 drainage lagoon (No.22), and access thereto, to the north side of the Plumstead Road Roundabout South and 300 metres south west of the C874 Plumstead Road/C258 Broad Lane junction;
- 18(xvii) the creation of grassland and woodland areas adjoining and within the junction works described in 18(i) – (iii) above, and on the east and west sides of this length of the NDR classified road, all within the area identified as Work No. 18 on the Works Plan Sheet 10 of 12 and Sheet 11 of 12.

Work No. 19

- 19(i) the construction of a new bridge to carry the NDR classified road over the Norwich to Cromer & Sheringham Railway line, including drainage works, earthworks, pavement works, kerbing and paved area works, signing and road marking works, safety barrier works, fencing works, landscaping works and other works associated with the construction of that bridge component of the NDR classified road,
- all within the area identified as Work No. 19 on the Works Plan Sheet 10 of 12.

Work No. 20

- 20(i) the construction of a 2,015 metres length of the, dual carriageway, NDR classified road, extending from that length of the NDR classified road described in 18(i) above, southwards, then south eastwards, towards the Business Park Roundabout, including the construction of northbound and southbound lay-bys on this length of the NDR classified road, immediately east of drainage lagoon No. 24;
- 20(ii) the improvement, by widening on both its north and south sides, of the C442 Middle Road on its 310 metres length easterly approach, and 190 metres length westerly approach to its bridge crossing of the NDR classified road, together with the construction of a bridge to carry its 75 metres realigned length, between the two aforementioned lengths, over the NDR classified road, and incorporating a bridle/pedestrian path within its southern embankment improvement, west of the NDR classified road, to connect with the new bridleway described in 20(xi) below;
- 20(iii) the improvement, by widening on its north side, of a length of Low Road (U59392) immediately to the east of the NDR classified road, by way of the construction of a turning head at what is to be its western termination point on the east side of the NDR classified road;
- 20(iv) the improvement, by widening on its north side, of a length of Low Road (U59392) immediately to the east of its junction with Green Lane (U59278), by way of the construction of a turning head at what is to be its eastern termination point on the west side of the NDR classified road;
- 20(v) The improvement, by widening on its south side, of a length of Smee Lane (U59400), at a point 180 metres east of its junction with the Green Lane (U59278)/C832 Cranley Road/C830 Broadland Way roundabout junction, by way of the construction of a turning head at what is to be its eastern termination point on the west side of the NDR classified road;
- 20(vi) The improvement, by widening on its south side, of a length of Smee Lane (U59400) immediately to the east of the NDR classified road, by way of the construction of a turning head at what is to be its western termination point on the east side of the NDR classified road;
- 20(vii) the construction of a length of bridleway, as a continuation of the bridleway described in paragraph 18(ix) above, running southwards alongside the east side of the NDR classified road, to junction with the C442 Middle Road (U59400);
- 20(viii) the construction of a new private means of access track to Oaks Farm;
- 20(ix) the construction of a bridleway, from the C442 Middle Road (U59400), running southwards alongside the east side of the NDR classified road, to junction with Smee Lane (U59400);
- 20(x) the construction of a cycle track (with a right of way on foot), from the bridleway described in 20(ix) above, at Smee Lane (U59400), combined with a private means of access track over a

- 185 metres length to lagoon No.25, running south eastwards alongside the east side of the NDR classified road, towards the Business Park Roundabout;
- 20(xi) the construction of a bridleway running south eastwards alongside the west side of the NDR classified road, from the C442 Middle Road to junction with the bridleway described in 20(xiii) below and, part way along its length, with the bridleway described in 20 (xii) below;
 - 20(xii) the construction of a bridleway, combined with a private means of access track to various premises along that length, along stopped up Low Road (U59392), from the turning head on Low Road (U59392), immediately east of Green Lane (U59278), running eastwards to junction with the bridleway described in 20(xi) above;
 - 20(xiii) the construction of a bridleway, combined with part of the private means of access track described in 20(xiv) below, from the westerly turning head on Smee Lane (U59400), running eastwards to junction with the bridleway described in 20(xi) above;
 - 20(xiv) the construction of a private means of access track, combined in part with the bridleway described in 20(xiii) above, from the westerly turning head on Smee Lane (U59400), running eastwards to and including an access turning head to be constructed immediately to the west of the NDR classified road;
 - 20(xv) drainage works, earthworks, pavement works, kerbing and paved area works, signing and road marking works, safety barrier works, fencing works, landscaping works and other works integral to or otherwise incidental to the construction of this length of the NDR classified road, the improvement of the C442 Middle Road, Low Road (U59392) and Smee Lane (U59400), or of the construction of other streets and private means of access, described in this Work No. 20;
 - 20(xvi) the construction of 1 drainage lagoon (No.23), and access thereto, to the east side of the NDR classified road 120 metres south west of the junction of the C442 Middle Road with Toad Lane (U59284);
 - 20(xvii) the construction of 1 drainage lagoon (No.24), and access thereto, to the west side of the NDR classified road 120 metres east of the Nursery outbuildings located north off Smee Lane (U59400);
 - 20(xviii) the construction of 1 drainage lagoon (No.25), and access thereto, east of the NDR classified road and 160 metres to the north of the Business Park Roundabout; and
 - 20(xix) the creation of grassland and woodland areas to the east and west sides of this length of the NDR classified road,
- all within the area identified as Work No. 20 on the Works Plan Sheet 11 of 12 and Sheet 12 of 12.

Work No. 21

- 21 the construction of a new junction (known as ‘Postwick Hub Junction’) to link the, dual carriageway, NDR classified road described in 20(i) above with the A47 Trunk Road, comprising:
 - 21(i) the construction of a 50 metres length of, dual carriageway, NDR classified road from that length of the NDR classified road described in 20(i) above, extending south eastwards to the Business Park Roundabout;
 - 21(ii) the construction of a roundabout junction as part of the NDR classified road, at the south east end of the NDR classified road described in 21(i) above (known as ‘Business Park Roundabout’);
 - 21(iii) the construction of a 550 metres length of the, dual carriageway, NDR classified road, from the Business Park Roundabout, south westwards to a new roundabout on the north side of the A47 Trunk Road (known as ‘Postwick North East Roundabout’);
 - 21(iv) the construction of a roundabout at the south west end of the NDR classified road described in 21(iii) above (known as ‘Postwick North East Roundabout’);
 - 21(v) the construction of a new bifurcated A47 Trunk Road eastbound diverge slip road, from a point on the eastbound carriageway of the A47 Trunk Road 250 metres generally east of where the A47 Trunk Road crosses over the Norwich to Yarmouth & Lowestoft Railway line, generally eastwards to connect with the Postwick North East Roundabout and with the northbound carriageway of the NDR classified road;

- 21(vi) the construction of a new A47 Trunk Road eastbound merge slip road, from the Postwick North East Roundabout, generally eastwards to connect with the eastbound carriageway of the A47 Trunk Road 125 metres west of the private access to ‘The Grange’;
- 21(vii) the construction of a 300 metres length of the, single carriageway, NDR classified road, and a new bridge crossing of the A47 Trunk Road (known as ‘New Postwick Bridge’), incorporating an easterly footway/cycleway along its length, from the Postwick North East Roundabout, south westwards to the junction of the A1042 Yarmouth Road, in the vicinity of the existing and proposed Postwick Park and Ride sites;
- 21(viii) the improvement of the A1042 Yarmouth Road, by the construction of a signalised junction (known as ‘Park and Ride Signalised Junction’), to replace the existing roundabout on the A1042 Yarmouth Road at the existing Postwick Park and Ride site;
- 21(ix) the improvement of the A1042 Yarmouth Road, over a 630 metres length east from the signalised junction described in 21(viii) above, including the provision of its tie-in with the new signalised junction and, along its northern verge, the construction of a new footway/cycleway eastwards to its junction with the C440 Church Road;
- 21(x) bridge and carriageway/verge alterations to the existing A1042 Yarmouth Road bridge over the A47 Trunk Road, including replacement of the bridge parapets, remodelling of its carriageway to provide three 3 metres wide lanes (2 southbound and 1 northbound), the construction of a footway/cycleway within the widened west side of the bridge, and the construction of a new vertical retaining northern bridge abutment, to replace the existing sloping paved embankment;
- 21(xi) the construction of a 550 metres single carriageway link road (known as ‘Broadland Gate Link’), from the Business Park Roundabout, westwards to the C829/C830 Broadland Way/C831 Peachman Way roundabout, incorporating the construction of a new roundabout (known as ‘Broadland Gate Roundabout’) and a 15 metres length southwards stub connection (for future access connection to the internal road layout proposed to serve the proposed Broadland Gate mixed commercial development), 310 metres along its length west of the Business Park Roundabout;
- 21(xii) the improvement of the east arc of the C829/C830 Broadland Way/C831 Peachman Way roundabout, to provide the tie-in connection with the Broadland Gate Link described in 21(xi) above and to part realign the southbound entry through the roundabout from the C831 Peachman Way;
- 21(xiii) alterations to the existing Postwick North West Roundabout, comprising the construction of a 14 metres eastwards stub connection (for the provision of future access to the proposed Broadland Gate development), and its widening on its south arc to incorporate carriageway alterations resulting from the removal of its connection with the A47 Trunk Road diverge slip road which is to be stopped up, together with the construction of a footway/cycleway connection across the north easterly connection point of the A47 Trunk Road diverge slip road which is to be removed;
- 21(xiv) the construction of a length of cycle track (with a right of way on foot), as a continuation of the cycle track described 20(x) above, running south, around the east side of the Business Park Roundabout, then continuing south westwards to junction with the Postwick North East Roundabout;
- 21(xv) the construction of a cycle track (with a right of way on foot), from the eastbound carriageway of the A47 Trunk Road to the Postwick North West Roundabout;
- 21(xvi) the construction of a private means of access from the Postwick North East Roundabout running eastwards to ‘The Grange’, and along its length providing access to drainage lagoon No.30;
- 21(xvii) the construction of a length of private means of access (continuing the existing length of access as extends off the C829 Broadland Way), running alongside the north side of the new A47 Trunk Road eastbound diverge slip road, to Heath Farm;
- 21(xviii) drainage works, earthworks, pavement works, kerbing and paved area works, signing and road marking works, safety barrier works, fencing works, landscaping works and other works integral to or otherwise incidental to the construction of this length of the NDR classified road, or of other existing streets to be improved, or of the construction of other streets and private means of access, as part of the Postwick Hub Junction, described in this Work No.21;
- 21(xix) the construction of 1 drainage lagoon (No.26) west of the Broadland Gate Roundabout and to the east of the C829/C830 Broadland Way/C831 Peachman Way roundabout;

- 21(xx) the construction of 1 wide infiltration swale (No.27) within the west side of the NDR classified road, between the Postwick North East Roundabout and the Business Park Roundabout;
 - 21(xxi) the construction of 1 drainage lagoon (No.28), and access thereto, to the west of the Postwick North East Roundabout, to the south of the new A47 Trunk Road eastbound diverge slip road, and to the north of the A47 Trunk Road eastbound carriageway;
 - 21(xxii) the construction of 1 drainage lagoon (No.29) to the north east of the A1042 Yarmouth Road Park and Ride Signalised Junction;
 - 21(xxiii) the construction of 1 drainage lagoon (No.30) to the east of the Postwick North East Roundabout and to the north of the new A47 Trunk Road eastbound merge slip road; and
 - 21(xxiv) the creation of grassland, woodland and scrubland areas adjoining and within the Postwick Hub Junction,
- all within the area identified as Work No. 21 on the Works Plan Sheet 12 of 12.

Work No. 22

- 22(i) the construction of a 95 metres length of single carriageway road, from the junction with the C258 Green Lane West 115 metres south east of its existing junction with the A1151 Wroxham Road, generally north westwards to its junction with the A1151 Wroxham Road;
- 22(ii) the improvement, by widening and realignment on its west side, of a 62 metres length of the C258 Green Lane West, from the south easterly connection point of, and so as to provide a tie-in with, the new street described in 22(i) above;
- 22(iii) the improvement, by widening, of a 15 metres length of the C258 Green Lane West at its junction with the A1151 Wroxham Road, by way of the construction of a cul-de-sac turning head at that point (at which its existing junction with the A1151 Wroxham Road will be closed);
- 22(iv) the improvement of a 160 metres length of the A1151 Wroxham Road south west of, and a 160 metres length north east of, the junction of the new street described in 22(i) above, including widening and verge alterations along parts of that length, including at the point of its junction with the existing C258 Green Lane West which will implement landscaping/verge works which will provide the physical works of closure of that junction; and
- 22(v) drainage works, earthworks, pavement works, kerbing and paved area works, signing and road marking works, safety barrier works, fencing works, landscaping works and other works associated with the construction of the new street described in 22(i) above, and of the improvement of the A1151 Wroxham Road and the C258 Green Lane West, described in this Work No.22,

all within the area identified as Work No. 22 on the Works Plan Sheet 9 of 12.

Work No. 23

- 23(i) street improvement works over a 750 metres length of the C874 Plumstead Road, south westwards from a point 230 metres north east of its junction with Broadland Drive (U51073), and over a 20 metres length of Broadland Drive (U51073) from its junction with the C874 Plumstead Road, at Thorpe End, including the construction of a mini roundabout at the junction of the C874 Plumstead Road with Broadland Drive (U51073), and the construction of a footway/cycleway within the northern verge of the C874 Plumstead Road along the frontages of No.15 Percy Howes Close and Nos. 49-63 (odds) Plumstead Road; and
- 23(ii) drainage works, earthworks, pavement works, kerbing and paved area works, signing and road marking works, safety barrier works, fencing works, landscaping works and other works associated with the street improvement works of the C874 Plumstead Road and Broadland Drive (U51073), described in this Work No.23,

all within the area identified as Work No. 23 on the Works Plan Sheet 11 of 12.

Work No. 24

- 24(i) the improvement of a 80 metres length of the B1150 North Walsham Road south of, and a 78 metres length north of, its junction with the C249 Rackheath Lane, incorporating verge alterations along parts of those lengths, including at the point of its junction with the existing C249 Rackheath Lane which will implement landscaping/verge works which will provide the

physical works of closure of that junction, together with the provision of a widened filter lane from the C249 Crostwick Lane to the northbound lane of the B1150 North Walsham Road;

- 24(ii) the improvement, by widening, of a 15 metres length of the C249 Rackheath Lane at its junction with the B1150 North Walsham Road, by way of the construction of a cul-de-sac turning head at that point (at which its existing junction with the B1150 North Walsham Road will be closed); and
- 24(iii) drainage works, earthworks, pavement works, kerbing and paved area works, signing and road marking works, safety barrier works, fencing works, landscaping works and other works associated with the improvement of the B1150 North Walsham Road and of the C249 Rackheath Lane, described in this Work No.24,

all within the area identified as Work No. 24 on the Works Plan Sheet 8 of 12.

And in connection with the undertaking of any of those works described in Work Nos. 1 - 24, such further development within the Order limits as may comprise of:

- (a) alteration of the layout of any street permanently or temporarily, including but not limited to increasing the width of the carriageway of the street by reducing the width of any kerb, footway, cycleway or verge within the street; altering the level or increasing the width of any such kerb, footway, cycleway or verge; reducing the width of the carriageway of the street; and provision of turning heads;
- (b) ramps, means of access, field accesses, footpaths, bridleways, cycle tracks, embankments, viaducts, aprons, abutments, shafts, foundations, retaining walls, drainage, wing walls, street lighting, fencing and culverts;
- (c) street works, including breaking up or opening a street, or any sewer, drain or tunnel under it; tunnelling or boring under a street; works to place or maintain apparatus in a street, works to alter the position of apparatus, including mains, sewers, drains and cables;
- (d) works to divert, alter, or other works to apparatus including mains, sewers, drains and cables;
- (e) works to alter the course of, or otherwise interfere with, a watercourse other than a navigable watercourse;
- (f) landscaping and other works, including the provision of hedgerows, to mitigate any adverse effects of the construction, maintenance or operation of the authorised development, including fencing and other boundary treatments;
- (g) works for the benefit or protection of land affected by the authorised development;
- (h) works required for the strengthening, improvement, maintenance, or reconstruction of any streets;
- (i) the provision of bat boxes, bat gantries, newt fencing, badger fencing and boxes for other wildlife; and
- (j) such other works, including contractor's compounds, working sites, storage areas, temporary top soil storage areas, and works of demolition, as may be necessary or expedient for the purposes of or in connection with the construction or maintenance of the authorised development and which fall within the scope of the environmental impact assessment.

SCHEDULE 2

REQUIREMENTS

Articles 3 and 46

Interpretation

1. In this Schedule—

(1) the following expressions shall have the following meanings:

“the advance works” means works including or in connection with site clearance, archaeological works, ecological mitigation, utility diversions, construction of bat gantries and the construction or erection of contractor’s offices and compounds;

"Design Manual for Roads and Bridges" means the document(s) of that name published by the Department for Transport;

“heavy goods vehicle” means a heavy goods vehicle of 7.5 tonnes gross vehicle weight or more;

“Marriott’s Way” means the land defined as the “Marriott’s Way open space land” in article 2;

"relevant district authority" means in respect of each of their respective administrative areas Broadland District Council, Norwich City Council and the Broads Authority (as applicable in respect of each work number); and

“relevant planning authority” means Norfolk County Council.

(2) where any requirement specifies that the relevant planning authority shall approve a matter “following consultation with the relevant district authorities” such consultation shall be carried out by the relevant planning authority in accordance with paragraph 2(3) of Schedule 15 (Procedure for discharge of requirements).

Time limits

2. The authorised development shall commence no later than the expiration of five (5) years beginning with the date that this Order comes into force.

Commencement of the authorised development

3. Notice of commencement of the authorised development shall be given to the relevant planning authority in writing within seven (7) days from the date that the authorised development is commenced.

Development to be carried out in accordance with plans

4. The authorised development must be carried out in accordance with the approved plans, such plans being subject to the limits of deviation, bearing references listed below and any other plans, drawings, documents, details, schemes, statements or strategies which have been approved by the relevant planning authority pursuant to any requirement:

Plan Name	Plan Numbers
Works Plans	R1C093-R1-5002, R1C093-R1-5003, R1C093-R1-5004, R1C093-R1-5005, R1C093-R1-5006, R1C093-R1-5007, R1C093-R1-5008, R1C093-R1-5009, R1C093-R1-50010, R1C093-R1-50011, R1C093-R1-50012, R1C093-R1-50013
General Arrangement Plans	R1C093-R1-5015, R1C093-R1-5016, R1C093-R1-5017, R1C093-R1-5018, R1C093-R1-5019, R1C093-R1-5020, R1C093-R1-5021, R1C093-R1-5022, R1C093-R1-5023, R1C093-R1-5024, R1C093-R1-5025, R1C093-R1-5026

Landscape

5.—(1) No part of each of work numbers 1 to 24 save for any advance works is to commence until a written landscape plan covering the landscape elements forming part of the relevant work number has been submitted to and, following consultation with the relevant district authorities, approved in writing by the relevant planning authority.

(2) The landscape plan (or plans) must include the following which must comply with or include relevant measures, details or mitigation set out in the environmental statement—

- (a) details of the landscape works and measures;
- (b) details of the implementation of the landscape works and measures; and
- (c) details of the management, monitoring and maintenance of landscape works and measures.

(3) The approved landscape plan (or plans) must be implemented in full.

(4) Any tree or shrub planted as part of the approved landscape plan (or plans) that, within a period of 2 years after planting, is removed, dies or becomes in the opinion of the relevant planning authority, seriously damaged or diseased shall be replaced in the first available planting season with a specimen of the same species as that originally planted.

Existing trees and hedgerows

6.—(1) All hedges and trees forming part of the boundary of the Order land or situated within it (unless shown to be removed in the environmental statement or a landscape plan approved pursuant to requirement 5) shall be protected from any damage during the construction of the authorised development.

(2) If any hedge or tree protected under sub-paragraph (1) is removed, uprooted, destroyed or damaged during the construction of the authorised development it shall be replaced in the first available planting season and thereafter maintained for a period of 2 years.

(3) All areas of the site left undisturbed, and all soil, soil making material and overburden mounds shall be kept free from noxious weeds throughout the construction of the authorised development.

Ecology

7.—(1) No part of each of work numbers 1 to 24 save for any advance work is to commence until a written ecological management plan covering the ecological and nature conservation elements forming part of the relevant work number has been submitted to and, following consultation with the relevant district authorities, approved in writing by the relevant planning authority.

(2) The ecological management plan (or plans) must include the following which must comply with or include relevant measures, details or mitigation set out in the environmental statement—

- (a) details of the ecological and nature conservation works and measures;
- (b) details of the implementation of the ecological and nature conservation works and measures; and
- (c) details of the management, monitoring and maintenance of ecological and nature conservation works and measures.

(3) The approved ecological management plan (or plans) must be implemented in full.

Contamination

8.—(1) No part of each of work numbers 1 to 24 save for any advance works shall commence until a written scheme and programme of remedial measures to be taken as necessary to render the land fit for

its intended purpose has been submitted to and, following consultation with the relevant district authorities, approved in writing by the relevant planning authority.

(2) The implementation of work numbers for which such remedial measures are required shall be carried out in accordance with the written scheme and programme of remedial measures approved pursuant to paragraph (1).

(3) In the event that contaminated materials are found at any time when carrying out the authorised development which were not previously identified in the environmental statement or the scheme approved pursuant to paragraph (1), it shall be reported immediately in writing to the relevant planning authority and the undertaker shall complete a risk assessment of the contamination.

(4) Where the relevant planning authority determines that remediation is necessary, a written scheme and programme for the remedial measures to be taken to render the land fit for its intended purpose, shall be submitted to and approved in writing by the relevant planning authority.

(5) Remediation shall be carried out in accordance with the scheme(s) approved pursuant to this requirement 8.

Noise and Vibration

9.—(1) No part of each of work numbers 1 to 24 save for any advance works shall commence until a written scheme for noise and vibration management during construction of that work number has been submitted to and, following consultation with the relevant district authorities, approved by the relevant planning authority.

(2) The scheme shall set out the particulars of—

- (a) the works necessary for the work number(s) in question and the method by which they are to be carried out;
- (b) the noise attenuation measures to be taken to minimise noise resulting from such works including any noise limits; and
- (c) a scheme for monitoring the noise during such works to ensure compliance with the noise limits and the effectiveness of the attenuation measures.

(3) The approved noise and vibration management scheme must be implemented before and maintained during the construction of the relevant part of the authorised development.

(4) The construction works must be undertaken in accordance with the approved noise and vibration management scheme.

Travel Plan

10.—(1) No part of each of work numbers 1 to 24 save for the advance works shall commence until a travel plan covering the construction of that work number, which must include details of the expected means of travel to and from the authorised development and any parking to be provided, has been submitted to and, following consultation with the relevant district authorities, approved by the relevant planning authority.

(2) The travel plan (or plans) approved pursuant to paragraph (1) must be implemented in full during the construction of the authorised development.

Traffic Management

11.—(1) No part of each of work numbers 1 to 24 save for the advance works shall commence until the locations and details of the access points for traffic associated with the construction of that work number from the public highway have been submitted to and, following consultation with the relevant district authorities, approved in writing by the relevant planning authority.

(2) All construction traffic shall access the authorised development using an access point approved pursuant to paragraph (1) at all times.

Hours of Working

12.—(1) No construction works, or the delivery or removal of materials shall take place outside the hours of-

- (a) 07:00 to 19:00 hours on Mondays to Fridays (except for Public Holidays); and
- (b) 07:00 to 13:00 hours on Saturdays or on Public Holidays.

(2) Sub-paragraph (1) shall not prevent outside such hours –

- (a) the use of pumping equipment or the carrying out of essential on-site repairs to plant and machinery; and
- (b) construction works, or the delivery or removal of materials carried out with the prior written approval of the relevant planning authority.

Dust and mud on the highway during construction

13.—(1) No part of each of work numbers 1 to 24 save for the advance works shall commence until wheel cleaning facilities have been installed to clean the wheels of all construction vehicles entering the public highway from the site of that work number, the design, specification and locations of which shall first be approved in writing by the relevant planning authority.

(2) The approved facilities shall remain in position and be maintained in full working order and be used by all heavy goods vehicles throughout the construction of the authorised development to minimise the risk that dust, mud or other deleterious matter is transferred to the public highway by vehicles leaving the authorised development.

Dust and mud during construction - air quality

14.—(1) No part of each of work numbers 1 to 24 save for the advance works shall commence until measures relevant to the construction of that work number to minimise the risk of dust or windblown material being carried on to adjacent land have been submitted to and, following consultation with the relevant district authorities, approved in writing by the relevant planning authority.

(2) All heavy goods vehicles carrying material in to or out of the authorised development during the construction of the development shall be securely sheeted unless the load is otherwise enclosed or is not liable to be blown by the wind.

Safeguarding of watercourses and drainage

15.—(1) No part of each of work numbers 1 to 24 save for the advance works shall commence until a written scheme for the provision and implementation of pollution control relevant to the construction of that work number has been submitted to and, following consultation with the relevant district authorities, approved in writing by the relevant planning authority.

(2) The written scheme (or schemes) must include the following which must comply with or include relevant measures or details set out in the environmental statement---

- (a) details of measures for the collection, treatment and disposal of all water entering or arising on the Order land;
 - (b) details of measures for the collection and disposal of foul drainage;
 - (c) details of measures for the storage of any chemicals, oil or fuel.
- (3) The approved scheme (or schemes) must be implemented in full.

Archaeology

16.—(1) No part of each of work numbers 1 to 24 save for the advance works shall commence until a written scheme of archaeological investigation covering the relevant work number has been submitted to and, following consultation with the relevant district authorities, approved in writing by the relevant planning authority.

(2) The authorised development shall be carried out at all times in accordance with the scheme (or schemes) approved under sub-paragraph (1).

(3) Any archaeological remains not previously identified in the written scheme approved pursuant to paragraph 1 or in the environmental statement which are revealed when carrying out the authorised development shall be retained in situ (subject to paragraph 4) and reported to the relevant planning authority in writing within 3 working days.

(4) No construction operations shall take place within 10 metres of such remains for a period of 14 days from the date of such notification unless otherwise agreed in writing by the relevant planning authority.

(5) If the relevant planning authority confirm in writing to the undertaker during the 14 day period referred to in paragraph (4) that the archaeological remains require further investigation, then no construction operations shall take place within 10 metres of the remains until provision has been made for the investigation and recording of the remains in accordance with details first submitted to and approved by the relevant planning authority.

Site waste management plan

17.—(1) No part of each of work numbers 1 to 24 save for the advance works shall commence until a Site Waste Management Plan (SWMP) covering the relevant work number has been submitted to and, following consultation with the relevant district authorities, approved in writing by the relevant planning authority.

(2) All construction works must be undertaken in accordance with the approved SWMP(s).

Control of emissions during construction

18.—(1) No part of each of work numbers 1 to 24 save for the advance works shall commence until a written scheme covering the construction of that work number for the management and mitigation or emissions from the authorised development of-

- (i) odour;
- (ii) artificial light; and
- (iv) smoke.

has been submitted to and, following consultation with the relevant district authorities, approved in writing by the relevant planning authority.

(2) All construction works must be undertaken in accordance with the schemes approved pursuant to paragraph (1).

Construction environmental management plan

19.—(1) No part of each of work numbers 1 to 24 save for the advance works shall commence until a Construction Environment Management Plan (CEMP) covering the relevant work number has been submitted to and, following consultation with the relevant district authorities, approved in writing by the relevant planning authority.

(2) Any CEMP must reflect the details of controls on construction operations approved under other requirements and must reflect the draft CEMP submitted within Volume 1 of the environmental statement.

- (3) All construction works must be undertaken in accordance with the approved CEMP(s).

Construction of highway works affecting the Trunk Road network

20.—(1) All highway works (including their construction) that directly affect the Trunk Road network, must comply in all respects with the relevant requirements of the Design Manual for Roads and Bridges.

Fencing and other means of enclosure

21.—(1) No part of each of work numbers 1 to 24 save for the advance works shall commence until written details of all proposed permanent and temporary fences, walls and other means of enclosure relevant to that work number have been submitted to and approved in writing by the relevant planning authority.

(2) The approved temporary fencing or enclosure must be erected in accordance with the details approved pursuant to paragraph (1) and must be retained throughout the construction of the relevant work number.

(3) Any temporary fencing must be removed on completion of the authorised development.

(4) The approved permanent fencing or enclosure must be erected in accordance with the details approved pursuant to paragraph (1) prior to the relevant part of the authorised development being opened to the public for use.

Operational noise attenuation measures and their on-going maintenance

22.—(1) The authorised development must not be brought into use until a written scheme detailing operational noise management and attenuation measures, and their ongoing maintenance, has been submitted to and, following consultation with the relevant district authorities, approved in writing by the relevant planning authority.

(2) The authorised development must be operated in accordance with the approved operational noise management and attenuation details.

Public Rights of Way

23.—(1) No public right of way to be closed or diverted during the construction of or as part of the construction or operation of the authorised development shall be closed or diverted before the relevant local planning authority has given its written approval to the details of the relevant closure or diversion.

(2) All public rights of way closures and diversions shall be carried out in accordance with the details approved pursuant to paragraph (1).

Alternative Route for Marriott's Way

24.—(1) Prior to the closure of Marriott's Way to the public the undertaker shall provide a reasonable alternative route so as to permit the passage of pedestrians, cyclists and equestrians, between the two points at which Marriott's Way is to be temporarily closed during construction of the authorised development, such alternative route to be first approved in writing by the relevant planning authority.

(2) The undertaker shall provide the alternative route approved pursuant to paragraph (1) from the date on which Marriott's Way is closed to the public until the date on which the replacement land for the first area of Marriott's Way is provided and open to the public, subject to the undertaker being permitted to:

- (a) cross the alternative route including with vehicles, plant and machinery;
- (b) temporarily close the alternative route for the purposes of health and safety or in case of emergency; and

- (c) temporarily close the alternative route for the purposes of works requiring its closure, and in relation to which the undertaker shall give notice in accordance with paragraph (3) and the undertaker shall seek to minimise the number and extent of closures under this paragraph (c).

(3) If the undertaker is to temporarily close the alternative route under paragraph (2)(c) above it shall, at least 3 days prior to any closure, erect notices advising of the closure of the alternative route, such notices to state the date of the closure and the date the alternative route will be re-opened, and to be erected at the end points of the closure and at such other points at which public users of the way would need to depart from their route if wishing to make a through route journey between Pendlesham Rise and Fir Covert Road.

Surface water drainage

25.—(1) No part of each of work numbers 1 to 24 save for the advance works shall commence until a detailed surface water drainage strategy for the relevant work numbers has been submitted to and, following consultation with the relevant district authorities, approved by the relevant planning authority.

(2) The authorised development must be constructed in accordance with the approved surface water drainage strategy, including any timetable or programme approved within it.

Amendments to approved details

26. With respect to any requirement which requires the approval of any details, plans or schemes (“Approved Details, Plans or Schemes”) by the relevant planning authority, the undertaker may submit to the relevant planning authority for approval any amendments to the Approved Details, Plans or Schemes and following any further approval by the relevant planning authority the Approved Details, Plans or Schemes shall be taken to include the amendments approved pursuant to this requirement 26.

SCHEDULE 3

STREETS SUBJECT TO PERMANENT ALTERATION OF LAYOUT

Article 8

<i>(1)</i> <i>Street Plans Number/Title/Area</i>	<i>(2)</i> <i>Street subject to alteration of layout</i>	<i>(3)</i> <i>Description of alteration</i>
<p>Street Plans (Sheet 1 of 12)/ Fakenham Road/</p> <p>In the Parishes of Attlebridge, and Taverham</p> <p>In the District of Broadland</p> <p>In the County of Norfolk</p>	<p>A1067 Fakenham Road</p>	<p>(i) An increase in width, and the realignment of its carriageway and verges, on its north east side, from a point 295 metres north west of its junction with Attlebridge Restricted Byway No.3, north westwards for 935 metres, including the provision of a new roundabout junction ('Fakenham Road Roundabout'), as the westerly commencement point of the NDR classified road, at a point 380 metres north west of its junction with Attlebridge Restricted Byway No.3;</p> <p>(ii) The provision of footways/cycleways as part of, and around the south and north west arcs of the carriageway of, Fakenham Road Roundabout, to connect with the eastern tie-in of the A1067 Fakenham Road, on its north westerly approach to that roundabout, and with the diverted route of Attlebridge Restricted Byway No.3 (A on the Street Plans (Sheet 1 of 12)), where it connects with the north arc of the Fakenham Road Roundabout;</p> <p>(iii) The reconfiguration of that part of its redundant carriageway, within the length described in (i) above, to provide verge, together with other verge alterations within that length.</p>
	<p>Attlebridge Restricted Byway No.3</p>	<p>(i) The provision of a diverted length of Restricted Byway (A on the Street Plans (Sheet 1 of 12)), which will provide a new southerly connection for Attlebridge Restricted Byway No.3 with the A1067 Fakenham Road Roundabout.</p>

(1) Street Plans Number/Title/Area	(2) Street subject to alteration of layout	(3) Description of alteration
<p>Street Plans (Sheet 2 of 12)/ Fir Covert Road to Breck Farm Lane and Marriott's Way/</p> <p>In the Parishes of Attlebridge, and Taverham</p> <p>In the District of Broadland</p> <p>In the County of Norfolk</p>	C262 Fir Covert Road	<p>(i) An increase in width and alteration to the adjoining verges, and in part its carriageway, on both its east and west sides, over a distance of 150 metres on its southerly approach and a distance of 100 metres on its northerly approach to the NDR classified road Fir Covert Road Roundabout;</p> <p>(ii) The provision of short lengths of footway/cycleway on its west side on its northerly approach and on both its west and east sides on its southerly approach to the NDR classified road Fir Covert Road Roundabout, to connect with the existing western footway/verge of the C262 Fir Cover Road and, for the footway/cycleway on its west side with the new Bridleway (B on the Street Plans (Sheet 2 of 2)) which runs eastwards from Attlebridge Restricted Byway No.3 on the north side of the NDR classified road and, for the footway/cycleway on its east side, with the new Bridleway (C on the Street Plans (Sheet 2 of 2)) which runs eastwards from the C262 Fir Covert Road on the north side of the NDR classified road.</p>
	Breck Farm Lane (U57168)	<p>(i) An increase in width, on its east side, together with associated carriageway tie-in works, from a point 12 metres north north-east of the Access to Breck Farm Bungalow, north north-eastwards for 26 metres, so as to provide a turning head at what will become its north easterly termination point on the south side of the NDR classified road.</p>
	Furze Lane (U57168)	<p>(i) An increase in width, on its east side, together with associated carriageway tie-in works, from a point 65 metres south of the south western corner of the curtilage of 'The Warren', southwards for 26 metres, so as to provide a turning head at</p>

(1) Street Plans Number/Title/Area	(2) Street subject to alteration of layout	(3) Description of alteration
		what will become its southerly termination point on the north side of the NDR classified road.
<p>Street Plans (Sheet 3 of 12)/ Reepham Road to Bell Farm Track/</p> <p>In the Parishes of Taverham, Drayton, and Horsford</p> <p>In the District of Broadland</p> <p>In the County of Norfolk</p>	C261 Reepham Road	<p>(i) An increase in width and alteration to the adjoining verges, and in part its carriageway, on both its north east and south west sides, over a distance of 250 metres on the south easterly approach and a distance of 250 metres on the north westerly approach to the NDR classified road Reepham Road Roundabout;</p> <p>(ii) The provision of lengths of footway/cycleway on its south western side, on its north westerly and south easterly approaches to the NDR classified road Reepham Road Roundabout, to connect with a new Cycle Track (with a right of way on foot) (H on the Street Plans (Sheet 3 of 12)), on the south side of the NDR classified road and with a new Bridleway (F on the Street Plans (Sheet 3 of 12)), on the north side of the NDR classified road, and leading to a crossing point of the north westerly arm of the NDR classified road Reepham Road Roundabout, to connect with another new Bridleway (I on the Street Plans (Sheet 3 of 12)) on the north side of the NDR classified road;</p> <p>(iii) The removal of 220 metres of the northerly grassed verge, between its junction with Long Dale (U51249), along the southern frontage of the premises of Kieft & Sons (growers, storage and packaging), and its replacement with a footway/cycleway along that length of verge.</p>
	Drayton Restricted Byway No.6/Dog Lane (U5176)/ Horsford Restricted Byway No.4	<p>(i) The provision of a new diverted length of Restricted Byway (J on the Street Plans (Sheet 3 of 12)), which will provide a new south westerly connection for Drayton Restricted Byway No.6 with the NDR classified road</p>

(1) Street Plans Number/Title/Area	(2) Street subject to alteration of layout	(3) Description of alteration
		Reepham Road Roundabout; (ii) The resurfacing of the length between the diverted route described in (i) above, north eastwards, then eastwards, to a point 30 metres east of the junction with Horsford Restricted Byway No.5.
	Horsford Restricted Byway No.5	(i) The provision of a new diverted route between Dog Lane (U57176) and the C261 Reepham Road (K on the Street Plans (Sheet 3 of 12)).
Street Plans (Sheet 4 of 12)/ East of Bell Farm Track to Drayton Lane/ In the Parishes of Horsford, and Drayton In the District of Broadland In the County of Norfolk	C282 Drayton Lane (North)	(i) An increase in width, together with associated carriageway tie-in works, on its west side, from the southern boundary of the curtilage of 'Rookery North', southwards for 28 metres, so as to provide a turning head, at the northerly point of the stopped up C282 Drayton Lane.
	B1149 Holt Road	(i) An increase in width, and the realignment of its carriageway and adjoining verges, from a point 40 metres north west of its junction with the Access to Glebe Farm, north westwards to its junction with the C253 Church Street, including the provision of a new roundabout junction ('Holt Road/Drayton Lane Roundabout'), at a point 100 metres south east of its junction with the C253 Church Street; (ii) The provision of a footway/cycleway on the north eastern side of and joining with its carriageway, from a point 20 metres south east of its junction with the C253 Church Street, south eastwards for 160 metres.
	C261 Reepham Road	(i) An increase in width, and realignment of its carriageway and verges, on its north side, and for part of its length on its south side in relation to verge, over a 420 metres length, so as to provide a major/minor priority T-junction with the new street (P on the Street Plans

(1) Street Plans Number/Title/Area	(2) Street subject to alteration of layout	(3) Description of alteration
		(Sheet 4 of 12)) which is to be constructed (as a realignment of the C282 Drayton Lane) between the C261 Reepham Road and the NDR classified road Drayton Lane Roundabout.
	C282 Drayton Lane (South)	(i) An increase in width, together with associated carriageway tie-in works, on its west side, from a point 2 metres south of its junction with the C261 Reepham Road, southwards for 26 metres, so as to provide a turning head at the southerly point of the stopped up C282 Drayton Lane (South), to the south of the C261 Reepham Road.
Street Plans (Sheet 5 of 12)/ Cromer Road Interchange to Old Norwich Road/ In the Parishes of Horsford, and Horsham St. Faith and Newton St. Faith In the District of Broadland In the County of Norfolk	B1149 Holt Road	(i) An increase in width, on its south west side, from the south easterly boundary of the Access to New Holme Farm, south eastwards for 26 metres, so as to provide a turning head at the north westerly point of the stopped up B1149 Holt Road, on the north side of the NDR classified road.
	Holly Lane (U57142)	(i) An increase in width, on its south side, from a point 10 metres east of the Access to Manor Farm, eastwards for 26 metres, so as to provide a turning head at the westerly point of stopped up Holly Lane (U57142), at what will become its easterly termination point on the south side of the NDR classified road.
	B1149/A140 Holt Road	(i) A reconfiguration of its carriageway and verges and of the Cromer Road Roundabout South, from a point some 30 metres south of its junction with the Access to Harts Hill Farm, north westwards for 330 metres; (ii) The provision of an incorporated footway/cycleway along its south west side, connecting to the footway/cycleway to be provided along the south west side of the carriageway of the

(1) Street Plans Number/Title/Area	(2) Street subject to alteration of layout	(3) Description of alteration
		<p>westbound merge slip road of the NDR classified road at Cromer Road Interchange, leading up to the connection point with the new Cycle Track (with a right of way on foot) (T on the Street Plans (Sheet 5 of 12)) along stopped up Holly Lane (U57142);</p> <p>(iii) The provision of a footway/cycleway on the east arc of the Cromer Road Roundabout South, connecting to the eastern footway/cycleway of the new street (W on the Street Plans (Sheet 5 of 12)) to be provided as the Cromer Road Overbridge grade separated crossing of the NDR classified road.</p>
	A140 Cromer Road	<p>(i) An increase in width, and realignment of its carriageway and verges, on its west side, and the provision of a footway/cycleway within its east side, from a point 105 metres north of its junction with the Unnamed Highway (Cromer Road to West Lane) (U57647), northwards for 200 metres, to provide the tie-in approach to the new street (W on Street Plans (Sheet 5 of 6)) and incorporated roundabout (Cromer Road Roundabout North), which will provide the Cromer Road Overbridge grade separated crossing of the NDR classified road.</p>
<p>Street Plans (Sheet 6 of 12)/ Access to Norwich International Airport and St. Faiths Road</p> <p>In the Parishes of Horsham St. Faith and Newton St. Faith, and Spixworth</p> <p>In the District of Broadland and in the City of Norwich</p> <p>In the County of Norfolk</p>	C251 Bullock Hill	<p>(i) An increase in width, together with associated carriageway tie-in works, on its north east side, from a point some 70 metres south east of its junction with Calf Lane (U57229), south eastwards for 24 metres, so as to provide a turning head at the north westerly point of the stopped up C251 Bullock Hill, on the north side of the NDR classified road.</p>

(1) Street Plans Number/Title/Area	(2) Street subject to alteration of layout	(3) Description of alteration
Street Plans (Sheet 7 of 12)/ Buxton Road In the Parish of Spixworth In the District of Broadland In the County of Norfolk	C251 St. Faiths Road	(i) An increase in width, together with associated carriageway tie-in works, on its west side, from a point 134 metres generally south of its junction with Spixworth Bridleway No.1, southwards for 26 metres, so as to provide a turning head at the southerly point of the stopped up C251 St Faiths Road, on the south side of the NDR classified road.
	Quaker Lane (U57188)	(i) An increase in width, together with associated carriageway tie-in works, on its south side, from the western boundary of the Access to Quaker Farm, westwards for 26 metres, so as to provide a turning head at the easterly point of the stopped up Quaker Lane (U57188), on the north side of the NDR classified road; (ii) An increase in width, on its south side, from a point 46 metres west of its junction with the C246 Buxton Road, westwards for 30 metres, so as to provide the tie-in for the new street (CC on the Street Plans (Sheet 7 of 12)) connecting Quaker Lane (U57188) with the C246 Buxton Road.
	C246 Buxton Road	(i) An increase in width, on its east side, from its junction with Arthurton Road (U51200), southwards for 365 metres, to its junction with the new street (DD on the Street Plans (Sheet 7 of 12)) to be provided as the Buxton Road Overbridge crossing of the NDR classified road, including realignment of its carriageway eastwards; removal of its former carriageway and replacement with verge; and the provision of a footway/cycleway along its eastern side; (ii) An increase in width, on its east side, from a point some 60 metres north of its junction with Beeston Lane (U57187), northwards for 240 metres, to its junction with the new street (DD on the Street

(1) Street Plans Number/Title/Area	(2) Street subject to alteration of layout	(3) Description of alteration
		Plans (Sheet 7 of 12)) to be provided as the Buxton Road Overbridge crossing of the NDR classified road, including realignment of its carriageway eastwards; replacement of its former carriageway with an equestrian/pedestrian path; the provision of a footway/cycleway along its east side; and the provision of new integral ways leading off its realigned carriageway to the private means of access to Nos. 318 – 324 (Evens) Buxton Road and to farmland lying to the west of the C246 Buxton Road and to the Electricity Sub-Station lying to the rear of No.318 Buxton Road.
Street Plans (Sheet 8 of 12)/ North Walsham Road to Beeston Lane and North Walsham Road/Rackheath Lane/Crosthwick Lane Junction Improvement In the Parishes of Beeston St. Andrew, and Crosthwick In the District of Broadland In the County of Norfolk	B1150 North Walsham Road	(i) An increase in width and alteration to the adjoining verges, on both its east and west sides, over a distance of 110 metres on its southerly approach and a distance of some 120 metres on its northerly approach to the NDR classified road North Walsham Road Roundabout; (ii) The provision of footway/cycleways around all four arcs of the NDR North Walsham Road Roundabout carriageway, leading to crossing points of the NDR on both the western and eastern arms of the NDR North Walsham Road Roundabout; (iii) The reconfiguration of its verges over a 80 metres length south of, and a 78 metres length north of, its junction with the C249 Rackheath Lane.
	C249 Crosthwick Lane	(i) The provision of a widened filter lane from the C249 Crosthwick Lane to the northbound lane of the B1150 North Walsham Road.
	C249 Rackheath Lane	(i) The widening of a 15 metres length, at its junction with the B1150 North Walsham Road, so as to provide a cul-de-sac turning head at that point, at which its existing junction with the B1150 North Walsham Road will be closed.

(1) Street Plans Number/Title/Area	(2) Street subject to alteration of layout	(3) Description of alteration
<p>Street Plans (Sheet 9 of 12)/</p> <p>Wroxham Road and Wroxham Road/Green Lane West Junction Improvement</p> <p>In the Parishes of Beeston St. Andrew, Rackheath, and Sprowston</p> <p>In the District of Broadland</p> <p>In the County of Norfolk</p>	<p>A1151 Wroxham Road</p>	<p>(i) An increase in width and alteration to the adjoining verges, on both its north west and south east sides, over a distance of 120 metres on its north easterly approach and a distance of 160 metres on its south westerly approach to the NDR classified road Wroxham Road Roundabout;</p> <p>(ii) The provision of footways/cycleways around the west, north and east arcs of the NDR classified road Wroxham Road Roundabout carriageway, leading to a crossing point of the NDR classified road on the western arm of the Wroxham Road Roundabout;</p> <p>(iii) Carriageway and verge reconfiguration works over a 160 metres length south west of and a 160 metres length north east of, its junction with the new street (GG on the Street Plans (Sheet 9 of 12)) which will provide a new Link Road from the C258 Green Lane West, incorporating landscaping/verge works which will provide the physical works of closure of the existing C258 Green Lane West junction with the A1151 Wroxham Road.</p>
	<p>C258 Green Lane West</p>	<p>(i) The widening, on its north and south sides, of a 15 metres length from its junction with the A1151 Wroxham Road, so as to provide a cul-de-sac turning head at that point, at which its existing junction with the A1151 Wroxham Road will be closed;</p> <p>(ii) The widening and reconfiguration of its carriageway and verges, on its south west side, of a 62 metres length, from the south easterly connection point of the new Link Road (GG on Street Plans (Sheet 9 of 12)) which is to be constructed between the A1151 Wroxham Road and the C258 Green Lane West, which alteration works will provide the tie-in with that latter street and which will form a T-junction with its remaining length which is to become a residential cul-de-sac.</p>

(1) Street Plans Number/Title/Area	(2) Street subject to alteration of layout	(3) Description of alteration
<p>Street Plans (Sheet 10 of 12)/ Newman Road, Salhouse Road and Railway Crossing</p> <p>In the Parishes of Rackheath, and Great and Little Plumstead</p> <p>In the District of Broadland</p> <p>In the County of Norfolk</p>	C283 Salhouse Road	<p>(i) An increase in width and alteration to the adjoining verges, on both its north west and south east sides, over a distance of 165 metres on its south westerly approach to the NDR classified road Salhouse Road Roundabout, and over a further 120 metres on the south east side only on that same approach, from its junction with the C258 Green Lane East, and over a distance of 70 metres on its north easterly approach to the NDR classified road Salhouse Road Roundabout, and over a further 60 metres on the south east side only, south west of those former alteration works;</p> <p>(ii) The provision of footways/cycleways around the north, east and south arcs of the NDR classified road Salhouse Road Roundabout carriageway, leading to a crossing point of the NDR classified road on the north westerly arm of the NDR Salhouse Road Roundabout, and with a short length of footway/cycleway around the west arc of the roundabout connecting with the new Cycle Track (JJ on the Street Plans (Sheet 9 of 12)), leading north westwards from the C283 Salhouse Road along the south west side of the NDR classified road.</p>
	C258 Broad Lane	<p>(i) An increase in width, together with associated carriageway tie-in works, on its south west side, from a point some 90 metres north west of its junction with the C874 Plumstead Road, north westwards for 26 metres, so as to provide a turning head situated some 12 metres to the north west of the north western and rear curtilage boundary of the property 'Braemar';</p> <p>(ii) Landscaping/verge works across the north west junction of the C258 Broad Lane/C874 Plumstead Road, which will provide the physical works of closure at that junction.</p>

(1) Street Plans Number/Title/Area	(2) Street subject to alteration of layout	(3) Description of alteration
	C874 Plumstead Road (Part on Street Plans (Sheet 11 of 12))	<p>(i) An increase in width, and realignment of its carriageway and verges, on its south east side, and in part on its north west side, from a point 20 metres south west of its junction with the C258 Broad Lane, south westwards for 420 metres, including the provision of a new roundabout ('Plumstead Road Roundabout North'), at a point 220 metres south west of its junction with the C258 Broad Lane;</p> <p>(ii) The provision of an integral footway/cycleway along its north west side, from a point 100 metres south west of its junction with the C258 Broad Lane, south westwards for 450 metres leading, at its south westerly termination, to the connection point with the new Bridleway (KK on the Street Plans (Sheet 10 of 12)) which will run along the west side of the Norwich to Cromer & Sheringham Railway, between the C874 Plumstead Road and the C258 Green Lane East.</p>
<p>Street Plans (Sheet 11 of 12)/ Plumstead Road, Middle Road and Low Road and Thorpe End Highway Improvement Measures</p> <p>In the Parish of Great and Little Plumstead</p> <p>In the District of Broadland</p> <p>In the County of Norfolk</p>	C874 Plumstead Road	<p>(i) The construction of a mini-roundabout junction, at its junction with Broadland Drive (U51073);</p> <p>(ii) The removal of its north western verge and replacement with a footway/cycleway, along the frontages of No.15 Percy Howes Close and Nos. 49-63 (odds) Plumstead Road.</p>
	Broadland Drive (U51073)	(i) The reconfiguration of a 20 metres length of carriageway on its south easterly approach to tie-in with the new C874 Plumstead Road mini-roundabout.
	C442 Middle Road	(i) An increase in width and its alteration/regrading of the adjoining verges, on both its north and south sides, over a distance of 315 metres on its easterly approach and a distance of some 170 metres on its westerly approach, to the point at which the C442 Middle Road will be carried over the NDR on the Middle Road

(1) Street Plans Number/Title/Area	(2) Street subject to alteration of layout	(3) Description of alteration
		<p>Overbridge, together with the raising of that length between those two points, to be carried on Overbridge across the NDR classified road;</p> <p>(ii) The provision of an integral footway/cycleway along its south side, along its elevated approaches and Overbridge crossing of the NDR classified road, namely from a point 10 metres west of its junction with Toad Lane (U59284), westwards for 550 metres, together with the provision of an equestrian/pedestrian path connection within the southern embankment, to the west of the NDR classified road, leading to its connection with the new Bridleway (OO on the Street Plans (Sheet 11 of 12)), running southwards on the west side of the NDR classified road.</p>
	Low Road (U59392)	<p>(i) An increase in width, together with associated carriageway tie-in works, on its north side, from a point 55 metres west of its junction with the Access to the 'Red House', westwards for 26 metres, so as to provide a turning head at what is to become the westerly termination point of Low Road (U59392), on the east side of the NDR classified road;</p> <p>(ii) An increase in width, together with associated carriageway tie-in works, on its north side, immediately to the east of its junction with Green Lane (U59278) at what is to become the easterly termination point of Low Road (U59392), on the west side of the NDR classified road, and lying to the west of the property 'Meadow View' and the Laurel Farm group of properties.</p>
<p>Street Plans (Sheet 12 of 12)/ Smee Lane and Postwick Interchange</p> <p>In the Parishes of Great and Little Plumstead, and Postwick with Witton</p>	Smee Lane (U59400)	<p>(i) An increase in width, together with associated carriageway tie-in works, on its south side, from a point 110 metres west of its junction with the Access to Apple Tree Farm, westwards for 26 metres, so as to provide a turning</p>

<i>(1)</i> <i>Street Plans</i> <i>Number/Title/Area</i>	<i>(2)</i> <i>Street subject to alteration of</i> <i>layout</i>	<i>(3)</i> <i>Description of alteration</i>
<p>In the District of Broadland and in the administrative area of The Broads Authority</p> <p>In the County of Norfolk</p>		<p>head at the easterly point of the stopped up Smee Lane (U59400), and what is to become its westerly termination point, on the east side of the NDR classified road;</p> <p>(ii) An increase in width, together with associated carriageway tie-in works, on its south side, from a point 180 metres east of its junction with the Green Lane (U59278)/C832 Cranley Road/C830 Broadland Way roundabout junction, eastwards for 26 metres, so as to provide a turning head at the westerly point of the stopped up Smee Lane (U59400), and what is to become its easterly termination point, on the west side of the NDR classified road.</p>
	C829 Broadland Way	<p>(i) The removal of its verge around the east arc of its roundabout junction and replacement with carriageway to provide the tie-in connection with the new Broadland Gate Link Road (SS on the Street Plans Sheet 12 of 12)), to be provided between the C829/C830 Broadland Way/C831 Peachman Way Roundabout and the NDR classified road Business Park Roundabout;</p> <p>(ii) The realignment/reconfiguration of the southbound lane and verge, and removal of the segregated filter lane off the southbound lane leading to the A47 Trunk Road Eastbound Merge Slip Road and its substitution with verge, from its junction with Access track to Heath Farm, southwards for 110 metres, on its southerly approach to the Postwick North West Roundabout, together with reconfiguration works over a 30 metres north east arc of the Postwick North West Roundabout, to provide the tie- in/short length stub arm entry/exit point (for future development purposes) in the north east quadrant of the roundabout.</p>
	A1042 Yarmouth Road	<p>(i) The reconfiguration of the verges and footway/cycleway around the</p>

(1) Street Plans Number/Title/Area	(2) Street subject to alteration of layout	(3) Description of alteration
		<p>south arc of the Postwick North West Roundabout, including the provision of a new footway/cycleway connection, between the two existing footways/cycleways, across the top of the A47 Eastbound Diverge Slip Road (which is to be stopped up);</p> <p>(ii) The removal of the verge and its substitution with a footway/cycleway, along the west side of the A1042 Yarmouth Road Overbridge of the A47 Trunk Road, so as to provide a continuous footway/cycleway along its west side between Postwick North West Roundabout and the Postwick Park & Ride site;</p> <p>(iii) Reconfiguration of the verges, footways/cycleways and of its roundabout junction in the vicinity of the Postwick Park & Ride site, so as to replace the roundabout with a new signalised controlled junction (Park & Ride Signalised Junction);</p> <p>(iv) Realignment of the carriageway and verges, on its south side, of that length over a distance of 160 metres on its westerly approach to the proposed signalised controlled junction in the vicinity of the Postwick Park & Ride site, so as to provide a 3-lane westerly approach to the proposed signalised junction;</p> <p>(v) The reconfiguration of the northern verge and in part the footway/cycleway, together with the removal of part of the northern verge and its substitution with a new footway/cycleway, over a 630 metres length east from the signalised junction at Postwick, to the junction of the C440 Church Road.</p>
	A47 Trunk Road Eastbound Diverge Slip Road	(i) Reconfiguration/regrading of the verges of that length of the slip road, and in part substitution of part of its carriageway by new verge, over a length of 275 metres

(1) Street Plans Number/Title/Area	(2) Street subject to alteration of layout	(3) Description of alteration
		<p>eastwards from where the A47 Trunk Road crosses over the Norwich to Yarmouth & Lowestoft Railway line, so as to provide a suitable tie-in with both the New A47 Trunk Road Eastbound Diverge Slip Road, at the easterly termination point of those aforementioned permanent alteration works, and also with a new Cycle Track (TT on the Street Plans (Sheet 12 of 12)) which is to be provided along a length of the stopped up A47 Trunk Road Eastbound Diverge Slip Road, leading to the A1042 Yarmouth Road at the Postwick North West Roundabout.</p>
	<p>A47 Trunk Road Eastbound Merge Slip Road</p>	<p>(i) Reconfiguration/regrading of the verges of that length of the slip road, and in part substitution of part of its carriageway by new verge, from a point 125 metres west of its junction with the Access to 'The Grange', eastwards for 240 metres, so as to provide a suitable tie-in with the New A47 Trunk Road Eastbound Merge Slip Road, at the westerly termination point of those aforementioned permanent alteration works.</p>

SCHEDULE 4

STREETS SUBJECT TO STREET WORKS

Article 9

<i>(1)</i> <i>Street Plans Number/Title</i>	<i>(2)</i> <i>Location</i>	<i>(3)</i> <i>Street subject to street works</i>
Street Plans (Sheet 1 of 12)/ Fakenham Road	In the Parishes of Attlebridge, and Taverham In the District of Broadland In the County of Norfolk	A1067 Fakenham Road Attlebridge Restricted Byway No.3
Street Plans (Sheet 2 of 12)/ Fir Covert Road to Breck Farm Lane and Marriott's Way	In the Parishes of Attlebridge, and Taverham In the District of Broadland In the County of Norfolk	C262 Fir Covert Road Breck Farm Lane/Furze Lane (U57168)
Street Plans (Sheet 3 of 12)/ Reepham Road to Bell Farm Track	In the Parishes of Taverham, Drayton, and Horsford In the District of Broadland In the County of Norfolk	C261 Reepham Road Drayton Restricted Byway No.6/Dog Lane (U57176)/Horsford Restricted Byway No.4 Horsford Restricted Byway No.5
Street Plans (Sheet 4 of 12)/ East of Bell Farm Track to Drayton Lane	In the Parishes of Horsford, and Drayton In the District of Broadland In the County of Norfolk	C282 Drayton Lane (North)/ Drayton Lane (South) B1149 Holt Road C261 Reepham Road
Street Plans (Sheet 5 of 12)/ Cromer Road Interchange to Old Norwich Road	In the Parishes of Horsford, and Horsham St. Faith and Newton St. Faith In the District of Broadland In the County of Norfolk	B1149 Holt Road Holly Lane (U57142) Unnamed Highway (Holt Road to Cromer Road) (U51625) Unnamed Highway (Cromer Road to West Lane) (U57647) A140 Cromer Road/Holt Road
Street Plans (Sheet 6 of 12)/ Access to Norwich International Airport and St. Faiths Road	In the Parishes of Horsham St. Faith and Newton St. Faith, and Spixworth In the District of Broadland and in the City of Norwich In the County of Norfolk	C251 Bullock Hill

<i>(1)</i> <i>Street Plans Number/Title</i>	<i>(2)</i> <i>Location</i>	<i>(3)</i> <i>Street subject to street works</i>
Street Plans (Sheet 7 of 12)/ Buxton Road	In the Parish of Spixworth In the District of Broadland In the County of Norfolk	C251 St Faiths Road Quaker Lane (U57188) C246 Buxton Road
Street Plans (Sheet 8 of 12)/ North Walsham Road to Beeston Lane and North Walsham Road/Rackheath Lane/Crostwick Lane Junction Improvement	In the Parishes of Beeston St. Andrew, and Crostwick In the District of Broadland In the County of Norfolk	B1150 North Walsham Road C249 Crostwick Lane C249 Rackheath Lane
Street Plans (Sheet 9 of 12)/ Wroxham Road and Wroxham Road/Green Lane West Junction Improvement	In the Parishes of Beeston St. Andrew, Rackheath, and Sprowston In the District of Broadland In the County of Norfolk	A1151 Wroxham Road C258 Green Lane West
Street Plans (Sheet 10 of 12)/ Newman Road, Salhouse Road and Railway Crossing	In the Parishes of Rackheath, and Great and Little Plumstead In the District of Broadland In the County of Norfolk	C283 Salhouse Road C874 Plumstead Road C258 Broad Lane
Street Plans (Sheet 11 of 12)/ Plumstead Road, Middle Road and Low Road and Thorpe End Highway Improvement Measures	In the Parish of Great and Little Plumstead In the District of Broadland In the County of Norfolk	C874 Plumstead Road Broadland Drive (U51073) C442 Middle Road Low Road (U59392)
Street Plans (Sheet 12 of 12)/ Smee Lane and Postwick Interchange	In the Parishes of Great and Little Plumstead, and Postwick with Witton In the District of Broadland and in the administrative area of The Broads Authority In the County of Norfolk	Smee Lane (U59400) C829 Broadland Way A1042 Yarmouth Road A47 Trunk Road (Norwich Southern Bypass at Postwick Interchange) – <ul style="list-style-type: none"> • Eastbound Diverge Slip Road • Eastbound Merge Slip Road

SCHEDULE 5

CLASSIFICATION OF ROADS

Article 11

PART 1

The New A47 Trunk Road Postwick Interchange Slip Roads

1. New A47 Trunk Road Eastbound Diverge Slip Road: A new, bifurcated, slip road, from a point on the existing A47 Trunk Road eastbound diverge slip road, where it is proposed to be improved, at Postwick Interchange, 250 metres generally east of where the A47 Trunk Road crosses over the Norwich to Yarmouth & Lowestoft Railway line, extending generally eastwards to connect –

- (a) for its first bifurcated part with the NDR classified road Postwick North East Roundabout; and
- (b) for its second bifurcated part with the northbound carriageway of the NDR classified road, some 60 metres north of the NDR classified road Postwick North East Roundabout,

identified on the street plans ((Sheet 12 of 12)/Smee Lane and Postwick Interchange) by the symbol indicated on those plans for ‘The New A47 Trunk Road Postwick Interchange Slip Roads’ and annotated on that sheet as ‘New A47 Trunk Road Eastbound Diverge Slip Road’, and as is identified on the Classification of Highways Plan by a solid green line.

2. New A47 Trunk Road Eastbound Merge Slip Road: A new slip road, from the NDR classified road Postwick North East Roundabout, extending eastwards to connect with the existing A47 Trunk Road eastbound merge slip road, where it is proposed to be improved, at a point 125 metres west of the private access to ‘The Grange’,

identified on the street plans ((Sheet 12 of 12)/Smee Lane and Postwick Interchange) by the symbol indicated on those plans for ‘The New A47 Trunk Road Postwick Interchange Slip Roads’ and annotated on that sheet as ‘New A47 Trunk Road Eastbound Merge Slip Road’, and as is identified on the Classification of Highways Plan by a solid green line.

PART 2

The NDR Classified Road

A 19.8 kilometre highway, to be constructed as the A1270 Principal Road –

- (a) commencing from its junction with the proposed roundabout, which will be constructed as an improvement of the A1067 Fakenham Road (‘Fakenham Road Roundabout’), 390 metres west north-west of its junction with Attlebridge Restricted Byway No.3;
- (b) then extending in a generally north easterly, then easterly, direction to its at-grade roundabout junction with the C262 Fir Covert Road (‘Fir Covert Road Roundabout’), situated to the north of the Taverham Garden Centre and to the south of the property ‘Chestnut House’;
- (c) then extending generally eastwards, crossing under Marriott’s Way, then crossing and severing Furze Lane (U57168)/Breck Farm Lane (U57168), to the south of the property ‘The Warren’, to its at-grade roundabout junction with the C261 Reepham Road (‘Reepham Road Roundabout’), 450 metres north west of the junction of the C261 Reepham Road with Drewray Drive (U51248);
- (d) then extending east south-eastwards, crossing under Bell Farm Track/Horsford Restricted Byway No.5, midway along its length, to its at-grade roundabout junction (‘Drayton Lane Roundabout’), with two new highway connections to the B1149 Holt Road and the C261 Reepham Road which

will replace the former C282 Drayton Lane, just to the south west of the property 'The Homestead';

- (e) then continuing east south-eastwards to its grade-separated dumb-bell interchange, incorporating two eastbound diverge and merge slip roads connecting with the A140 Cromer Road Roundabout North, just to the south of New Holme Farm, and two westbound diverge and merge slip roads connecting with the A140 Cromer Road Roundabout South, and with the B1149 Holt Road (also to become the A1270), respectively, just to the north of Manor Park Sports Club;
- (f) then continuing eastwards, passing to the south of the City of Norwich Aviation Museum and to the north of the Norwich International Airport Control Tower, then north eastwards, to its roundabout junction at the north west corner of Norwich International Airport ('Airport Roundabout'), 160 metres north east of The Petans Training Centre at Bullock Hill;
- (g) then turning south eastwards, crossing and severing Quaker Lane (U57188) and the C251 St Faiths Road where those two highways connect, then eastwards, crossing under the new and realigned C246 Buxton Road, to the north east of No. 318 Buxton Road and to the south of Quaker Lane (U57188), then north eastwards, to its at-grade roundabout junction with the B1150 North Walsham Road ('North Walsham Road Roundabout'), to the north of the HFG Farm Shop and Garden Centre;
- (h) then extending eastwards, then east south-eastwards, to its at-grade roundabout junction with the A1151 Wroxham Road ('Wroxham Road Roundabout'), 140 metres south west of its junction with Sloe Lane (U57095);
- (i) then extending generally south eastwards, crossing under a proposed private access/bridleway bridge, 200 metres south west of the junction of Newman Road (U57490) with Long's Crescent (U57852), to its at-grade roundabout junction with the C283 Salhouse Road ('Salhouse Road Roundabout'), 310 metres south west of its crossroads junction with the C258 Green Lane East and C258 Green Lane West;
- (j) then continuing south eastwards, crossing over, by bridges, the Norwich to Cromer & Sheringham railway line and the C874 Plumstead Road, just to the north east of the existing railway crossing on the C874 Plumstead Road, to its new roundabout junction ('Plumstead Road Roundabout South'), with a new connecting Link Road with, and 270 metres south east of, the improved C874 Plumstead Road;
- (k) then extending generally southwards, crossing under the C442 Middle Road, just to the west of Oaks Farm;
- (l) then continuing southwards, crossing and severing Low Road (U59392), 70 metres to the west of the curtilage of the property 'The Red House';
- (m) then continuing southwards, crossing and severing Smee Lane (U59400), 90 metres west of the curtilage of Apple Tree Farm;
- (n) then continuing south south-eastwards to a new roundabout junction ('Business Park Roundabout'), 550 metres east of the C829/C830 Broadland Way/C831 Peachman Way Roundabout;
- (o) then turning south westwards to a new roundabout junction ('Postwick North East Roundabout'), on the northern side of the A47 Trunk Road Norwich Southern Bypass; and

- (p) then continuing south westwards, on overbridge across the A47 Trunk Road Norwich Southern Bypass, terminating at its junction with the A1042 Yarmouth Road, where it is to be improved to provide a signalised junction, just east of the Postwick Park and Ride Site,

identified on the street plans, by the symbol indicated on those plans for ‘The NDR classified road’, and as is identified on the Highway Classifications Plan by a solid red line.

PART 3

Holt Road

A 200 metre length of the B1149 Holt Road, to be classified as the A1270 Principal Road, as extends north westwards from its junction with the A140 Cromer Road roundabout junction (‘Cromer Road Roundabout South’),

identified by cross hatching on the street plans ((Sheet 5 of 12)/Cromer Road Interchange to Old Norwich Road), as the north westerly arm off the Cromer Road Roundabout South, and as is identified on the Highway Classifications Plan by a red pecked line.

PART 4

The A140 Cromer Road Classified Road

A 450 metre length of new highway, to be constructed as the A140 Principal Road, from its junction with the B1149 Holt Road/A140 Cromer Road roundabout junction (‘Cromer Road Roundabout South’), extending generally northwards, and incorporating a new roundabout (‘Cromer Road Roundabout North’) at a point 280 metres north along its length, to its junction with the existing A140 Cromer Road, at a point 110 metres north of its junction with the unnamed highway (Cromer Road to West Lane (U57647)),

identified on the street plans ((Sheet 5 of 12)/Cromer Road Interchange to Old Norwich Road) as new highway W, and as is identified on the Highway Classifications Plan by a solid pink line.

PART 5

The Broadland Gate Link Road

- (a) A 550 metre length of new highway (‘Broadland Gate Link Road’), to be constructed as the A1194 Principal Road, from its junction with the C829/C830 Broadland Way/C831 Peachman Way roundabout junction, extending eastwards to its junction with the NDR classified road Business Park Roundabout,

identified on the street plans ((Sheet 12 of 12)/Smee Lane and Postwick Interchange) as new highway SS, and as is identified on the Highway Classifications Plan by a solid purple line.

Broadland Way

- (b) A 385 metre length, being the whole of the C829 Broadland Way, to be classified as the A1194 Principal Road, from its junction with the A1042 Yarmouth Road roundabout junction (‘Postwick North West Roundabout’), extending northwards to and including its roundabout junction with the C830 Broadland Way North and C831 Peachman Way,

as appears on the street plans ((Sheet 12 of 12)/Smee Lane and Postwick Interchange), and as is identified on the Highway Classifications Plan by a pecked purple line.

SCHEDULE 6

Article 12

In relating this Schedule 6 to its corresponding Street Plans, the provisions described herein are shown on the Street Plans in the following manner –

- (a) Streets to be stopped up, described in column (3) of Part 1 of this Schedule, are shown by thick black hatching, over the extent of stopping up described in column (4) of that Part;
- (b) New Streets to be substituted for a Street to be stopped up, or are otherwise to be provided, other than the NDR classified road and/or the New A47 Trunk Road Eastbound Diverge Slip Road and the New A47 Trunk Road Eastbound Merge Slip Road in relation to which those other new Streets are to be constructed, as are included in column (5) of Part 1 of this Schedule, are shown by stipple and given a reference letter(s), and will be a road unless the word “Bridleway”, “Cycle Track with a right of way on foot” or “Restricted Byway” appears in brackets beneath its reference letter in that column;
- (c) Private Accesses to be stopped up, described in column (3) of Parts 2 and 3 of this Schedule, are shown by a solid black band, over the extent of stopping up described in column (4) of each of those Parts, and are given a reference number, preceded by ‘PMA’, commencing with ‘PMA 0’; and
- (d) New Private Accesses to be substituted for a Private Access to be stopped up, or are otherwise to be provided in relation to the NDR classified road and/or the New A47 Trunk Road Eastbound Diverge Slip Road and the New A47 Trunk Road Eastbound Merge Slip Road, as are included in column (5) of Part 2 of this Schedule, are shown by thin diagonal hatching, and are given a reference number, preceded by ‘X’, commencing with ‘X0’.

STREETS TO BE STOPPED UP

PART 1

**STREETS FOR WHICH A SUBSTITUTE IS TO BE PROVIDED,
AND OTHER NEW STREETS TO BE PROVIDED**

<i>(1) Street Plans Number/Title</i>	<i>(2) Area</i>	<i>(3) Street to be stopped up</i>	<i>(4) Extent of stopping up</i>	<i>(5) New Street to be substituted, and other New Streets to be provided</i>
Street Plans (Sheet 1 of 12)/ Fakenham Road	In the Parishes of Attlebridge, and Taverham	Attlebridge Restricted Byway No.3	See Schedule 7 – Public rights of way	A (Restricted Byway) See Schedule 7 – Public rights of way
	In the District of Broadland	-	-	B (Part) (Bridleway)
	In the County of Norfolk			

(1) Street Plans Number/Title	(2) Area	(3) Street to be stopped up	(4) Extent of stopping up	(5) New Street to be substituted, and other New Streets to be provided
Street Plans (Sheet 2 of 12)/ Fir Covert Road to Breck Farm Lane and Marriott's Way	In the Parishes of Attlebridge, and Taverham In the District of Broadland In the County of Norfolk	C262 Fir Covert Road	A length: Where crossed by the NDR classified road, namely from a point 170 metres generally south of its junction with the access to 'Fir Covert', generally southwards for a distance of 90 metres.	The NDR classified road Fir Covert Road Roundabout
		-	-	B (Part) (Bridleway)
		-	-	C (Bridleway)
		-	-	D (Bridleway)
		Breck Farm Lane/ Furze Lane (U57168)	A length: From a point 40 metres north north-east of the access to Breck Farm Bungalow, north north-eastwards for a distance of 540 metres.	D (Part)* (Bridleway) E* (Bridleway) & G (Bridleway)* * Substitute Streets for non-motorised vehicular traffic (together with Marriott's Way overbridge open space recreational way)
		-	-	F (Part) (Bridleway)
		-	-	H (Part) (Cycle Track with a right of way on foot)
Street Plans (Sheet 3 of 12)/ Reepham Road to Bell Farm Track	In the Parishes of Taverham, Drayton, and Horsford In the District of Broadland	C261 Reepham Road	A length: Where crossed by the NDR classified road, namely from a point 450 metres north west of the junction of the C261 Reepham Road with Drewray Drive (U51248), north westwards for a	The NDR classified road Reepham Road Roundabout

<i>(1) Street Plans Number/Title</i>	<i>(2) Area</i>	<i>(3) Street to be stopped up</i>	<i>(4) Extent of stopping up</i>	<i>(5) New Street to be substituted, and other New Streets to be provided</i>
	In the County of Norfolk		distance of 90 metres.	
Street Plans (Sheet 3 of 12)/ Reepham Road to Bell Farm Track (Cont'd)	In the Parishes of Taverham, Drayton, and Horsford	-	-	F (Part) (Bridleway)
		-	-	H (Part) (Cycle Track with a right of way on foot)
	In the District of Broadland	-	-	I (Bridleway)
	In the County of Norfolk	Drayton Restricted Byway No.6	See Schedule 7 – Public rights of way	J (Restricted Byway) See Schedule 7 – Public rights of way
		Horsford Restricted Byway No.5	See Schedule 7 – Public rights of way	K (Restricted Byway) See Schedule 7 – Public rights of way
Street Plans (Sheet 4 of 12)/ East of Bell Farm Track to Drayton Lane	In the Parishes of Horsford, and Drayton	C282 Drayton Lane (North)	A length: From its junction with the C621 Reepham Road, generally northwards for a distance of 898 metres.	L* (Cycle Track with a right of way on foot) M* (Cycle Track with a right of way on foot) N O* (Bridleway) P Q* (Cycle Track with a right of way on foot) & R* (Cycle Track with a right of way on foot) * Substitute Streets for non-motorised vehicular traffic
	In the District of Broadland In the County of Norfolk			Horsford Restricted Byway No.7

<i>(1) Street Plans Number/Title</i>	<i>(2) Area</i>	<i>(3) Street to be stopped up</i>	<i>(4) Extent of stopping up</i>	<i>(5) New Street to be substituted, and other New Streets to be provided</i>
Street Plans (Sheet 4 of 12)/ East of Bell Farm Track to Drayton Lane (Cont'd)	In the Parishes of Horsford, and Drayton In the District of Broadland In the County of Norfolk	C282 Drayton Lane (South)	A length: From its junction with the C261 Reepham Road, generally southwards for a distance of 2 metres.	S* (Cycle Track with a right of way on foot) * Substitute Street for non- motorised vehicular traffic
Street Plans (Sheet 5 of 12)/ Cromer Road Interchange to Old Norwich Road	In the Parishes of Horsford, and Horsham St. Faith and Newton St. Faith In the District of Broadland In the County of Norfolk	Holly Lane (U57142)	A length: From its junction with the B1149 Holt Road, west south-westwards for a distance of 290 metres.	T* (Cycle Track with a right of way on foot) * Substitute Street for non- motorised vehicular traffic
		B1149 Holt Road	A length: From a point 200 metres north west of its roundabout junction with the A140 Cromer Road, north westwards for a distance of 250 metres.	N & P & The NDR classified road Drayton Lane Roundabout (On Street Plans (Sheet 4 of 12)/East of Bell Farm Track to Drayton Lane)
		Unnamed Highway (Holt Road to Cromer Road) (U51625)	The whole of: From its junction with the B1149 Holt Road, north eastwards, then eastwards, to its junction with the A140 Cromer Road, a distance of 260 metres.	U* (Cycle Track with a right of way on foot) * Substitute Street for non- motorised vehicular traffic
		A140 Cromer Road	A length: From its roundabout junction with the B1149 Holt Road, northwards for a distance of 430 metres.	W

<i>(1)</i> <i>Street Plans Number/Title</i>	<i>(2)</i> <i>Area</i>	<i>(3)</i> <i>Street to be stopped up</i>	<i>(4)</i> <i>Extent of stopping up</i>	<i>(5)</i> <i>New Street to be substituted, and other New Streets to be provided</i>
Street Plans (Sheet 5 of 12)/ Cromer Road Interchange to Old Norwich Road (Cont'd)	In the Parishes of Horsford, and Horsham St. Faith and Newton St. Faith In the District of Broadland In the County of Norfolk	Unnamed Highway (Cromer Road to West Lane) (U57647)	A length: From its junction with the A140 Cromer Road, north eastwards for a distance of 132 metres.	V* (Cycle Track with a right of way on foot) * Substitute Street for non- motorised vehicular traffic
Street Plans (Sheet 6 of 12)/ Access to Norwich International Airport and St. Faiths Road	In the Parishes of Horsham St. Faith and Newton St. Faith, and Spixworth In the District of Broadland and in the City of Norwich In the County of Norfolk	C251 Bullock Hill	A length: From a point 22 metres north west of its south eastern termination point, north westwards for a distance of 194 metres.	The NDR classified road Airport Roundabout Y Z X (Part)* (Bridleway) * Substitute Street for non- motorised vehicular traffic
		Horsham St. Faith and Newton St. Faith Bridleway No.6	The whole of: From its junction with Spixwoth Restricted Byway No. 1, extending north westwards to its north westerly termination point, just east of Norwich International Airport, a distance of 85 metres.	AA (Part) (Cycle Track with a right of way on foot)
		-	-	X (Part) (Bridleway)
		-	-	AA (Part) (Cycle Track with a right of way on foot)
Street Plans (Sheet 7 of 12)/ Buxton Road	In the Parish of Spixworth In the District of Broadland In the County of Norfolk	Spixworth Bridleway No.1	The whole of: From its junction with the C251 St. Faiths Road/Quaker Lane (U57188), extending north westwards to its junction with Horsham St. Faith and Newton St. Faith Bridleway No.6, a distance of 65 metres.	AA (Part) (Cycle Track with a right of way on foot)

<i>(1) Street Plans Number/Title</i>	<i>(2) Area</i>	<i>(3) Street to be stopped up</i>	<i>(4) Extent of stopping up</i>	<i>(5) New Street to be substituted, and other New Streets to be provided</i>
Street Plans (Sheet 7 of 12)/ Buxton Road (Cont'd)	In the Parish of Spixworth In the District of Broadland In the County of Norfolk	Quaker Lane (U57188)	A length: From its junction with the C251 St Faiths Road, extending generally eastwards for a distance of 106 metres.	X (Part)* (Bridleway) The NDR classified road Airport Roundabout* Y (Part)* & AA (Part)* (Cycle Track with a right of way on foot) * Substitute Streets for non-motorised vehicular traffic
		C251 St Faiths Road	A length: From its junction with Quaker Lane (U57188), extending generally southwards for a distance of 138 metres.	X (Part)* (Bridleway) The NDR classified road Airport Road Roundabout* Z (Part)* & AA (Part)* (Cycle Track with a right of way on foot) * Substitute Streets for non-motorised vehicular traffic
	-	-	-	X (Part) (Bridleway)
	-	-	-	AA (Part) (Cycle Track with a right of way on foot)
	-	-	-	BB (Bridleway)
		Quaker Lane (U57188)	A length: From its junction with the C246 Buxton Road, extending generally westwards for a distance of 46 metres.	CC

<i>(1) Street Plans Number/Title</i>	<i>(2) Area</i>	<i>(3) Street to be stopped up</i>	<i>(4) Extent of stopping up</i>	<i>(5) New Street to be substituted, and other New Streets to be provided</i>
Street Plans (Sheet 7 of 12)/ Buxton Road (Cont'd)	In the Parish of Spixworth In the District of Broadland In the County of Norfolk	C246 Buxton Road	A length: Between the boundaries of the NDR classified road, namely from a point 136 metres generally south of its junction with Quaker Lane (U57188), southwards for a distance of 96 metres.	DD
		-	-	EE (Bridleway)
Street Plans (Sheet 8 of 12)/ North Walsham Road to Beeston Lane and North Walsham Road/Rackheath Lane/Crostwick Lane Junction Improvement	In the Parishes of Beeston St. Andrew, and Crostwick In the District of Broadland In the County of Norfolk	B1150 North Walsham Road	A length: Between the boundaries of the NDR classified road, namely from a point 140 metres generally north of its junction with the access to the HFG Farm Shop and Garden Centre, generally northwards for a distance of 90 metres.	The NDR classified road North Walsham Road Roundabout
		-	-	FF (Part) (Bridleway)
Street Plans (Sheet 9 of 12)/ Wroxham Road and Wroxham Road/Green Lane West Junction Improvement	In the Parishes of Beeston St. Andrew, Rackheath, and Sprowston In the District of Broadland In the County of Norfolk	-	-	FF (Part) (Bridleway)
		-	-	GG
		A1151 Wroxham Road	A length: Between the boundaries of the NDR classified road, namely from a point 80 metres south west of its junction with Sloe Lane, south westwards for a distance of 90 metres.	The NDR classified road Wroxham Road Roundabout

<i>(1) Street Plans Number/Title</i>	<i>(2) Area</i>	<i>(3) Street to be stopped up</i>	<i>(4) Extent of stopping up</i>	<i>(5) New Street to be substituted, and other New Streets to be provided</i>
Street Plans (Sheet 9 of 12)/ Wroxham Road and Wroxham Road/Green Lane West Junction Improvement (Cont'd)	In the Parishes of Beeston St. Andrew, Rackheath, and Sprowston In the District of Broadland In the County of Norfolk	A1151 Wroxham Road	A south eastern part width: Comprising a highway layby area and verge, from its junction with the private access to No.8 Wroxham Road and Oakwood House, north eastwards for a distance of 75 metres and having a maximum width of 10 metres.	HH (Part) (Bridleway)
		-	-	HH (Part) (Bridleway)
Street Plans (Sheet 10 of 12)/ Newman Road, Salhouse Road and Railway Crossing	In the Parishes of Rackheath, and Great and Little Plumstead In the District of Broadland	Newman Road (Any public highway rights) (U57490)	A length: From its junction with Long's Crescent, south westwards for a distance of 180 metres, to its south western termination point.	II (Bridleway)* * Substitute Street for non- motorised vehicular traffic
	In the County of Norfolk	C283 Salhouse Road	A length: Where crossed by the NDR classified road, namely from a point 306 metres south west of its junction with the C258 Green Lane West/Green Lane East carriageway, south westwards for a distance of 90 metres.	The NDR classified road Salhouse Road Roundabout
		-	-	HH (Part) (Bridleway)
		-	-	II (Bridleway)
		-	-	JJ (Cycle Track with a right of way on foot)
		-	-	KK (Bridleway)
		-	-	LL (Part) (Bridleway)

<i>(1) Street Plans Number/Title</i>	<i>(2) Area</i>	<i>(3) Street to be stopped up</i>	<i>(4) Extent of stopping up</i>	<i>(5) New Street to be substituted, and other New Streets to be provided</i>
Street Plans (Sheet 11 of 12)/ Plumstead Road, Middle Road and Low Road and Thorpe End Highway Improvement Measures	In the Parish of Great and Little Plumstead	-	-	LL (Part) (Bridleway)
		-	-	MM
	In the District of Broadland	-	-	NN (Part) (Bridleway)
		-	-	OO (Part) (Bridleway)
	In the County of Norfolk	Low Road (U59392)	A length: From a point 84 metres west of its junction with the access to 'The Red House', generally westwards for a distance of 480 metres.	NN (Part)* (Bridleway) OO (Part)* (Bridleway) & PP* (Bridleway) * Substitute Streets for non- motorised vehicular traffic
		Great and Little Plumstead Footpath No.5 (Stopping Up extends onto Street Plans (Sheet 12 of 12)/Smee Lane and Postwick Interchange)	A length: From a point 70 metres south west of its junction with Low Road (U59392), extending south westwards, then southwards, to its junction with Smee Lane (U59400), a distance of 554 metres.	NN (Part) (Bridleway) OO (Bridleway) & QQ (Bridleway) (Parts extend onto Street Plans (Sheet 12 of 12)/Smee Lane and Postwick Interchange)

<i>(1) Street Plans Number/Title</i>	<i>(2) Area</i>	<i>(3) Street to be stopped up</i>	<i>(4) Extent of stopping up</i>	<i>(5) New Street to be substituted, and other New Streets to be provided</i>
Street Plans (Sheet 12 of 12)/ Smee Lane and Postwick Interchange	In the Parishes of Great and Little Plumstead, and Postwick with Witton In the District of Broadland and in the administrative area of The Broads Authority	Smee Lane (U59400)	A length: From a point 204 metres generally east of its roundabout junction with Green Lane (U59278)/C832 Cranley Road/C830 Broadland Way, generally eastwards for a distance of 300 metres.	NN* (Bridleway) OO* (Bridleway) & QQ* (Bridleway) (Parts extend onto Street Plans (Sheet 11 of 12)/ Plumstead Road, Middle Road and Low Road and Thorpe End Highway Improvement Measures) * Substitute Streets for non-motorised vehicular traffic
	In the County of Norfolk	-	-	RR (Cycle Track with a right of way on foot)
	-	-	-	SS
	-	-	-	TT (Cycle Track with a right of way on foot)
	-	A47 Trunk Road Eastbound Exit Slip Road	A tapered part of its Carriageway: From a point 250 metres west of where the A1042 Yarmouth Road Overbridge passes over the A47 Trunk Road, north eastwards for a distance of 228 metres, to its roundabout junction with the A1042 Yarmouth Road.	The New A47 Trunk Road Eastbound Diverge Slip Road
	-	A47 Trunk Road Westbound Access Slip Road	A length: From its junction with the A1042 Yarmouth Road and C829 Broadland Way roundabout junction, eastwards for a distance of 560 metres, to where it joins the eastbound carriageway of the A47 Trunk Road.	The New A47 Trunk Road Eastbound Merge Slip Road

(1) Street Plans Number/Title	(2) Area	(3) Street to be stopped up	(4) Extent of stopping up	(5) New Street to be substituted, and other New Streets to be provided
<p>Street Plans (Sheet 12 of 12)/ Smee Lane and Postwick Interchange (Cont'd)</p>	<p>In the Parishes of Great and Little Plumstead, and Postwick with Witton In the District of Broadland and in the administrative area of The Broads Authority In the County of Norfolk</p>	<p>Postwick Footpath No.2</p>	<p>A length: From its junction with the A1042 Yarmouth Road, on the south side of the A47 Trunk Road, northwards for a distance of 700 metres.</p>	<p>RR (Part) (Cycle Track with a right of way on foot)</p>

PART 2

**PRIVATE ACCESS FOR WHICH A SUBSTITUTE IS TO BE PROVIDED
AND OTHER NEW MEANS OF ACCESS TO BE PROVIDED**

<i>(1) Street Plans Number/Title</i>	<i>(2) Area</i>	<i>(3) Private Access to be stopped up</i>	<i>(4) Extent of stopping up</i>	<i>(5) Private Access to be substituted, and other New Means of Access to be provided</i>
Street Plans (Sheet 1 of 12)/ Fakenham Road	In the Parishes of Attlebridge, and Taverham	PMA 0	Field access to agricultural land on the north east side of the A1067 Fakenham Road, opposite to the access to 'Woodstock', north eastwards for a distance of 2 metres.	X0
	In the District of Broadland	PMA 2	Access track from the A1067 Fakenham Road, situated at a point 206 metres west north- west of its junction with Attlebridge Restricted Byway No.3, to – Farmland lying immediately to the north of the A1067 Fakenham Road; 'Deighton Hills'; and 'The Lodge' and The Firing Range and Clubhouse of the Mid- Norfolk Shooting School, from a point 52 metres north of its junction with the A1067 Fakenham Road, northwards to its junction with Attlebridge Restricted Byway No.3, a distance of 200 metres.	X1
	In the County of Norfolk	-	-	X2 (Part)

(1) Street Plans Number/Title	(2) Area	(3) Private Access to be stopped up	(4) Extent of stopping up	(5) Private Access to be substituted, and other New Means of Access to be provided
Street Plans (Sheet 1 of 12)/ Fakenham Road (Cont'd)	In the Parishes of Attlebridge, and Taverham In the District of Broadland In the County of Norfolk	PMA 3	Access Track from the A1067 Fakenham Road to – Farmland lying to the north of the A1067 Fakenham Road; ‘Deighton Hills’; ‘The Lodge’ and The Firing Range and Clubhouse of the Mid- Norfolk Shooting School; Biffa Waste Services Ltd; and ‘Peacehaven’, from a point 256 metres north west of its junction with the A1067 Fakenham Road, running along a co-existent route with Attlebridge Restricted Byway No.3, north westwards for a distance of 130 metres.	X1
Street Plans (Sheet 2 of 12)/ Fir Covert Road to Breck Farm Lane and Marriott’s Way	In the Parishes of Attlebridge, and Taverham	-	-	X2 (Part)
		-	-	X3
	In the District of Broadland In the County of Norfolk	PMA 4	Field access to farmland of Spring Farm, from the C262 Fir Covert Road, at a point 160 metres generally south of the access to ‘Fir Covert’, westwards for a distance of 2 metres.	X4
PMA 5		Field access to field situated to the south of the curtilage of ‘Fir Covert’ and to the north of the curtilage of ‘Chestnut House’, from the C262 Fir Covert Road, eastwards for a distance of 2 metres.	X5	

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Street Plans (Sheet 2 of 12)/ Fir Covert Road to Breck Farm Lane and Marriott's Way (Cont'd)	In the Parishes of Attlebridge, and Taverham	PMA 6	Access from the C262 Fir Covert Road to 'Chestnut House', eastwards for a distance of 2 metres.	X6
	In the District of Broadland	PMA 7	Field access to farmland to the east of, and from, the C262 Fir Covert Road, at a point 220 metres generally south of the access to 'Fir Covert', eastwards for a distance of 2 metres.	X7
	In the County of Norfolk	PMA 8	Access to farmland and buildings, to the west of, and from, Breck Farm Lane (U57168), at a point 70 metres north north-eastwards of the access to Breck Farm Bungalow, generally westwards for a distance of 2 metres.	X8 (Part)
	PMA 9	Access to the most northerly barn and adjacent farmland, to the west of, and from, Breck Farm Lane (U57168), at a point 85 metres north north- eastwards of the access to Breck Farm Bungalow, generally westwards for a distance of 2 metres.	X8 (Part)	
	PMA 10	Field access to farmland to the west of, and from, Breck Farm Lane (U57168), at a point 194 metres north north-eastwards of the access to Breck Farm Bungalow, generally westwards for a distance of 2 metres.	X8 (Part)	

(1) Street Plans Number/Title	(2) Area	(3) Private Access to be stopped up	(4) Extent of stopping up	(5) Private Access to be substituted, and other New Means of Access to be provided
Street Plans (Sheet 2 of 12)/ Fir Covert Road to Breck Farm Lane and Marriott's Way (Cont'd)	In the Parishes of Attlebridge, and Taverham In the District of Broadland In the County of Norfolk	PMA 11	Field access to farmland to the west of, and from, Breck Farm Lane (U57168), at a point 234 metres north north-eastwards of the access to Breck Farm Bungalow, generally westwards for a distance of 2 metres.	X8 (Part)
		PMA 12	Field access to farmland to the east of, and from, Furze Lane (U57168), at a point 110 metres north north- eastwards of where Furze Lane/Breck Farm Lane (U57168) crosses over Marriott's Way, south eastwards for a distance of 2 metres.	X8 (Part)
		PMA 13	Field access to farmland to the east of, and from, Breck Farm Lane (U57168), at a point 194 metres north north-eastwards of the access to Breck Farm Bungalow, eastwards for a distance of 2 metres.	X8 (Part)
Street Plans (Sheet 3 of 12)/ Reepham Road to Bell Farm Track	In the Parishes of Taverham, Drayton, and Horsford In the District of Broadland In the County of Norfolk	-	-	X9
		-	-	X10
		PMA 14	Access track to farmland, lying immediately to the north east of the C261 Reepham Road, to the south east of Brands Lane and to the north west of Drayton Restricted Byway No.6, from its junction with the C261 Reepham Road, extending generally northwards, then north eastwards, for a distance of 82 metres.	X11

(1) Street Plans Number/Title	(2) Area	(3) Private Access to be stopped up	(4) Extent of stopping up	(5) Private Access to be substituted, and other New Means of Access to be provided
Street Plans (Sheet 3 of 12)/ Reepham Road to Bell Farm Track (Cont'd)	In the Parishes of Taverham, Drayton, and Horsford In the District of Broadland In the County of Norfolk	PMA 15	Access track to Felthorpe Woods, from its junction with the C261 Reepham Road, running along a co-existent route with Drayton Restricted Bridleway No.6, extending north eastwards, for a distance of 85 metres.	X12
		-	-	X13
		-	-	X14
		PMA 17	Access track (known as Bell Farm Track) to Bell Farm, from its junction with the C261 Reepham Road, generally northwards to its junction with Dog Lane (U57176), a distance of 736 metres.	X15
		-	-	X16 (Part)
Street Plans (Sheet 4 of 12)/ East of Bell Farm Track to Drayton Lane	In the Parishes of Horsford, and Drayton In the District of Broadland In the County of Norfolk	PMA 18	Field access (at the point of a concrete hard-standing area) to farmland to the west of, and from, the C282 Drayton Lane, at a point 166 metres south-west of the southern boundary of the property 'Rookery North', westwards for a distance of 2 metres.	X17
		PMA 19	Field access to farmland to the east of, and from, the C282 Drayton Lane, at a point 164 metres south-west of the southern boundary of the property 'Rookery North', eastwards for a distance of 2 metres.	X17
		-	-	X18

(1) Street Plans Number/Title	(2) Area	(3) Private Access to be stopped up	(4) Extent of stopping up	(5) Private Access to be substituted, and other New Means of Access to be provided
Street Plans (Sheet 4 of 12)/ East of Bell Farm Track to Drayton Lane (Cont'd)	In the Parishes of Horsford, and Drayton	PMA 20	Access to 'The Homestead' (Kennels and Cattery), from the C282 Drayton Lane, generally eastwards for a distance of 4 metres.	X19
	In the District of Broadland	PMA 21	Access to smallholding/paddock, lying opposite and just to the south west of 'The Homestead' (Kennels and Cattery), from its junction with the C282 Drayton Lane, generally westwards for a distance of 8 metres.	X16 (Part)
	In the County of Norfolk	PMA 22	Field access to farmland to the west of, and from, the C282 Drayton Lane, at a point 470 metres north north-east of its junction with the C261 Reepham Road, westwards for a distance of 2 metres.	X16 (Part)
		PMA 24	Field access to farmland of Manor Farm, from the C282 Drayton Lane (South), at a point 14 metres generally south of its junction with the C621 Reepham Road, westwards for a distance of 2 metres.	X20
		-	-	X21
		PMA 25	Access from the C261 Reepham Road to 'Borderlands', southwards for a distance of 2 metres.	X22
	Street Plans (Sheet 5 of 12)/ Cromer Road Interchange to Old Norwich Road	In the Parishes of Horsford, and Horsham St. Faith and Newton St. Faith	-	-
		-	-	X24
		-	-	X25
In the District		-	-	X26

(1) Street Plans Number/Title	(2) Area	(3) Private Access to be stopped up	(4) Extent of stopping up	(5) Private Access to be substituted, and other New Means of Access to be provided
	of Broadland In the County of Norfolk	-	-	X27
Street Plans (Sheet 5 of 12)/ Cromer Road Interchange to Old Norwich Road (Cont'd)	In the Parishes of Horsford, and Horsham St. Faith and Newton St. Faith In the District of Broadland In the County of Norfolk	PMA 31	Field access to farmland to the south east of, and from, the Unnamed Highway (Cromer Road to West Lane (U57647)), at a point 50 metres north east of its junction with the A140 Cromer Road, south eastwards for a distance of 2 metres.	X28
		PMA 32	Field access to farmland to the east of, and from, the A140 Cromer Road, at a point 100 metres north of its roundabout junction with the B1149 Holt Road, eastwards for a distance of 2 metres.	X28
		PMA 34	Access track to Norwich International Airport and to the Norwich International Airport Control Tower, where crossed by the NDR classified road, namely from a point 20 metres south west of the access to the City of Norwich Aviation Museum, south westwards for 74 metres.	X30 (On Street Plans (Sheet 6 of 12)/Access to Norwich International Airport and St. Faiths Road))
Street Plans (Sheet 6 of 12)/ Access to Norwich International Airport and St. Faiths Road	In the Parishes of Horsham St. Faith and Newton St. Faith, and Spixworth In the District of Broadland and in the City of Norwich In the County of Norfolk	-	-	X29
		PMA 35	Field access to farmland, of Oak Tree Farm, from the C251 Bullock Hill, some 14 metres north west of its south easterly termination point, north eastwards for a distance of 2 metres.	X32 (Part)

(1) Street Plans Number/Title	(2) Area	(3) Private Access to be stopped up	(4) Extent of stopping up	(5) Private Access to be substituted, and other New Means of Access to be provided
Street Plans (Sheet 6 of 12)/ Access to Norwich International Airport and St. Faiths Road (Cont'd)	In the Parishes of Horsham St. Faith and Newton St. Faith, and Spixworth In the District of Broadland and in the City of Norwich In the County of Norfolk	PMA 36 (Part shown on Street Plans (Sheet 7 of 12)/ Buxton Road)	Access track to farmland, of Grange Farm, and to Norwich International Airport, from its junction with Quaker Lane (U57188)/C251 St Faiths Road, running along a co-existent route with Spixworth Bridleway No.1, and Horsham St.Faith and Newton St.Faith Bridleway No.6, west north-westwards for a distance of 160 metres. (Part shown on Street Plans (Sheet 7 of 12)/ Buxton Road)	X31 (Part) & X32
Street Plans (Sheet 7 of 12)/ Buxton Road	In the Parish of Spixworth	-	-	X31 (Part)
	In the District of Broadland	-	-	X32 (Part)
	In the County of Norfolk	-	-	X33
	In the County of Norfolk	-	-	X34
	In the County of Norfolk	PMA 37	Access to the Gas Governor site, from Quaker Lane (U57188), at a point 14 metres west of its junction with the C246 Buxton Road, southwards for a distance of 2 metres.	X35
	In the County of Norfolk	-	-	X36
	In the County of Norfolk	-	-	X37
	In the County of Norfolk	-	-	X38
Street Plans (Sheet 8 of 12)/ North Walsham Road to Beeston Lane and North Walsham Road/Rackheath Lane/Crostwick Lane Junction Improvement	In the Parishes of Beeston St. Andrew, and Crostwick In the District of Broadland In the County of Norfolk	PMA 39	Access track to farmland of Red Hall Farm, from Beeston Lane (U57187), from a point 2 metre south east of the south eastern boundary of the NDR classified road, extending north westwards, then generally northwards, for a distance of 212 metres.	X36 (On Street Plans (Sheet 7 of 12)/Buxton Road))

(1) Street Plans Number/Title	(2) Area	(3) Private Access to be stopped up	(4) Extent of stopping up	(5) Private Access to be substituted, and other New Means of Access to be provided
Street Plans (Sheet 8 of 12)/ North Walsham Road to Beeston Lane and North Walsham Road/Rackheath Lane/Crostwick Lane Junction Improvement (Cont'd)	In the Parishes of Beeston St. Andrew, and Crostwick	PMA 40	Access to farmland of Red Hall Farm, from the B1150 North Walsham Road, at a point 266 metres north of the access to the HFG Farm Shop and Garden Centre, westwards for a distance of 2 metres.	X36 (On Street Plans (Sheet 7 of 12)/Buxton Road))
	In the District of Broadland	-	-	X39
	In the County of Norfolk	PMA 41	Access to farmland and woodland to the north, and off, the northernmost corner of Beeston Lane (U57186), at a point 240 metres north east of No.2 Manor Farm Cottages, generally northwards for a distance of 255 metres.	X40 (Part) & X41
Street Plans (Sheet 9 of 12)/ Wroxham Road and Wroxham Road/Green Lane West Junction Improvement	In the Parishes of Beeston St. Andrew, Rackheath, and Sprowston	PMA 42	Access to the Sewage Works, from the A1151 Wroxham Road, westwards for a distance of 82 metres.	X42
	In the District of Broadland	PMA 43	Access to Hill Farm Lodge and to Hill Farm House, from the A1151 Wroxham Road, westwards for a distance of 3 metres.	X43
	In the County of Norfolk	-	-	X44
		PMA 44	Access to woodland 'Osier Carr', from the A1151 Wroxham Road, at a point 16 metres south west of its junction with Sloe Lane (U57095), south eastwards for a distance of 8 metres.	X46
		PMA 45	Access to farmland to the south east of, and from, the A1151 Wroxham Road, opposite to the access to the Sewage Works, generally eastwards for a distance of 2 metres.	X44

(1) Street Plans Number/Title	(2) Area	(3) Private Access to be stopped up	(4) Extent of stopping up	(5) Private Access to be substituted, and other New Means of Access to be provided
Street Plans (Sheet 9 of 12)/ Wroxham Road and Wroxham Road/Green Lane West Junction Improvement (Cont'd)	In the Parishes of Beeston St. Andrew, Rackheath, and Sprowston	PMA 46	Access to No.8 Wroxham Road and Oakwood House, from the A1151 Wroxham Road, southwards for 3 metres.	X45
	In the District of Broadland In the County of Norfolk	PMA 47	Access track to farmland and other premises to the west of, and from the C258 Green Lane West, at a point immediately south of Nos. 1 – 4 The Close and opposite to the access to Green Farm, generally westwards, then south westwards, then southwards, for a for a distance of 525 metres.	X46 (to premises on the eastern side of the NDR classified road) & X47g, X47h, & X47i (On Street Plans (Sheet 10 of 12/ Newman Road, Salhouse Road and Railway Crossing)) (to certain premises on the western side of the NDR classified road)
Street Plans (Sheet 10 of 12)/ Newman Road, Salhouse Road and Railway Crossing	In the Parishes of Rackheath, and Great and Little Plumstead	PMA 48	Access to Commercial Unit No.1, situated on Newman Road/Private Access Road (U57490), at a point some 108 metres south west of its junction with Long's Crescent (U57852), north westwards for a distance of 2 metres.	X47a
	In the District of Broadland	PMA 49	Access to Commercial Unit No.2, situated on Newman Road/Private Access Road (U57490), at a point some 124 metres south west of its junction with Long's Crescent (U57852), north westwards for a distance of 2 metres.	X47b
	In the County of Norfolk	PMA 50	Access to Commercial Unit No.3, situated on Newman Road/Private Access Road (U57490), at a point some 134 metres south west of its junction with Long's Crescent (U57852), north westwards for a distance of 2 metres.	X47c

(1) Street Plans Number/Title	(2) Area	(3) Private Access to be stopped up	(4) Extent of stopping up	(5) Private Access to be substituted, and other New Means of Access to be provided
Street Plans (Sheet 10 of 12)/ Newman Road, Salhouse Road and Railway Crossing (Cont'd)	In the Parishes of Rackheath, and Great and Little Plumstead In the District of Broadland In the County of Norfolk	PMA 51	Disused access track, situated on Newman Road/Private Access Road (U57490), at a point 170 metres south west of its junction with Long's Crescent (U57852), northwards for a distance of 50 metres.	X47d
		-	-	47e
		PMA 52	Access track to Gazebo Farm, situated on Newman Road/Private Access Road (U57490), at a point 280 metres south west of its junction with Long's Crescent (U57852), northwards for a distance of 10 metres.	X47j
		PMA 53	Newman Road Private Access Track, from its junction with Long's Crescent (U57852), generally south westwards for a distance of 400 metres.	X47g, X47h & X47i
		PMA 54	Access track to woodland, situated on Newman Road/Private Access Road (U57490), at a point 140 metres south west of its junction with Long's Crescent (U57852), south eastwards for a distance of 12 metres.	X47f
		PMA 55	Access track to Hall Farm, as extends off the C258 Green Lane West, opposite No.40 Green Lane West, from a point 300 metres south west of its junction with the C258 Green Lane West, generally south westwards, then northwards, for a distance of 140 metres, terminating at the farm yard and buildings.	X48

(1) Street Plans Number/Title	(2) Area	(3) Private Access to be stopped up	(4) Extent of stopping up	(5) Private Access to be substituted, and other New Means of Access to be provided
Street Plans (Sheet 10 of 12)/ Newman Road, Salhouse Road and Railway Crossing (Cont'd)	In the Parishes of Rackheath, and Great and Little Plumstead In the District of Broadland In the County of Norfolk	PMA 56	Disused access track to woodland and to Hall Farm, from the C283 Salhouse Road, at a point 454 metres south west of its junction with the carriageway of the C258 Green Lane West/Green Lane East, north westwards for a distance of 12 metres	X48
		-	-	X49
		-	-	X50
		PMA 59	Field access to Fuel Allotment land, from the C874 Plumstead Road, at a point 280 metres south west of its junction with the C258 Broad Lane, north westwards for a distance of 2 metres.	X51
		PMA 60	Field access to farmland to the south east of, and from, the C874 Plumstead Road, at a point some 60 metres south west of its junction with the C258 Broad Lane, south eastwards for a distance of 2 metres.	X54 (On Street Plans (Sheet 11 of 12)/ Plumstead Road, Middle Road and Low Road and Thorpe End Highway Improvement Measures)
		PMA 61	Field access to farmland to the south east of, and from, the C874 Plumstead Road, at a point some 175 metres south west of its junction with the C258 Broad Lane, south eastwards for a distance of 2 metres.	X54 (On Street Plans (Sheet 11 of 12)/ Plumstead Road, Middle Road and Low Road and Thorpe End Highway Improvement Measures)
		PMA 62	Field access to farmland to the south east of, and from, the C874 Plumstead Road, at a point some 230 metres south west of its junction with the C258 Broad Lane, south eastwards for a distance of 2 metres.	X56 (On Street Plans (Sheet 11 of 12)/ Plumstead Road, Middle Road and Low Road and Thorpe End Highway Improvement Measures)

(1) Street Plans Number/Title	(2) Area	(3) Private Access to be stopped up	(4) Extent of stopping up	(5) Private Access to be substituted, and other New Means of Access to be provided
Street Plans (Sheet 10 of 12)/ Newman Road, Salhouse Road and Railway Crossing (Cont'd)	In the Parishes of Rackheath, and Great and Little Plumstead In the District of Broadland In the County of Norfolk	PMA 63	Field gate access to farmland to the south east of, and from, the C874 Plumstead Road, at a point some 170 metres north east of the railway level crossing of the C874 Plumstead Road, south eastwards for a distance of 2 metres.	X56 (On Street Plans (Sheet 11 of 12)/Plumstead Road, Middle Road and Low Road and Thorpe End Highway Improvement Measures)
		PMA 64	Field gate access to farmland to the south east of, and from, the C874 Plumstead Road, at a point some 35 metres north east of the railway level crossing of the C874 Plumstead Road, south eastwards for a distance of 6 metres.	X56 (On Street Plans (Sheet 11 of 12)/Plumstead Road, Middle Road and Low Road and Thorpe End Highway Improvement Measures)
		PMA 65	Access to the property 'the Railway Crossing', from the C874 Plumstead Road, south westwards for a distance of 5 metres.	X52
Street Plans (Sheet 11 of 12)/ Plumstead Road, Middle Road and Low Road and Thorpe End Highway Improvement Measures	In the Parish of Great and Little Plumstead In the District of Broadland In the County of Norfolk	-	-	X53
		-	-	X55
		PMA 66	Field access to Oaks Farm, from the C442 Middle Road, at a point 65 metres west of the main access track to Oaks Farm, northwards for a distance of 2 metres.	X57
		PMA 67	Main access track to Oaks Farm, from the C442 Middle Road, northwards for a distance of 8 metres.	X57
PMA 68	Field access to the south of, and from, the C442 Middle Road, immediately to the west of where Great and Little Plumstead Footpath No.5 junctions with the C442 Middle Road, southwards for a distance of 2 metres.	X58		

<i>(1) Street Plans Number/Title</i>	<i>(2) Area</i>	<i>(3) Private Access to be stopped up</i>	<i>(4) Extent of stopping up</i>	<i>(5) Private Access to be substituted, and other New Means of Access to be provided</i>
Street Plans (Sheet 11 of 12)/ Plumstead Road, Middle Road and Low Road and Thorpe End Highway Improvement Measures (Cont'd)	In the Parish of Great and Little Plumstead	PMA 69	Westerly access to land and buildings of Laurel Farm, from Low Road (U59392), some 102 metres east of its junction with Green Lane (U59278), northwards for a distance of 2 metres.	X59/X59a
	In the District of Broadland	PMA 70	Two horse shoe access connections to buildings of Laurel Farm, from Low Road (U59392), some 154 metres and 178 metres, respectively, east of its junction of with Green Lane (U59278), northwards for a distance of 2 metres.	X59/X59b
	In the County of Norfolk	PMA 71	Easterly access to easternmost barn of Laurel Farm, and to two residential properties lying to the east thereof, from Low Road (U59392), some 208 metres east of its junction with Green Lane (U59278), northwards for a distance of 2 metres.	X59/X59c
		PMA 72	Field access to farmland to the north of, and from, Low Road (U59392), some 276 metres east of its junction with Green Lane (U59278), northwards for a distance of 2 metres.	X59/X59d
		PMA 73	Field access to farmland to the north of, and from, Low Road (U59392), some 442 metres east of its junction with Green Lane (U59278), northwards for a distance of 2 metres.	X59/X59d

(1) Street Plans Number/Title	(2) Area	(3) Private Access to be stopped up	(4) Extent of stopping up	(5) Private Access to be substituted, and other New Means of Access to be provided
Street Plans (Sheet 11 of 12)/ Plumstead Road, Middle Road and Low Road and Thorpe End Highway Improvement Measures (Cont'd)	In the Parish of Great and Little Plumstead In the District of Broadland In the County of Norfolk	PMA 74	Access track to the Nurseries and to farmland to the south of, and from a point 70 metres south west of its junction with Low Road (U59392), extending south westwards, then southwards, running along a co-existent route with Great and Little Plumstead Footpath No.5, to its junction with Smee Lane (U59400), a distance of 554 metres. (Part shown on Street Plans (Sheet 12 of 12)/Smee Lane and Postwick Interchange)	X61b (On Street Plans (Sheet 12 of 12)/Smee Lane and Postwick Interchange) (to land to the west of the NDR classified road)
		PMA 75	Field access to farmland to the south of, and from, Low Road (U59392), some 368 metres east of its junction with Green Lane (U59278), southwards for a distance of 2 metres.	X59/X59e
		PMA 76	Field access to farmland to the south of, and from, Low Road (U59392), some 276 metres east of its junction with Green Lane (U59278), southwards for a distance of 2 metres.	X59/X59f
		PMA 77	Access to 'The Bungalow', from Low Road (U59392), southwards for a distance of 2 metres.	X59/X59g
		PMA 78	Access to 'Laurel Farm Farmhouse', from Low Road (U59392), southwards for a distance of 2 metres.	X59/X59h
		PMA 79	Field access to farmland to the south of, and from, Low Road (U59392), some 110 metres east of its junction of with Green Lane (U59278), southwards for a distance of 2 metres.	X59/X59j

(1) Street Plans Number/Title	(2) Area	(3) Private Access to be stopped up	(4) Extent of stopping up	(5) Private Access to be substituted, and other New Means of Access to be provided
Street Plans (Sheet 11 of 12)/ Plumstead Road, Middle Road and Low Road and Thorpe End Highway Improvement Measures (Cont'd)	In the Parish of Great and Little Plumstead	PMA 80	Access track to the detached garage of 'Meadow View', from Low Road (U59392), southwards for a distance of 2 metres.	X59/X59k
	In the District of Broadland	PMA 81	Access to 'Meadow View', from Low Road (U59392), southwards for a distance of 2 metres.	X59/X59l
	In the County of Norfolk	-	-	X60
		-	-	X61a
Street Plans (Sheet 12 of 12)/ Smee Lane and Postwick Interchange	In the Parishes of Great and Little Plumstead,	-	-	X62
	and Postwick with Witton	PMA 82	Access track to Heath Farm, from a point 510 metres south of its junction with Smee Lane (U59400), southwards for a distance of 22 metres.	X63
	In the District of Broadland and in the administrative area of The Broads Authority	PMA 83	Access track to Heath Farm, from a point 190 metres generally south, then east, of its junction with the C829 Broadland Way, generally eastwards, then northwards, for a distance of 380 metres.	X64
	In the County of Norfolk	-	-	X65
		PMA 84	Access to 'The Grange', from its junction with the A47 Trunk Road eastbound carriageway, northwards for a distance of 4 metres.	X66

PART 3

PRIVATE ACCESSES FOR WHICH NO SUBSTITUTE IS TO BE PROVIDED

<i>(1)</i> Street Plan Number/ Title	<i>(2)</i> Area	<i>(3)</i> Private Access to be stopped up	<i>(4)</i> Extent of stopping up
Street Plans (Sheet 1 of 12)/ Fakenham Road	In the Parishes of Attlebridge, and Taverham In the District of Broadland In the County of Norfolk	PMA 1	Gated access point, at the south easterly point of the private service road to Old Hall Farm, from the A1067 Fakenham Road layby, at a point 495 metres south east of the main access track to Old Hall Farm, north westwards for 2 metres.
Street Plans (Sheet 2 of 12)/ Fir Covert Road to Breck Farm Lane and Marriott's Way	In the Parishes of Attlebridge, and Taverham In the District of Broadland In the County of Norfolk	N/A	N/A
Street Plans (Sheet 3 of 12)/ Reepham Road to Bell Farm Track	In the Parishes of Taverham, Drayton, and Horsford In the District of Broadland In the County of Norfolk	PMA 16	Access track to Bell Farm, running along the western boundary of Kieft & Sons (Growers, storage & packaging), where crossed by the NDR classified road, namely from a point 265 metres north of its junction with the C261 Reepham Road, northwards for a distance of 85 metres.
Street Plans (Sheet 4 of 12)/ East of Bell Farm Track to Drayton Lane	In the Parishes of Horsford, and Drayton In the District of Broadland	PMA 23	Field access to farmland to the south east of, and from, the C282 Drayton Lane, at a point 266 metres north east of its junction with the C261 Reepham Road, eastwards for a distance of 2 metres.
		PMA 26	Access track to farmland of Glebe Farm, from the C261 Reepham Road, at a point 260 metres east of its junction with the C282 Drayton Lane, where crossed by the NDR classified road, a distance of 112 metres.

(1) Street Plan Number/ Title	(2) Area	(3) Private Access to be stopped up	(4) Extent of stopping up
Street Plans (Sheet 5 of 12)/ Cromer Road Interchange to Old Norwich Road	In the Parishes of Horsford, and Horsham St. Faith and Newton St. Faith	PMA 27	Field access to farmland lying to the east of, and from the Unnamed Highway (Holt Road to Cromer Road) (U51625), at its junction with the B1149 Holt Road, eastwards for a distance of 2 metres.
	In the District of Broadland	PMA 28	Field access to farmland lying to the north of, and from, the Unnamed Highway (Holt Road to Cromer Road) (U51625), at a point 212 metres north east, then east, of its junction with the B1149 Holt Road, northwards for a distance of 2 metres.
	In the County of Norfolk	PMA 29	Field access to farmland to the south of, and from, the Unnamed Highway (Holt Road to Cromer Road) (U51625), at a point 210 metres north east, then east, of its junction with the A140 Cromer Road, southwards for a distance of 2 metres.
		PMA 30	Field access to farmland to the west of, and from, the A140 Cromer Road, at a point 98 metres north of its roundabout junction with the B1149 Holt Road, westwards for a distance of 2 metres.
		PMA 33	Field access to farmland to the east of, and from, the A140 Cromer Road, at a point 86 metres north of its roundabout junction with the B1149 Holt Road, eastwards for a distance of 2 metres.
Street Plans (Sheet 6 of 12)/ Access to Norwich International Airport and St. Faiths Road	In the Parishes of Horsham St. Faith and Newton St. Faith, and Spixworth In the District of Broadland and in the City of Norwich In the County of Norfolk	N/A	N/A
Street Plans (Sheet 7 of 12)/ Buxton Road	In the Parish of Spixworth In the District of Broadland In the County of Norfolk	PMA 38	Access to farmland of Red Hall Farm, from the C246 Buxton Road, at a point 265 metres north of its junction with Beeston Lane (U57187), eastwards for a distance of 2 metres.

<i>(1)</i> Street Plan Number/ Title	<i>(2)</i> Area	<i>(3)</i> Private Access to be stopped up	<i>(4)</i> Extent of stopping up
Street Plans (Sheet 8 of 12)/ North Walsham Road to Beeston Lane and North Walsham Road/Rackheath Lane/Crostwick Lane Junction Improvement	In the Parishes of Beeston St. Andrew, and Crostwick In the District of Broadland In the County of Norfolk	N/A	N/A
Street Plans (Sheet 9 of 12)/ Wroxham Road and Wroxham Road/Green Lane West Junction Improvement	In the Parishes of Beeston St. Andrew, Rackheath, and Sprowston In the District of Broadland In the County of Norfolk	N/A	N/A
Street Plans (Sheet 10 of 12)/ Newman Road, Salhouse Road and Railway Crossing	In the Parishes of Rackheath, and Great and Little Plumstead	PMA 57	Field access to farmland to the south east of, and from, the C283 Salhouse Road, at a point 370 metres south west of its junction with the C258 Green Lane West/Green Lane East carriageway, south eastwards for a distance of 2 metres.
	In the District of Broadland In the County of Norfolk	PMA 58	Field access to farmland of Dairy Farm, from the C874 Plumstead Road, at a point 15 metres north east of the existing railway crossing on the C874 Plumstead Road, north westwards for 2 meters.
Street Plans (Sheet 11 of 12)/ Plumstead Road, Middle Road and Low Road and Thorpe End Highway Improvement Measures	In the Parish of Great and Little Plumstead In the District of Broadland In the County of Norfolk	N/A	N/A

(1) Street Plan Number/ Title	(2) Area	(3) Private Access to be stopped up	(4) Extent of stopping up
Street Plans (Sheet 12 of 12)/ Smee Lane and Postwick Interchange	In the Parishes of Great and Little Plumstead, and Postwick with Witton In the District of Broadland and in the administrative area of The Broads Authority In the County of Norfolk	N/A	N/A

SCHEDULE 7

PUBLIC RIGHTS OF WAY

Article 13

PART 1

Attlebridge Restricted Byway No.3

- (a) That length of Attlebridge Restricted Byway No.3, from its junction with the A1067 Fakenham Road, extending north westwards for a distance of 386 metres, shown by thick black diagonal hatching on the Street Plans ((Sheet 1 of 12)/Fakenham Road).
- (b) An alternative section of Attlebridge Restricted Byway No.3, to be co-existent with a private means of access to premises, from the proposed Fakenham Road Roundabout on the A1067 Fakenham Road, extending east north-eastwards, then north westwards, for a distance of 315 metres, shown by stipple and given the reference letter A on the Street Plans ((Sheet 1 of 12)/Fakenham Road – Inset 1/2).

PART 2

Drayton Restricted Byway No.6

- (a) That length of Drayton Restricted Byway No.6, from its junction with the C261 Reepham Road, extending north eastwards for a distance of 90 metres, shown by thick black diagonal hatching on the Street Plans ((Sheet 3 of 12)/Reepham Road to Bell Farm Track).
- (b) An alternative section of Drayton Restricted Byway No.6, to be co-existent with a private means of access to premises, from the NDR classified road Reepham Road Roundabout, extending generally north eastwards, for a distance of 70 metres, shown by stipple and given the reference letter J on the Street Plans ((Sheet 3 of 12)/Reepham Road to Bell Farm Track).

PART 3

Horsford Restricted Byway No.5

- (a) The whole of Horsford Restricted Byway No.5, from its junction with the C261 Reepham Road, generally northwards to its junction with Dog Lane (U57176), a distance of 736 metres, shown by thick diagonal hatching on the Street Plans ((Sheet 3 of 12)/Reepham Road to Bell Farm Track).
- (b) An alternative section of Horsford Restricted Byway No.5, to be co-existent with a private means of access to premises, from the same point at its junction with the C261 Reepham Road as its former route, extending generally northwards, deviating from its former route along its central section, to its junction with Dog Lane (U57176) at the same point as its former route, shown by stipple and given the reference letter K on the Street Plans ((Sheet 3 of 12)/Reepham Road to Bell Farm Track – Inset 3/3).

SCHEDULE 8

TEMPORARY PROHIBITION OR RESTRICTION OF THE USE OF STREETS

Article 14

In relating this Schedule 8 to its corresponding street plans, the lengths of street to be subject to temporary prohibition or restriction of driving/use, as described in column (4) of this Schedule, are given a reference number, preceded by 'TEMP TR', commencing with 'TEMP TR 1', and that reference appears in column (4) at the end of the described length.

<i>(1)</i> Street Plans Number/Title	<i>(2)</i> Area	<i>(3)</i> Temporary prohibition or restriction of use of streets	<i>(4)</i> Extent of temporary prohibition or restriction of use of streets
Street Plans (Sheet 1 of 12)/ Fakenham Road	In the Parishes of Attlebridge, and Taverham In the District of Broadland In the County of Norfolk	A1067 Fakenham Road <i>Prohibition and/or restriction of driving/use, as will be directed by traffic signs/signal control.</i>	1.1 <u><i>Prohibition/Restriction:</i></u> From its junction with Attlebridge Restricted Byway No.4, south eastwards for 1,120 metres, to where it meets the north western boundary of the curtilage of the property 'Peacehaven' (marked TEMP TR 1 on the Street Plans (Sheet 1 of 12)). Access to and from frontage properties (1 & 2 Old Hall Cottages, 'Woodstock', Old Hall Farm, and Agricultural Access opposite to 'Woodstock') will be maintained at all times. <u><i>Purpose of Prohibition/Restriction:</i></u> Works are proposed to be executed on or near that length of street, which will provide the north westerly most tie-in point of the A1067 Fakenham Road highway improvement with the NDR classified road. <u><i>Alternative Route:</i></u> An alternative route between the two end points marked TEMP TR 1 on the Street Plans (Sheet 1 of 12) will be available (including, in part, an area of non-highway land on the north eastern side of the existing carriageway for temporary use for traffic management purposes), for the purpose of continuity of use by two-way directional traffic.
Street Plans (Sheet 2 of 12)/ Fir Covert Road to Breck Farm Lane and Marriott's Way	In the Parishes of Attlebridge, and Taverham In the District of Broadland In the County of Norfolk	C262 Fir Covert Road <i>Prohibition and/or restriction of driving/use, as will be directed by traffic signs/signal control.</i>	2.1 <u><i>Prohibition/Restriction:</i></u> From a point 18 metres south south-west of its junction with the access to the property 'Fir Covert', south south-westwards for 375 metres (marked TEMP TR 2 on the Street Plans (Sheet 2 of 12)). <u><i>Purpose of Prohibition/Restriction:</i></u> Works are proposed to be executed on or near that length of street, which will provide its

(1) Street Plans Number/Title	(2) Area	(3) Temporary prohibition or restriction of use of streets	(4) Extent of temporary prohibition or restriction of use of streets
			<p>north easterly and south westerly approach tie-ins to the NDR classified road Fir Covert Road Roundabout.</p> <p><i>Alternative Route:</i> An alternative route between the two end points marked TEMP TR 2 on the Street Plans (Sheet 2 of 12) will be available, for the purpose of continuity of use by two-way directional traffic.</p>
<p>Street Plans (Sheet 2 of 12)/</p> <p>Fir Covert Road to Breck Farm Lane and Marriott's Way</p> <p>(Cont'd)</p>	<p>In the Parishes of Attlebridge, and Taverham</p> <p>In the District of Broadland</p> <p>In the County of Norfolk</p>	<p>Marriott's Way (Recreational public amenity path)</p> <p><i>Prohibition and/or restriction of use, as will be directed by traffic signs.</i></p>	<p>2.2</p> <p><i>Prohibition/Restriction:</i> From a point 125 metres south east of where the existing Breck Farm Lane/Furze Lane (U57168) bridge crosses over the Marriott's Way, north westwards for 470 metres (marked TEMP TR 3 on the Street Plans (Sheet 2 of 12)).</p> <p><i>Purpose of Prohibition/Restriction:</i> Works are proposed to be executed on or near that length of recreational public amenity path, to raise its level to carry it over the NDR classified road on a new overbridge.</p> <p><i>Alternative Route:</i></p> <p><i>During times of Restriction of Use:</i> An alternative route between the two end points marked TEMP TR 3 on the Street Plans (Sheet 2 of 12) will be available, for the purpose of continuity of use by travellers proceeding north west and south east along the recreational public amenity path; and</p> <p><i>During (expected minimal) times of Prohibition of Use:</i></p> <ul style="list-style-type: none"> - The route will remain available north west and south east of its closure points, but not as a through route; - Through route traffic will be directed, by notices posted on the C262 Fir Covert Road, in the north west, and on Pendleshurst Road (U51205), in the south east, to the alternative route to take to rejoin Marriott's Way at those two highways, whilst the prohibition of use is in force.
<p>Street Plans (Sheet 3 of 12)/</p> <p>Reepham Road to Bell</p>	<p>In the Parishes of Taverham, Drayton, and Horsford</p>	<p>C261 Reepham Road</p> <p><i>Prohibition and/or</i></p>	<p>3.1</p> <p><i>Prohibition/Restriction:</i> From a point 200 metres north west of its junction with Drewray</p>

(1) Street Plans Number/Title	(2) Area	(3) Temporary prohibition or restriction of use of streets	(4) Extent of temporary prohibition or restriction of use of streets
Farm Track	In the District of Broadland In the County of Norfolk	<i>restriction of driving/use, as will be directed by traffic signs/signal control.</i>	Drive (U51248), north westwards for 595 metres (marked TEMP TR 4 on the Street Plans (Sheet 3 of 12)). <u>Purpose of Prohibition/Restriction:</u> Works are proposed to be executed on or near that length of street, which will provide its north westerly and south easterly approach realignment tie-ins with the NDR classified road Reepham Road Roundabout. <u>Alternative Route:</u> An alternative route between the two end points marked TEMP TR 4 on the Street Plans (Sheet 3 of 12) will be available (including, in part, an area on non-highway land on the south western side of the existing carriageway for temporary use for traffic management purposes), for the purpose of continuity of use by two-way directional traffic.
		Drayton Restricted Byway No.6/Dog Lane (U57176)/Horsford Restricted Byway No.4 <i>Prohibition and/or restriction of use, as will be directed by traffic signs.</i>	3.2 <u>Prohibition/Restriction:</u> From the junction of the diverted Drayton Restricted Byway No.6 with the NDR classified road Reepham Road Roundabout, eastwards, then north eastwards, then generally eastwards, for a distance of 1225 metres, to a point 30 metres east of the junction with Horsford Restricted Byway No.5 (marked TEMP TR 5 on the Street Plans (Sheet 3 of 12)). <u>Purpose of Prohibition/Restriction:</u> Works are proposed to be executed on the undiverted part of that length of the Restricted Byways, to provide an improved highway surface. <u>Alternative Route:</u> C261 Reepham Road and Horsford Restricted Byway No.5. Note: <u>Prohibitions/Restrictions</u> of use of 3.2 and 3.3 will not operate at the same time.
Street Plans (Sheet 3 of 12)/ Reepham Road to Bell Farm Track (Cont'd)	In the Parishes of Taverham, Drayton, and Horsford In the District of Broadland In the County of Norfolk	Horsford Restricted Byway No.5 (Bell Farm Track) <i>Prohibition and/or restriction of use, as will be directed by traffic signs.</i>	3.3 <u>Prohibition/Restriction:</u> From its junction with the C261 Reepham Road, north eastwards to its junction with Dog Lane (U57176) (marked TEMP TR 6 on Street Plans (Sheet 3 of 12)). Private access traffic over a 150 metre length of the track from Dog Lane (U57176), and a 200 metre length of the track from the C261 Reepham Road, will be maintained for the

(1) Street Plans Number/Title	(2) Area	(3) Temporary prohibition or restriction of use of streets	(4) Extent of temporary prohibition or restriction of use of streets
			<p>purposes of access to the premises of land of Bell Farm, lying to the north and to the south of the NDR classified road.</p> <p><i>Purpose of Prohibition/Restriction:</i> Works are proposed to be executed on or near that length of street to raise its level to carry its realigned route over the NDR classified road on a new overbridge.</p> <p><i>Alternative Route:</i> C261 Reepham Road and Dog Lane (U57176)/Drayton Restricted Byway No.6.</p> <hr/> <p>Note: <i>Prohibitions/Restrictions</i> of use of 3.2 and 3.3 will not operate at the same time.</p>
<p>Street Plans (Sheet 4 of 12)/</p> <p>East of Bell Farm Track to Drayton Lane</p>	<p>In the Parishes of Horsford, and Drayton</p> <p>In the District of Broadland</p> <p>In the County of Norfolk</p>	<p>B1149 Holt Road</p> <p><i>Prohibition and/or restriction of driving/use, as will be directed by traffic signs/signal control.</i></p>	<p>4.1</p> <p><i>Prohibition/Restriction:</i> From its northerly junction with the C253 Church Street, south eastwards for 300 metres (marked TEMP TR 7 on the Street Plans (Sheet 4 of 12))</p> <p><i>Purpose of Prohibition/Restriction:</i> Works are proposed to be executed on or near that length of street, to provide a roundabout junction upon it as a connection with the new Link Road to the NDR classified road Drayton Lane Roundabout.</p> <p><i>Alternative Route:</i> An alternative route between the two end points marked TEMP TR 7 on the Street Plans (Sheet 4 of 12) will be available, for the purpose of continuity of use by two-way directional traffic, until such times as the two new Link Roads, connecting the B1149 Holt Road and the C261 Reepham Road with the NDR classified road Drayton Lane Roundabout are completed and open to traffic.</p>
<p>Street Plans (Sheet 4 of 12)/</p> <p>East of Bell Farm Track to Drayton Lane</p> <p>(Cont'd)</p>	<p>In the Parishes of Horsford, and Drayton</p> <p>In the District of Broadland</p> <p>In the County of Norfolk</p>	<p>C282 Drayton Lane</p> <p><i>Prohibition and/or restriction of driving/use, as will be directed by traffic signs/signal control.</i></p>	<p>4.2</p> <p><i>Prohibition/Restriction:</i> From its junction with the C261 Reepham Road northwards for 898 metres (marked TEMP TR 8 on the Street Plans (Sheet 4 of 12)).</p> <p><i>Purpose of Prohibition/Restriction:</i> Works are proposed to be executed on or near that length of street, which will provide a new Drayton Lane link between the C261 Reepham Road and the NDR classified road Drayton Lane Roundabout and a new Drayton Lane link between that roundabout and the proposed</p>

(1) Street Plans Number/Title	(2) Area	(3) Temporary prohibition or restriction of use of streets	(4) Extent of temporary prohibition or restriction of use of streets
			<p>roundabout on the B1149 Holt Road.</p> <p><i>Alternative Route:</i> An alternative route between the two end points marked TEMP TR 8 on the Street Plans (Sheet 4 of 12) will be available, for the purpose of continuity of use by two-way directional traffic, until such times as the new highways N and P shown on the Street Plans (Sheet 4 of 12), and the NDR classified road Drayton Lane Roundabout, are completed and open to traffic, so as to provide the permanent route between the C261 Reepham Road and the B1149 Holt Road.</p>
<p>Street Plans (Sheet 4 of 12)/</p> <p>East of Bell Farm Track to Drayton Lane</p> <p>(Cont'd)</p>	<p>In the Parishes of Horsford, and Drayton</p> <p>In the District of Broadland</p> <p>In the County of Norfolk</p>	<p>C261 Reepham Road</p> <p><i>Prohibition and/or restriction of driving/use, as will be directed by traffic signs/signal control.</i></p>	<p>4.3</p> <p><i>Prohibition/Restriction:</i> From a point 260 metres south east of its junction with the C282 Drayton Lane, north westwards for 425 metres (marked TEMP TR 9 on Street Plans (Sheet 4 of 12)).</p> <p>Access to and from the frontage property 'Borderlands' will be maintained at all times.</p> <p><i>Purpose of Prohibition/Restriction:</i> Works are proposed to be executed on or near that length of street, which will provide its tie-in, and create a major/minor priority junction with, the new Link Road to be provided from the C261 Reepham Road to the NDR classified road Drayton Lane Roundabout.</p> <p><i>Alternative Route:</i> An alternative route between the two end points marked TEMP TR 9 on the Street Plans (Sheet 4 of 12) will be available, for the purpose of continuity of use by two-way directional traffic.</p>
<p>Street Plans (Sheet 5 of 12)/</p> <p>Cromer Road Interchange to Old Norwich Road</p>	<p>In the Parishes of Horsford, and Horsham St. Faith and Newton St. Faith</p> <p>In the District of Broadland</p> <p>In the County of Norfolk</p>	<p>A140 Cromer Road/A140 Holt Road</p> <p><i>Prohibition and/or restriction of driving/use, as will be directed by traffic signs/signal control.</i></p>	<p>5.1</p> <p><i>Prohibition/Restriction:</i> From a point 90 metres south east of its junction with the B1149 Holt Road roundabout junction, northwards for 900 metres (marked TEMP TR 10 on the Street Plans (Sheet 5 of 12)).</p> <p><i>Purpose of Prohibition/Restriction:</i> Works are proposed to be executed on or near that length of street, to provide a new Grade Separated Interchange with the NDR classified road, including a new overbridge to carry the new alignment of the A140 Cromer Road over the NDR classified road.</p>

(1) <i>Street Plans Number/Title</i>	(2) <i>Area</i>	(3) <i>Temporary prohibition or restriction of use of streets</i>	(4) <i>Extent of temporary prohibition or restriction of use of streets</i>
			<i>Alternative Route:</i> An alternative route between the two end points marked TEMP TR 10 on the Street Plans (Sheet 5 of 12) will be available, for the purpose of continuity of use by two-way directional traffic, until such time as the new highway W on the Street Plans (Sheet 5 of 12) is completed and open to traffic.
Street Plans (Sheet 6 of 12)/ Access to Norwich International Airport and St. Faiths Road	In the Parishes of Horsham St. Faith and Newton St. Faith, and Spixworth In the District of Broadland and in the City of Norwich In the County of Norfolk	-	-
Street Plans (Sheet 7 of 12)/ Buxton Road	In the Parish of Spixworth In the District of Broadland In the County of Norfolk	Quaker Lane (U57188) <i>Prohibition and/or restriction of driving/use, as will be directed by traffic signs/signal control.</i>	7.1 <i>Prohibition/Restriction:</i> From its junction with the C246 Buxton Road, westwards for 80 metres (marked TEMP TR 11 on the Street Plans (Sheet 7 of 12)). <i>Purpose of Prohibition/Restriction:</i> Works are proposed to be executed on or near that length of street, which will provide its new easterly approach link with the realigned C246 Buxton Road. <i>Alternative Route:</i> An alternative route between the two end points marked TEMP TR 11 on the Street Plans (Sheet 7 of 12) will be available, for the purpose of continuity of use by two-way directional traffic, until such times as the new highway marked CC on the Street Plans (Sheet 7 of 12) is completed and open to traffic.
Street Plans (Sheet 7 of 12)/ Buxton Road (Cont'd)	In the Parish of Spixworth In the District of Broadland In the County of Norfolk	C246 Buxton Road <i>Prohibition and/or restriction of driving/use, as will be directed by traffic signs/signal control.</i>	7.2 <i>Prohibition/Restriction:</i> From its junction with Beeston Lane (U57187), northwards for 750 metres (marked TEMP TR 12 on the Street Plans (Sheet 7 of 12)) Access to and from Beeston Lane (U57187), and Quaker Lane (U57188) will be maintained at all times.

(1) <i>Street Plans Number/Title</i>	(2) <i>Area</i>	(3) <i>Temporary prohibition or restriction of use of streets</i>	(4) <i>Extent of temporary prohibition or restriction of use of streets</i>
			<p><i>Purpose of Prohibition/Restriction:</i> Works are proposed to be executed on or near that length of street, which will provide a new easterly aligned route for the C246 Buxton Road, and the raising of its level to carry it over the NDR classified road on a new overbridge.</p> <p><i>Alternative Route:</i> An alternative route between the two end points marked TEMP TR 12 on the Street Plans (Sheet 7 of 12) will be available, for the purpose of continuity of use by two-way directional traffic, until such time as the new highway DD on the Street Plans (Sheet 7 of 12) is completed and open to traffic.</p>
<p>Street Plans (Sheet 8 of 12)/</p> <p>North Walsham Road to Beeston Lane and North Walsham Road/Rackheath Lane/Crostwick Lane Junction Improvement</p>	<p>In the Parishes of Beeston St. Andrew, and Crostwick</p> <p>In the District of Broadland</p> <p>In the County of Norfolk</p>	<p>B1150 North Walsham Road</p> <p><i>Prohibition and/or restriction of driving/use, as will be directed by traffic signs/signal control.</i></p>	<p>8.1</p> <p><i>Prohibition/Restriction:</i> From a point 20 metres north of its junction with the access to the HFG Farm Shop and Garden Centre, northwards for 395 metres (marked TEMP TR 13 on the Street Plans (Sheet 8 of 12)).</p> <p><i>Purpose of Prohibition/Restriction:</i> Works are proposed to be executed on or near that length of street, which will provide its southerly and northerly approach tie-ins to the NDR classified road North Walsham Road Roundabout.</p> <p><i>Alternative Route:</i> An alternative route (including, in part, an area of non-highway land on the eastern side of the existing carriageway, beside the Tithe Plantation, for temporary use for traffic management purposes) between the two end points marked TEMP TR 13 on the Street Plans (Sheet 8 of 12) will be available, for the purpose of use by two-way directional traffic.</p>
<p>Street Plans (Sheet 8 of 12)/</p> <p>North Walsham Road to Beeston Lane and North Walsham Road/Rackheath Lane/Crostwick Lane Junction Improvement</p> <p>(Cont'd)</p>	<p>In the Parishes of Beeston St. Andrew, and Crostwick</p> <p>In the District of Broadland</p> <p>In the County of Norfolk</p>	<p>B1150 North Walsham Road</p> <p><i>Prohibition and/or restriction of driving/use, as will be directed by traffic signs/signal control.</i></p>	<p>8.2</p> <p><i>Prohibition/Restriction:</i> From a point 60 metres south south-west of its junction with the C249 Crostwick Lane, north north-eastwards for 165 metres (marked TEMP TR 14 on the Street Plans (Sheet 8 of 12)).</p> <p>Access to and from the C249 Crostwick Lane will be maintained at all times</p> <p><i>Purpose of Prohibition/Restriction:</i> Works are proposed to be executed on or near that length of street, which will provide an</p>

(1) <i>Street Plans Number/Title</i>	(2) <i>Area</i>	(3) <i>Temporary prohibition or restriction of use of streets</i>	(4) <i>Extent of temporary prohibition or restriction of use of streets</i>
			<p>increased northerly splay connection with it from the C249 Crostwick Lane; verge works across its existing junction with the C249 Rackheath Lane which is to be closed; and associated road markings and other works, to identify its new junction layout as that of a, improved, T-Junction from the C249 Crostwick Lane.</p> <p><i>Alternative Route:</i> An alternative route between the two end points marked TEMP TR 14 on the Street Plans (Sheet 8 of 12) will be available, for the purpose of continuity of use by two-way directional traffic.</p>
<p>Street Plans (Sheet 8 of 12)/</p> <p>North Walsham Road to Beeston Lane and North Walsham Road/Rackheath Lane/Crostwick Lane Junction Improvement</p> <p>(Cont'd)</p>	<p>In the Parishes of Beeston St. Andrew, and Crostwick</p> <p>In the District of Broadland</p> <p>In the County of Norfolk</p>	<p>C249 Crostwick Lane</p> <p><i>Prohibition and/or restriction of driving/use, as will be directed by traffic signs/signal control.</i></p>	<p>8.3</p> <p><i>Prohibition/Restriction:</i> From its junction with the B1150 North Walsham Road, westwards for 35 metres (marked TEMP 14A on the Street Plans (Sheet 8 of 12)).</p> <p>Access to and from the B1150 North Walsham Road will be maintained at all times</p> <p><i>Purpose of Prohibition/Restriction:</i> Works are proposed to be executed on or near that length of street, which will provide it with an increased northerly splay connection with the B1150 North Walsham Road; verge works across the existing opposite junction of the B1150 North Walsham Road with the C249 Rackheath Lane which is to be closed; and associated road markings and other works, to identify the new junction layout of the C249 Crostwick Lane as that of a, improved, T-Junction with the B1150 North Walsham Road.</p> <p><i>Alternative Route:</i> An alternative route between the two end points marked TEMP TR 14A on the Street Plans (Sheet 8 of 12) will be available, for the purpose of continuity of use by two-way directional traffic.</p>
<p>Street Plans (Sheet 9 of 12)/</p> <p>Wroxham Road and Wroxham Road/Green Lane West Junction Improvement</p>	<p>In the Parishes of Beeston St. Andrew, Rackheath, and Sprowston</p> <p>In the District of Broadland</p> <p>In the County of Norfolk</p>	<p>A1151 Wroxham Road</p> <p><i>Prohibition and/or restriction of driving/use, as will be directed by traffic signs/signal control.</i></p>	<p>9.1</p> <p><i>Prohibition/Restriction:</i> From a point 50 metres north east of its junction with the C258 Green Lane West, south westwards for 315 metres (marked TEMP TR 15 on the Street Plans (Sheet 9 of 12)).</p> <p><i>Purpose of Prohibition/Restriction:</i> Works are proposed to be executed on or near that length of street, which will provide it with</p>

(1) Street Plans Number/Title	(2) Area	(3) Temporary prohibition or restriction of use of streets	(4) Extent of temporary prohibition or restriction of use of streets
			<p>a new Link Road connection, moved westwards from its existing location, from the C258 Green Lane West; verge works across its existing junction with the C258 Green Lane West which is to be closed; and associated road markings and other works, to identify the new Link Road connection from the C258 Green Lane West.</p> <p><i>Alternative Route:</i> An alternative route between the two end points marked TEMP TR 15 on the Street Plans (Sheet 8 of 12) will be available, for the purpose of continuity of use by two-way directional traffic.</p>
<p>Street Plans (Sheet 9 of 12)/</p> <p>Wroxham Road and Wroxham Road/Green Lane West Junction Improvement</p> <p>(Cont'd)</p>	<p>In the Parishes of Beeston St. Andrew, Rackheath, and Sprowston</p> <p>In the District of Broadland</p> <p>In the County of Norfolk</p>	<p>C258 Green Lane West</p> <p><i>Prohibition and/or restriction of driving/use, as will be directed by traffic signs/signal control.</i></p>	<p>9.2</p> <p><i>Prohibition/Restriction:</i> From its junction with the A1151 Wroxham Road, south eastwards for 200 metres (marked TEMP TR 16 on the Street Plans (Sheet 9 of 12)).</p> <p>Access to and from residential properties along this length of C258 Green Lane West will be maintained at all times.</p> <p><i>Purpose of Prohibition/Restriction:</i> Works are proposed to be executed on or near that length of street, which will remove its existing junction with the A1151 Wroxham Road, including verge works across that existing junction and the provision of a residential cul-de-sac turning head at that position; tie-in works with the new Link Road to be provided, westwards of its existing location, between the C258 Green Lane West and the A1151 Wroxham Road; and associated road markings and other works, to identify the new Link Road connection from the C258 Green Lane West.</p> <p><i>Alternative Route:</i> An alternative route between the two end points marked TEMP TR 16 on the Street Plans (Sheet 8 of 12) will be available, for the purpose of continuity of use by two-way directional traffic, until such times as the new highway GG on the Street Plans (Sheet 9 of 12) is completed and open to traffic and the existing length of the C258 Green Lane West becomes a residential two-way cul-de-sac.</p>
<p>Street Plans (Sheet 9 of 12)/</p> <p>Wroxham Road and</p>	<p>In the Parishes of Beeston St. Andrew, Rackheath, and Sprowston</p>	<p>A1151 Wroxham Road</p> <p><i>Prohibition and/or restriction of</i></p>	<p>9.3</p> <p><i>Prohibition/Restriction:</i> From a point 80 metres north east of Sloe Lane (U57095), south westwards for 380 metres (marked TEMP TR</p>

(1) Street Plans Number/Title	(2) Area	(3) Temporary prohibition or restriction of use of streets	(4) Extent of temporary prohibition or restriction of use of streets
<p>Wroxham Road/Green Lane West Junction Improvement</p> <p>(Cont'd)</p>	<p>In the District of Broadland</p> <p>In the County of Norfolk</p>	<p><i>driving/use, as will be directed by traffic signs/signal control.</i></p>	<p>17 on the Street Plans (Sheet 9 of 12)).</p> <p>Access to and from Sloe Lane (U57095) will be maintained at most times.</p> <p><i>Purpose of Prohibition/Restriction:</i> Works are proposed to be executed on or near that length of street, which will provide its south westerly and north easterly approach tie-ins to the NDR classified road Wroxham Road Roundabout.</p> <p><i>Alternative Route:</i> An alternative route between the two end points marked TEMP TR 17 on the Street Plans (Sheet 9 of 12) will be available, for the purpose of continuity of use by two-way directional traffic.</p> <p><i>When access to and from Sloe Lane (U57095) is to be prohibited –</i></p> <p>Traffic requiring agricultural access off Sloe Lane (U57095) will be directed to use Swash Lane (U57147), to join Sloe Lane (U57095) from the north; and</p> <p>Other traffic will be directed to use Swash Lane (U57147) or the C249 Dobb's Lane, both lying to the north, to leave or join the A1151 Wroxham Road, to continue their journey from there.</p>
<p>Street Plans (Sheet 10 of 12)/</p> <p>Newman Road, Salhouse Road and Railway Crossing</p>	<p>In the Parishes of Rackheath, and Great and Little Plumstead</p> <p>In the District of Broadland</p> <p>In the County of Norfolk</p>	<p>C283 Salhouse Road</p> <p><i>Prohibition and/or restriction of driving/use, as will be directed by traffic signs/signal control.</i></p>	<p>10.1</p> <p><i>Prohibition/Restriction:</i> From a point 20 metres south of its junction with the carriageway of the C258 Green Lane West/Green Lane East, southwards for 515 metres (marked TEMP TR 18 on the Street Plans (Sheet 10 of 12)).</p> <p><i>Purpose of Prohibition/Restriction:</i> Works are proposed to be executed on or near that length of street, which will provide its south easterly and north westerly approach tie-ins to the NDR classified road Salhouse Road Roundabout.</p> <p><i>Alternative Route:</i> An alternative route between the two end points marked TEMP TR 18 on the Street Plans (Sheet 10 of 12) will be available, for the purpose of continuity of use by two-way directional traffic.</p>

(1) Street Plans Number/Title	(2) Area	(3) Temporary prohibition or restriction of use of streets	(4) Extent of temporary prohibition or restriction of use of streets
		<p>C874 Plumstead Road</p> <p><i>Prohibition and/or restriction of driving/use, as will be directed by traffic signs/signal control.</i></p>	<p>10.2</p> <p><i>Prohibition/Restriction:</i> From a point 10 metres north east of its junction with the C258 Broad Lane, south westwards for 700 metres, including passing under a new bridge which will carry the NDR classified road over the C874 Plumstead Road (marked TEMP TR 19 on the Street Plans (Sheet 10 of 12)).</p> <p><i>Purpose of Prohibition/Restriction:</i> Works are proposed to be executed on or near that length of street, to provide a realigned section of Plumstead Road, including a new roundabout upon it, which will connect to a new Link Road to and from the NDR classified road.</p> <p><i>Alternative Route:</i> An alternative route between the two end points marked TEMP TR 19 on the Street Plans (Sheet 10 of 12) will be available, for the purpose of continuity of use by two-way directional traffic.</p>
<p>Street Plans (Sheet 11 of 12)/</p> <p>Plumstead Road, Middle Road and Low Road and Thorpe End Highway Improvement Measures</p>	<p>In the Parish of Great and Little Plumstead</p> <p>In the District of Broadland</p> <p>In the County of Norfolk</p>	<p>C442 Middle Road</p> <p><i>Prohibition and/or restriction of driving/use, as will be directed by traffic signs/signal control.</i></p>	<p>11.1</p> <p><i>Prohibition/Restriction:</i> From a point 25 metres east of its junction with Toad Lane (U59284), westwards for some 625 metres (marked TEMP TR 20 on the Street Plans (Sheet 11 of 12)).</p> <p><i>Purpose of Prohibition/Restriction:</i> Works are proposed to be executed on or near that length of street, to provide it on a realigned/raised route, including the construction of a new overbridge, to carry it over the NDR classified road.</p> <p><i>Alternative Route:</i></p> <p><i>Agricultural Access</i> - C442 Middle Road will remain open from its western point of closure, westwards to its junction with Green Lane (U59278), and access to agricultural fields adjoining that length will continue to be available.</p> <p><i>Through Traffic</i> - Alternative route for through traffic will be - Green Lane (U59278); Low Road (U59392), or Smee Lane (U59400); and un-prohibited/unrestricted length of C442 Middle Road from the east and its junction with Smee Lane (U59400).</p> <p>Note: One or other of Low Road (U59392) or</p>

(1) Street Plans Number/Title	(2) Area	(3) Temporary prohibition or restriction of use of streets	(4) Extent of temporary prohibition or restriction of use of streets
			Smee Lane (U59400) will not be permanently closed, until such times as the above-mentioned works on the C442 Middle Road are completed and open to traffic.
Street Plans (Sheet 11 of 12)/ Plumstead Road, Middle Road and Low Road and Thorpe End Highway Improvement Measures (Cont'd)	In the Parish of Great and Little Plumstead In the District of Broadland In the County of Norfolk	C874 Plumstead Road <i>Prohibition and/or restriction of driving/use, as will be directed by traffic signs/signal control.</i>	11.2 <i>Prohibition/Restriction:</i> From a point 230 metres north east of its junction with Broadland Drive (U51073), south westwards for 750 metres (marked TEMP TR 21 on the Street Plans (Sheet 11 of 12)). <i>Purpose of Prohibition/Restriction:</i> Highway improvement works are proposed to be executed on or near that length of street, to provide a new mini-roundabout at its junction with Broadland Drive (U51073); and the provision of a new northern footway, to replace the existing highway verge, along the frontage between St David's Drive (U51312) and Percy Howe's Close, and along the frontages of Nos. 49 – 63 (odds) Plumstead Road. <i>Alternative Route:</i> An alternative route between the two end points marked TEMP TR 21 on the Street Plans (Sheet 11 of 12) will be available, for the purpose of continuity of use by two-way directional traffic.
Street Plans (Sheet 12 of 12)/ Smee Lane and Postwick Interchange	In the Parishes of Great and Little Plumstead, and Postwick with Witton In the District of Broadland and in the administrative area of The Broads Authority In the County of Norfolk	A47 Trunk Road, including - Eastbound Diverge Slip Road, and - Eastbound Merge Slip Road <i>Prohibition and/or restriction of driving/use, as will be directed by traffic signs/signal control.</i>	12.1 <i>Prohibition/Restriction:</i> That length, from the western side of its bridge crossing of the A47 Trunk Road over the Norwich to Yarmouth & Lowestoft Railway line, eastwards for 1160 metres; The existing Eastbound Diverge Slip Road, from the eastbound carriageway of the A47 Trunk Road to the Postwick North West Roundabout; and The existing Eastbound Merge Slip Road, from the Postwick North West Roundabout to the eastbound carriageway of the A47 Trunk Road. (marked TEMP TR 22 on the Street Plans (Sheet 12 of 12)).
Street Plans (Sheet 12 of 12)/ Smee Lane and	In the Parishes of Great and Little Plumstead, and Postwick with	A47 Trunk Road, including - Eastbound Diverge	12.2 <i>Purpose of Prohibition/Restriction:</i> To allow –

(1) Street Plans Number/Title	(2) Area	(3) Temporary prohibition or restriction of use of streets	(4) Extent of temporary prohibition or restriction of use of streets
Postwick Interchange (Cont'd)	Witton In the District of Broadland and in the administrative area of The Broads Authority In the County of Norfolk	Slip Road, and - Eastbound Merge Slip Road <i>Prohibition and/or restriction of driving/use, as will be directed by traffic signs/signal control.</i> (Cont'd)	<p>A new Diverge Slip Road to be constructed, between the A47 Trunk Road eastbound carriageway and the NDR classified road Postwick North East Roundabout;</p> <p>A new Merge Slip Road to be constructed, between the NDR classified road Postwick North East Roundabout and the eastbound carriageway of the A47 Trunk Road; and</p> <p>For a new bridge to be constructed to carry the NDR classified road over the A47 Trunk Road, from the Postwick North East Roundabout, to the A1042 Yarmouth Road, in the vicinity of the Park & Ride site.</p> <p><u>Alternative Route:</u></p> <p>A47 Trunk Road eastbound and westbound through traffic flow will be maintained along a route between the two end points marked TEMP TR 22 on the Street Plans (Sheet 12 of 12), whether by use of its carriageways, or of its existing and proposed eastbound Diverge and Merge Slip Roads.</p> <p>A47 Trunk Road eastbound Diverge Slip Road traffic and A47 Trunk Road eastbound Merge Slip Road traffic, will have a route maintained from and to their same diverge/merge points, via the existing or new Slip Roads, or a combination of the two, until the works at the A47 Trunk Road junction are completed, providing the new permanent eastbound Slip Road routes.</p>

(1) Street Plans Number/Title	(2) Area	(3) Temporary prohibition or restriction of use of streets	(4) Extent of temporary prohibition or restriction of use of streets
Street Plans (Sheet 12 of 12)/ Smee Lane and Postwick Interchange (Cont'd)	<p>In the Parishes of Great and Little Plumstead, and Postwick with Witton</p> <p>In the District of Broadland and in the administrative area of The Broads Authority</p> <p>In the County of Norfolk</p>	<p>A1042 Yarmouth Road</p> <p><i>Prohibition and/or restriction of driving/use, as will be directed by traffic signs/signal control.</i></p>	<p>12.3</p> <p><u>Prohibition/Restriction:</u> From a point on the Postwick Bridge, 80 metres south east of its junction with Postwick North West Roundabout, south eastwards, then eastwards, to a point 20 metres east of its junction with the C440 Church Road (marked TEMP TR 23 on the Street Plans (Sheet 12 of 12)).</p> <p><u>Purpose of Prohibition/Restriction:</u></p> <p>To install the works for the signalised junction to replace the existing roundabout on the A1042 Yarmouth Road, at the south westerly termination point of the NDR classified road in the vicinity of the Park & Ride site at Postwick, together with realignment works and the provision of a northern footway/cycleway, on its eastern approach to the new signalised junction.</p> <p><u>Alternative Route:</u> A route between the two end points marked TEMP TR 23 on the Street Plans (Sheet 12 of 12) will be maintained for through route and joining traffic to the length of street concerned, by traffic management and temporary traffic signal control, until the permanent signalised junction proposals are completed and operational.</p>

SCHEDULE 9
CONSTRUCTION ACCESS TO AND FROM WORKS

Article 15

<i>(1)</i> <i>Area</i>	<i>(2)</i> <i>Description of access</i>
In the District of Broadland In the County of Norfolk	Access from the A1067 Fakenham Road (from the location of the proposed Fakenham Road Roundabout) to travel east along the line of the NDR classified road.
	Access from the southern length, leading off the A1067 Fakenham Road, of the C262 Fir Covert Road (from the location of the proposed Fir Covert Road Roundabout), to travel east and west along the line of the NDR classified road.
	Access along Furze Lane (U57168) to the Marriott's Way bridge compound.
	Access along Breck Farm Lane (U57168) in order to construct the turning head on that lane at Breck Farm.
	Access from the south side of the C261 Reepham Road (from the location of the proposed Reepham Road Roundabout) to travel east and west along the line of the NDR classified road.
	Access along Bell Farm Track (private means of access/Horsford Restricted Byway No.5) from the C261 Reepham Road to the compound on the south west side of the proposed bridge crossing of the access and restricted byway over the NDR classified road.
	Access along the C282 Drayton Lane from the C261 Reepham Road to travel (from the location of the proposed Drayton Lane Roundabout) east and west along the line of the NDR classified road and to access the compound situated north west of the aforementioned roundabout.
	Access along the B1149 Holt Road from its junction with A140 Cromer Road in order to construct the new junction with the new Drayton Lane Link Road and the turning head on the B1149 Holt Road at what is to become its south east termination point on the north side of the NDR classified road.
	Access from the A140 Cromer Road along the route of the private means of access (from Cromer Road Roundabout North) to the compound situated on Norwich International Airport land.
	Access along the A140 Cromer Road and the B1149 Holt Road (from the location of the proposed NDR Cromer Road grade separated junction) to access west along the line of the NDR classified road and east to the new Cromer Road overbridge.
	Access along Holly Lane (U57142) to construct the turning head on that lane at Manor Farm.
	Access along the C251 Bullock Hill to construct the turning head on that street at what is to become its south east termination point on the north side of the NDR classified road.
	Access along Quaker Lane (U57188) to construct the turning head on that street at what is to become its westerly termination point on the north side of the NDR classified road.
Access along the C251 St Faiths Road to construct the turning head on that street at what is to become its northerly termination point on the south side of the NDR classified road.	
Access along the C246 Buxton Road from the south to travel (from the location of the Buxton Road overbridge crossing) east and west along the line of the NDR classified road.	

<i>(1)</i> <i>Area</i>	<i>(2)</i> <i>Description of access</i>
In the District of Broadland In the County of Norfolk (cont.)	Access from the southern length of the C246 Buxton Road to the bridge compound and batching plant.
	Access along the B1150 North Walsham Road from the south to travel (from the location of the proposed North Walsham Road Roundabout) east and west along the line of the NDR classified road.
	Access along the A1151 Wroxham Road from the south to travel (from the location of the proposed Wroxham Road Roundabout) north west and south south-east along the line of the NDR classified road.
	Access from the C258 Green Lane West and Newman Road (U57852) to Gazebo Farm office and the bridge compound.
	Access along the C283 Salhouse Road from the C258 Green Lane West/Green Lane East to travel (from the location of the proposed Salhouse Road Roundabout) north west and south south-east along the line of the NDR classified road.
	Access along the C874 Plumstead Road from the C258 Broad Lane to the temporary compounds, east and west of the NDR classified road, and (from the location of the proposed Plumstead Road Roundabout North) to provide access south towards the proposed Plumstead Road Roundabout South.
	Access along the C442 Middle Road to the bridge compound on the south side of the lane and on the east side of the NDR classified road and to the new Middle Road overbridge.
	Access along Low Road (U59392) to construct the turning heads on that street on each side of the NDR classified road.
	Access along Smee Lane (U59400) in order to construct the turning heads on that street on each side of the NDR classified road.
	Access from the C830 Broadland Way at the C829/C830 Broadland Way/C831 Peachman Way roundabout east towards the Broadland Gate Roundabout.
	Access from the C830 Broadland Way at the Postwick North West Roundabout to the new A47(T) eastbound diverge slip road.
	A47(T) Eastbound Diverge Slip Road - access from the slip road along the route of the new slip road.
	A47(T) Eastbound Diverge Slip Road - access from the slip road to construct the north pier of the new A47(T) overbridge.
	Access along Oaks Lane (U59329) to the site compound on the proposed park and ride site.
Access along the A1042 Yarmouth Road to construct the south pier and abutment of the new A47(T) overbridge and the new signalised controlled junction with the park and ride site and to the existing Postwick Bridge.	

SCHEDULE 10

LAND IN WHICH ONLY NEW RIGHTS ETC. MAY BE ACQUIRED

Article 24

(1) Land Plans Number/Title	(2) Number of land shown on Land Plan	(3) Purpose for which Rights over the land may be acquired
Land Plans (Sheet 2 of 12)/ Fir Covert Road to Breck Farm Lane and Marriott's Way	Plot 2/26	The right to regrade/elevate land of the Marriott's Way recreational public amenity path, so as to raise its levels to meet with its new bridge crossing of the NDR classified road.
	Plot 2/28	The right to regrade/elevate land of the Marriott's Way recreational public amenity path, so as to raise its levels to meet with its new bridge crossing of the NDR classified road.
	Plot 2/29	The right to construct and retain a length of private access track across the Marriott's Way recreational public amenity path.
Land Plans (Sheet 9 of 12)/ Wroxham Road and Wroxham Road/Green Lane West Junction Improvement	Plot 9/5	The right to construct, inspect, and maintain a drainage ditch.
Land Plans (Sheet 10 of 12)/ Newman Road, Salhouse Road and Railway Crossing	Plot 10/40	The right to construct, inspect, and maintain a bridge to carry the NDR classified road over the Norwich to Cromer & Sheringham Railway line.
Land Plans (Sheet 12 of 12)/ Smee Lane and Postwick Interchange	Plot 12/41	The right to undertake, inspect, and maintain street alterations (improvements) on the existing A1042 Yarmouth Road overbridge structure of the A47(T) Norwich Southern Bypass.
	Plot 12/42	The right to construct, inspect, and maintain a bridge, to carry the NDR classified road over the A47(T) Norwich Southern Bypass.

SCHEDULE 11

Article 24

MODIFICATION OF COMPENSATION AND COMPULSORY PURCHASE ENACTMENTS FOR CREATION OF NEW RIGHTS

Compensation enactments

1. The enactments for the time being in force with respect to compensation for the compulsory purchase of land shall apply, with the necessary modifications as respects compensation, in the case of a compulsory acquisition under this Order of a right by the creation of a new right as they apply as respects compensation on the compulsory purchase of land and interests in land.

2.—(1) Without prejudice to the generality of paragraph 1, the Land Compensation Act 1973 shall have effect subject to the modifications set out in sub-paragraph (2) and (3).

(2) In section 44(1) (compensation for injurious affection), as it applies to compensation for injurious affection under section 7 of the 1965 Act as substituted by paragraph 4—

- (a) for the words “land is acquired or taken” there shall be substituted the words “a right or restrictive covenant over land is purchased from or imposed on”; and
- (b) for the words “acquired or taken from him” there shall be substituted the words “over which the right is exercisable or the restrictive covenant enforceable”.

(3) In section 58(1) (determination of material detriment where part of house etc. proposed for compulsory acquisition), as it applies to determinations under section 8 of the 1965 Act as substituted by paragraph 5—

- (a) for the word “part” in paragraph (a) and (b) there shall be substituted the words “a right over or restrictive covenant affecting land consisting”;
- (b) for the word “severance” there shall be substituted the words “right or restrictive covenant over or affecting the whole of the park or garden”;
- (c) for the words “part proposed” there shall be substituted the words “right or restrictive covenant proposed”; and
- (d) for the words “part is” there shall be substituted the words “right or restrictive covenant is”.

Application of the 1965 Act

3.—(1) The 1965 Act shall have effect with the modifications necessary to make it apply to the compulsory acquisition under this Order of a right by the creation of a new right, or to the imposition under this Order of a restrictive covenant, as it applies to the compulsory acquisition under this Order of land, so that, in appropriate contexts, references in that Act to land are read (according to the requirements of the particular context) as referring to, or as including references to—

- (a) the right acquired or to be acquired; or
- (b) the land over which the right is or is to be exercisable.

(2) Without prejudice to the generality of sub-paragraph (1), Part 1 of the 1965 Act shall apply in relation to the compulsory acquisition under this Order of a right by the creation of a new right with the modifications specified in the following provisions of this Schedule.

4. For section 7 of the 1965 Act (measure of compensation) there shall be substituted the following section—

“7. In assessing the compensation to be paid by the acquiring authority under this Act, regard shall be had not only to the extent (if any) to which the value of the land over which the right is to be acquired or the restrictive covenant is to be imposed is depreciated by the acquisition of the right or the imposition of the covenant but also to the damage (if any) to be sustained by the owner of the land by reason of its severance from other land of the owner, or injuriously affecting that other land by the exercise of the powers conferred by this or the special Act.”.

5. For section 8 of the 1965 Act (provisions as to divided land) there shall be substituted the following section—

“8.—(1) Where in consequence of the service on a person under section 5 of this Act of a notice to treat in respect of a right over land consisting of a house, building or manufactory or of a park or garden belonging to a house (“the relevant land”)—

- (a) a question of disputed compensation in respect of the purchase of the right or the imposition of the restrictive covenant would apart from this section fall to be determined by the Upper Tribunal (“the tribunal”); and
- (b) before the tribunal has determined that question the tribunal is satisfied that the person has an interest in the whole of the relevant land and is able and willing to sell that land and—
 - (i) where that land consists of a house, building or manufactory, that the right cannot be purchased or the restrictive covenant imposed without material detriment to that land; or
 - (ii) where the land consists of such a park or garden, that the right cannot be purchased or the restrictive covenant imposed without seriously affecting the amenity or convenience of the house to which that land belongs,

The Norwich Northern Distributor Road (A47 to A1067) Order 201[](a)(“the Order”) shall, in relation to that person, cease to authorise the purchase of the right and be deemed to authorise the purchase of that person’s interest in the whole of the relevant land including, where the land consists of such a park or garden, the house to which it belongs, and the notice shall be deemed to authorise the purchase of that person’s interest in the whole of the relevant land including, where the land consists of such a park or garden, the house to which it belongs, and the notice shall be deemed to have been served in respect of that interest on such date as the tribunal directs.

(2) Any question as to the extent of the land in which the Order is deemed to authorise the purchase of an interest by virtue of subsection (1) of this section shall be determined by the tribunal.

(3) Where in consequence of a determination of the tribunal that it is satisfied as mentioned in subsection (1) of this section the Order is deemed by virtue of that subsection to authorise the purchase of an interest in land, the acquiring authority may, at any time within the period of 6 weeks beginning with the date of the determination, withdraw the notice to treat in consequence of which the determination was made; but nothing in this subsection prejudices any other power of the authority to withdraw the notice.”.

6. The following provisions of the 1965 Act (which state the effect of a deed poll executed in various circumstances where there is no conveyance by persons with interests in the land), that is to say—

- (a) section 9(4) (failure by owners to convey);
- (b) paragraph 10(3) of Schedule 1 (owners under incapacity);
- (c) paragraph 2(3) of Schedule 2 (absent and untraced owners); and
- (d) paragraphs 2(3) and 7(2) of Schedule 4 (common land),

shall be so modified as to secure that, as against persons with interests in the land which are expressed to be overridden by the deed, the right which is to be compulsorily acquired or the restrictive covenant which is to be imposed is vested absolutely in the acquiring authority.

7. Section 11 of the 1965 Act (powers of entry) shall be so modified as to secure that, as from the date on which the acquiring authority has served notice to treat in respect of any right it has power, exercisable in equivalent circumstances and subject to equivalent conditions, to enter for the purpose of exercising that right or enforcing that restrictive covenant (which shall be deemed for this purpose to have been created on that date of service of the notice); and sections 12 (penalty for unauthorised entry) and 13 (entry on warrant in the event of obstruction) of the 1965 Act shall be modified correspondingly.

8. Section 20 of the 1965 Act (protection for interests of tenants at will, etc.) shall apply with the modifications necessary to secure that persons with such interests in land as are mentioned in that section are compensated in a manner corresponding to that in which they would be compensated on a compulsory acquisition under this Order of that land, but taking into account only the extent (if any) of such interference with such an interest as is actually caused, or likely to be caused, by the exercise of the right or the enforcement of the restrictive covenant in question.

9. Section 22 of the 1965 Act (protection of acquiring authority's possession where by inadvertence an estate, right or interest has not been got in) shall be so modified as to enable the acquiring authority, in circumstances corresponding to those referred to in that section, to continue to be entitled to exercise the right acquired, subject to compliance with that section as respects compensation.

SCHEDULE 12

LAND OF WHICH TEMPORARY POSSESSION MAY BE TAKEN

Article 30

<i>(1) Land Plans Number/Title</i>	<i>(2) Location</i>	<i>(3) Number of land shown on Land Plan</i>	<i>(4) Purpose for which temporary possession may be taken</i>	<i>(5) Relevant part of the authorised development</i>	
Land Plans (Sheet 1 of 12)/ Fakenham Road	North of the A1067 Fakenham Road and west of the curtilage of the property 'Peacehaven'	Plot 1/11	Temporary traffic management/diversion area.	Part of Work No. 1	
		Plot 1/15			
		Plot 1/19			
Land Plans (Sheet 2 of 12)/ Fir Covert Road to Breck Farm Lane and Marriott's Way	North of the NDR classified road and east of the A1067 Fakenham Road Roundabout	Plot 2/3	The diversion of a high pressure gas main, together with operational working space associated with those works.	Part of Work No. 2	
		Plot 2/6			
	South of the NDR classified road and east of the A1067 Fakenham Road Roundabout.	Plot 2/4	The diversion of a high pressure gas main, together with operational working space associated with those works.	Part of Work No. 2	
		Plot 2/8			
		Plot 2/10			
	North of the NDR classified road and west of the NDR classified road Fir Covert Road Roundabout.	Plot 2/12	Temporary topsoil storage area.	Part of Work No. 2	
	North of the NDR classified road and immediately west of Furze Lane (U57168).	Plot 2/35	Bridge Compound (for the construction of the Marriott's Way recreational public amenity path overbridge of the NDR classified road).	Part of Work No. 4	
	Land Plans (Sheet 3 of 12)/ Reepham Road to Bell Farm Track	North west of the NDR classified road and south west of the C261 Reepham Road.	Plot 3/2	Temporary topsoil storage area.	Part of Work No. 4
		South west of the C261 Reepham Road and 200 metres north west of Drewray Drive (U51248).	Plot 3/4	Temporary traffic management/diversion area.	Part of Work No. 5

(1) Land Plans Number/Title	(2) Location	(3) Number of land shown on Land Plan	(4) Purpose for which temporary possession may be taken	(5) Relevant part of the authorised development
	South of the NDR classified road and east of Horsford Restricted Byway No.5/Bell Farm Private Access Track midway along their length.	Plot 3/33	Site compound.	Part of Work No. 6
Land Plans (Sheet 4 of 12)/ East of Bell Farm Track to Drayton Lane	North of the NDR classified road Drayton Lane Roundabout and west of the C282 Drayton Lane.	Plot 4/9	Site compound with temporary mitigation measures and temporary topsoil storage area.	Part of Work No. 6
	North of the NDR classified road Drayton Lane Roundabout and west of the C282 Drayton Lane.	Plot 4/11	Site compound with temporary mitigation measures.	Part of Work No. 6
	South of the NDR classified road Drayton Lane Roundabout and east of the C282 Drayton Lane.	Plot 4/24	Temporary traffic management/diversion area.	Part of Work No. 7
	South of the NDR classified road and north of Holly Lane (U57142).	Plot 4/39	Temporary topsoil storage area.	Part of Work No. 9
Land Plans (Sheet 5 of 12)/ Cromer Road Interchange to Old Norwich Road	South of the NDR classified road and north of Holly Lane (U57142).	Plot 5/2	Temporary topsoil storage area.	Part of Work No. 9
	East of the A140 Cromer Road and 310 metres north of the Unnamed Highway (Cromer Road to West Lane (U57647)).	Plot 5/33	Temporary traffic management/diversion area.	Part of Work No. 9
	Eastern part of the A140 Cromer Road and 310 metres north of the Unnamed Highway (Cromer Road to West Lane (U57647)).	Plot 5/34	Temporary traffic management/diversion area.	Part of Work No. 9

(1) Land Plans Number/Title	(2) Location	(3) Number of land shown on Land Plan	(4) Purpose for which temporary possession may be taken	(5) Relevant part of the authorised development
	North of the NDR classified road and west of West Farm and the City of Norwich Aviation Museum.	Plot 5/43	Site compound, plant yard, crushing plant, recycling plant, temporary mitigation measures, and temporary topsoil storage area.	Part of Work No. 10
Land Plans (Sheet 6 of 12)/ Access to Norwich International Airport and St. Faiths Road	East of the NDR classified road Airport Roundabout.	Plot 6/14	Temporary topsoil storage area.	Part of Work Nos. 11 and 12
	East of the NDR classified road and south of the NDR classified road Airport Roundabout.	Plot 6/16	Removal of existing hedgerow and airport fencing and planting of new hedgerow.	Part of Work No. 12
Land Plans (Sheet 7 of 12)/ Buxton Road	North of the NDR classified road and west of the C246 Buxton Road overbridge crossing of the NDR classified road.	Plot 7/17	Temporary topsoil storage area.	Part of Work No. 12
	South of the NDR classified road and east of the C246 Buxton Road overbridge crossing of the NDR classified road.	Plot 7/33	Bridge compound and temporary topsoil storage area.	Part of Work No. 12
Land Plans (Sheet 8 of 12)/ North Walsham Road to Beeston Lane and North Walsham Road/Rackheath Lane/Crostwick Lane Junction Improvement	North of the NDR classified road North Walsham Road Roundabout and east of the B1150 North Walsham Road.	Plot 8/7	Temporary traffic management/diversion area.	Part of Work No. 13
Land Plans (Sheet 9 of 12)/ Wroxham Road and Wroxham Road/Green Lane West Junction Improvement	West of the NDR classified road and north of Gazebo Farm.	Plot 9/38	Temporary ecological mitigation measures.	Part of Work No. 16
Land Plans (Sheet 10 of 12)/	Gazebo Farm to	Plot 10/7	Site compound with	Part of Work No. 16

(1) Land Plans Number/Title	(2) Location	(3) Number of land shown on Land Plan	(4) Purpose for which temporary possession may be taken	(5) Relevant part of the authorised development
Newman Road, Salhouse Road and Railway Crossing	the west of the NDR classified road.		temporary mitigation measures.	
	To the south west of the NDR classified road and to the north west of the C282 Salhouse Road.	Plot 10/25	Temporary topsoil storage area.	Part of Work No. 16
	To the south west of the NDR classified road and to the north west of the C282 Salhouse Road.	Plot 10/26	Temporary topsoil storage area.	Part of Work Nos. 16 and 17
	To the south west of the NDR classified road and to the north west of the C282 Salhouse Road.	Plot 10/28	Temporary topsoil storage area.	Part of Work Nos. 16 and 17
	To the south west of the NDR classified road and to the north west of the C874 Plumstead Road.	Plot 10/38	Site compound with batching plant, bridge access and access to bridge northern abutment (of NDR classified road bridge crossing of the Norwich to Cromer & Sheringham Railway line) , with temporary mitigation measures.	Part of Work No. 18
	To the south west of the NDR classified road and to the north west of the C874 Plumstead Road.	Plot 10/39	Site compound with batching plant, bridge access and access to bridge northern abutment (of NDR classified road bridge crossing of the Norwich to Cromer & Sheringham Railway line), with temporary mitigation measures, and temporary topsoil storage area.	Part of Work No. 18
	To the north west of the C874 Plumstead Road and to the south east of the Norwich to	Plot 10/42	Bridge compound.	Part of Work No. 18

(1) Land Plans Number/Title	(2) Location	(3) Number of land shown on Land Plan	(4) Purpose for which temporary possession may be taken	(5) Relevant part of the authorised development
	Cromer & Sheringham Railway line.			
	To the south of the C874 Plumstead Road and to the east of the Norwich to Cromer & Sheringham Railway line.	Plot 10/52	Temporary topsoil storage area.	Part of Work No. 18
Land Plans (Sheet 11 of 12)/ Plumstead Road, Middle Road and Low Road and Thorpe End Highway Improvement Measures	To the west of the NDR classified road and to the east of the Norwich to Cromer & Sheringham Railway line.	Plot 11/7	Temporary topsoil storage area.	Part of Work No. 18
	To the east of the NDR classified road and to the north of Low Road (U59392).	Plot 11/13	Bridge compound and temporary topsoil storage area.	Part of Work No. 18
Land Plans (Sheet 12 of 12)/ Smee Lane and Postwick Interchange	To the east of the NDR classified road and to the south of Smee Lane (U59400).	Plot 12/9	Temporary topsoil storage area.	Part of Work Nos. 20 and 21
	To the south of the A1042 Yarmouth Road, to the east of the Postwick Park & Ride site, and to the west of Oak's Lane (U59329).	Plot 12/61	Site compound with temporary mitigation measures and access road thereto.	Part of Work No. 21

SCHEDULE 13
PROTECTIVE PROVISIONS

Article 41

PART 1
FOR THE PROTECTION OF [•]

[•]

PART 2
FOR THE PROTECTION OF [•]

[•]

SCHEDULE 14

Article 45

PART 1

SPEED LIMITS

Parish	Road name, number and length	Speed Limit
Taverham	C262 Fir Covert Road From its junction with the A1067 Fakenham Road northwards to a point 45 metres south of its junction with the NDR classified road.	40 miles per hour
	From its junction with the C261 Reepham Road southwards to a point 45 metres north of its junction with the NDR classified road.	40 miles per hour
Horsford & Drayton	C261 Reepham Road From a point 75 metres northwest of the centreline of its junction with the U57388 Drayton Wood Road north-westwards to a point 168 metres north-west of the centreline of its junction with the U51248 Drewray Drive.	50 miles per hour
Horsford	B1149 Holt Road From a point 50 metres southeast of the centreline of its junction with the proposed Drayton Lane Link Road north-westwards to a point 25 metres north-west of the centreline of its junction with the U57634 Olive Crescent (including the entire area of the roundabout).	30 miles per hour (Partly lit)
	C282 Drayton Lane From its junction with the B1149 Holt Road westwards and southwards for a distance of 224 metres.	30 miles per hour (Unlit)
	Drayton Lane Link Road (northern leg) From its junction with the B1149 Holt Road south-westwards for a distance of 30 metres.	30 miles per hour (Unlit)
	From a point 30 metres south-west of it's the junction with the B1149 Holt Road south-westwards for a distance of 460 metres.	40 miles per hour
	Drayton Lane Link Road (southern leg) From the centreline of its junction with the C261 Reepham Road northwards for a distance of 330 metres.	50 miles per hour
Spixworth	C246 Buxton Road	30 miles per hour (Partly lit)

Parish	Road name, number and length	Speed Limit
	From a point 103 metres south of the centreline of its junction with the U57187 Beeston Road northwards to a point 325 metres north of the centreline of its junction with the C250 Church Lane.	
	U57187 Beeston Lane From its junction with the C246 Buxton Road eastwards for a distance of 13 metres.	30 miles per hour (Unlit)
Spixworth and Old Catton	C246 Buxton Road/Spixworth Road From a point 103 metres south of the centreline of its junction with the U57187 Beeston Road southwards to a point 91 metres north of the centreline of its junction with the U51004 The Paddocks.	40 miles per hour
Rackheath and Sprowston	A1151 Wroxham Road From a point 400 metres northeast of the centreline of its junction with the U57617 Chenery Drive north-eastwards to a point 40 metres south-west of its junction with the NDR classified road.	50 miles per hour
Rackheath	A1151 Wroxham Road From a point 47 metres north-east of its junction with the NDR classified road to a point 265 metres north-east of the centreline of its junction with the U57143 Stonehouse Road.	50 miles per hour
Rackheath & Great and Little Plumstead	C874 Norwich Road/Plumstead Road From a point 198 metres north-east of the centreline of its junction with the C258 Broad Lane south-westward to a point 62 metres south-west of the centreline of its junction with the proposed Plumstead Road Link Road (including the entire area of the roundabout).	40 miles per hour
	Plumstead Road Link Road From its junction with the NDR classified road northwards to its junction with the C874 Plumstead Road.	40 miles per hour
Great and Little Plumstead	C442 Middle Road From a point 200 metres east of its junction with the U59278 Green Lane North eastwards to its junction with the C258 ChurchRoad/U59392 Low Road.	30 miles per hour (Unlit)
	U59392 Low Road From a point 140 metres west of its junction with	40 miles per hour

Parish	Road name, number and length	Speed Limit
	the C258 Church Road westwards to its western most end on the east side of the NDR classified road.	
	U59400 Smea Lane From its junction with the C258 Church Lane westwards to its western most end on the east side of the NDR classified road.	40 miles per hour
	U59400 Smea Lane From its junction with the C380 Broadland Way eastwards for a distance of 190 metres.	40 miles per hour
	U59284 Toad Lane From its junction with the C442 Middle Road northwards for a distance of 245 metres.	30 miles per hour
Rackheath and Salhouse	C283 Salhouse Road From a point 40 metres northeast of its junction with the NDR classified road north-eastwards to a point 470 metres north-east of the centreline of its junction with the U51493 Eva Road.	30 miles per hour (Partly lit)
Postwick with Witton	A1194 Broadland Gate Link From its junction with the C829 Broadland Way eastwards for its entire length (including the entire area of the Broadland Gate and Business Park Roundabouts).	40 miles per hour
	A1270 Business Park Link From its junction with the A1194 Broadland Gate Link southwards for its entire length (including the Postwick North East Roundabout).	40 miles per hour
	A1270 Business Park Link (segregated left turn lane) From its junction with the A1270 Business Park Link main carriageway south-westwards for a distance of 112 metres (to the boundary with the Trunk Road).	40 miles per hour
	New Postwick Bridge From its junction with the A1042 Yarmouth Road north-eastwards for its entire length (including the entire area of the Postwick Park and Ride signalised junction).	40 miles per hour
	A1042 Yarmouth Road From a point 95 metres east of the centreline of its junction with the U59329 Oaks Lane	40 miles per hour

Parish	Road name, number and length	Speed Limit
	westwards and north-westwards to its junction with the A1042 Postwick North West roundabout (including the Postwick North West roundabout).	
	A1042 Yarmouth Road From its junction with the Postwick North West roundabout westwards to a point 7 metres west of the centreline of its junction with the UP93 Griffin Lane	40 miles per hour
	U59329 Oaks Lane From its junction with the A1042 Yarmouth Road southwards for a distance of 30 metres.	40 miles per hour
	Stub Arm off Broadland Gate Roundabout From its junction with the A1194 Broadland Gate Link southwards for its entire length.	40 miles per hour
	A1270 Norwich Northern Distributor Road From its junction with the A1194 Broadland Gate Link north-westwards for a distance of 35 metres.	40 miles per hour
	A47 Southern Bypass Trunk Road Postwick Eastbound Diverge Slip Road) From its junction with the proposed Postwick North East Roundabout westwards for a distance of 96 metres.	40 miles per hour
	A47 Southern Bypass Trunk Road Postwick Eastbound Diverge Slip Road (segregated left turn lane) From a point 96 metres west of its junction with the Postwick North East Roundabout north-eastwards for a distance of 191 metres.	40 miles per hour
	A47 Southern Bypass Trunk Road (Postwick westbound merge slip road) From its junction with the A1042 Yarmouth Road westwards for a distance of 80 metres.	40 miles per hour

PART 2

TRAFFIC REGULATION MEASURES

Parish(es)	Road name, number and length	Measure
Attlebridge, Taverham, Drayton, Horsford, Horsham St Faith & Newton St Faith, Spixworth, Beeston St Andrew, Sprowston, Rackheath, Great and Little Plumstead and Postwick with Witton	NDR classified road From its junction with the A1067 Fakenham Road eastwards and southwards to its junction with the A1194 Broadland Gate Link/Business Park Link (for its entire length including the entire area of roundabout junctions and slip roads), excluding the western side of the northbound lay-by from a point 232 metres north of the U59400 Smea Lane (in the Parish of Great and Little Plumstead) northwards for a distance of 120 metres and the eastern side of the southbound lay-by from a point 248 metres north of its junction with the U59400 Smea Lane northwards for a distance of 107 metres.	Carriageway and verge clearway
Horsford, Horsham St Faith and Newton St Faith	A140 Holt Road/Cromer Road From a point 68 metres south-east of its junction with the NDR classified road merge slip road northwards for a distance of 440 metres (including all areas of roundabout junctions).	Carriageway and verge clearway
Horsford	Drayton Lane Link Road (southern leg) From its junction with the NDR classified road southwards for a distance of 44 metres.	Carriageway and verge clearway
	Drayton Lane Link Road (northern leg) From its junction with the NDR classified road northwards for a distance of 41 metres.	Carriageway and verge clearway
Postwick with Witton	A1042 Yarmouth Road From its junction with the A47 Southern Bypass westwards and north-westwards to its junction with the A1042 Postwick North West Roundabout (including the entire area of the Oaks Lane Roundabout and the Park and Ride Signalised Junction).	Carriageway and verge clearway
	U59329 Oaks Lane From its junction with the A1042 Yarmouth Road southwards for a distance of 30 metres.	Carriageway and verge clearway
	A1194 Broadland Gate Link From its junction with the C829 Broadland Way eastwards for its entire length (including the entire area of the Business Park Roundabout).	Carriageway and verge clearway

Parish(es)	Road name, number and length	Measure
	<p>A1270 Business Park Link</p> <p>From its junction with the A1194 Broadland Gate Link southwards for its entire length (including the entire area of the Postwick Northeast Roundabout and the segregated left turn lane).</p>	Carriageway and verge clearway
	<p>A1270 New Postwick Bridge</p> <p>From its junction with the A1042 Yarmouth Road north-eastwards for its entire length (including the entire area of the Park and Ride signalised junction).</p>	Carriageway and verge clearway
	<p>Stub Arm off Broadland Gate Roundabout</p> <p>From its junction with the A1194 Broadland Gate Link southwards for its entire length.</p>	Carriageway and verge clearway
	<p>A47 Southern Bypass Trunk Road (Postwick eastbound diverge slip road)</p> <p>From its junction with the A47 southern bypass north-eastwards for its entire length (including the entire area of the Trunk Road segregated left turn lane).</p>	Carriageway and verge clearway
	<p>A47 Southern Bypass Trunk Road (Postwick westbound merge slip road)</p> <p>From its junction with the A1042 Yarmouth Road westwards for its entire length.</p>	Carriageway and verge clearway
	<p>A47 Southern Bypass Trunk Road (eastbound merge slip road)</p> <p>From its junction with the A1270 Business Park Link south-eastwards for its entire length.</p>	Carriageway and verge clearway
Horsford	<p>A140 Cromer Road / NDR classified road</p> <p>At a point where the NDR classified road westbound diverge slip road meets the A140 Cromer Road southern roundabout.</p>	Prohibition of entry
	<p>A140 Cromer Road / NDR classified road</p> <p>At a point where the NDR classified road eastbound diverge slip road meets the A140 Cromer Road northern roundabout.</p>	Prohibition of entry
Postwick with Witton	<p>A1270 Business Park Link/ A47 Southern Bypass</p> <p>At a point where the A47 Southern Bypass eastbound diverge slip road meets the A1270 Postwick North East roundabout.</p>	Prohibition of entry

Parish(es)	Road name, number and length	Measure
Crostick	C249 Rackheath Lane From its junction with the B1150 North Walsham Road eastwards for a distance of 12 metres.	Prohibition of motor vehicles
Rackheath	C258 Green Lane West From its junction with the A1151 south-eastwards for a distance of 12 metres.	Prohibition of motor vehicles
Great and Little Plumstead	C258 Broad Lane From its junction with the C874 Norwich Road north-westwards for a distance of 4 metres.	Prohibition of motor vehicles
Postwick with Witton	U99800 Postwick Park and Ride western entry From its junction with the A1042 Yarmouth Road southwards for a distance of 5 metres.	Prohibition of motor vehicles (except buses)

PART 3

SPEED LIMIT REVOCATIONS AND VARIATIONS

Parish(es)	Road name, number and length	Title of Order
Taverham	C262 Fir Covert Road From its junction with the A1067 Fakenham Road to its junction with the C261 Reepham Road.	The Norfolk County Council (Taverham, C262 Fir Covert Road) (40 mph Speed Limit) Order 2002. (3081)
Horsford & Drayton	C261 Reepham Road From a point 75 metres north-west of the centreline of its junction with the U57388 Drayton Wood Road north-westwards to a point 168 metres north-west of the centreline of its junction with the U51248 Drewray Drive a distance of 3953 metres.	The Norfolk County Council (Horsford and Drayton, Reepham Road) (50 mph Speed Limit) Order 2003. (3368)
Horsford	B1149 Holt Road From a point 63 metres south-east of the centreline of its junction with Drayton Lane north-westwards to a point 25 metres north-west of the centreline of its junction with the U57634 Olive Crescent.	The Norfolk County Council (Horsford, Holt Road, Drayton Lane and Church Street) (30 mph Speed Limit) Order 2011. (4664)
	C282 Drayton Lane From its junction with the B1149 Holt Road westwards for a distance of 144 metres.	The Norfolk County Council (Horsford, Holt Road, Drayton Lane and Church Street) (30 mph Speed Limit) Order 2011. (4664)
Spixworth	C246 Buxton Road From a point 30 metres south of the centreline of its junction with the U51200 Arthurton Road northwards to a point 325 metres north of the centreline of its junction with the C250 Church Lane.	The Norfolk County Council (Spixworth, Buxton Road and Church Lane) (30 mph Speed Limit) Order 2007. (4105)
Spixworth and Old Catton	C246 Buxton Road/Spixworth Road From a point 30 metres south of its junction with the U51200 Arthurton Road to a point 91 metres north of its junction with The Paddocks.	The Norfolk County (Spixworth, Old Catton and Sprowston) (30 mph and 40 mph Speed Limits) Order 1999. (2641)
Rackheath	A1151 Wroxham Road From a point 400 metres northeast of the centreline of its junction with the U57617 Chenery Drive north-eastwards to a point 265 metres north-east of the centreline of its junction with the U57143 Stonehouse Road.	The Norfolk County (Sprowston and Rackheath, A1151 Wroxham Road) (30 mph and 50 mph Speed Limits) Order 2003. (3277)
Rackheath & Great and Little Plumstead	C874 Norwich Road/Plumstead Road From a point 100 metres south-west of the centreline of its junction with the C258 Broad Lane north-eastwards for a distance of 300 metres.	The Norfolk County (Rackheath and Great and Little Plumstead) (40 mph Speed Limit) Order 2011. (4663)

Parish(es)	Road name, number and length	Title of Order
Great and Little Plumstead	C442 Middle Road From a point 128 metres west of the centre of its junction with the C258 Church Road for a distance of 175m in a westerly direction.	The Norfolk County (Great and Little Plumstead) (30 mph Speed Limit) Order 1996. (2067)
	U59392 Low Road From a point 138 metres west of its junction with the Church Road (C258) for its entire length.	The Norfolk County (Great and Little Plumstead) (40 mph Speed Limit) Order 2007. (4236)
	U59400 Smea Lane For its entire length	The Norfolk County (Great and Little Plumstead) (40 mph Speed Limit) Order 2007. (4236)
Rackheath and Salhouse	C283 Salhouse Road From a point 100 metres south-west of its junction with the C258 Green Lane East north-eastwards to a point 470 metres northeast of its junction with the U51493 Eva Road.	The Norfolk County Council (Rackheath, Salhouse Road (No.2)) (30 mph Speed Limit) Order 2005 (3848)
Postwick with Witton and Thorpe St. Andrew	A47 (eastbound slip road leaving the A47) From its junction with the A1042 flyover northern roundabout for a distance of 60 metres in a southerly direction.	The Norfolk County (Postwick and Thorpe St. Andrew, A1042 Yarmouth Road) (40 mph Speed Limit) Order 1999. (2589)
	A1042 Yarmouth Road From a point 87 metres east of its junction with the A1042 flyover southern roundabout to a point 7 metres west of the centreline of Griffin Lane.	The Norfolk County (Postwick and Thorpe St. Andrew, A1042 Yarmouth Road) (40 mph Speed Limit) Order 1999. (2589)
	The carriageway forming the northern arm of the A1042 flyover northern roundabout From its junction with the A1042 flyover northern roundabout to the roundabout junction located approximately 360 metres to the north The roundabout junction located approximately 360 metres north of the A1042 flyover northern roundabout.	The Norfolk County (Postwick and Thorpe St. Andrew, A1042 Yarmouth Road) (40 mph Speed Limit) Order 1999. (2589)
	A1042 Yarmouth Road – north east side From a point 18 metres south-east of the A1042 northern flyover roundabout in a south easterly direction for 160 metres.	The Norfolk County (Postwick and Thorpe St. Andrew, A1042) (Cycle Lane) Order 1999. (2552)
	A1042 Yarmouth Road – north east side From a point 13 metres south-east of the A1042 northern flyover roundabout in a south easterly direction for 165 metres.	The Norfolk County (Postwick and Thorpe St. Andrew, A1042) (Cycle Lane) Order 1999. (2552)

PART 4

WEIGHT LIMIT VARIATIONS

Parish	Road name, number and length	Title of Order	Variation
Spixworth and Crostwick	U57188 Quaker Lane For its entire length	The Norfolk County Council (Horsham St Faiths and Newton St Faiths, Hainford, Frettenham, Spixworth, Old Catton and Horstead with Stanninghall) (7.5T Weight Restriction) Order 2006. (4042)	U57188 Quaker Lane From its junction with the C246 Buxton Road westwards to its western end where it meets the northern side of the NDR classified road.
Spixworth and Crostwick and Old Catton	C251 St Faiths Road From its junction with the U57188 Quaker Lane to its junction with the U57057 Lodge Lane	The Norfolk County Council (Horsham St Faiths and Newton St Faiths, Hainford, Frettenham, Spixworth, Old Catton and Horstead with Stanninghall) (7.5T Weight Restriction) Order 2006. (4042)	C251 St Faiths Road From its junction with the U57057 Lodge Lane northwards to its northern most end where it meets the southern side of the NDR classified road.
Great and Little Plumstead	U59392 Low Road For its entire length	The Norfolk County Council (Thorpe St Andrew, Great and Little Plumstead, Postwick with Witton, Blofield, Hemblington, Woodbastwick, Lingwood and Burlingham and South Walsham) (7.5T Weight Restriction) Order 2007 (4208)	U59392 Low Road From its junction with the C258 Church Road westwards to its western most end where it meets the eastern side of the NDR classified road. U59392 Low Road From its junction with the U59278 Green Lane North eastwards to its eastern most end, where it meets the western side of the NDR classified road.
	U59400 Smea Lane For its entire length	The Norfolk County Council (Thorpe St Andrew, Great and Little Plumstead, Postwick with Witton, Blofield, Hemblington, Woodbastwick, Lingwood and Burlingham and South Walsham) (7.5T Weight Restriction) Order 2007 (4208)	U59400 Smea Lane From its junction with the C258 Church Road westwards to its western most end where it meets the eastern side of the NDR classified road. U59400 Smea Lane From its junction with the C830 Broadland Way eastwards to its eastern most end, where it meets the western side of the NDR classified road.

PROCEDURE FOR DISCHARGE OF REQUIREMENTS

Applications made under requirements

1. (1). Where an application has been made to the relevant planning authority for any consent, agreement or approval required by a requirement included in this Order the relevant planning authority shall give notice to the undertaker of their decision on the application within a period of eight (8) weeks beginning with:

- (a) the day immediately following that on which the application is received by the authority;
- (b) the day immediately following that on which further information has been supplied by the undertaker under paragraph 2; or
- (c) such longer period as may be agreed by the undertaker and the relevant planning authority in writing.

(2) Subject to sub-paragraph (3), in the event that the relevant planning authority does not determine an application within the period set out in sub-paragraph (1), the relevant planning authority shall be taken to have granted the application (without any condition or qualification) at the end of that period.

(3) Where:

- (a) an application has been made to the relevant planning authority for any consent, agreement or approval required by a requirement included in this Order; and
- (b) the relevant planning authority does not determine such application within the period set out in sub-paragraph (1); and
- (c) such application is accompanied by a report that considers it likely that the subject matter of such application will give rise to any materially new or materially different environmental effects in comparison with the authorised development as approved

then the application shall be taken to have been refused by the relevant planning authority at the end of that period.

Further information and consultation

2. (1) In relation to any application to which this Schedule applies, the relevant planning authority shall have the right to request such further information from the undertaker as is necessary to enable it to consider the application.

(2) In the event that the relevant planning authority considers such further information to be necessary and the provision governing or requiring the application does not specify that consultation with a requirement consultee is required the relevant planning authority shall, within fourteen (14) days of receipt of the application, notify the undertaker in writing specifying the further information required.

(3) If the provision governing or requiring the application specifies that consultation with a requirement consultee is required, the relevant planning authority shall issue the consultation to the requirement consultee within 2 business days of receipt of the application, and shall notify the undertaker in writing specifying any further information requested by the requirement consultee within 2 business days of receipt of such a request and in any event within 21 days of receipt of the application.

(4) In the event that the relevant planning authority does not give notification as specified in sub-paragraph (2) or (3) it shall be deemed to have sufficient information to consider the application and shall not thereafter be entitled to request further information without the prior agreement of the undertaker.

Fees

3. (1) Where an application is made to the relevant planning authority for written consent, agreement or approval in respect of a requirement, the fee contained in regulation 11D(1)(b) of the Town and Country

Planning (Fees for Applications and Deemed Applications) Regulations 1989 (as may be amended or replaced from time to time) shall apply and shall be paid to that authority for each application.

- (2) Any fee paid under this Schedule shall be refunded to the undertaker within eight (8) weeks of:
- (a) the application being rejected as invalidly made; or
 - (b) the relevant planning authority failing to determine the application within eight (8) weeks from the date on which it is received unless:
 - (i) within that period the undertaker agrees, in writing, that the fee shall be retained by the relevant planning authority and credited in respect of a future application; or
 - (ii) a longer period of time for determining the application has been agreed pursuant to sub-paragraph 1(1)(c) of this Schedule.

Appeals

4. (1) The undertaker may appeal in the event that:

- (a) the relevant planning authority refuses (including a deemed refusal pursuant to paragraph 1(3)) an application for any consent, agreement or approval required by a requirement included in this Order or grants it subject to conditions;
- (b) on receipt of a request for further information pursuant to paragraph 2 the undertaker considers that either the whole or part of the specified information requested by the relevant planning authority is not necessary for consideration of the application; or
- (c) on receipt of any further information requested, the relevant planning authority notifies the undertaker that the information provided is inadequate and requests additional information which the undertaker considers is not necessary for consideration of the application.

(2) The appeal process shall be as follows:

- (a) The undertaker shall submit the appeal documentation to the Secretary of State and shall on the same day provide copies of the appeal documentation to the relevant planning authority and the requirement consultee;
- (b) The Secretary of State shall appoint a person within ten (10) business days of receiving the appeal documentation and shall forthwith notify the appeal parties of the identity of the appointed person and the address to which all correspondence for his attention should be sent;
- (c) The relevant planning authority and the requirement consultee shall submit written representations to the appointed person in respect of the appeal within ten (10) business days of the start date and shall ensure that copies of their written representations are sent to each other and to the undertaker on the day on which they are submitted to the appointed person;
- (d) The appeal parties shall make any counter-submissions to the appointed person within ten (10) business days of receipt of written representations pursuant to sub-paragraph (c) above; and
- (e) The appointed person shall make his decision and notify it to the appeal parties, with reasons, as soon as reasonably practicable and in any event within fifteen (15) business days of the deadline for the receipt of counter-submissions pursuant to sub-paragraph (d).

The appointment of the person pursuant to paragraph sub-paragraph (b) may be undertaken by a person appointed by the Secretary of State for this purpose instead of by the Secretary of State.

(3) In the event that the appointed person considers that further information is necessary to enable him to consider the appeal he shall, within five (5) business days of his appointment, notify the appeal parties in writing specifying the further information required.

(4) Any further information required pursuant to sub-paragraph (3) shall be provided by the undertaker to the appointed person, the relevant planning authority and the requirement consultee on the date specified by the appointed person (the "specified date"), and the appointed person shall notify the appeal parties of the revised timetable for the appeal on or before that day. The revised timetable for the appeal shall require submission of written representations to the appointed person within ten (10)

business days of the specified date but shall otherwise be in accordance with the process and time limits set out in sub-paragraph (2)(c)-(e).

(5) On an appeal under this paragraph, the appointed person may-

- (a) allow or dismiss the appeal, or
- (b) reverse or vary any part of the decision of the relevant planning authority (whether the appeal relates to that part of it or not),

and may deal with the application as if it had been made to him in the first instance.

(6) The appointed person may proceed to a decision on an appeal taking into account only such written representations as have been sent within the relevant time limits.

(7) The appointed person may proceed to a decision even though no written representations have been made within the relevant time limits, if it appears to him that there is sufficient material to enable a decision to be made on the merits of the case.

(8) The decision of the appointed person on an appeal shall be final and binding on the parties, and a court may entertain proceedings for questioning the decision only if the proceedings are brought by a claim for judicial review.

(9) If an approval is given by the appointed person pursuant to this Schedule, it shall be deemed to be an approval for the purpose of Schedule 2 (Requirements) as if it had been given by the relevant planning authority. The relevant planning authority may confirm any determination given by the appointed person in identical form in writing but a failure to give such confirmation (or a failure to give it in identical form) shall not be taken to affect or invalidate the effect of the appointed person's determination.

(10) The appointed person may or may not be a member of the Planning Inspectorate but shall be a qualified town planner of at least ten (10) years' experience.

(11) Save where a direction is given pursuant to sub-paragraph 12 requiring the costs of the appointed person to be paid by the relevant planning authority, the reasonable costs of the appointed person shall be met by the undertaker.

(12) On application by the relevant planning authority or the undertaker, the appointed person may give directions as to the costs of the appeal parties and as to the parties by whom the costs of the appeal are to be paid. In considering whether to make any such direction and the terms on which it shall be made, the appointed person shall have regard to Communities and Local Government Circular 03/2009 or any circular or guidance which may from time to time replace it.

Interpretation of Schedule 15

5. In this Schedule 15:

"business day" means a day other than a Saturday or Sunday which is not Christmas Day, Good Friday or a bank holiday under section 1 of the Banking and Financial Dealings Act 1971;

"requirement consultee" means any body named in a requirement as a body to be consulted by the relevant planning authority in discharging that requirement.

SCHEDULE 16

Article 37

TREES SUBJECT TO TREE PRESERVATION ORDERS

<i>(1)</i> <i>Type of tree</i>	<i>(2)</i> <i>Work number in which tree(s)</i> <i>are situated</i>	<i>(3)</i> <i>Work to be carried out</i>
[●]	[●]	[●]
[●]	[●]	[●]

EXPLANATORY NOTE

(This note is not part of the Order)

This Order authorises Norfolk County Council (referred to in this Order as the undertaker) to construct and operate a new predominantly dual carriageway road starting at Fakenham Road (A1067) and ending at the A47 Trunk Road and to carry out associated works. The Order would permit the undertaker to acquire, compulsorily or by agreement, land and rights in land and to use land for this purpose. The Order also makes provision in connection with the maintenance of the authorised development.

A copy of the Order plans and the book of reference mentioned in this Order and certified in accordance with article 42 (certification of plans etc.) may be inspected free of charge during working hours at [●].

The Norfolk County Council (Norwich Northern Distributor Road (A1067 to A47(T))) Order

3.2 Explanatory Memorandum

Planning Act 2008
Infrastructure Planning (Applications: Prescribed Forms and Procedures)
Regulations 2009

PINS Reference Number: TR010015

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Regulation Number: 5(2)(c)

Author: Norfolk County Council

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INTRODUCTION

This document is submitted in relation to the application for a Development Consent Order by Norfolk County Council to the Secretary of State, under the Planning Act 2008.

The application is for the Norfolk County Council (Norwich Northern Distributor Road (A1067 to A47(T))) Order, to grant development consent for the construction of a new highway running west to east, to south, between the A1067 Fakenham Road and the A47 Trunk Road at Postwick, including improvements to the existing highway network, to the north and north east of Norwich.

This document is the Explanatory Memorandum, comprises part of the application documents and is provided as required under Regulation 5(2)(c) of the Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009.

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1 Summary

- 1.1 This explanatory memorandum is prepared to explain the purpose and effect of each Article of, and the Schedules to, the draft Norfolk County Council (Norwich Northern Distributor Road (A1067 to A47(T))) Order ("the Order"), as required by Regulation 5(2)(c) of the Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 (SI 2264).
- 1.2 The Order is based on the model provisions (see paragraph 2 below for further information on these), but where necessary departs from them. Where there is a significant departure from the model provisions, an explanation of the departure is provided.

2 Introduction

- 2.1 This explanatory memorandum seeks to explain the purpose and effect of each Article of, and the Schedules to, the draft Norfolk County Council (Norwich Northern Distributor Road (A1067 to A47(T))) Order ("the Order"), as required by Regulation 5(2)(c) of the Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 (SI 2264). It also seeks to identify and explain departures from the Infrastructure Planning (Model Provisions) (England and Wales) Order 2009 ("the model provisions"). Whilst the power for the Secretary of State to designate, and the requirement to have regard to, model provisions have been removed by the Localism Act 2011, the applicant considers it is still relevant to note and explain variations made in the Order compared to the model provisions.

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3 The Purpose of the Order

- 3.1 Norfolk County Council (NCC or the applicant) is making an application to the Secretary of State for a development consent order for the construction and operation of the Norwich Northern Distributor Road in the County of Norfolk ("the Scheme", or as referred to in the Order "the authorised development"). The Order refers to the person authorised to exercise the powers in the Order as "the undertaker", and defines the undertaker as Norfolk County Council.
- 3.2 The Secretary of State made a direction under section 35 Planning Act 2008 on 9 August 2013 that the Scheme is to be treated as development for which development consent is required under the Planning Act 2008 ("the Direction"). A copy of the Direction is at Appendix C to the Introduction to the Application (Document 1.1).
- 3.3 The applicant therefore requires development consent under the Planning Act 2008 in order to construct the Scheme. Development consent may only be granted by order, following an application to the Secretary of State (section 37 Planning Act 2008).
- 3.4 In addition to providing for the construction and operation of the authorised development, the Order will, in accordance with section 122 and section 120(3) / Schedule 5 of the Planning Act 2008, authorise the acquisition of land and rights over land, and the extinguishment of, or interference with, interests in or rights over land. The Book of Reference (Document 4.3) sets out what land is to be acquired and what other rights and interests will be affected. The Order and the Book of Reference should be read together with the Statement of Reasons (Document 4.1) which accompanies the Application and which sets out the justification for the acquisition or interference with the Order land. The plots of land listed in the Book of Reference are shown on the Land Plans (Document 2.2).
- 3.5 The matters for which development consent is sought are summarised briefly below – the formal description is provided in Schedule 1 to the draft DCO:
- 3.5.1 The main component of the Scheme is the Norwich Northern Distributor Road itself (known as "the NDR"). This is defined in the Order as the "NDR classified road", and Part 2 of Schedule 5 to the Order describes which parts of the Scheme will be formally part of the NDR classified road (which once operational will be classified as the A1270);

- 3.5.2 In addition, the authorised development also includes works which are proposed as well or which are required as a result of the NDR classified road, such as:
- a. new highways (other than the NDR classified road) and private accesses, and stopping up, diversion of and alterations to existing highways (including public rights of way) and accesses;
 - b. landscaping, habitats and other environmental or ecological mitigation measures;
 - c. drainage infrastructure;
 - d. demolition of two barns and construction of two bat barns;
 - e. closures of, alterations to and new private means of access;
 - f. various other works associated with the construction of the Scheme (as set out in Schedule 1 to the Order); and
 - g. various temporary works and sites required for the construction of the Scheme.
- 3.6 A description of the route of the NDR classified road is provided in paragraph 1 of the Introduction to the Application (Document 1.1) and a more detailed description of the various elements of the authorised development is provided in Chapter 2 of the Environmental Statement (Volume 1, Document 6.1).
- 3.7 The Order does not include any associated development pursuant to section 115(1)(b) of the Planning Act 2008, due to the terms of the Direction. The fifth paragraph of the Direction states "THE SECRETARY OF STATE DIRECTS that development, together with any matters associated with it, is to be treated as development for which development consent is required." The first reference to "development" is to the Norwich Northern Distributor Road, which therefore requires development consent. The Direction also specifies that "any matters associated with [the NDR]" are to be treated as development for which development consent is required.
- 3.8 Section 115(1) of the Planning Act 2008 provides that development consent may be granted for "(a) development for which development consent is required, or (b) associated development" (emphasis added). As the two limbs of section 115(1) are separated by "or", it is clear that any particular part of a project cannot be both development for which development consent is required (under section 115(1)(a)) and associated development (under section 115(1)(b)). As the Secretary of State has directed that the NDR "together with any matters associated with it" (emphasis added) is development for which

development consent is required, the whole Scheme is therefore within that category, and cannot be associated development.

4 The Provisions of the Order

- 4.1 The Order consists of 47 operative provisions, each referred to as Articles, and 16 Schedules. The Articles are considered below in numerical order, and Schedules are considered along with the corresponding Article.

Parts 1 (Preliminary) and 2 (Principal Powers)

- 4.2 Articles 1 and 2 are preliminary provisions. Article 1 provides for the way in which the Order should be cited and when it takes effect. Article 2 provides for the interpretation of the rest of the Order, including the Schedules. Article 2 makes alterations to the model provisions to accommodate the departures from the model provisions elsewhere in the Order, and to add required definitions, including:
- 4.2.1 As the Order relates to a highways development, various definitions have been added which are relevant to that type of development and which are used in the Order. These include "apparatus", "bridleway", "highway", "restricted byway" and "trunk road". Wherever possible terms are defined are by reference to existing legislation;
 - 4.2.2 Certain definitions have been added so that documents relating to the Application can be referred to, including "environmental impact assessment", "environmental statement", "the land plan(s)", "the landscaping plans", "the sections", "the street plans" and "the works plans";
 - 4.2.3 The Order provides a definition for "maintain" in order to provide clarity as to what the undertaker is permitted to do under the power of maintenance (see further below);
 - 4.2.4 The "limits of deviation" for the authorised development are defined so as to set out the extent to which the undertaker may deviate from the Scheme as shown on the works plans (Document 2.3) when it is constructing the Scheme;
 - 4.2.5 Two bodies – National Grid and Network Rail – are defined as their apparatus is crossed by the NDR and they are therefore referred to in the Order;
 - 4.2.6 The NDR is defined as "the NDR classified road"; and
 - 4.2.7 Norfolk County Council is defined as the "relevant planning authority", which is the body who will approve matters pursuant to the requirements

(in Schedule 2, see further below). Norfolk County Council acting in this role is standard for similar road schemes promoted under other legislation and has been agreed with the host local authorities.

- 4.3 Article 3 grants development consent for the authorised development. Schedule 1 describes the authorised development in detail, split into 'work numbers' each of which represents different sections or parts of the Scheme. This split of the Scheme between different work numbers enables the Order to refer to certain parts of the Scheme with clarity, by simply citing the relevant work number. The work numbers are delineated on the works plans (Document 2.3).
- 4.4 Article 3 also requires the works authorised by the Order to be constructed in the lines or situations shown on the works plans (Document 2.3), in accordance with the drawings specified in the requirements and only within the 'Order limits' (the boundary of the Scheme, as shown on the works plans). Article 3 also permits construction within limits of deviation which are specified in article 5 and are shown on the works plans. This approach, whilst going beyond the model provisions, reflects a standard approach used in orders made under the Transport and Works Act 1992 as well as a number of recent development consent orders for highways developments, and serves to precisely define the authorised development by reference to the plans. The Environmental Statement (Documents 6.1 – 6.3) has taken account of the limits of deviation.
- 4.5 Article 4 provides for the maintenance of the authorised development. Article 4(1) closely reflects the terms of the model provisions. Article 4(2) goes beyond the model provisions to reflect the particular maintenance needs of the authorised development itself. This includes the carrying out and maintenance of such works as may be necessary or expedient for the purposes of, or for purposes ancillary to, the construction of the authorised development including altering the position of apparatus. Article 4(2) is provided for the avoidance of doubt, and the list of matters falling within 'maintenance' is not exhaustive. Whilst this approach departs from the model provisions, it provides greater clarity and ensures the maintenance provisions meet the specific needs of the project. Article 4(3) is included to ensure that the power to carry out maintenance only arises within the Order limits.
- 4.6 Article 5 permits the construction of the authorised development to deviate laterally or vertically within limits set by reference to the parameters within the Article. The parameters in the tables in article 5(2) and 5(3) apply to the elements of the Scheme set out in the second column, within those work numbers listed in the first column. The table in article 5(2) applies to all the

work numbers in Schedule 1 (i.e. the whole Scheme), whereas the table in article 5(3) applies to the specified work numbers only. The undertaker requires the (lower) limits of deviation in article 5(2) generally across the Scheme, and has identified the need for certain areas of the Scheme to have slightly increased flexibility, which is provided for in article 5(3).

- 4.7 Article 6(1) overrides section 156(1) Planning Act 2008 (which is permitted by section 156(2)) and provides that the benefit of the Order is for the undertaker, rather than anyone with an interest in the land. It would be impracticable and inappropriate for a variety of landowners to implement parts of the Order, as might occur without this provision. The undertaker is defined in Article 2 as Norfolk County Council, as promoter of the Scheme.
- 4.8 Articles 6(2) and 7 provide for exceptions to Article 6(1). Article 6(2) provides that Article 6(1) does not apply to numbered works which are for the benefit of statutory undertakers. Article 7 makes detailed provision for the transfer of the benefit of the Order. The Article goes beyond the similar model provision in the interests of clarity.

Part 3 (Streets)

- 4.9 Article 8 allows the undertaker to alter the layout of and carry out works within certain streets, being both those identified in Parts 1 and 2 of Schedule 3 and those within the Order limits generally. Where works are carried out temporarily the street must be restored, and other than in situations where the undertaker is the street authority (i.e. where they are the same body, as at present), then the consent of the street authority is required before works can be carried out under Article 8(2). Article 8(5) provides for the consent of the street authority to be deemed to be given if it receives an application under article 8(4) and does not determine it within 28 days – this is provided to ensure that the undertaker is not held up in its implementation of the Scheme, although as noted above in relation to article 8(2), this would not apply whilst Norfolk County Council is the undertaker (as at present, and as proposed).
- 4.10 Article 9 allows the undertaker to carry out street works in accordance with the statutory rights under the New Roads and Street Works Act 1991. It is based on the model provision intended to permit the laying of utilities in streets for the purposes of the authorised project. Articles 9(3) and 9(4) have been added to the model provision – respectively they ensure that any streets which are temporarily altered are restored and require the consent of the street authority before the powers in Article 9(1) are exercised.

- 4.11 Article 10 provides for the maintenance of all streets to be constructed or altered as part of the authorised development. Those which are to be public highway (including the NDR itself) will be maintained by the highway authority. Those which are not intended to be highway (such as private accesses which the undertaker is altering or creating) will be maintained by the undertaker for 12 months from completion, and then by the street authority. Article 10(3) incorporates a defence from the Highways Act 1980 where the undertaker is subject to an action for damages and has taken such care as was reasonably required in the circumstances to secure that the street was not dangerous to traffic.
- 4.12 Article 10(4) is not a model provision – it provides for the undertaker to be responsible for maintaining three specific structures which will cross the NDR, and which will not be highways. This liability is placed on the undertaker for clarity for those that will rely on these structures to pass over the NDR for access.
- 4.13 Article 11 provides for the classification of roads that are to be constructed or altered as part of the authorised development. This is not a model provision but is integral to the implementation and use of the Scheme. The highway specified in Part 1 of Schedule 5 (at the Postwick end of the NDR at the A47(T)) will become trunk roads, with the Secretary of State as highway authority, through Article 11(1). The NDR classified road will become a principal road (the A1270) (Article 11(2) and Part 2 of Schedule 5). In addition, Article 11(3), 11(4), 11(5) and 11(6) provide either for the classification or where necessary for the de-classification and then re-classification of certain other highways affected by the Scheme. De-classification of existing highways must occur first, since a highway cannot have two classifications simultaneously.
- 4.14 Article 12 permits the stopping up of the streets and private accesses which are identified in Schedule 6. It is based on the model provision, with the addition of private accesses utilising the same power. In general the streets or accesses are required to be stopped up as their continued existence would be inconsistent with the Scheme. Where substitutes are to be provided (Parts 1 and 2 of Schedule 6), the existing street or access cannot be stopped up until either the permanent replacement or a temporary alternative has been provided (article 12(2)).
- 4.15 Paragraphs 12(3) and (4) permits the stopping up of the private accesses listed in Part 3 of Schedule 6 in certain circumstances, designed to ensure that third

parties who own land either side of the relevant street are not adversely affected.

- 4.16 Article 12(6) provides that anyone suffering loss due to the operation of Article 12 is entitled to compensation, and the whole Article is subject to the operation of Article 33 which therefore provides protection in respect of statutory undertakers' equipment which may be within roads or accesses being stopped up.
- 4.17 The principle of Article 13 is based on the model provision although the wording used has been heavily adapted. Article 13(1) provides for the three rights of way listed in paragraph (a) of each of Parts 1, 2 and 3 of Schedule 7 to be stopped up. Article 13(2) requires the provision of the alternative rights of way as set out in paragraph (b) of each of Parts 1, 2 and 3 of Schedule 7. The timing of the stopping up and re-provision in Article 13 is amended from the model provision. The rights of way are (legally) stopped up from the date of their being physically stopped up by the undertaker. In addition, the new rights of way cannot be provided from the date of the closure of the existing rights of way (i.e. around the start of construction), as the new rights of way are part of the Scheme. They are therefore to become public rights of way (restricted byways in all three cases) once they are constructed and open to the public.
- 4.18 Article 14 is a model provision which provides for the temporary stopping up of streets for the purposes of carrying out the authorised project. As per the model provision it applies generally, and also applies specifically to certain streets – those are set out in Schedule 8 to the Order. Paragraph (2) confers a power on the undertaker where the use of a street has been temporarily stopped up under the article 14 power to use it as a temporary working site. Any person suffering loss due to the stopping up of a private right of way under article 14 is entitled to compensation (article 14(6)). As for article 8, the provisions relating to consulting with and consent from the street authority (including deemed consent under article 14(7)) are not relevant whilst Norfolk County Council is the undertaker, but they are retained to provide for the possible future situation (although not anticipated) that that position changes.
- 4.19 Article 15 is an adaptation of a model provision which permits the undertaker to form new or to improve existing means of access in the locations specified in Schedule 9. Such means of access or works can also occur in other locations reasonably required for the authorised development with the approval of the relevant planning authority in consultation with the highway authority. The model provision relates this article to the authorised development generally,

whereas this article 15 relates only to construction of the Scheme – that is because accesses to the NDR (once built) are effectively part of the Scheme itself (i.e. the new side roads etc which will be adopted highway). Therefore Article 15 just provides for construction stage accesses – this is in any case largely 'confirmatory' as the Order land construction area can (and will) be accessed using the various public highways which intersect it, which would therefore be available even without Article 15.

- 4.20 Article 16 is a model provision which authorises street authorities and the undertaker to enter into agreements relating to the construction of a street or the carrying out of works in the street and the stopping up, alteration and diversion of the street. As above, this article is retained for the scenario in which the undertaker is no longer Norfolk County Council – whilst it is, this Article will not be needed.

Part 4 (Supplemental Powers)

- 4.21 Article 17 is a model provision which enables the undertaker to discharge water into any watercourse, public sewer or drain in connection with the construction and maintenance of the authorised development with the approval of the owner of the watercourse, public sewer or drain (such approval not to be unreasonably withheld) and subject to certain other conditions.
- 4.22 Article 18 is a model provision which allows the undertaker to carry out protective works to buildings within the Order limits, subject to a number of conditions including the service of 14 days' notice (except in the case of emergency) and the payment of compensation.
- 4.23 Article 19 is a model provision which allows the undertaker to survey and/or investigate land including bringing equipment onto the land and making trial holes. The power is subject to a number of conditions including a requirement for 14 days' notice to be given, and is subject to the payment of compensation.

Part 5 (Compulsory acquisition of land)

- 4.24 Article 20 provides for the compulsory acquisition of land as shown on the land plans and described in the book of reference so far as it is required for the authorised development (or to facilitate the authorised development or if incidental to the authorised development). Land can also be acquired

compulsorily if required as replacement land for special category land (see Article 32 below).

- 4.25 Article 20 makes consequential provision for the extinguishment of rights in the land in order to ensure that such rights cannot impact on implementation or use of the authorised development, and provides for the payment of compensation. Article 20 is also subject to two articles which provide for a lesser interference with land (Article 22, compulsory acquisition of rights and Article 28, temporary use of land for carrying out the authorised development). Those articles are explained below. Article 20 follows the model provision.
- 4.26 Article 21 follows the model provision and incorporates the minerals code into the Order. Article 21 has been included within the Order as mineral rights have been identified within the Order land, and the mineral code provides a statutory process for dealing with the purchase of and compensation for minerals within compulsory acquisition under the Order.
- 4.27 Article 22 is a power to override easements and other rights and reflects the terms of section 120(3) and (4), and paragraphs 2 and 3 of Part 1 of Schedule 5 Planning Act 2008. This Article is not a model provision but has a precedent in the Rookery South (Resource Recovery Facility) Order 2011. While the model provisions state that land vested in the undertaker would be discharged from all rights, trusts and incidents to which it was previously subject at the point of vesting it is not clear whether this covers the benefit of restrictive covenants and instances where land subject to third party rights is acquired by agreement rather than through compulsory acquisition. It also provides for the situation where access to the land for the purposes of the Scheme occurs before vesting.
- 4.28 Provision is made for the payment of compensation for any interests which are overridden by Article 22.
- 4.29 Article 23 is a model provision which imposes a time limit of 5 years for the exercise of powers of compulsory acquisition.
- 4.30 Article 24 is based on but departs from a model provision which entitles the undertaker to acquire rights over land which may be compulsorily acquired, including rights already in existence or by creating new ones. The revised Article 24(1) provides for such rights as may be required to be acquired by the undertaker over land which it is authorised to acquire under Article 20, instead of referring to specific rights to be acquired.

- 4.31 The public benefit of this is that it would allow the undertaker, if possible, to reduce the area of outright acquisition and rely on rights instead. A provision of this kind is usual in Transport and Works Act orders and Hybrid Bills, and without it this flexibility would not be possible. This is subject to new paragraph (2), which provides that for the land described in Schedule 10, the undertaker's powers of compulsory acquisition are limited to the acquisition of such rights, and the imposition of such restrictive covenants, as may be required for the purposes set out in that Schedule. Outright acquisition is not required for the Schedule 10 land, and a provision such as this was included in the Network Rail (Nuneaton North Chord) Order 2010 and the M1 Junction 10a (Grade Separation) Order 2013.
- 4.32 Article 24(5) and Schedule 11 impose modifications to the compulsory purchase and compensation provisions under general legislation. They do not affect the entitlement to compensation, but generally ensure that the compensation procedure applies to the additional categories of acquisition covered by the Order – the creation of new rights and the imposition of restrictive covenants in particular. This is a consequence of the extension of land acquisition powers to these categories (done to allow lesser land interests to be acquired), and is commonplace in Transport and Works Act orders. For the purpose of section 126(2) of the Planning Act 2008, the relevant compensation provisions are modified only to the extent necessary to ensure that they apply properly to the acquisition of rights, and not to affect the amount of compensation to which landowners would be entitled.
- 4.33 Article 25 is based on a model provision and has the effect of extinguishing private rights over land compulsorily acquired – it departs from the model provision in that it relates to all rights over land, not just rights of way, to ensure that any other rights that may exist cannot prevent the implementation or use of the Scheme. It provides for the extinguishment of private rights over Order land already owned by the undertaker, when any activity authorised by the Order interferes with or breaches those rights. It follows the approach in the Rookery South (Resource Recovery Facility) Order 2012 and the M1 Junction 10a (Grade Separation) Order 2013.
- 4.34 Article 26 applies the vesting procedures in the Compulsory Purchase (Vesting Declarations) Act 1981 to the exercise of powers of compulsory acquisition pursuant to the Order and is a model provision.

- 4.35 Article 27 permits the undertaker to acquire only the subsoil of land which is to be compulsorily acquired, and gives the undertaker the ability to minimise the extent of interests acquired from owners. This is a model provision.
- 4.36 Article 28 relates to situations where the undertaker is seeking to acquire part, rather than the whole, of properties compulsorily under the Order. It provides for a procedure whereby the owner whose land is being acquired in part may, subject to conditions, require the whole of his property to be taken. Express provision is made for the resolution of disputes in the Upper Tribunal (Lands Chamber). This is a model provision.
- 4.37 Article 29 is a model provision which allows the undertaker to enter on and appropriate interests within streets where required for the purposes of the authorised development without being required to acquire that land. Provision is made for the payment of compensation in certain circumstances.
- 4.38 Article 30 allows the land specified in Schedule 12 to be temporarily used for the carrying out of the authorised development. Article 30 is clarified by the addition of paragraph (11) (not a model provision) which confirms that the undertaker may take land temporarily more than once.
- 4.39 Article 31 is similar to article 30 but permits the temporary use of land for maintenance of the authorised project.
- 4.40 Both Articles 30 and 31 are model provisions and provide for the payment of compensation for that temporary use of the land.
- 4.41 Article 32 makes provision for the two types of 'special category land' applicable to the authorised development – open space and fuel allotment land. The open space (at Marriott's Way) is to be replaced as part of the Scheme by permanent provision in a similar location on a new bridge deck over the NDR. During construction of the Scheme a route between the two closure points on Marriott's Way is to be re-provided (subject to exceptions), but in a location to the side of the current area so that the bridge can be built. The provision of that route is secured by requirement 24 in Schedule 2 to the Order, and the closure of Marriott's Way open space is tied into that requirement in Article 32. The article departs from the model provision in relation to Marriott's Way open space in order to allow for the gap in time between the necessary closure of the existing open space and the opening of the new open space.
- 4.42 The fuel allotment land is also being replaced by land close to the land being compulsorily acquired. The replacement land is provided in two parts – the first

part is to be provided prior to the existing fuel allotment land being taken by the undertaker for use within the Scheme. The second part is required as a temporary construction compound for the Scheme and will then be provided as fuel allotment land at the end of the construction period. Further detail on the special category land is provided in Section 10 of the Statement of Reasons (Document 4.1).

- 4.43 Article 33 provides for the acquisition of land of statutory undertakers which is identified in the Book of Reference (Document 4.3). This article includes a power to move the apparatus of those statutory undertakers and to extinguish rights. It is a model provision, except it is made subject to the protective provisions in Schedule 13, which are to apply to certain statutory undertakers as set out in that Schedule.
- 4.44 Article 34 makes provision in respect of the apparatus and rights of statutory undertakers in streets which are stopped up, including provision as to the relocation of apparatus. It is a model provision.
- 4.45 Article 35 provides that persons who have to create a new connection following the removal of apparatus from stopped up streets may recover the costs of new connections from the undertaker. It is a model provision.

Part 6 (Operations)

- 4.46 Article 36 provides that the undertaker may fell or lop or cut back the roots of any tree or shrub to prevent it obstructing or interfering with the construction, maintenance or operation of the authorised development. Compensation is provided for if loss or damage is caused.
- 4.47 Article 37 is in similar terms to the previous Article, but applies to trees subject to tree preservation orders, which are listed in Schedule 16. The permission granted by the article constitutes deemed consent under a tree preservation order. The article follows the model provision. At present Schedule 16 does not contain any entries, as there are not currently any tree preservation orders which are affected by the Scheme. However, Norfolk County Council understands that the District local planning authorities for the Scheme area may implement tree preservation orders in certain places in due course - whilst it is expected from discussions that these will be in locations which can be protected by the undertaker and will not be affected by the Scheme, it has chosen to include the power in the draft DCO at this stage in case that is not

the case. The position will be reviewed during the examination of the Application.

Part 7 (Miscellaneous and General)

- 4.48 Article 38 is a model provision which would override landlord and tenant law so far as it would prejudice the operation of any agreement for leasing the whole of the authorised development or the right to operate the same or any agreement entered into by the undertaker for the construction, maintenance, use or operation of the authorised development.
- 4.49 Article 39 is a model provision which has the effect of ensuring that the land on which the authorised development is constructed is not excluded from being “operational land” under the Town and Country Planning Act 1990 by the effect of s 263 of that Act.
- 4.50 Article 40 provides that no one shall be able to bring statutory nuisance proceedings under the Environmental Protection Act 1990 in respect of noise, if the noise is created in the course of carrying out or maintenance of the authorised development and for which notice has been given under section 60 or consent obtained under section 61 or 65 of the Control of Pollution Act 1974 or which is an unavoidable consequence of the authorised development.
- 4.51 Article 41 provides for Schedule 13 – which protects the interests of certain statutory undertakers (as referred to in Article 33 above) – to have effect. Schedule 13 is currently blank – Norfolk County Council is continuing discussions with statutory undertakers affected by the Scheme and anticipates being able to provide agreed protective provisions for Schedule 13 in due course.
- 4.52 Article 42 is a model provision which provides for certification of the approved plans, etc, to which the Order relates.
- 4.53 Article 43 deals with the service of notices pursuant to the Order. These provisions are based on those appearing in the Transport and Works (Model Provisions for Railways and Tramways) Order 2006.
- 4.54 Article 44 provides the undertaker with powers to make traffic regulation orders in relation to roads for which it is not the highway authority. The undertaker can only do so within 12 months of the opening of the Scheme highways for public use, must consult with the police and traffic authority, and can only implement

measures with the latter's approval. As the undertaker is Norfolk County Council (the local highway authority), this Article presently applies in relation to the A47(T) only.

- 4.55 Article 45 provides for applicable traffic regulation measures and speed limits for the parts of the authorised development identified in Schedule 14. In addition, Schedule 14 also provides certain traffic regulation measures which are to come into effect as part of the Scheme, and for specified existing orders to be amended or revoked in the manner set out.
- 4.56 Article 46 provides a procedure in relation to consents and approvals required pursuant to the Order. It applies to all such consents etc, bar those under requirements in Schedule 2, where a separate more detailed procedure is provided for in Schedule 15.
- 4.57 Article 47 is a general arbitration provision which provides that differences under the Order should be settled by arbitration unless another means of resolving a dispute is provided for in the Order. It is a model provision.

Requirements

- 4.58 Schedule 2 sets out the requirements which are a method through which the implementation and operation of the Scheme is controlled. Norfolk County Council has consulted with other local authorities relevant to the Scheme on these requirements, and those authorities have confirmed that they are content for Norfolk County Council to be the 'relevant planning authority' (see the definition in Article 1) to whom applications under requirements are made, subject to the local authorities being consulted. Such consultation is provided for in appropriate requirements, and is included within the process set out in Schedule 15 (see further below).
- 4.59 The requirements are as follows:
- 4.59.1 Paragraph 1 contains certain definitions and preliminary matters which relate to the requirements. The definition of "the advance works" describes certain elements of the works – this definition is then used in certain requirements to allow NCC to carry out those works prior to discharging or complying with those requirements. This will allow NCC to make an 'early start' on the authorised development, where appropriate, whilst discharging the relevant requirements at the same time.

- 4.59.2 The definition of "relevant district authorities" is used to define those Councils which Norfolk County Council (as local planning authority) must consult in considering whether to approve something submitted pursuant to a requirement.
- 4.59.3 A number of the requirements include wording which allows NCC to discharge them in relation to parts of the authorised development (using the work numbers in Schedule 1 to the Order). Whilst NCC intends to discharge each requirement in one submission (i.e. not phased), this wording gives NCC flexibility in terms of how the authorised development comes forward in appropriate circumstances. It does this through allowing NCC to discharge a requirement in respect of a particular work number (or numbers) and start work on that part of the Scheme, if that was what the construction timetable required. The requirement must then be separately discharged in relation to the remainder of the Scheme before works can commence on those latter parts of it.
- 4.59.4 Requirement 2 requires the authorised development to commence within 5 years of the date the Order comes into force, and requirement 3 requires NCC to give notice of the commencement of the authorised development to the relevant planning authority.
- 4.59.5 Requirement 4 ties the implementation and construction of the authorised development to the approved plans.
- 4.59.6 Requirement 5 requires the approval and implementation of the detailed landscape proposals that will form part of the Scheme, as well as the replacement of trees and shrubs that require replacement following planting.
- 4.59.7 Requirement 6 requires any trees and shrubs that are to be retained within the Order land to be protected during construction, and to be replaced if any are removed or damaged. It also requires areas of soil to be kept free of noxious weeds during construction.
- 4.59.8 Requirement 7 requires the approval and implementation of the detailed ecological mitigation measures that form part of the Scheme.
- 4.59.9 Requirement 8 requires the approval and implementation of measures to ensure that any contamination found during construction is appropriately dealt with, and also includes a provision setting out a

process for dealing with any unexpected contamination that may be found during construction.

- 4.59.10 Requirement 9 requires the approval and implementation of measures to mitigate the noise impacts of the construction of the Scheme.
- 4.59.11 Requirement 10 requires the approval and implementation of a travel plan for the construction stage of the Scheme, and requirement 11 requires the details of the construction stage access points to be approved and then implemented. Construction traffic must then use the approved accesses.
- 4.59.12 Requirement 12 limits the hours during which NCC may carry out works to construct the Scheme (including deliveries) to 7am to 7pm Mondays to Fridays and 7am to 1pm Saturdays and public holidays. No works are permitted outside the days and hours.
- 4.59.13 Requirement 13 requires the approval and implementation of measures to ensure that vehicles' wheels are cleaned prior to them leaving the construction site, to limit the deposition of mud and dust on the public highway.
- 4.59.14 Requirement 14 requires the approval and implementation of measures to control dust or other material from being blown off the construction site, as well as requiring all vehicles carrying relevant materials to be sheeted for the same reason.
- 4.59.15 Requirement 15 requires the approval and implementation of pollution control measures to ensure that watercourses and drainage in the area of the works are protected from potential pollution sources arising from the works.
- 4.59.16 Requirement 16 requires the approval and implementation of a written scheme of archaeological investigation in relation to the route of the authorised development, as well as setting out a process to control what must happen in the event that 'unexpected' archaeological finds are made as construction progresses.
- 4.59.17 Requirement 17 requires the approval and implementation of a site waste management plan for the construction stage of the Scheme.

- 4.59.18 Requirement 18 requires the approval and implementation of a plan to control emissions during the construction stage of the Scheme.
- 4.59.19 Requirement 19 requires the approval and implementation of a construction environmental management plan (CEMP) for the construction stage of the Scheme.
- 4.59.20 Requirement 20 requires that relevant parts of the works (that relating to Trunk Roads) are constructed in accordance with the Design Manual for Roads and Bridges (DMRB), a document published by the Department for Transport.
- 4.59.21 Requirement 21 requires the approval and implementation of both temporary and permanent fencing or other means of enclosure (so far as proposed). The temporary fencing must remain in place for the construction stage and then must be removed, whilst the permanent fencing must be in place prior to the authorised development opening for public use.
- 4.59.22 Requirement 22 requires the approval and implementation of permanent noise attenuation measures required to be in place during the operation of the authorised development (i.e. once in use).
- 4.59.23 Requirement 23 requires the approval and implementation of all public rights of way closures or diversions proposed as part of the Scheme.
- 4.59.24 Requirement 24 relates to Marriott's Way and to the provisions of Article 32 (see above). Marriott's Way is considered likely to be open space, and is to be replaced with other open space on an overbridge over the route of the NDR – this will be open to the public once constructed. The requirement secures the approval and implementation of an alternative route so that users of Marriott's Way can safely and conveniently cross the construction site whilst the overbridge is being constructed. The requirement provides limited exceptions to the obligation to keep the alternative route open, and requires the undertaker to give public notice where closures are planned.
- 4.59.25 Requirement 25 requires the approval and implementation of a surface water management strategy relating to the Scheme.

- 4.59.26 Requirement 26 confirms that where undertaker has obtained approval of a matter pursuant to a requirement, it can also obtain a 'further' approval from the relevant planning authority which will supersede the earlier one. Any such further submission would be subject to the same process under Schedule 15.
- 4.60 Schedule 15 sets out a process for the discharge of the requirements in Schedule 2 as no process is provided by the Planning Act 2008 or secondary legislation (unlike the Town and Country Planning Act 1990 regime). The undertaker considers it is logical that a formal process is set out for clarity. Processes similar to this have precedents in many of the development consent orders made so far under the Planning Act 2008. Norfolk County Council has consulted with the relevant planning authority and relevant district authorities prior to submitting Schedule 15 as part of the Order, and they have confirmed they are content with its form.
- 4.61 Paragraph 1(1) requires the relevant planning authority to determine applications pursuant to requirements within 8 weeks. That period runs from the date the application is received, unless the relevant planning authority requests further information (see below) or unless the undertaker and relevant planning authority agree a longer period.
- 4.62 If the relevant planning authority does not determine an application within 8 weeks (or relevant extended period) then it is deemed to be granted (paragraph 1(2)), except in cases where there are potentially different environmental effects from those assessed in the Environmental Statement (Documents 6.1 to 6.3) in which case deemed approval is not appropriate and deemed refusal is provided for instead (paragraph 1(3)).
- 4.63 Paragraph 2 provides for the consultation and information part of the process. When it receives an application the relevant planning authority has 14 days in which to request further information from the undertaker in relation to requirements for which there are no consultees. Where there are consultees the relevant planning authority must send the application to the consultees within 2 days of receipt and then has 21 days to notify the undertaker of any further information required.
- 4.64 Paragraph 3 requires the undertaker to pay a fee to the relevant planning authority in relation to applications pursuant to requirement. The fees are determined by reference to the amount payable under the Town and Country

Planning Act 1990 regime in relation to discharge of conditions given the close analogy between these situations.

4.65 Paragraph 4 sets out the ability for the undertaker to appeal – it may do so if the relevant planning authority refuses an application or requests further information which the undertaker does not consider is necessary to determine the application. Paragraph 4(2) sets out the process that any appeal will follow, including that the Secretary of State has conduct of any appeal, a concept taken from the Town and Country Planning Act 1990 regime.

5 Glossary

Term	Meaning/Definition
the Application	The Application for the DCO for the Scheme
DCO	Development consent order, the type of consent that can be granted by the Secretary of State pursuant to the Planning Act 2008 and for which NCC has applied pursuant to the Application
the Order	The Norfolk County Council (Norwich Northern Distributor Road (A47 to A1067(T))) Order', being a draft development consent order and which is required for the Scheme
NCC	Norfolk County Council
NDR	Norwich Northern Distributor Road, part of the development for which consent is sought in the Order, and described in the Order as the "NDR classified road"
the Scheme	The development for which NCC is seeking consent within the Order, and described in the Order as the "authorised development"

The Norfolk County Council (Norwich Northern Distributor Road (A1067 to A47(T))) Order

4.1 Statement of Reasons

Planning Act 2008

Infrastructure Planning

The Infrastructure Planning (Applications: Prescribed Forms and Procedure)
Regulations 2009

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1.0 Summary

1.1.1 This Statement of Reasons ('Statement') relates to an application made by Norfolk County Council ('NCC') to the Secretary of State for Transport under the Planning Act 2008 ('PA 2008'). The application is for the Norfolk County Council (Norwich Northern Distributor Road (A1067 to A47(T))) Order ('the DCO'). The Statement explains why it is necessary, proportionate and justifiable for the DCO to contain compulsory acquisition powers, and why there is a compelling case in the public interest for NCC to be granted these powers. The matters addressed in this Statement are summarised in this section. References to numbered sections or paragraphs are to sections or paragraphs of this Statement.

1.2 Scheme Details (Section 3.0)

1.2.1 The Northern Distributor Road (NDR) is a dual carriageway all-purpose strategic distributor road of approximately 20.4km linking the A1067 Fakenham Road to the A47(T) at Postwick.

1.2.2 In August 2013, the Secretary of State for Transport directed, under section 35 of the PA 2008, that the NDR Scheme is a project of national significance and is to be treated as development for which development consent is required on the basis that it:

- provides a direct connection to/from an international airport to the Trans European Network and the Strategic Road Network;
- supports national growth potential by directly supporting over 135ha of proposed employment growth; and
- improves connection to/from the Great Yarmouth Enterprise Zone which supports the offshore energy industry and supply chain.

1.3 The Need for the Scheme and Alternatives considered (Section 4.0)

1.3.1 One of the key issues affecting the City of Norwich and its surroundings relates to the transport network. Problems include congestion, high volumes of traffic using inappropriate routes and poor access to the strategic road network, Norwich International Airport and north and north-east Norfolk. These problems have adverse implications for businesses and services, for the growth and development of Norwich, for the effective operation of public transport, walking and cycling and for the environment and quality of life.

1.3.2 The overall strategy set out in the Norwich Area Transportation Strategy (NATS) is that a package of transport measures is required, including an NDR.

1.3.3 The NDR will:

- reduce traffic flows on the northern sections of the Outer Ring Road, on key northern radial routes and on unsuitable residential and rural roads;
- reduce City Centre through traffic;
- reduce congestion;
- significantly improve access for north Norwich and north and north east Norfolk to the strategic road network and to Norwich International Airport;
- provide the transport infrastructure needed to allow planned and proposed growth to come forward; and
- increase the opportunities for improving public transport and the provision for pedestrians and cyclists.

Consideration of other approaches leading to the development of the proposals

1.3.4 Following an initial assessment of possible transport interventions, the following six strategies were assessed:

- Option 1 – A ‘full length’ NDR linking the A47(T) on both east and west sides of the city and complementary measures;
- Option 2 – A ‘half length’ NDR between the A47(T) at Postwick and the A140 Cromer Road and complementary measures;
- Option 3 – A ‘three quarter length’ NDR from the A47(T) at Postwick to the A1067 Fakenham Road and complementary measures;
- Option 4 – A new orbital bus service around Norwich; major improvements to existing radial bus services; improvements to junctions on Inner and Outer Ring Roads, and a ‘Ring and Loop’ system to prevent car drivers making through trips within the Inner Ring Road.

- Option 5 – A Light Rapid Transit service; improvements to junctions on the Inner and Outer Ring Roads; road user charging or workplace parking charging within the Inner Ring Road; a Ring and Loop system plus additional physical restrictions on car access to the City Centre.
- Option 6 – Planning new development so as to reduce the distance between home, work and services; financial incentives to implement workplace travel plans; improvements to walking and cycling networks and the promotion of alternative modes of transport and fuels.

1.3.5 The assessment concluded that a northern distributor road was required in order to address the transport problems. The full NDR was considered to give rise to impacts that could not be mitigated however a ‘three-quarter length’ NDR would still achieve the objectives set by the NATS review. Public transport options would not have sufficient impact across the NATS area to be considered as strategic alternatives in their own right or in combination, but they could play an important role in complementing the NDR options.

1.3.6 Before deciding on the application proposals, the conclusions of previous analyses were reviewed.

Measures to enhance the existing highway network as an alternative to the NDR

1.3.7 Measures to enhance the existing network would only partially meet the traffic need at the expense of widespread impact on urban and residential environments. Traffic would continue to be drawn into the urban area and many cross-city journeys would not be facilitated or would be less well served, resulting in continued urban and rural rat-running. It would also be less effective in supporting urban expansion to the north east of the City and less effective in stimulating and serving economic growth generally.

Improvement to public transport provision as an alternative to the NDR

1.3.8 Public transport initiatives are an essential complement to the NDR but, even in combination, they do not constitute an alternative to it. By relieving the radial routes of traffic, the NDR would help to facilitate improvements in bus services. Freeing the internal road networks of new developments from the need to cater for extraneous through traffic would result in better residential environments, which would be more easily penetrated by local bus services, pedestrians and cyclists.

Alternatives to the application proposals

- 1.3.9 The alignment and form of the NDR are the result of iterative design, informed by the output of land-use/transportation modelling and the preliminary conclusions of the studies carried out for the environmental impact assessment.
- 1.3.10 To confirm that the preferred option (the subject of the Application) is the one that best meets the need, the application proposals have been compared with the following:
- Alternative 1 - Single carriageway on the same route as the preferred Scheme.
 - Alternative 2 - Dual carriageway from the A47(T) at Postwick on a route the same as that of the preferred Scheme but terminating at the A140.
 - Alternative 3 – As Alternative 2 but with the addition of a single carriageway from the A140 to the A1067.
 - Alternative 4 – The preferred Scheme except for a single carriageway stretch between Fir Covert Road and the A1067.
 - Alternative 5 – Developer-funded link roads between the north east radials (in the segment between the A47(T) at Postwick and the A140) in conjunction with the development of planned growth areas.
- 1.3.11 Alternative 1's fulfilment of the scheme objectives is limited by the traffic capacity and attractiveness of its single carriageway to traffic. It has therefore been assessed as not performing as well as the Scheme and has not been pursued.
- 1.3.12 Alternative 2 fails to address problems west of the A140, and this limits its fulfilment of Scheme objectives. It has therefore been assessed as not performing as well as the Scheme and has not been pursued.
- 1.3.13 Alternative 3's fulfilment of the Scheme objectives is limited by the capacity and attractiveness of its single carriageway west of the A140. It has therefore been assessed as not performing as well as the Scheme and has not been pursued.
- 1.3.14 Alternative 4 would not provide a consistent standard for the NDR, it would not provide continuity of road type with the A47(T) Norwich Southern Bypass for

the entire length of the NDR and would provide an inferior performance in terms of link accidents and user costs. Feedback from consultation indicated that among those that responded there was a majority support for the dual carriageway between Fir Covert Road and the A1067. Alternative 4 has therefore been assessed as not performing as well as the Scheme and has not been pursued.

1.3.15 Alternative 5's fulfilment of Scheme objectives is very limited as it would serve as a direct access to development, would cater for large traffic flows, and also would make no provision west of the A140. It has therefore been assessed as not performing as well as the Scheme and has not been pursued.

1.4 Scope of Acquisition (Section 5.0)

1.4.1 Regulation 5(2)(h) of the Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 (the 'APFP Regulations') requires a statement of reasons for seeking a Development Consent Order ('DCO') which authorises "*the compulsory acquisition of land or an interest in land or right over land*". In addition to authorising the compulsory acquisition of land or interests or rights over land (Part 5, Powers of Acquisition, in the DCO), the DCO contains further powers, including:

- Article 8 – Power to alter layout, etc., of streets and Article 9 – Street works.
- Article 12 – Stopping up of streets and private access and Article 14 – Temporary prohibition or restriction of use of streets.
- Article 18 – Protective works to buildings.
- Article 19 – Authority to survey and investigate land.
- Article 29 – Rights under or over streets
- Article 30 – Temporary use of land for carrying out the authorised development and Article 31 – Temporary use of land for maintaining authorised development.
- Article 33 – Statutory undertakers, Article 34 – Apparatus and rights of statutory undertakers in land acquired or used and Article 35 – Recovery of costs of new connections.

1.4.2 For the purposes of this Statement, the expression 'compulsory acquisition powers' includes these additional powers.

1.5 Description of Land subject to Compulsory Acquisition (Section 6.0)

1.5.1 The majority of the land required is currently in agricultural use. Other land required includes land which is already part of the highway network, land

within Norwich International Airport, part of the grounds of the Norwich Aviation Museum, Marriott's Way recreational path, woodland, paddocks, bridleways, private access tracks, a water course, parts of the grounds of individual properties, an industrial storage area, a sewage pumping station, part of the railway line, the forecourt of business premises and derelict farm buildings.

1.6 Purpose in seeking Acquisition Powers (Section 7.0)

- 1.6.1 In broad terms, the purpose of the acquisition powers being sought is to enable NCC to construct and operate the NDR within the Order limits. The specific purposes for which each parcel of land is required are set out in Appendix 1.
- 1.6.2 An explanation of the additional acquisition powers described in paragraph 1.4.1 of this summary is included in Section 7.0 of this Statement.

1.7 The Justification for seeking Powers of Compulsory Acquisition (Section 8.0)

- 1.7.1 Section 4.0 of this document and Chapter 3 of the Environmental Statement explain the need for the NDR. NCC believes there is a compelling case in the public interest which justifies the proposed compulsory acquisition of land and rights necessary to facilitate its delivery.
- 1.7.2 NCC will continue to liaise, discuss and negotiate with landowners to ensure that where the opportunity arises, it can purchase interests by agreement.
- 1.7.3 NCC has sought to mitigate the direct impacts of the acquisition of land interests through discussions with the affected landowners. Interference with private rights being sought is considered to be necessary, proportionate and legitimate.
- 1.7.4 The NDR will be jointly funded by the Department for Transport (DfT) and NCC.

1.8 National Policy: The view of the Government (Section 9.0)

- 1.8.1 The National Infrastructure Plan 2011 ('the NIP 2011') set out a strategy for meeting the infrastructure needs of the UK economy, recognising that infrastructure networks form the backbone of a modern economy and are a major determinant of growth and productivity. It identified 40 key areas of infrastructure investment. Local authority major transport schemes development pool projects are referred to in the NIP 2011 as 'priority infrastructure investment'. When the NIP was published in November 2011 the NDR was included as one of a number of 'development pool projects' but

its status as a funded project was announced by DfT in December 2011. In the National Infrastructure Plan 2013 ('the NIP 2013') (published on 4 December 2013) the NDR is identified as a 'key project' and one of the Government's Top 40 priority infrastructure investments.

- 1.8.2 Section 104 of the Planning Act 2008 highlights the importance of National Policy Statements (NPS) in the determination of applications for development consent. The consultation draft of a NPS for National Road and Rail Networks (the draft NPS) was published by the DfT on 4 December 2013. The draft NPS is not project specific. The underlying substance of the draft NPS has been addressed in the NDR Application documentation.

1.9 Special Considerations Affecting the Land (Section 10.0)

- 1.9.1 The draft DCO includes provision for the compulsory acquisition of the Marriott's Way public amenity path (plots 2/26, 2/27, 2/28 and 2/29) which is considered to be open space land and therefore special category land.
- 1.9.2 Acquisition powers are being sought for a new right upon plots 2/26, 2/28 and 2/29. The freehold ownership of these plots would remain with Broadland District Council and the open space status of these plots would remain.
- 1.9.3 Powers are being sought to acquire plot 2/27 and replacement land is proposed to be provided on either side of Marriott's Way on the approaches to the proposed Marriott's Way Overbridge of the NDR. The land carried upon the Overbridge deck level will also be provided as part of the replacement land, providing a continuous open space corridor of the Marriott's Way public amenity path across the NDR. This replacement land would vest in Broadland District Council. For the period of the bridge construction, NCC will provide an alternative route for use by the public.
- 1.9.4 The draft DCO includes provision for the compulsory acquisition of part of a fuel allotment (plot 10/45), which is also special category land. Replacement land is proposed to be provided.

1.10 Impacts on Statutory Undertakers (Section 11.0)

1.10.1 The draft DCO includes the provision for the compulsory acquisition of statutory undertakers' land, specifically Eastern Power Networks, Anglian Water Services Ltd, Network Rail Infrastructure Ltd, Norwich Airport Ltd and National Grid Gas plc. Details are provided in Section 11 of this Statement.

1.11 Obstacles and other Consents (Section 12.0)

1.11.1 NCC has obtained the consent of the Highways Agency to include Crown land in the DCO in respect of land at Postwick. NCC is currently seeking the consent of the Highways Agency to include Crown land in the DCO in respect of both land at Marriott's Way (where rights previously owned by the former BRB (Residuary) Ltd have recently been transferred to the Highways Agency Historical Railways Estate, for and on behalf of the Secretary of State for Transport) and further land at Postwick (plot 12/55, where there is the potential for the Crown to retain an interest following the de-trunking of the former A47 road).

1.11.2 Consent for discharge of water to the aquifer may be required. Any discharge consents required will be sought from the Environment Agency.

1.11.3 Protected Species Licences will be sought from Natural England. A draft application has been submitted already.

1.11.4 Consent to obstruct watercourses may be sought from the Broads Internal Drainage Board.

1.11.5 Prior consent for works on construction sites may be sought from the relevant local authority under section 61 of the Control of Pollution Act 1974.

1.11.6 Temporary road traffic regulation orders will be sought, as necessary.

1.12 Human Rights (Section 13.0)

1.12.1 The DCO has the potential to infringe the human rights of persons who own property or have rights in the land proposed to be acquired pursuant to the DCO.

1.12.2 NCC considers that there would be very significant public benefit arising from the grant of development consent for the NDR Scheme. That benefit can only be realised if the development consent is accompanied by the grant of powers of compulsory acquisition.

1.12.3 The significant public benefits of the NDR Scheme are considered to outweigh the effects of the Scheme upon persons with an interest in the land required for the Scheme. NCC believes that there would not be a disproportionate interference with the rights of such persons under Article 8 and Article 1 of the

First Protocol of the European Convention on Human Rights. In addition, those affected by compulsory acquisition powers will be entitled to compensation.

2.0 Introduction

- 2.1.1 This Statement of Reasons ('this Statement') relates to an application for development consent ('the Application') made by Norfolk County Council ('NCC') to the Secretary of State under the Planning Act 2008 ('PA 2008')¹. The Application is for 'The Norfolk County Council (Norwich Northern Distributor Road (A1067 to A47(T))) Order' ('the DCO'). The DCO would, amongst other things, grant powers to construct, operate and maintain a new highway around the east and north of Norwich (the Northern Distributor Road ('NDR')) together with consent for any matters associated with the NDR. (The NDR and those associated matters are collectively referred to in this Statement as either 'the NDR', 'the NDR Scheme' or 'the Scheme').
- 2.1.2 This Statement has been prepared to comply with the requirements of Regulation 5(2)(h) of the Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 (the 'APFP Regulations')². It has been prepared in accordance with the relevant parts of the Department for Communities and Local Government September 2013 guidance, 'Planning Act 2008: Guidance related to procedures for the compulsory acquisition of land' (the 'Guidance')³.
- 2.1.3 This Statement is required as an Application document in accordance with Regulation 5(2)(h) of the APFP Regulations, because the proposed DCO would authorise the compulsory acquisition of land or an interest in land or right over land.
- 2.1.4 The Application consists of a suite of documents, and this Statement should be read alongside and is informed by those other documents. In particular, regard should be had to:
- i. The Land Plans (document reference 2.2) – plans which (in accordance with APFP Regulation 5(2)(i)) show –
 - the land over which it is proposed to exercise powers of compulsory acquisition or any right to use the land;
 - any land in relation to which it is proposed to extinguish easements, servitudes and other private rights;
 - the special category land which is to be compulsorily acquired, or over which a right to use the land is to be acquired, and the replacement land which is proposed to be given for the special category land which is to be acquired.

- ii. The Book of Reference (document reference 4.3) – a document which (in accordance with APFP Regulations 5(2)(d) and Regulation 7) contains the names and addresses of persons who have certain interests in the land to be acquired or directly affected; specifies the owner of any Crown interest in the land which is proposed to be used for the purposes of the DCO; and specifies such land included for compulsory acquisition which is special category land and replacement land;
- iii. The Statement of Funding (document reference 4.2) – a document which (in accordance with APFP Regulation 5(2)(h)) indicates how the works which would be authorised by the DCO, including any compulsory acquisition costs, are to be funded;
- iv. The draft proposed Order (document reference 3.1) and accompanying explanatory memorandum (document reference 3.2); and
- v. Chapter 3 of Volume 1 of the Environmental Statement (document reference 6.1).

2.1.5 The remainder of this Statement,

- i. provides details of the NDR Scheme that results in the need for compulsory acquisition powers to be sought (Section 3.0);
- ii. outlines the need for the NDR Scheme and alternatives considered (Section 4.0);
- iii. explains the scope of compulsory acquisition powers being applied for (Section 5.0);
- iv. describes the land over which compulsory acquisition powers are being sought (Section 6.0);
- v. sets out NCC's purpose in seeking compulsory acquisition powers (Section 7.0);
- vi. provides the justification for seeking the compulsory acquisition powers sought and explains the compelling case in the public interest for the exercise of such powers to acquire land and create new rights compulsorily (Section 8.0);
- vii. sets out any known views of Government about the NDR Scheme (Section 9.0);
- viii. explains the special considerations affecting the land to be compulsorily acquired (Section 10.0);

- ix. explains the position in respect of statutory undertakers' land and interests (Section 11.0);
- x. explains the position in respect of other obstacles or consents necessary to enable implementation of the NDR Scheme (Section 12.0);
- xi. considers the proposed compulsory acquisition powers in the context of the Human Rights Act 1998 (Section 13.0). and
- xii. explains further the purpose in seeking acquisition powers (Appendix 1), the details of negotiations with owners of interests in land and other information relating to land interests (Appendix 2), and details certain access and highway related matters (Appendix 3).

3.0 Scheme Details

3.1 The NDR Scheme

- 3.1.1 The Scheme (the Norwich Northern Distributor Road, known as the NDR) is a dual carriageway all-purpose strategic distributor road, which would run west to east around the north side of Norwich, linking the A1067 Fakenham Road, near Attlebridge to the A47 Trunk Road at Postwick. The NDR will be approximately 20.4km in length. A detailed description of the route is set out in Chapter 2 of Volume 1 of the Environmental Statement (document reference 6.1).
- 3.1.2 The route of the Scheme is, for the most part, within Broadland District. It does, however, for a short stretch close to Norwich International Airport, fall within the administrative area of Norwich City Council. A very small part of the works at Postwick falls within The Broads Authority.
- 3.1.3 In order for the new dual carriageway NDR mainline route to link into the existing highway network the Scheme includes the construction of a number of new highway features. These include six (6) overbridges, four (4) underbridges, two (2) grade separated junctions, eight (8) at-grade roundabout junctions, two (2) on-line access roundabouts, three (3) off-line roundabouts and one (1) major / minor priority junction. The works will necessitate the diversion of a number of utility pipelines and services, a series of road closures and the stopping up, diversion and closure of a number of tracks and public and private rights of way.
- 3.1.4 In addition to the construction of the NDR itself, the Scheme also includes the creation of approximately 25km of new links suitable for use by pedestrians, cyclists and equestrians, plus the provision of seven (7) bat gantries. A number of complementary works are also proposed, including the provision of a shared footway/cycleway, the relocation, closure and widening of a number of junctions and certain highway improvements to parts of the existing network.

3.2 Status of the Scheme under the Planning Act 2008

- 3.2.1 At the time NCC declared its intention to the Secretary of State for Transport that it proposed to make an application to him for the NDR Scheme in February 2013, the NDR was a Nationally Significant Infrastructure Project (NSIP).

- 3.2.2 As a result of changes to certain NSIP definitions made by the Highway and Railway (Nationally Significant Infrastructure Project) Order 2013⁴, from 25 July 2013 the NDR Scheme ceased to be an NSIP. As a result, a qualifying request was made by NCC in July 2013 to the Secretary of State for Transport, seeking that he direct under section 35 of the PA 2008 that the NDR Scheme be treated as development for which development consent is required.
- 3.2.3 On 9 August 2013, the Secretary of State for Transport directed, under section 35 of the PA 2008, that the NDR Scheme by itself is a project of national significance and is to be treated as development for which development consent is required. His reasons were given as –
- ‘it provides a direct connection to/from an international airport to the Trans European Network-Transport (TEN-T) and the Strategic Road Network. The TEN-T link is to the A47, one of only a limited number of Roads in the East of England which is recognised as such; and
 - in addition the scheme:
 - supports national growth potential by directly supporting over 135ha of proposed employment growth; and
 - improves connection to/from the Great Yarmouth Enterprise Zone which supports the offshore energy industry and supply chain.’
- 3.2.4 As the NDR Scheme is the subject of a Section 35 direction, a DCO is required.

3.3 The A47(T) Postwick Junction

- 3.3.1 At its eastern end, the NDR would link with the strategic road network via the A47(T) at Postwick. This link would require the closure of the existing eastbound merge and diverge A47(T) slip roads and the construction of new eastbound merge and diverge slip roads, forming part of an improved grade separated junction at Postwick.
- 3.3.2 Separately from the current proposals for the NDR to join the A47 at Postwick, which form part of NCC's application for development consent for the NDR under the Planning Act 2008, NCC has the benefit of extant planning permission granted by Broadland District Council in 2011 for works to improve the existing Postwick Junction. That planning permission is a hybrid permission consisting of outline consent for the development of a business park at Broadland Gate (the Broadland Gate Business Park, being promoted by a developer) and full consent for highway improvements to the Postwick Junction. The junction improvement works are designed to address capacity and congestion problems which are predicted to persist and worsen as a result of increasing traffic demand.

- 3.3.3 The planning permission (Reference: 20081773) includes all of the junction improvement works which relate to the highway within NCC's control, but excludes the parts of the Postwick junction which are part of the A47(T). This is because the Highways Agency, on behalf of the Secretary of State for Transport, has permitted development rights in relation to improvement works within the existing highway, and it is proposed that works on such land will be carried out by NCC pursuant to an agreement between NCC and the Highways Agency, on behalf of the Secretary of State for Transport, under section 6 of the Highways Act 1980⁵.
- 3.3.4 In addition, the implementation of parts of the junction improvement works is subject to the making, by the Secretary of State, of a Side Roads Order and a Slip Roads Order under the Highways Act 1980. These Orders were made in draft by the Highways Agency in 2009 and were the subject of a public inquiry in July 2013. The Secretary of State's decision as to whether or not the Orders shall be made is currently awaited. If the Secretary of State decides to make the Orders, NCC will have all the necessary statutory consents in place to enable implementation of the improvement works at the Postwick Junction and would commence those works as soon as practicable.
- 3.3.5 In developing the design of the proposed improvements to the existing Postwick Junction, NCC considered the linkage between the NDR and the A47(T) in physical and operational terms. Therefore, if the existing Postwick Junction is improved pursuant to the planning permission and approved Side Roads Order and Slip Roads Order, it would accommodate the linkage between the NDR and the A47(T).

4.0 The Need for the Scheme and Alternatives considered

4.1 Introduction

- 4.1.1 This section provides a summary of the need for the Scheme and the alternatives considered. A more detailed explanation is provided in Chapter 3 of Volume 1 the Environmental Statement (document reference 6.1).
- 4.1.2 The NDR is needed to improve connectivity and accessibility across both the northern part of the Norwich urban area and areas of the county in an arc from the north west to the east of this main urban area. It will also provide the basis of the transport infrastructure required to both address existing and future problems and achieve the growth objectives which have been identified for Norwich and its surrounding area.
- 4.1.3 The possibility that the need could be met in some other way, for example by a different standard NDR, by an NDR following a different route, or without road construction has been addressed in principle and in detail over a lengthy period. The studies undertaken confirm that the NDR is an essential component of the package of transport measures required. Analysis of other approaches has confirmed that it is not possible to meet the need without the NDR, and that the application proposals are the most appropriate response.

4.2 Context for the Need

- 4.2.1 Located within a largely rural county, Norwich has historically been a focal point on which the road network converges. The most significant transport legacy of the past is a road network which is structured around a series of routes which radiate out from the centre of the City. These routes provide links between the City and an extensive area that includes most of the county of Norfolk and substantial areas of north Suffolk.
- 4.2.2 Various measures have been taken historically in response to the issues associated with an increasing amount of traffic within the City. These have included the provision of an inner and outer ring road within the urban area, the provision of a strategic A47(T) Norwich Southern Bypass to the south of the City, the implementation of works and strategies to restrict the use of the private car within the City and the implementation of works and strategies to support alternatives to the use of the private car.
- 4.2.3 For obvious reasons of geography, Norfolk is on the periphery of the national road and rail networks. There are no motorways in the county and only three trunk roads providing access to other towns and cities and the wider strategic road network of the country. Norwich International Airport, which is not on the strategic road network, plays, amongst other things, a nationally significant role in the offshore energy industry, as a base for four of the leading offshore helicopter transport services and the location for offshore survival training.

- 4.2.4 The rail network that serves Norwich and the surrounding county is similarly at the periphery of the national system. It plays a much smaller role in providing local transport opportunities than the road network.
- 4.2.5 Norwich is one of the largest urban areas in the East of England, and a significant centre for employment, tourism and culture. The city exerts a powerful economic, social and cultural influence well beyond its administrative boundaries.
- 4.2.6 A number of objectives and aspirations which centre on substantial population growth and economic development have been identified and determined for the City of Norwich and its surrounding area. These objectives and aspirations, which have been identified by those charged with undertaking functions relating to the management and future development of the area, recognise and reflect:
- i. the overarching national growth agenda;
 - ii. the need, identified at national level, for every part of the UK (and not just London and the south-east) to fulfil its potential and thereby drive strong and lasting growth and create a balanced economy;
 - iii. the fact that Norwich is one of the largest and most important urban centres in the East of England and has the potential to contribute significantly to the country's growth and economic development needs; and
 - iv. the fact that Norwich and its surrounding area is a suitable location to provide for development that will contribute to growth and economic development needs.
- 4.2.7 The Joint Core Strategy⁶ (JCS) prepared by the Greater Norwich Development Partnership (GNDP) sets out an overall spatial vision for the future of the area. It highlights Norwich as a main focus for growth for new homes and jobs, leisure, cultural and educational development. A target of at least 27,000 additional jobs and at least 36,820 new homes are to be delivered within the period 2008 to 2026. A large proportion (33,000 dwellings) is to be focused within the 'Norwich Policy Area' (NPA), the 50 parishes within and around Norwich.
- 4.2.8 The North East Growth Triangle (NEGT) located within the NPA is considered by the GNDP to be a sustainable location for significant growth. The soon to be adopted parts of JCS Policy 9 seek to deliver a minimum of 7,000 dwellings by 2026 growing to around 10,000 dwellings in the NEGТ.

4.2.9 Within the JCS, new employment locations include a new business park of around 30ha associated with Norwich International Airport and focussed on uses benefiting from an Airport location and an extension to the Broadland Business Park of around 25ha. The soon to be adopted JCS Policy 9 proposes a further 25ha of employment land at Rackheath as part of the proposed NEGТ. These proposals form part of the 135ha of employment growth referred to in the Section 35 Direction earlier referred to.

4.2.10 Although set at the local or sub-regional level, the objectives and aspirations for Norwich and its surrounding area are supported by and consistent with objectives set at the national level.

4.3 The Identified Problems

4.3.1 One of the key issues affecting the City and its surroundings relates to the transport network. Fundamentally, the problems are caused by the limitations of the road network in and around the urban area, and its incapacity to deal with the demands placed on it. This issue will get worse as Norwich grows, which is what the growth objectives and aspirations outlined for the area seek to achieve.

4.3.2 In summary, the transport and related problems caused include:

- i. High volumes of traffic on routes such as the Outer Ring Road and the radial routes, which in combination with the physical characteristics of these routes leads to congestion and associated issues.
- ii. High volumes of traffic using inappropriate routes. This includes traffic travelling through the historic City Centre, traffic 'rat running' along urban residential streets and routes to move between the main radial routes and traffic using rural routes in an attempt to get around the north of Norwich.
- iii. Poor access to the strategic road network to and from areas and facilities located to the north of Norwich such as Norwich International Airport and areas of north and north-east Norfolk.
- iv. Adverse implications for existing businesses and services in terms of access to workplaces for staff, the importing and exporting of goods and the ability of customers to access businesses and services.
- v. Adverse implications for the growth and development of both Norwich and its surrounding area, and other locations further afield, which result from an effective restriction on the extent to which planned and proposed development can be brought forward and growth aspirations achieved.

- vi. Adverse implications on the effective operation and attractiveness of public transport within the City and its surroundings, and a limitation on the ability to provide further public transport, walking and cycling improvements.
- vii. Adverse environmental and quality of life implications.

4.4 Resolving the Identified Problems

- 4.4.1 Transport and related problems within and around the City of Norwich have been the subject of analysis, discussion and consultation over the course of many years. A cross-local authority boundary approach to planning for the future development of the transport system has been taken. This has taken the form of the Norwich Area Transportation Strategy (NATS).
- 4.4.2 The overall strategy set out in NATS is that a package of transport measures, interventions and improvements are required, including a Norwich Northern Distributor Road.
- 4.4.3 Taking account of the identified problems and having regard to the considerations and analysis undertaken, the specific objectives of the NDR are to:
 - i. reduce traffic levels and congestion on the existing road network both within the urban area and beyond to the north;
 - ii. facilitate journeys that are currently difficult and require traffic to use roads that are unsuitable for the type and volume of traffic that is currently accommodated;
 - iii. provide access to and help to deliver, planned and potential areas of growth, and enable those areas to be free of the need to incorporate provision for extraneous traffic;
 - iv. provide improved transport connectivity, including with the national strategic road network, for existing and future areas of residential and employment development, Norwich International Airport and the wider area of north and north-east Norfolk;
 - v. increase the opportunities for improving provision for public transport and other sustainable forms of transport and for improving traffic management within the City Centre, thereby encouraging modal shift, and
 - vi. improve traffic related environmental conditions for residents in the northern suburbs of Norwich and outlying villages, whilst minimising the adverse environmental impacts of the NDR.

- 4.4.4 Through the achievement of these objectives, the NDR will facilitate the step change in transport infrastructure that is required to address existing deficiencies and serve the full scale of population and economic expansion identified in the objectives and aspirations for the area.
- 4.4.5 The JCS notes that achieving the full economic potential of the area is dependent on improved connectivity (paragraph 5.38). JCS policy 6 highlights the need to implement NATS, including construction of the NDR, and Appendix 7 of the JCS identifies the NDR as a 'Priority 1 Infrastructure' requirement which is needed for the overall scale of growth identified.
- 4.4.6 The NDR is also identified in Norfolk County Council's Local Transport Plan⁷ as an element of the framework that will facilitate growth in the Greater Norwich area and provide strategic access to north-east Norfolk and Norwich International Airport. Norfolk County Council's economic growth strategy⁸ (at its section 5.2) highlights the NDR as being vital to the continued economic success of the Greater Norwich area, and also of benefit to north Norfolk and Great Yarmouth.
- 4.4.7 The Norfolk Infrastructure Plan was produced with the objective of delivering economic growth in Norfolk⁹. It identifies the NDR as a key infrastructure project. It notes that the NDR will address existing traffic issues to the north and east of Norwich and the City Centre and deliver economic benefits for Norwich and North Norfolk. The benefits of the NDR providing easy and reliable access to the national trunk road network and to Norwich International Airport are identified as considerable.
- 4.4.8 The Government in its National infrastructure Plan¹⁰ (2011) made it clear that to remain globally competitive the UK needs to address issues with its existing transport system and develop infrastructure capable of supporting a dynamic, modern economy. The NDR as a Local Authority Major Scheme is identified as one of the Government's key areas of infrastructure investment. The National Infrastructure Plan 2013¹¹ (published on 4 December 2013) identifies the NDR as a 'key project' and as one of the Government's Top 40 priority infrastructure investments.
- 4.4.9 The traffic impact of the NDR is detailed within the Transport Assessment (document reference 5.5) and associated documentation that supports the NDR DCO Application. The information provided in those documents demonstrates that, in summary, the NDR will:
- reduce traffic flows on the northern sections of the Outer Ring Road;
 - reduce traffic flows on key northern radial routes;
 - reduce City Centre through traffic;
 - reduce congestion;

- reduce traffic flows on unsuitable residential routes and on rural routes to the north of the urban area;
- significantly improve access for north Norwich and north and north east Norfolk to the strategic road network;
- provide direct dual carriageway access from all of the key northern radials to the national strategic road network;
- improve access to Norwich International Airport;
- provide the transport infrastructure needed to allow planned and proposed growth to come forward;
- increase the opportunities for improving the provision for pedestrians and cyclists; and
- increase the opportunities for improving public transport provision.

4.5 Consideration of other approaches leading to the development of the proposals

- 4.5.1 The need for a distributor road around the north of the City of Norwich emerged in 1992 as a conclusion of the review of the transport strategy for the Norwich area (NATS). The initial proposal was for a 'full length' NDR, i.e., one which would terminate in junctions with the A47(T) on both the western and the eastern flanks of the City.
- 4.5.2 The 1992 NATS review acknowledged that the construction of an NDR would inevitably have an impact on the environment of the area through which it passed. Studies showed that adverse effects were particularly likely on the most westerly section of the route, between the A1067 Fakenham Road and the A47(T)(west), where all possible alignments would have to cross the valley of the River Wensum, which is designated as a Special Area of Conservation (SAC).
- 4.5.3 Transport strategy for the Norwich area was next comprehensively reviewed over the period 2002 – 2005. A wide-ranging 'long list' of over 30 possible transportation interventions for inclusion in the review of possible strategies was identified. Possibilities included road-based and public transport interventions and the application of land use policies and other measures to reduce the demand for travel and encourage modal shift. Following a qualitative assessment of the performance of each intervention in addressing the problems and issues of the area, those possibilities that performed inadequately were not taken forward.

- 4.5.4 Possibilities not taken forward included a short NDR to the north-west of the City, between the A140 or the A1067 and the A47(T)(west). It would be much less effective than other versions of the NDR, the traffic benefits would be limited and it would not facilitate growth, which is largely planned to the north-east of the City. The section between the A1067 and the A47(T)(west) would also be likely give rise to significant adverse environmental effects, which studies showed and consultation at the time confirmed could not easily be mitigated.
- 4.5.5 Improvements to the Outer Ring Road were also considered. Even if they could be implemented acceptably within the urban environment, such improvements would be much less successful than the NDR options in improving accessibility and meeting the economic objectives. They would also fail to address the growth issues on the north-east edge of the city. Notwithstanding this conclusion, however, the principle of improvements to the existing road network as an alternative to the NDR was retained for re-examination.
- 4.5.6 The following range of public transport interventions were also considered:
- a light rapid transit (LRT) system;
 - a guided bus route along the Marriott's Way corridor;
 - orbital bus routes;
 - cross-city bus routes linking existing Park and Ride sites;
 - a new Park and Ride site at Taverham/Drayton;
 - interchange facilities at key nodes within Norwich;
 - additional rail stations to the east of Norwich, and
 - revenue support for additional bus services.
- 4.5.7 A qualitative assessment of the performance of these options in resolving the transport problems and issues and the NATS aims and objectives concluded that whilst neither individual public transport interventions or a combination of them would meet the need, public transport improvements were key elements of the solution.
- 4.5.8 Following the initial assessment outlined above, the following six possible strategies were assessed using an approach based on the Department for Transport's WebTAG methodology.

- Option 1 – A ‘full length’ NDR linking the northern radial routes with the A47(T) on both the east and west sides of the City; complementary measures to reduce the impact of traffic on minor roads and residential streets around the north of Norwich; improvements to junctions on the Inner and Outer Ring Roads; improvements to radial bus services, and measures to reduce through traffic in the City Centre.
- Option 2 – As Option 1 but a ‘half length’ NDR between the A47(T) at Postwick and the A140 Cromer Road, adjacent to Norwich International Airport.
- Option 3 – As Option 1, but a ‘three quarter length’ NDR from the A47(T) at Postwick, past Norwich International Airport to the A1067 Fakenham Road.
- Option 4 – A new orbital bus service around Norwich; major improvements to existing radial bus services; improvements to junctions on the Inner and Outer Ring Roads, and a ‘Ring and Loop’ system to prevent car drivers making through trips within the Inner Ring Road.
- Option 5 – A Light Rapid Transit service on a route linking Thickthorn Park and Ride, Norfolk & Norwich Hospital, the University of East Anglia (UEA), the City Centre and railway station, Postwick Park and Ride, Broadland Business Park and residential development in the north east fringe of Norwich; improvements to junctions on the Inner and Outer Ring Roads; road user charging or workplace parking charging within the Inner Ring Road; a Ring and Loop system to prevent car drivers making through trips within the Inner Ring Road, plus additional physical restrictions on car access to the City Centre as a consequence of LRT alignment through the City Centre.
- Option 6 – Planning new development so as to reduce the distance between home, work and services; financial incentives to implement workplace travel plans (including targets for reduced car use by existing businesses as well as those expanding or relocating); improvements to walking and cycling networks, including measures to support safer and healthier journeys to school; the promotion of alternative modes of transport and alternative fuels; and delivery of individualised marketing campaigns in support of travel plans.

4.5.9 The assessment in 2005 concluded that a northern distributor road was required in order to address the transport problems. The full NDR would have to cross the Wensum Special Area of Conservation (SAC) and pass through a landscape containing historic parkland and it was considered that this would give rise to impacts that could not be mitigated. The review concluded that even if the link between the A1067 and the A47(T) was not built, a ‘three-quarter length’ NDR would still achieve the objectives set by the NATS review.

- 4.5.10 In respect of the public transport options, the assessment concluded that cross-city bus routes linking existing Park and Ride sites, the development of interchange facilities at key nodes within Norwich and additional rail stations on the Cromer line to the east of Norwich would not have sufficient impact across the NATS area to be considered as strategic alternatives in their own right or in combination, but they could play an important role in complementing the NDR options.
- 4.5.11 In 2009, following the submission by NCC of a Major Scheme Business Case, the Department for Transport (DfT) granted funding for the NDR from the A140 to the A47(T) at Postwick, subject to progression by NCC of the NATS public transport measures which were complementary to the NDR.
- 4.5.12 A public transport model was developed to test public transport options in preparing the Major Scheme Business Case (MSBC) for the NDR. A combination of Bus Rapid Transit (BRT) with the best performing bus improvements was adopted as the preferred public transport option for modelling and a WebTAG appraisal for the MSBC. The option comprised improvements to the frequency of radial services on existing routes; a new bus service on a part of the Outer Ring Road, which would provide service to areas similar to that of the NDR; and a BRT corridor linking Sprowston, the City Centre, the University of East Anglia (UEA), Norfolk and Norwich Hospital and the Norwich Research Park.
- 4.5.13 Following the submission of the MSBC, the DfT asked NCC to investigate the sensitivity of the Benefit/Cost Ratio (BCR) for the Public Transport (PT) Option presented in the MSBC to higher levels of patronage on the new and enhanced services, thus generating additional revenue and reducing the level of subsidy required.
- 4.5.14 The results of these tests suggested that additional bus services included in the PT Option would have to operate without subsidy to achieve a BCR of 1.5 or above. In addition, patronage on the existing core bus routes enhanced under the PT Option (either through the introduction of a more frequent bus service or a new BRT service) would need to increase by 25% to achieve a BCR of circa 1.5 and by 32% to achieve a BCR of circa 2.0. These scenarios were considered to be implausible as they meant that the orbital bus service would have to generate sufficient patronage and revenue to operate without subsidy.

4.6 Overall review of options and alternatives 2013

- 4.6.1 Before deciding on the application proposals, the conclusion of previous analyses were reviewed in the light of traffic surveys undertaken in 2012, the results of the environmental studies, feedback from stakeholder and public consultation, and the progress of the Joint Core Strategy to adoption.

Measures to enhance the existing highway network as an alternative to the NDR

- 4.6.2 The 2002 - 2005 NATS review had considered whether forecast traffic growth in and around the north of Norwich could be accommodated on the existing network without an NDR. It concluded that this would require widespread major works to widen and reconfigure many carriageways and junctions, including several with frontage properties necessitating extensive property purchase and/or demolition.
- 4.6.3 The interconnected nature of the radial and orbital road system serving the City means that piecemeal improvements to sections where schemes might be feasible in isolation would not resolve the current traffic issues since other parts of the network, where improvement was impractical, would remain congested. This would leave overall route capacity and journey time reliability little changed and the propensity and opportunity for continued rat-running undiminished.
- 4.6.4 A comprehensive scheme of improvements to the existing road network between the A47(T) and the A1067 Fakenham Road would unavoidably have a direct and/or indirect impact on many residential and commercial properties, and would require demolition. It would be likely to face considerable opposition, especially from affected land owners and occupiers.
- 4.6.5 For the reasons summarised above, such a scheme would only partially meet the traffic need at the expense of widespread impacts on urban and residential environments. Traffic would continue to be drawn into the urban area and many cross-city journeys that would be facilitated by the NDR would not be facilitated or would be less well served by such a scheme, resulting in continued urban and rural rat-running. Such a scheme would also be less effective than an NDR in supporting urban expansion to the north east of the City and less effective in stimulating and serving economic growth generally.

Improvement to public transport provision as an alternative to the NDR

- 4.6.6 Extensive and detailed analyses of the potential for public transport improvements formed part of the reviews of NATS and supported the MSBC submission to the DfT. Each previous iteration of the analysis has reached the conclusion that public transport initiatives are an essential complement to the NDR but, even in combination, they do not constitute an alternative to it. By relieving the radials of traffic, the NDR would help to facilitate improvements in bus services. Freeing the internal road networks of new developments from the need to cater for extraneous through traffic would result in better residential environments, which would be more easily penetrated by local bus services, pedestrians and cyclists.

4.7 Alternatives to the application proposals

- 4.7.1 The analyses undertaken and summarised above conclude that the need can only be met by the construction of a NDR alongside the implementation of measures to improve public transport. The possibility of a 'full length' NDR having been discarded because of the likely significant impact on the environment of the Wensum Valley SAC, the remaining feasible alternatives were thus seen to be variations of the standard and alignment of the NDR between the A1067 and the A47(T) to the east of the City.
- 4.7.2 Environmental considerations figured largely in the judgements made about the most appropriate route. Once identified, these were matched against highway engineering considerations and likely effects on the human environment (advised by the results of public consultation) and a judgement reached as to the most appropriate alignment and design.
- 4.7.3 In summary, the alignment and form of the NDR are the result of iteration of options, informed by the output of land-use/transportation modelling and the preliminary conclusions of the studies carried out for the environmental impact assessment.
- 4.7.4 At the time of the 2002-2005 NATS review five possible route corridors were identified and considered between the A140 and the A1067, and three route corridor options were identified and considered east of the A140: an inner route immediately north of the then existing urban edge; an outer corridor to the south of Rackheath, Spixworth and Horsham St Faith and a central route between the two.
- 4.7.5 Between the A1067 and the A140, a direct route to the north of Taverham, Drayton and Thorpe Marriot was chosen in preference to an option which retained the use of the A1067 through those settlements. Such an option would do nothing to relieve those settlements or the built-up section of the A1067 which passes through them.
- 4.7.6 East of the A140 the outer corridor, although not free of impacts on the natural environment but having less impact than the other routes on the human environment and being best located to serve new development, was used as the basis for working up the application proposals.
- 4.7.7 Several variations within a corridor between the Airport and Horsham St Faith were investigated. The selected route passes as far as possible from dwellings in Horsham St Faith and Spixworth without interfering with the operation of the Airport. Between Thorpe End and the junction with the A47(T) at Postwick, the selected route was part of the arrangement of the junction with the A47(T) and the development of the Broadland Gate Business Park.

4.7.8 To confirm that the preferred option was the best option, the application proposals have been compared with five variations, which constitute the potential alternatives to the application proposals. The five variations are:

- Alternative 1 - Single carriageway on the same route as the preferred Scheme.
- Alternative 2 - Dual carriageway from the A47(T) at Postwick on a route the same as that of the preferred Scheme but terminating at the A140.
- Alternative 3 – As Alternative 2 but with the addition of a single carriageway from the A140 to the A1067.
- Alternative 4 – As the preferred Scheme except as a single carriageway between Fir Covert Road and the A1067.
- Alternative 5 – Developer-funded link roads between the north east radials (in the segment between the A47(T) at Postwick and the A140) in conjunction with the development of planned growth areas.

4.7.9 Alternative 1's fulfilment of the Scheme objectives is limited by the traffic capacity and attractiveness of its single carriageway to traffic. Its lower cost has resulted in a better assessment for effects on Public Accounts. However, this is outweighed by its assessments for other aspects. It has therefore been assessed as not performing as well as the Scheme, and has not been pursued.

4.7.10 Alternative 2 fails to address problems west of the A140, and this limits its fulfilment of Scheme objectives. Its lower cost has resulted in a better assessment for effects on Public Accounts. However, this is outweighed by its assessments for other aspects. It has therefore been assessed as not performing as well as the Scheme, and has not been pursued.

4.7.11 Alternative 3's fulfilment of the Scheme objectives is limited by the capacity and attractiveness of its single carriageway west of the A140. This is not outweighed by other aspects. It has therefore been assessed as not performing as well as the Scheme, and has not been pursued.

4.7.12 Alternative 4 would not provide a consistent standard for the NDR, it would not provide continuity of road type with the A47(T) Norwich Southern Bypass for the entire length of the NDR and would provide an inferior performance in terms of link accidents and user costs. Alternative 4 was included as an alternative to the Scheme within both the Section 47 and Section 42 statutory consultation under the Planning Act 2008. Feedback from the consultation indicated that of those that responded there was a majority support for the dual carriageway between Fir Covert Road and the A1067. It has therefore been assessed as not performing as well as the Scheme, and has not been pursued.

4.7.13 Alternative 5's fulfilment of Scheme objectives is very limited as it would serve as a direct access to development, would cater for large traffic flows and due to the lack of provision west of the A140. This is not outweighed by its significantly better assessment for its effects on Public Accounts due to its much lower cost. It has therefore been assessed as not performing as well as the Scheme, and has not been pursued.

5.0 Scope of Acquisition

- 5.1.1 Section 122 of the PA 2008 provides that “*An order granting development consent may include provision authorising the compulsory acquisition of land ...*”. Section 122 of the PA 2008 goes on to set out certain conditions, which must be met before powers of compulsory acquisition can be authorised by the Secretary of State - these are considered in section 8 of this Statement.
- 5.1.2 Regulation 5(2)(h) of the APFP Regulations requires a statement of reasons for seeking a DCO which authorises “*the compulsory acquisition of land or an interest in land or right over land*”.
- 5.1.3 The powers authorising the compulsory acquisition of land or interests in rights over land are contained in Articles 20, 22, 24 and 25 of the draft proposed DCO.
- 5.1.4 In addition, section 120 of the PA 2008 enables a DCO to contain provisions relating to, or to matters ancillary to, the development for which development consent is sought. The ancillary matters, which may be provided for in a DCO, include (but are not expressly limited to) those matters listed in Part 1 of Schedule 5 to the PA 2008, and in relation to the compulsory acquisition of land or interests in or rights over land include the following:
- i. the acquisition of land, compulsorily or by agreement (Schedule 5 paragraph 1);
 - ii. the creation, suspension or extinguishment of, or interference with, interests in or rights over land, compulsorily or by agreement (Schedule 5 paragraph 2);
 - iii. the abrogation or modification of agreements relating to land (Schedule 5 paragraph 3); and
 - iv. the payment of compensation (Schedule 5 paragraph 36).
- 5.1.5 The reference in Regulation 5(2)(h) to ‘acquisition’ of land or interests in or rights over land extends (by virtue of section 159 of the PA 2008) beyond merely the bare acquisition of land. It also includes the acquisition of an existing right over land or the creation of a new right over land. There are also various other powers sought in the draft proposed DCO which relate to land and which will, or may, interfere with property rights and interests.

5.1.6 The scope of the powers included in the draft proposed DCO, other than the 'main' compulsory acquisition powers, is briefly set out below. These powers are further outlined and explained in the DCO Explanatory Memorandum (document reference 3.2) that forms part of the Application, and in section 7 of this Statement.

- Article 8 – Power to alter layout, etc., of streets and Article 9 – Street works.
- Article 12 – Stopping up of streets and private access and Article 14 – Temporary prohibition or restriction of use of streets.
- Article 18 – Protective works to buildings.
- Article 19 – Authority to survey and investigate land.
- Article 29 – Rights under or over streets
- Article 30 – Temporary use of land for carrying out the authorised development and Article 31 – Temporary use of land for maintaining authorised development.
- Article 33 – Statutory undertakers, Article 34 – Apparatus and rights of statutory undertakers in land acquired or used and Article 35 – Recovery of costs of new connections.

5.1.7 All these additional powers relate to the ownership, occupation and use of land and will or may interfere with property rights and interests. As the justification for seeking these additional powers raises the same issues as apply to the acquisition of land and rights, this Statement also relates to them. Accordingly, the expression 'compulsory acquisition powers' includes these additional powers.

6.0 Description of Land subject to Compulsory Acquisition

6.1 Introduction

6.1.1 This section describes the land which is to be subject to the compulsory acquisition powers. The land is shown on the Land Plans (document reference 2.2) and the works proposed are represented on the Works Plans (document reference 2.3). In addition to the information in this Statement, descriptions of each numbered plot and details of ownership and other interests are provided in the Book of Reference (document reference 4.3). Land which is proposed to be acquired is shown in pink on the Land Plans, and land over which new rights are to be acquired is shown blue on the Land Plans. Land which is proposed to be temporarily used for or in connection with the carrying out of the authorised development is shown orange on the Land Plans, whilst replacement land ('exchange land') which is to be provided for special category land which is to be compulsorily acquired, is shown green on the Land Plans. Land which is shown striped pink and green on the Land Plans is land which is to be acquired and subsequently transferred as exchange land; and land which is shown striped orange and green on the Land Plans is land which is to be used temporarily and subsequently transferred as exchange land.

6.1.2 A full description of the land affected by the NDR Scheme, together with the key features and characteristics of its surroundings, is provided in Volume 1 of the Environmental Statement, Chapter 2 (document reference 6.1).

6.2 Location and Description of Works

6.2.1 The NDR would comprise a dual carriageway all-purpose strategic distributor road of approximately 20.4km running around the north side of Norwich. It would run from the A1067 Fakenham Road near Attlebridge in the west to the A47 Trunk Road at Postwick in the east.

Work Nos. 1 – 3

6.2.2 These works are located to the north-west and north of Taverham, which forms part of the north western urban fringe of Norwich. These works are located on or over existing parts of the public highway (the A1067 Fakenham Road, the C262 Fir Covert Road and the combined private access track and public highway known as Attlebridge Restricted Byway number 3), farmland, woodland, a private access track and small parts of the grounds of individual properties.

6.2.3 Land surrounding these works includes areas of woodland, farmland, and residential and business premises (including those located along Fir Covert Road).

Work Nos. 4 – 5

- 6.2.4 These works are located to the north of Taverham. They are located on or over existing parts of the public highway (the C261 Reepham Road, the U57168 Furze Lane / Breck Farm Lane and the combined private access track and public highway known as Drayton Restricted Byway number 6) farmland and a small part of the grounds of an individual property. These works are also located on or over parts of the recreational path known as Marriott's Way.
- 6.2.5 Land surrounding these works includes areas of farmland and individual properties located off Breck Farm Lane / Furze Lane and Reepham Road.

Work Nos. 6 – 8

- 6.2.6 Work numbers 6 to 8 are located to the north-east / north of Thorpe Marriott and to the south / south-east of Horsford. Thorpe Marriott is a settlement constructed from new in the 1990's as an extension to the urban area of Norwich. The village of Horsford has steadily expanded since the 1930's along the B1149 Holt Road and now encompasses several farm buildings and cottages of older date along its margins.
- 6.2.7 These works are located on or over existing parts of the public highway (the C261 Reepham Road, the C282 Drayton Lane, the B1149 Holt Road, the C253 Church Street, the combined private access track and public highway known as Drayton Restricted Byway number 6, the public highway known as Horsford Restricted Byway number 4/Dog Lane U57176, the combined private access track and public highway known as Horsford Restricted Byway number 5 and the Horsford Restricted Byway number 7), farmland, woodland, paddocks, private access tracks and small parts of the grounds of individual properties.
- 6.2.8 Land surrounding these works includes areas of farmland, woodland, individual properties and the settlements of Thorpe Marriott and Horsford.

Work No. 9

- 6.2.9 This work is located south-west of the settlement of Horsham St Faith in the vicinity of the existing junction of the B1149 Holt Road and the A140 Cromer Road. The work is located on or over existing parts of the public highway (the A140 Cromer Road/Holt Road, the B1149 Holt Road, the U57142 Holly Lane, the unnamed stretch of the U51625 public highway between the A140 Cromer Road and the B1149 Holt Road and a section of the unnamed stretch of the U57647 public highway running between the A140 Cromer Road and West Lane). The work is also located on or over farmland, woodland and land within Norwich International Airport.
- 6.2.10 Land surrounding this work includes farmland, woodland, residential properties, agricultural buildings, Manor Park Sports Club and Norwich International Airport.

Work Nos. 10 – 11

- 6.2.11 These works are located to the north of Norwich International Airport and to the south / south-east of the settlement of Horsham St Faith – a village with a historic core that has developed in a piecemeal fashion.
- 6.2.12 These works are located on or over parts of the existing public highway (the C251 Bullock Hill), land within Norwich International Airport, a private access track used for airport purposes, part of the grounds of the Norwich Aviation Museum, farmland, grassland and woodland.
- 6.2.13 Land surrounding these works includes Norwich International Airport, the City of Norwich Aviation Museum and the Petans Training Centre.

Work Nos. 12 – 13

- 6.2.14 These works are located to the north-east of Norwich International Airport and south of the settlement of Spixworth. This was originally a small village centred on the parish church, with Spixworth Hall and associated parkland lying adjacent to the west. Since the 1930's a large amount of residential development has occurred at the south eastern part of the settlement.
- 6.2.15 These works are located on or over parts of the existing public highway (the B1150 North Walsham Road, the C251 St Faiths Road, the C246 Buxton Road, the U57188 Quaker Lane, the U51200 Arthurton Road, the Horsham St Faith & Newton St Faith Bridleway number 6/Spixworth restricted byway number 1). These works are also located on or over farmland, woodland, a private access, grounds of an individual property and The Eastern Power Networks Spixworth Switching Station.
- 6.2.16 Surrounding land uses to the area covered by these works include Norwich International Airport, farmland, woodland, residential properties and agricultural buildings.

Work Nos. 14 – 15

- 6.2.17 These works are located to the south-east of Spixworth and to the west of Rackheath. Rackheath contains housing of different styles and ages and an industrial estate on land that was formerly used as a Second World War airfield. The route of these works runs through the northern part of Beeston Park.
- 6.2.18 These works are located on or over parts of the existing public highway (the A1151 Wroxham Road), farmland, woodland, a water course, private access tracks and grounds of individual properties.
- 6.2.19 Land surrounding these works includes farmland, a sewage works and residential properties.

Work Nos. 16 – 18

6.2.20 These works are generally located to the south-west of both Rackheath and west / south-west / south of New Rackheath.

6.2.21 These works are located on or over parts of the existing public highway (the C283 Salhouse Road, the C258 Broad Lane, the C874 Plumstead Road, a private access track with potential public highway rights known as Newman Road U57490 and an unnamed combined private access track with potential highway rights). These works are also located on or over farmland, farmland that forms part of a fuel allotment, woodland, private access tracks, disused private access tracks, an industrial storage area, a sewage pumping station, the forecourt of business premises, two properties (west of New Rackheath) known as 'The Barn' and 'Gazebo Farm' respectively, and the derelict Hall Farm buildings.

Work No. 19

6.2.22 This work is located to the south / south-west of New Rackheath at the point where the proposed NDR scheme crosses the Norwich to Cromer & Sheringham Railway. This work is located on or over parts of the railway line and farmland.

Work Nos. 20 – 21

6.2.23 These works are generally located to the east / south-east of Thorpe End and the Thorpe St Andrew area of Norwich. The small settlement of Great Plumstead is located further to the east of the works.

6.2.24 These works are located on or over parts of the existing public highway (A47 Trunk Road Norwich Southern Bypass, A47 Trunk Road Slip Roads, A1042 Yarmouth Road, C289 Broadland Way, C442 Middle Road, Low Road U59392, Smee Lane U59400, a combined private access track and the Great and Little Plumstead Footpath Number 5 and Postwick Footpath Number 2), farmland and a private access track.

6.2.25 Land surrounding these works includes farmland, Business Park, residential properties and agricultural buildings.

Work Nos. 22 – 24

6.2.26 These works are located to the north-west of Rackheath (work number 22), in Thorpe End (work number 23) and to the east of Spixworth (work number 24) respectively. These works are located on or over parts of the existing public highway (the A1151 Wroxham Road and the C258 Green Lane West in respect of work number 22, the C874 Plumstead Road in respect of work 23 and the B1150 North Walsham Road and the C249 Crostwick Lane / Rackheath Lane in respect of work number 24) and in respect of work number 22 an area of farmland.

7.0 Purpose in seeking Acquisition Powers

7.1 Introduction

- 7.1.1 The purpose of the acquisition powers being sought is to enable NCC to construct and operate the NDR within the limits of the land included in the DCO ('the Order limits'). The need for the NDR is explained in Chapter 3 of Volume 1 of the Environmental Statement (document reference 6.1) and summarised in section 4.0 of this Statement.
- 7.1.2 The purposes for which each parcel of land subject to compulsory acquisition powers is required are set out in Appendix 1 to this Statement. Appendix 2 to this Statement sets out further information relating to the ownership, the specific purposes for which land is required, other impacts on the land holding (such as severance and/or impacts on access) and the status of negotiations relating to the proposed acquisition of the land and / or new rights. The purposes for which the land is required are described having regard to the works as detailed in the description of the authorised development in Schedule 1 of the draft proposed DCO (document reference 3.1) and the plot / parcel numbers are as shown on the Land Plans (document reference 2.2) and as noted in the Book of Reference (document reference 4.3). Appendices 1 and 2 to this statement should be read in conjunction with and by reference to those documents.
- 7.1.3 Appendices 1 and 2 detail the land in which the freehold interest (and any other interests) are proposed to be acquired (i.e. outright acquisition of the land). This land is within the limits of deviation for the NDR works that are shown on the Works Plans (document reference 2.3). The purpose of acquiring outright the land detailed in Appendix 1 is to enable NCC to construct on that land the permanent works and to undertake the other specific activities detailed in Appendix 2 to this Statement.
- 7.1.4 Details of the land over which existing rights are to be acquired (i.e. extinguished) or over which new rights are to be created in favour of NCC are set out within Appendix 2. These rights are required in order to construct and carry out maintenance of the works.
- 7.1.5 Appendix 1 also contains details of the land of which NCC requires temporary possession. The purpose of using the land detailed as being required temporarily is to provide essential work sites and access, compounds, storage areas and working space to construct the NDR. These uses of the land are required temporarily as essential aspects of the construction process.
- 7.1.6 An explanation of the additional acquisition powers described in paragraph 5.1.6 is given below.

7.2 Article 8 - Power to alter layout, etc., of streets and Article 9 – Street works

7.2.1 The purpose of Article 8 is to allow the Applicant to alter the layout of and carry out works within certain streets, being both those identified in Parts 1 and 2 of Schedule 3 and those within the Order limits generally. The purpose of Article 9 is to allow the Applicant to carry out street works in accordance with the statutory rights under the New Roads and Street Works Act 1991. It is a model provision intended to permit the laying of utilities in streets for the purposes of the authorised project.

7.3 Article 12 – Stopping up of streets and private accesses and Article 14 – Temporary prohibition or restriction of use of streets.

7.3.1 The purpose of Article 12 is to give authority to the stopping up of the streets and private accesses which are identified in Schedule 6 of the draft DCO. It is based on the model provision, with the addition of private accesses utilising the same power. Schedule 6 sets out where a substitute street or access is to be provided, as an alternative for a street or access which is being stopped up, and identifies other streets and accesses which are to be provided as a consequence of the construction of the NDR. In general, the streets or accesses are required to be stopped up either where they are crossed by the NDR and will be replaced by a component of it, such as where a length of the C262 Fir Covert Road will be stopped up to be replaced by the NDR Fir Covert Road Roundabout, or because their continued existence would be incompatible with the Scheme. Appendix 3 of this Statement provides further explanation regarding the stopping up of streets and private means of access and of the provision of substitute, and other, streets, and of other alternative routes for stopped up streets, and accesses.

7.3.2 Article 14 is a model provision the purpose of which is to provide for the temporary prohibition or restriction of use of streets for the purposes of carrying out the authorised development. As per the model provision it applies generally, and also applies specifically to certain streets – those that are set out in Schedule 8 to the DCO. Paragraph (2) of Article 14 confers a power on the undertaker that where the use of a street has been temporarily prohibited or restricted it may use it as a temporary working site.

7.4 Article 18 - Protective works to buildings

7.4.1 Article 18 is a model provision, the purpose of which is to allow the Applicant to carry out protective works to buildings within the Order limits, subject to a number of conditions including the service of 14 days' notice (except in the case of emergency) and the payment of compensation.

7.5 Article 19 – Authority to survey and investigate land

7.5.1 Article 19 is a model provision, the purpose of which is to allow the Applicant to survey and/or investigate land including bringing equipment onto the land and making trial holes. The power is subject to a number of conditions including a requirement for 14 days' notice to be given, and is subject to the payment of compensation.

7.6 Article 29 – Rights under or over streets

7.6.1 Article 29 is a model provision, the purpose of which is to allow the undertaker to enter on and appropriate interests within streets where required for the purposes of the authorised development without being required to acquire that land. Provision is made for the payment of compensation in certain circumstances.

7.7 Article 30 – Temporary use of land for carrying out the authorised development and Article 31 – Temporary use of land for maintaining authorised development

7.7.1 The purpose of Article 30 is to allow the land specified in Schedule 11 to be temporarily used for the carrying out of the authorised development. Article 31 is similar to Article 30 but permits the temporary use of land for maintenance of the authorised project.

7.8 Article 33 – Statutory undertakers, Article 34 – Apparatus and rights of statutory undertakers in land acquired or used and Article 35 – Recovery of costs of new connection

7.8.1 The purpose of Article 33 is to provide for the acquisition of land of statutory undertakers which is identified in the Book of Reference (document reference 4.3). This Article includes a power to move the apparatus of those statutory undertakers and to extinguish rights. It is a model provision, except it is made subject to the protective provisions in Schedule 12, which are to apply to certain statutory undertakers as set out in that Schedule.

7.8.2 The purpose of Article 34 is to make provision in respect of the apparatus and rights of statutory undertakers in streets which are stopped up, including provision as to the relocation of apparatus. It is a model provision.

7.8.3 The purpose of Article 35 is to provide that persons who have to create a new connection following the removal of apparatus from stopped up streets may recover the costs of new connections from the Applicant. It is a model provision.

8.0 The Justification for seeking Powers of Compulsory Acquisition

8.1 Matters to which the decision maker must have regard

- 8.1.1 Section 122(1) of the PA 2008 provides that a DCO may only include compulsory acquisition powers if the conditions in section 122(2) and 122(3) are met. The conditions are:
- that the land is either: (a) required for the development to which the DCO relates, (b) required to facilitate or is incidental to that development, or (c) is replacement land which is to be given in exchange for the order land under section 131 or 132 of the PA 2008 (PA 2008 section 122(2)); and
 - that there is a compelling case in the public interest for the land to be acquired compulsorily (PA 2008 Section 122(3)).
- 8.1.2 The Guidance (at paragraph 11) provides advice in respect of the section 122(2) criteria.
- 8.1.3 In respect of criterion (a) of section 122(2), the Guidance highlights that the applicant should be able to demonstrate that the land in question is needed for the development for which consent is sought. It is further made clear that the Secretary of State will need to be satisfied that the land to be acquired is no more than is reasonably required for the purposes of the development.
- 8.1.4 In respect of criterion (b) of section 122(2), the Secretary of State must be satisfied that the land is required to facilitate, or is incidental to, the proposed development.
- 8.1.5 In respect of criterion (c) of section 122(2), the Guidance highlights that the Secretary of State will need to be satisfied that the compulsory acquisition is needed to provide replacement land to be given in exchange for certain types of special category land which are proposed to be acquired pursuant to the draft DCO, and that no more land is being taken than is reasonably necessary for that purpose, and than is proportionate. Issues relating to land to which sections 131 and 132 of the PA 2008 apply are considered further in section 10.0 of this Statement.
- 8.1.6 The Guidance also confirms (at paragraph 12) that in addition, section 122 requires the Secretary of State to be satisfied that there is a compelling case in the public interest for the land to be acquired compulsorily. Paragraph 13 of the Guidance goes on to make clear that for this condition to be met, the Secretary of State needs to be persuaded that the public benefits that would be derived from the compulsory acquisition (i.e. public benefits arising from the scheme facilitated by the compulsory acquisition) will outweigh the private loss that would be suffered by those affected by compulsory acquisition.

8.1.7 In addition to advice on the specific conditions and criteria within section 122, the Guidance (at paragraphs 8 to 10) sets out a number of general considerations that the promoter of a scheme requiring development consent under the PA 2008 should be able to demonstrate to the satisfaction of the Secretary of State, in respect of justifying an order authorising compulsory acquisition. These are:

- i. that all reasonable alternatives to compulsory acquisition (including modifications to the scheme) have been explored (paragraph 8);
- ii. that the proposed interference with the rights of those with an interest in the land is for a legitimate purpose and is necessary and proportionate (paragraph 8);
- iii. that the applicant has a clear idea of how it intends to use the land proposed to be acquired (paragraph 9);
- iv. that the applicant can demonstrate that there is a reasonable prospect of the requisite funds for acquisition becoming available (paragraph 9);
- v. that the purposes for which such powers are included in the draft DCO are legitimate and sufficiently justify interfering with the human rights of those with an interest in the land affected (paragraph 10).

8.1.8 The following sections of this Statement explain why NCC considers that the conditions in section 122 of the PA 2008 and the considerations set out in Guidance outlined in the preceding paragraphs are satisfied in respect of the NDR.

8.2 Section 122(2) – Requirement for the Order Land

8.2.1 Appendices 1 and 2 set out the details of the land required under the DCO and explain why the land is needed to enable both the construction and subsequent operation and maintenance of the NDR Scheme.

8.3 Section 122(3) – Compelling case in the public interest

8.3.1 NCC believes that there is a compelling case in the public interest which justifies the proposed compulsory acquisition of land and rights necessary to facilitate the delivery of the NDR Scheme. Chapter 3 of the Environmental Statement (document reference 6.1) and the summary of that which is provided in section 4.0 of this Statement explain the need for the NDR Scheme. To avoid repetition that detail is not repeated here. The NDR Scheme would:

- a. be in accordance with national and local planning and transport policy;

- b. meet the need which has been identified, as demonstrated in Chapter 3 of Volume 1 of the Environmental Statement and Section 4.0 of this Statement;
- c. contribute towards the achievement of the Government's objectives which underlie the reasons for which the Section 35 Direction was made;
- d. mitigate environmental impacts during the Scheme's construction, operation and maintenance phases;
- e. not be constructed without the exercise of powers of compulsory acquisition to acquire the land and rights necessary for the delivery of the Scheme.

8.3.2 NCC therefore considers that together, this Statement of Reasons and the related Application documentation demonstrate that there is a compelling case in the public interest for granting development consent, including authorisation of the use of powers of compulsory purchase for the NDR Scheme. NCC considers that the exercise of such powers would be necessary, justified and proportionate on the basis that the detrimental effects arising from any interference with private land and rights would be outweighed by the public benefits which would be brought about if the NDR Scheme were to be implemented pursuant to any grant of development consent.

8.4 Consideration of reasonable alternatives to compulsory acquisition

- 8.4.1 Appendix 2 of this Statement provides details of the position, at the time of the submission of the Application, on the state of negotiations and discussions with landowners affected by the NDR Scheme.
- 8.4.2 NCC will continue to liaise, discuss and negotiate with landowners to ensure that where the opportunity arises it can purchase interests by agreement. Continuing to negotiate with landowners to acquire land by agreement throughout the DCO process will help to ensure that parties at the examination are only dealing with the minimum number of compulsory acquisition issues.
- 8.4.3 Potential alternatives, including modifications to the Scheme, are discussed in Chapter 3 of Volume 1 of the Environmental Statement (document reference 6.1) and the summary provided in section 4.0 of this Statement.

8.5 Interference is necessary, proportionate and legitimate

- 8.5.1 Explanation is provided in Appendix 2 of this Statement as to why the identified land is required to be acquired compulsorily. This explanation demonstrates that the interference with private rights that would result from the acquisition of land in furtherance of the NDR Scheme is necessary, proportionate and legitimate.
- 8.5.2 NCC has sought to mitigate the direct impacts of the acquisition of land interests through a series of discussions with the affected landowners. Wherever possible the concerns of landowners have been taken on board and mitigation measures aimed at addressing those concerns have been incorporated into the Scheme design. Severance issues have been minimised by ensuring that access to retained land continues to be provided, and in order to address concerns about noise and visual impacts arising from the Scheme, earth bunds and areas of landscaping are being provided to screen properties.
- 8.5.3 The design of the Scheme has also been informed by a general approach which seeks to minimise the direct impact of land acquisition by, wherever possible, avoiding residential properties and ensuring that the Scheme is distanced from larger residential areas.

8.6 Fair compensation and certainty of funding

- 8.6.1 Compulsory acquisition powers and the related 'compensation code' (comprising a body of statutes and case law) serve an important function in ensuring that the compensation paid to landowners and others affected by compulsory acquisition represents a fair open market value. This benefits both those to whom compensation may be payable and NCC as the acquiring authority.
- 8.6.2 In the event of compensation not being agreed a judicial process applies. Compensation disputes will be decided, upon reference to it, by the Upper Tribunal (Lands Chamber). Decisions made by the Upper Tribunal may be appealed to the Court of Appeal.

8.6.3 The compulsory purchase procedure, therefore, provides certainty of outcome (the land and / or rights will be acquired), certainty of liability to compensation (fair open market price) and fairness of outcome (recourse to arbitrary / judicial process if necessary in case of a dispute on land value). The procedure, therefore, provides fair treatment for all parties involved in it.

8.6.4 As detailed in the separate Funding Statement application document (document reference 4.2) the NDR will be jointly funded by the Department for Transport (DfT) and NCC. The current total cost estimate for the NDR Scheme is £148.55 million, which includes an amount to cover the compulsory acquisition costs. DfT's funding grant is capped at £86.5m, meaning the remaining funding will be underwritten by NCC.

8.7 Human Rights

8.7.1 Issues relating to the consideration of the interference with Human Rights are addressed separately in section 13.0 of this Statement.

9.0 National Policy: The view of the Government

- 9.1.1 The section 35 Direction was given without prejudice to the Secretary of State's consideration of the Application, but the Government has expressed other views which are relevant to and support the proposed NDR.
- 9.1.2 The National Infrastructure Plan 2011 ('the NIP 2011') set out a strategy for meeting the infrastructure needs of the UK economy. It recognised that infrastructure networks form the backbone of a modern economy and are a major determinant of growth and productivity. The Government considers that historically, UK infrastructure has suffered from under-investment and a lack of coherent strategic forward planning. The Government makes it clear in the NIP that, *"To remain globally competitive, the UK needs to address these failures and develop an infrastructure capable of supporting a dynamic, modern economy"* (National Infrastructure Plan 2011 – Executive Summary).
- 9.1.3 As part of the Government's strategy for meeting the infrastructure needs of the UK economy, the NIP identified 40 key areas of infrastructure investment. Referred to as 'Priority infrastructure investment' these areas include "Local authority major transport schemes – development pool projects" (NIP 2011 Table 2.B). Local Authority schemes considered by the Government to fall within this priority infrastructure investment area were initially announced in stages in late 2011. The NDR was given programme entry status into the 'development pool project' investment area in December 2011 (Local Authority Major Transport Scheme – Development Pool Schemes – Scheme Decisions – December 2011). In the National Infrastructure Plan 2013 ('the NIP 2013') (published on 4 December 2013) the NDR is identified as a 'key project' and one of the Government's Top 40 priority infrastructure investments.
- 9.1.4 Section 104 of the Planning Act 2008 highlights the importance of National Policy Statements (NPS) in the determination of applications for development consent. The consultation draft of a NPS for National Road and Rail Networks (the draft NPS) was published by the Department for Transport on 4 December 2013. The draft NPS is not project specific. The underlying substance of the draft NPS has been addressed in the NDR Application documentation.

10.0 Special Considerations Affecting the Land

10.1 Special Category Land – Open Space

- 10.1.1 The draft DCO includes the provision for the compulsory acquisition of land (plots 2/26, 2/27, 2/28 and 2/29) which forms a length of the Marriott's Way recreational public amenity path, and which is considered to be open space land. This land comes within the definition of special category land as defined in the APFP Regulations (Regulation 2(1)).
- 10.1.2 Plots 2/26, 2/28 and 2/29 (which cover 1592, 4864 and 118 square metres, respectively) are required for the creation of a new right to enable construction of the Marriott's Way Overbridge. The freehold ownership of these plots would remain with Broadland District Council (the current freehold owner) and the open space status of these plots would be maintained. As such, NCC considers that the land in these plots (when burdened with the new right which NCC proposes to acquire pursuant to the DCO) would be no less advantageous to Broadland District Council, to any persons entitled to any rights of common, and to the public than it was before (in accordance with section 132(3) of the PA 2008, and being a matter upon which the Secretary of State is required to be satisfied). No replacement land is therefore to be provided for these plots.
- 10.1.3 Plot 2/27 (which covers some 1246 square metres) is required for the new NDR alignment. As indicated in the Appendices to this Statement, powers are being sought to acquire this plot of land.
- 10.1.4 Replacement land is proposed to be provided for plot 2/27. This replacement land consists of four land areas (plots 2/23, 2/25, 2/34 and 2/37) on either side of Marriott's Way on the approaches to the proposed Marriott's Way Overbridge of the NDR. Additionally, a further plot of land (plot 2/27a), comprising only the land carried upon the Overbridge deck level of the Marriott's Way Overbridge (once it is constructed), will also be provided as part of the replacement land, providing a continuous open space corridor of the Marriott's Way recreational public amenity path across the NDR. The land and air space below the Marriott's Way Overbridge would, if and when acquired under the DCO, remain in the ownership of NCC as land necessary for the construction, operation and maintenance of the NDR.

10.1.5 The overall area that is covered by the proposed replacement land amounts to 1987 square metres, consisting of:

Plot 2/23	588 square metres
Plot 2/25	429 square metres
Plot 2/34	369 square metres
Plot 2/37	127 square metres
Plot 2/27a	474 square metres

10.1.6 This replacement land would vest in Broadland District Council, under the terms of the DCO, and be subject to the same rights, trusts and incidents as are attached to the open space land which it replaces. In view of this, NCC is content that its proposals accord with section 131(4) of the PA 2008 (a matter upon which the Secretary of State is required to be satisfied).

10.1.7 The replacement land will not, however, be available for a period of time (envisaged to be nine months) whilst the Marriott's Way Overbridge is being constructed. Prior to the closure of Marriott's Way and for the period of the bridge construction, NCC will provide an alternative route for use by the public across the route of the NDR Scheme.

10.2 Special Category Land – Fuel Allotment

10.2.1 The draft DCO also includes provision for the compulsory acquisition of part of a fuel allotment, situated to the south west of the C258 Broad Lane and to the north west of the C874 Plumstead Road. The fuel allotment land also comes within the definition of special category land, as defined in the APFP Regulations (Regulation 2(1)).

10.2.2 Plot 10/45 (which covers some 3117 square metres) forms part of a fuel allotment and would be acquired to create a new Private Means of Access.

10.2.3 Replacement land is proposed to be provided for plot 10/45. This replacement land consists of two areas of land, plot 10/41, which covers some 3117 square metres, and plot 10/42, which covers some 9209 square metres. Plot 10/41 will be provided at the same time as plot 10/45 is acquired for the scheme. Plot 10/42 will be provided once its temporary use as a Bridge Compound has finished. This replacement land would vest in the Trustees of the Great Plumstead Fuel Allotment Charity and be subject to the same rights, trusts and incidents as attached to the fuel allotment land which it replaces. In view of this NCC is content that its proposals accord with section 131(4) of the PA 2008 (a matter upon which the Secretary of State is required to be satisfied).

11.0 Impacts on Statutory Undertakers

- 11.1.1 The draft DCO includes the provision for the compulsory acquisition of statutory undertakers' land as detailed in the following paragraphs.
- 11.1.2 Plot 7/7 is to be acquired from Eastern Power Networks plc. The land comprises an electricity substation. The substation does not need to be replaced and the existing cable network will be amended accordingly. The precise details of the works and how they will be undertaken will be agreed with the Statutory Undertaker.
- 11.1.3 Plot 9/28 is land owned by Anglian Water Services Limited. The land comprises a foul sewage pumping station. It is envisaged that the pumping station will be able to remain operational in its current location after the works. If this is the case, despite being shown to be acquired, then only temporary use of the land will be required to enable the works to be completed. However, permanent acquisition is currently shown to enable the Applicant to ensure that any required works can be completed. The precise details of the works, and level of acquisition requirement, will be agreed with the Statutory Undertaker.
- 11.1.4 Plot 10/40 is owned by Network Rail Infrastructure Limited. Rights for construction of the NDR Bridge (Over Railway Line) are required. Access to carry out the works over the railway line will be secured under a Basic Asset Protection Agreement and a Bridge Agreement with the Company. The precise details of the works will be agreed with the Statutory Undertaker.
- 11.1.5 Plot 6/4 is owned by Norwich Airport Limited. The land is required for the new NDR highway alignment. The Airport is also tenant of other Plots required for the Scheme, although these do not form part of their operational site. Negotiations have been ongoing with the Airport over the impact of the Scheme on its operational activities. Agreement has been reached over the re-provision of the Airport's radar.
- 11.1.6 At approximate chainage 1100 a National Grid Gas plc high pressure gas main crosses the new NDR highway alignment. The main will require re-routing so that it crosses the new highway at 90 degrees. Negotiations are ongoing with National Grid Gas plc to agree the precise new route for the main. The company's existing agreements with the affected landowners will be amended to reflect the final route. Temporary working areas are included within the DCO to facilitate the necessary diversion works.
- 11.1.7 A number of other existing pipes, cables, wires etc will be affected by the Scheme. Discussions are continuing with all relevant companies to ensure the appropriate diversion of such pipes, cables and wires etc, to ensure the continuation of the statutory undertakers' service delivery

12.0 Obstacles and other Consents

12.1 Consent under section 135 of the PA 2008

- 12.1.1 Part of the land on which the NDR Scheme is to be constructed is Crown land, by virtue of the fact that it comes within the definition of Crown land in section 135 of the PA 2008 in that it is held by a Government department – the Department for Transport.
- 12.1.2 Section 135(1) of the PA 2008 enables development consent orders to authorise the compulsory acquisition of an interest in Crown land where that interest is held by a party other than the Crown. If provisions to compulsorily acquire such interests are to be included in a development consent order, then the consent of the appropriate Crown authority is needed before the development consent order can be made by the Secretary of State.
- 12.1.3 The Crown land which is required to be included in the DCO for the NDR Scheme is held by the Department for Transport. The Highways Agency, as the executive agency of that Department, is authorised to grant consent to the inclusion of Crown land in the DCO on the basis prescribed by section 135 of the PA 2008.
- 12.1.4 The DCO includes Crown land at Postwick, where the NDR would link with the A47(T) (see paragraphs 12.1.5 to 12.1.6 below) and at Marriott's Way public recreational amenity path, on which a crossing for non-motorised users will be provided over the NDR (see paragraph 12.1.7 below). There is also the potential for a Crown interest in plot 12/55 (see paragraph 12.1.8 below). The Crown land is shown on the Crown Land Plan (document reference 2.12)
- 12.1.5 NCC has obtained the consent of the Highways Agency, on behalf of the Secretary of State for Transport, to include Crown land at Postwick in the DCO for the NDR, and the Highways Agency's letter of consent forms part of the Application documentation (document reference 10.4). The Highways Agency's consent acknowledges that the works which NCC proposes to carry out on Crown land pursuant to the DCO, if it is made, are to be carried out pursuant to an agreement between NCC and the Highways Agency, on behalf of the Secretary of State for Transport, under section 6 of the Highways Act 1980 ('the Section 6 Agreement').
- 12.1.6 The Section 6 Agreement will authorise:
- a. construction and maintenance of the proposed new Postwick bridge over the A47(T), such bridge to run from the proposed new Postwick North East Roundabout (on the north side of the A47(T)) to the existing Postwick Park and Ride Junction (which will be signalled as part of the works to which the DCO relates);

- b. proposed improvements to be made to the existing Postwick bridge which currently crosses the A47(T) (and which runs from the existing Postwick North West Roundabout on the north side of the A47(T) to the existing Park and Ride Junction on the south side of the A47(T)); and
- c. proposed signalisation and improvements to be made to the existing Postwick Park and Ride Junction on the south side of the A47(T);
- d. carrying out works to close the existing eastbound merge and diverge A47(T) slip roads and subsequently re-opening part of the eastbound diverge slip road to provide access for non-motorised users between the A47(T) and the A1042 Yarmouth Road where it joins the Postwick North West Roundabout; and
- e. proposed construction of new merge and diverge eastbound slip roads running from the proposed new Postwick North East Roundabout to the A47(T).

12.1.7 Marriott's Way is a recreational public amenity path, providing public open space in the form of a footpath, bridleway and cycle track along the routes of two disused railway lines running between Aylsham and Norwich. British Rail Board (Residuary) Ltd (BRBR) formerly owned rights over the land known as Marriott's Way. With effect from 30 September 2013, BRBR was abolished and its interests in the historical railways estate (formerly known as the Burdensome Estate, which includes legacy bridges, abutments, tunnels, cuttings, viaducts and similar properties associated with closed railway lines and sales) have been transferred to the Highways Agency Historical Railways Estate. As the Highways Agency is an executive agency of the Department for Transport, and as the definition of 'land' in sections 235 and 159 of the PA 2008 includes any existing interest in or right over land, the former BRBR rights over land at Marriott's Way have become Crown land, for the purposes of section 135 of the PA 2008. The Highways Agency is authorised to grant consent to the inclusion of Crown land in the DCO on the basis prescribed by section 135 of the PA 2008 and accordingly NCC is in the process of seeking the Highways Agency's consent to the inclusion in the DCO of the Crown's interests in the land at Marriott's Way.

12.1.8 Plot 12/55 is made up of part of the A1042 Yarmouth Road and its verge on the northern side. Norfolk County Council is the highway authority in respect of this section of highway – it was formerly part of a trunk road (the previous route of the A47(T)), for which the Secretary of State for Transport was the highway authority. NCC became the highway authority following the construction of the new (as is now in place) A47(T), and by virtue of The A47 Leicester-Great Yarmouth Trunk Road (Easton-Poswick), A11 London-Norwich Trunk Road (Cringleford-Mile End Road), A140 Ipswich-Norwich Trunk Road (South of Norwich Road-Daniels Road) (Norwich Southern

Bypass) Detrunking Order 1989 (SI 1989/2264). The registered owner of plot 12/55 is a non-Crown person, but the registered title includes reference to a Shortened Procedure Agreement (SPA) involving the (then) Minister of Transport. The Minister (part of the Crown) was the beneficiary of the dedication for highway purposes of the SPA land. The land remains used for that dedicated highway purpose, albeit the highway is of a different status through detrunking (with NCC as highway authority). NCC is continuing to investigate the complex historical title position in relation to plot 12/55 and to seek any necessary consent from the Highways Agency to the inclusion of the land in the DCO. Given the continuing investigation it has included it as land in which there is a Crown interest, and considers that such interest is currently most likely to be owned by NCC.

12.2 Discharge Consents

12.2.1 Consent for discharge of water to the aquifer may be required under the Environmental Permitting (England and Wales) Regulations 2010¹².

12.2.2 Piling work will take place at bridge locations and the piles may penetrate the water table. If so, some water may have to be pumped out and placed back in the aquifer. Before it is returned to the aquifer it would be treated in a settlement system.

12.2.3 Any discharge consents will be sought from the Environment Agency prior to any such works being carried out. The potential requirement to obtain discharge consents is a relatively standard implementation matter regularly addressed for schemes such as the NDR.

12.3 Protected Species Licences

12.3.1 Protected Species Licences will be required under The Conservation of Habitats and Species Regulations 2010¹³.

12.3.2 A breeding pond and an associated area of terrestrial habitat for great crested newts is being removed as part of the construction works. This pond is one of a series and the other ponds in the series are not being removed. Four new ponds are being created in the immediate vicinity and areas of remaining terrestrial habitat will be maintained along with the new ponds. Newt fencing will be erected before construction works begin and trapping and relocation of newts will be carried out.

12.3.3 The construction works will result in the removal of a number of bat roosts in buildings and in trees. The NDR will intersect flight paths and other features of bat activity. New roosts will be provided (two bat houses and a number of bat boxes). Severance of significant flight paths will be addressed by the installation of crossing points of various types, such as bat gantries, green bridges, underpasses and modified highway bridges to provide dark corridors.

12.3.4 Protected species licenses will be sought from Natural England following the making of the development consent order that is being sought. Mitigation measures have been discussed with the Natural England case officer during the consultation that has been on-going throughout the design and evolution of the Scheme. Draft licence applications were submitted to Natural England in November 2013, with a view to a letter of comfort being obtained confirming that Natural England consider that it is likely that it would be in a position to grant licences when formally sought.

12.4 Land Drainage Consent

12.4.1 Consent to obstruct watercourses may be sought from the relevant local drainage board under section 23 of the Land Drainage Act 1991¹⁴.

12.4.2 Any necessary consent will be sought from the Broads Internal Drainage Board. Discussions regarding this and other relevant matters have already taken place with the Environment Agency and the Internal Drainage Board.

12.5 Noise controls

12.5.1 Prior consent for works on construction sites may be sought from the relevant local authority under section 61 of the Control of Pollution Act 1974¹⁵.

12.5.2 Certain construction activities will be noisy and although measures will be put in place to reduce noise and its effects there may be some disturbance.

12.5.3 Any such consents will be sought from the relevant local authority by the contractor. The potential requirement to obtain such consents is a relatively standard implementation matter regularly addressed for schemes such as the NDR.

12.6 Traffic controls

12.6.1 The draft DCO provides powers for specific temporary restrictions as well as general powers for NCC to control traffic for the purposes of the construction of the NDR. In the event that any temporary or permanent traffic controls are required that are outside the scope of the DCO then they would be applied for by the contractor / NCC at the appropriate time.

13.0 Human Rights

13.1 The Human Rights Act 1998

13.1.1 The Human Rights Act 1998¹⁶ incorporated into UK law the European Convention on Human Rights ("the Convention"). The Convention includes provisions in the form of Articles, the aim of which is to protect the rights of the individual.

13.1.2 The following Articles of the Convention are relevant to the Secretary of State's decision as to whether the DCO should be made so as to include powers of compulsory acquisition:

- Article 6 entitles those affected by the powers sought in a DCO to a fair and public hearing by an independent and impartial tribunal.
- Article 8 protects the right of the individual to respect for his or her private and family life, home and correspondence. A public authority cannot interfere with these interests unless such interference is in accordance with the law and is necessary in the interests of, amongst other things, national security, public safety or the economic well-being of the country.
- Article 1 of the First Protocol protects the right of everyone to peaceful enjoyment of possessions. No one can be deprived of their possessions except in the public interest and subject to the relevant national and international laws. As with Article 8, any interference with possessions must be proportionate and, in determining whether a particular measure is proportionate, a fair balance must be struck between the public benefit sought and the interference with the rights in question.

13.1.3 The DCO has the potential to infringe the human rights of persons who own property or have rights in the land proposed to be acquired pursuant to the DCO. Such infringement can be authorised by law provided that:

- the statutory procedures for obtaining the DCO are followed and there is a compelling case in the public interest for the inclusion of powers of compulsory acquisition in the DCO; and
- any interference with the Convention right is proportionate to the legitimate aim served.

13.2 Compliance with the Convention and the Human Rights Act 1998

- 13.2.1 NCC has considered the potential infringement of Convention rights in consequence of the exercise of the compulsory acquisition powers included within the DCO. The land to be acquired for the NDR Scheme has been kept to the minimum necessary to enable proper delivery of the Scheme, and the NDR Scheme is designed to minimise interference with the peaceful enjoyment of a person's possessions under Article 1 of the First Protocol of the Convention.
- 13.2.2 NCC considers that there would be very significant public benefit arising from the grant of development consent for the NDR Scheme. That benefit can only be realised if the development consent is accompanied by the grant of powers of compulsory acquisition. The public interest can only be safeguarded by the acquisition of this land and such acquisition would not place a disproportionate burden on the affected land owners.
- 13.2.3 The significant public benefits of the NDR Scheme outweigh the effects of the DCO upon persons with property rights in the land and would not be a disproportionate interference with their rights under Article 8 and Article 1 of the First Protocol. In addition, those affected by compulsory acquisition powers will be entitled to compensation.
- 13.2.4 In relation to Article 6, there will have been an opportunity for members of the public to make representations on the Application. In accordance with Part 5 of the PA 2008, NCC consulted the persons prescribed in section 44 of the PA 2008. This included known owners and occupiers of the land to be acquired pursuant to the DCO, those with rights in the land to be acquired pursuant to the DCO and those who might make claims either under section 10 of the Compulsory Purchase Act 1965 in respect of injurious affection, or under Part 1 of the Land Compensation Act 1973. Those with the benefit of restrictive covenants, easements and other rights overridden by the exercise of powers in the DCO would be entitled to make claims under section 10 of the Compulsory Purchase Act 1965.
- 13.2.5 Furthermore, representations/objections to the Application can be made in response to any notice given under section 56 of the PA 2008, for consideration at the examination of the Application by the examining authority, and in any written representations procedure which the Examining Authority decides to hold, or at any compulsory acquisition hearing held under section 92 of the PA 2008.

- 13.2.6 Should the DCO be made, and be published as made, a 6 week period within which a claim for judicial review to the High Court, questioning the order or its decision or proceedings, will be afforded pursuant to section 118 of the PA 2008.
- 13.2.7 In relation to matters of compensation for land to be acquired, affected persons have the right to apply to the Upper Tribunal (Lands Chamber), an independent tribunal, in the case of any dispute on the value of land to be acquired pursuant to the DCO.
- 13.2.8 For the above reasons, any infringement of the Convention rights of those whose interests are affected by the inclusion in the DCO of powers of compulsory acquisition, is proportionate and legitimate and is in accordance with national and European law. For the reasons set out in Section 8.0 of this Statement, NCC believes that there is a compelling case in the public interest for the exercise of such powers of compulsory acquisition. NCC considers that it would, therefore, be appropriate and proportionate for the Secretary of State to make the DCO, including the grant of compulsory acquisition powers.

14.0 Glossary

Term	Meaning/Definition
The APFP Regulations	<i>The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 (SI 2009/2264)</i>
The Application	<i>The Application for the DCO for the NDR Scheme</i>
Compulsory acquisition powers	<i>Powers to authorise the compulsory acquisition of land and of new or existing rights over land (set out in the Planning Act 2008 sections 122-126 and other sections) and additional powers to create new rights over or in land, to extinguish private rights, to exercise rights in relation to streets, to make temporary use of land for construction and maintenance, and to permanently and temporarily alter the layout of streets or stop up streets and private accesses.</i>
The Convention	<i>The European Convention on Human Rights</i>
DCO	<i>'The Norfolk County Council (Norwich Northern Distributor Road (A1067 to A47(T))) Order', being a Development Consent Order required for the NDR Scheme (pursuant to the Planning Act 2008, Part 4)</i>
ES	<i>The Environmental Statement produced in connection with the NDR Scheme</i>
First Protocol	<i>The First Protocol of the Convention</i>

<i>The Guidance</i>	<i>The Department for Communities and Local Government guidance, 'Planning Act 2008: Guidance related to procedures for the compulsory acquisition of land', September 2013</i>
<i>NCC</i>	<i>Norfolk County Council</i>
<i>NDR</i>	<i>Norwich Northern Distributor Road</i>
<i>NIP</i>	<i>National Infrastructure Plan, published in November 2011 or December 2013 by HM Treasury and Infrastructure UK</i>
<i>NSIP</i>	<i>Nationally Significant Infrastructure Project, for which development consent is required under the Planning Act 2008</i>
<i>PA 2008</i>	<i>Planning Act 2008</i>
<i>This Statement</i>	<i>This Statement of Reasons</i>
<i>WebTAG</i>	<i>The Department for Transport's website for guidance on the conduct of transport studies and advice on the modelling and appraisal appropriate for major highway and public transport schemes.</i>

15.0 Bibliography

1. Planning Act 2008
 2. The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 (SI 2009/2264)
 3. Planning Act 2008 – Guidance related to procedures for the compulsory acquisition of land (DCLG)(September 2013)
 4. The Highway and Railway (Nationally Significant Infrastructure Project) Order 2013 (SI 2013/1883)
 5. Highways Act 1980
 6. Joint Core Strategy for Broadland, Norwich and South Norfolk (Greater Norwich Development Partnership)(Adopted March 2011)
 7. Norfolk's Local Transport Plan 3: Connecting Norfolk (Norfolk County Council)(April 2011)
 8. Delivering Economic Growth in Norfolk 2012 – 2017 (Norfolk County Council)
 9. Norfolk Infrastructure Plan 2012 (Norfolk County Council)
 10. National Infrastructure Plan 2011 (HM Treasury and Infrastructure UK)(November 2011)
 11. National Infrastructure Plan 2013 (HM Treasury)(December 2013)
 12. Environmental Permitting (England and Wales) Regulations 2010
 13. The Conservation of Habitats and Species Regulations 2010 (SI 2010/490)
 14. Land Drainage Act 1991
 15. Control of Pollution Act 1974
 16. Human Rights Act 1998
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Appendix 1

Details of the purpose in seeking acquisition powers

Appendix 1: Details of the purpose in seeking acquisition powers

1. The specific purposes for which each plot of land subject to compulsory purchase powers is required are set out in Tables 1, 2 and 3 below. The first column of these tables uses the plot numbers shown in the Book of Reference (Application Document Reference 4.3) and on the Land Plans (Application Document Reference 2.2). The second column of the tables refers to the works as described in Schedule 1 of the DCO (Application Document Reference 3.1) and as shown on the Works Plans (Application Document Reference 2.3). Tables 1, 1A, 2, 2A, 3 and 3A below should therefore be read in conjunction with and by reference to those documents.
2. Tables 1 and 1A detail the land that is to be acquired freehold by the Applicant. This land is within the DCO boundary shown on the Works Plans. The purpose of acquiring the land referred to in Table 1 is to enable the Applicant to construct on that land the permanent works, described in Schedule 1 of the DCO. The two tables list the same plot numbers: Table 1 lists them by Work Number and Table 1A by the use to which they will be put. The terms used in the second column of Table 1A are explained at the end of Table 1A.
3. Tables 2 and 2A list the land over which specific permanent new rights are to be acquired by the Applicant. These rights are necessary for the purpose of constructing the works, carrying out maintenance thereafter or to protect the works. The Applicant has decided that, for the Scheme, it is not necessary to acquire the land outright. The two tables list the same plot numbers: Table 2 lists them by Work Number and Table 2A by the use to which they will be put.
4. Tables 3 and 3A set out the land which the Applicant only requires temporary possession of for the purpose of constructing the Scheme. Uses include temporary areas for highway diversions, site compounds, storage areas and land for utility diversion works. The two tables list the same plot numbers: Table 3 lists them by Work Number and Table 3A by the use to which they will be put.

TABLE 1

Acquisition of Land	
No on Land Plans	Purpose for which land is required
1/1, 1/2, 1/3, 1/4, 1/5, 1/6, 1/7(part), 1/8(part) and 1/10(part)	Work No.1
1/7(part), 1/8(part), 1/9, 1/10(part), 1/12, 1/13, 1/14, 1/16, 1/17, 1/18, 1/20, 1/21, 1/22, 1/23, 1/24, 1/25, 2/1, 2/2, 2/5(part), 2/7, 2/9, 2/11 and 2/13(part)	Work No.2
2/5(part), 2/13(part), 2/14, 2/15, 2/16, 2/17, 2/18, 2/19(part), 2/20(part) and 2/21	Work No.3
2/19(part), 2/20(part), 2/22, 2/23, 2/24, 2/25, 2/27, 2/30, 2/31, 2/32, 2/33, 2/34, 2/36, 2/37, 2/38, 2/39, 2/40, 2/41, 2/42, 3/1(part) and 3/3	Work No.4
3/1(part), 3/5, 3/6, 3/7, 3/8, 3/9, 3/10(part), 3/12(part), 3/13(part), 3/14(part) and 3/15	Work No.5
3/10(part), 3/11, 3/12(part), 3/13(part), 3/14(part), 3/16, 3/17, 3/18, 3/19, 3/20, 3/21, 3/22, 3/23, 3/24, 3/25, 3/26, 3/27, 3/28, 3/29, 3/30, 3/31, 3/32, 3/34, 3/35, 4/1, 4/2, 4/3, 4/4 and 4/5(part)	Work No.6
4/5(part), 4/6, 4/7, 4/8, 4/10, 4/12, 4/13, 4/14, 4/15, 4/16, 4/17, 4/18, 4/19, 4/20, 4/21, 4/22, 4/23(part), 4/25, 4/26, 4/27, 4/28, 4/29, 4/30, 4/31, 4/32, 4/33, 4/34, 4/35 and 4/36	Work No.7
4/23(part), 4/37 and 4/38	Work No.8
5/1, 5/3, 5/4, 5/5, 5/6, 5/7, 5/8, 5/9, 5/10, 5/11, 5/12, 5/13, 5/14, 5/15, 5/16, 5/17, 5/18, 5/19, 5/20, 5/21, 5/22, 5/23, 5/24, 5/25, 5/26, 5/27, 5/28, 5/29, 5/30, 5/31, 5/32, 5/35, 5/36, 5/37, 5/38, 5/39, 5/40, 5/41, 5/42 and 5/44(part)	Work No.9

5/44(part), 5/45, 5/46, 5/47, 5/48, 5/49, 6/1, 6/2, 6/3, 6/4, 6/5, 6/6, 6/7, 6/8(part) and 6/11(part)	Work No.10
6/8(part), 6/9, 6/10, 6/11(part), 6/12, 6/13 and 6/15(part)	Work No.11
6/15(part), 6/17, 6/18, 6/19, 6/20, 6/21, 7/1, 7/2, 7/3, 7/4, 7/5, 7/6, 7/7, 7/8, 7/9, 7/10, 7/11, 7/12, 7/13, 7/14, 7/15, 7/16, 7/18, 7/19, 7/20, 7/21, 7/22, 7/23, 7/24, 7/25, 7/26, 7/27, 7/28, 7/29, 7/30, 7/31, 7/32 and 8/1(part)	Work No.12
8/1(part), 8/2, 8/3, 8/4, 8/5, 8/6, 8/8, 8/9 and 8/10(part)	Work No.13
8/10(part), 8/11, 8/12, 8/13, 8/14, 9/1, 9/2, 9/3, 9/4, 9/6(part), 9/7(part) and 9/8(part)	Work No.14
9/6(part), 9/7(part), 9/8(part), 9/9, 9/10, 9/11, 9/12, 9/13, 9/14, 9/15, 9/16, 9/17, 9/18, 9/19, 9/20, 9/21(part), 9/22(part), 9/23(part), 9/24 and 9/25	Work No.15
9/21(part), 9/22(part), 9/23(part), 9/26, 9/27, 9/28, 9/29, 9/30, 9/31, 9/32, 9/33, 9/34, 9/35, 9/36, 9/37, 9/39, 10/1, 10/2, 10/3, 10/4, 10/5, 10/6, 10/8, 10/9, 10/10, 10/11, 10/12, 10/13, 10/14, 10/15, 10/16, 10/17, 10/18, 10/19, 10/20, 10/21, 10/22, 10/23, 10/24 and 10/27(part)	Work No.16
10/27(part), 10/29, 10/30, 10/31, 10/32, 10/33, 10/34, 10/35(part) and 10/36(part)	Work No.17
10/35(part), 10/36(part), 10/37(part), 10/41, 10/42, 10/43(part), 10/44(part), 10/45, 10/46, 10/47, 10/48, 10/49, 10/50, 10/51, 10/53, 11/1, 11/2, 11/3, 11/4, 11/5, 11/6 and 11/8(part)	Work No.18

10/37(part), 10/43(part) and 10/44(part)	Work No.19
11/8(part), 11/9, 11/10, 11/11, 11/12, 11/14, 11/15, 11/16, 11/17, 11/18, 11/19, 11/20, 11/21, 11/22, 11/23, 12/1, 12/2, 12/3, 12/4, 12/5, 12/6, 12/7, 12/8(part) and 12/10	Work No.20
12/8(part), 12/11, 12/12, 12/13, 12/14, 12/15, 12/16, 12/17, 12/18, 12/19, 12/20, 12/21, 12/22, 12/23, 12/24, 12/25, 12/26, 12/27, 12/28, 12/29, 12/30, 12/31, 12/32, 12/33, 12/34, 12/35, 12/36, 12/37, 12/38, 12/39, 12/40, 12/43, 12/44, 12/45, 12/46, 12/47, 12/48, 12/49, 12/50, 12/51, 12/52, 12/53, 12/54, 12/55, 12/56, 12/57, 12/58, 12/59 and 12/60	Work No.21
9/40, 9/41 and 9/42	Work No.22
11/24, 11/25 and 11/26	Work No.23
8/15	Work No.24

TABLE 1A

Acquisition of Land	
No on Land Plans	Purpose for which land is required
1/13, 1/17, 1/23, 2/1, 2/9, 2/27, 2/36, 3/16, 3/19, 3/23, 5/11, 5/19, 5/42, 5/44, 5/46, 5/47, 6/20, 7/9, 9/30, 10/1, 10/4, 10/6 and 10/21	Required for NDR alignment
1/24, 1/25, 2/2, 2/22, 3/9, 3/13, 3/22, 3/26, 3/27, 3/28, 3/34, 4/1, 4/4, 4/23, 4/37, 4/38, 5/13, 5/16, 5/29, 5/40, 5/41, 5/48, 6/1, 6/3, 6/4, 6/5, 6/6, 6/11, 6/15, 7/3, 7/12, 7/16, 7/31, 8/1, 8/10, 9/6, 9/36, 9/37, 10/23, 10/37, 10/44, 11/18, 11/20, 11/22 and 12/1	Required for a) NDR alignment b) Mitigation / landscaping works
1/21	Required for

	<ul style="list-style-type: none"> a) NDR alignment b) Mitigation / landscaping works c) Provision of New Private Means of Access
5/7	Required for <ul style="list-style-type: none"> a) NDR alignment b) Drainage Lagoon
2/15, 3/6, 5/9, 6/19, 7/24, 8/5, 9/13 and 10/32	Required for re-use of existing public highway for NDR alignment
1/8, 2/20, 2/24, 2/41, 3/1, 3/8, 5/1, 9/10, 10/51, 11/19, 12/8 and 12/51	Required for: <ul style="list-style-type: none"> a) NDR alignment b) New highway (Non - NDR)
11/1 and 11/8	Required for <ul style="list-style-type: none"> a) NDR alignment b) New highway (Non - NDR) c) Mitigation / landscaping works d) Drainage Lagoon
2/5, 3/25, 3/32, 4/5, 9/23, 10/27, 10/35 and 11/11	Required for <ul style="list-style-type: none"> a) NDR alignment b) New highway (Non - NDR) c) Mitigation / landscaping works
6/12, 10/16 and 10/19	Required for <ul style="list-style-type: none"> a) NDR alignment b) New highway (Non - NDR) c) Mitigation / landscaping works d) Provision of New Private Means of Access
4/13, 5/6, 5/12, 5/14, 5/15, 6/8, 7/4, 7/28, 8/3, 8/8, 9/12, 10/47, 11/10, 11/15 and 12/5	Required for re-use of existing public highway for <ul style="list-style-type: none"> a) NDR alignment b) Non-NDR alignment
12/13 and 12/15	Required for A47(T) alignment
12/19, 12/20, 12/21, 12/22, 12/23, 12/24, 12/26, 12/27, 12/38, 12/39, 12/40, 12/44, 12/45, 12/46 and 12/47	Required for re-use of existing public highway for Trunk Road
1/3, 2/17, 2/18, 2/21, 2/33, 3/30, 4/7,	Required for new highway (Non – NDR)

4/10, 4/12, 4/15, 4/16, 4/18, 4/20, 4/21, 4/22, 4/27, 4/29, 4/31, 4/34, 4/35, 4/36, 5/4, 5/21, 5/23, 5/25, 5/27, 5/36, 7/11, 7/14, 7/18, 7/20, 7/22, 8/9, 9/15, 9/16, 9/20, 9/24, 9/25, 10/12, 10/13, 10/14, 10/15, 10/29, 10/34, 10/48, 10/49, 10/53, 11/2, 11/16, 12/3, 12/7, 12/32 and 12/54	
5/38, 9/7 and 12/34	Required for a) New highway (Non-NDR) b) Mitigation / landscaping works
3/14	Required for a) New highway (Non - NDR) b) Drainage Lagoon
1/1, 1/2, 1/4, 1/5, 1/6, 2/14, 2/16, 2/31, 2/32, 2/39, 2/40, 3/5, 3/7, 3/35, 4/6, 4/8, 4/14, 4/17, 4/30, 4/32, 4/33, 5/3, 5/8, 5/26, 5/28, 5/30, 5/32, 5/35, 5/37, 5/39, 6/7, 6/9, 7/5, 7/6, 7/19, 7/21, 7/23, 7/25, 7/27, 7/29, 8/2, 8/4, 8/6, 9/11, 9/14, 9/17, 9/18, 10/31, 10/33, 10/46, 11/14, 11/17, 12/4, 12/6, 12/31, 12/33, 12/36, 12/37, 12/43, 12/48, 12/49, 12/53, 12/55, 12/56, 12/57, 12/58, 12/59 and 12/60	Required for re-use of existing public highway for Non – NDR alignment
1/7, 1/20, 2/7, 2/11, 2/19, 2/38, 3/12, 3/17, 3/18, 3/21, 3/29, 4/25, 4/28, 5/31, 5/45, 5/49, 6/2, 6/18, 7/2, 7/7, 7/8, 7/13, 7/15, 8/11, 8/14, 9/2, 9/4, 9/8, 9/9, 9/19, 9/21, 9/31, 9/32, 9/33, 9/34, 9/35, 9/39, 10/2, 10/3, 10/8, 10/20, 10/22, 10/24, 10/43, 11/4, 11/6, 12/11, 12/25, 12/28, 12/29, 12/35 and 12/50	Required for mitigation / landscaping works
1/9, 1/10, 1/12, 1/14, 1/16, 1/18, 2/13, 3/3, 4/2, 4/3, 4/19, 4/26, 5/5, 5/10, 5/17, 5/18, 5/20, 5/22, 5/24, 6/10, 6/17, 6/21, 7/1, 7/10, 7/30, 7/32, 8/12, 8/13, 9/1, 9/3, 9/22, 9/28, 9/29, 10/36, 10/50, 11/3, 11/5, 11/12, 11/21, 11/23, 12/2, 12/10, 12/12, 12/14, 12/16 and 12/52	Required for new drainage lagoon
3/10, 3/11, 3/20, 3/24 and 3/31	Required for improvements to Restricted

	By-way surface
1/22, 2/30, 2/42, 3/15, 6/13, 7/26, 9/26, 9/27, 10/5, 10/9, 10/10, 10/11, 10/17, 10/18, 10/30, 10/45, 12/17, 12/18 and 12/30	Required for provision of new Private Means of Access
2/23, 2/25, 2/34, 2/37, 10/41 and 10/42	Required as replacement land
9/40, 9/41 and 9/42	Required for the Wroxham Road / Green Lane West Junction Improvement
11/24, 11/25 and 11/26	Required for the Thorpe End (Highway Improvement Measures)
8/15	Required for the Rackheath Lane Closure

In Table 1A above:

- **“NDR Alignment”** means the NDR Classified Road carriageway and integral embankments and cuttings.
- **“Mitigation / Landscaping”** means areas of earth bunds and areas of existing woodland or woodland, grassland and scrubland creation.
- **“New highway (Non - NDR)”** means areas of new carriageway that do not form part of either the NDR Alignment or A47(T) Alignment. For example this includes improvements to side roads connecting into the NDR Alignment such as Fir Covert Road and Drayton Lane. It also includes the lengths of the A140 Cromer Road and the A1067 Fakenham Road which are being improved. The areas also include proposed new bridleways, cycle tracks, footways/cycleways and turning heads.
- **“Drainage Lagoon”** means areas included within the proposed new lagoons.
- **“Provision of new Private Means of Access”** means lengths of track being provided to give access to third party land.
- **“Re-use of existing public highway for NDR alignment”** means areas of existing public highway land, which will remain as public highway, but which will become part of the NDR Alignment.
- **“Required for A47(T) Alignment”** means the areas of land required for the new A47 Trunk Road Postwick Junction Slip Roads.

- **“Required as replacement land”** means the areas identified as replacement for the Special Category Land.
- **“Re-use of existing public highway for Trunk Road”** means areas of existing public highway land, which will remain as public highway, but which will become part of the A47(T) Alignment.
- **“Re-use of existing public highway for Non – NDR Alignment”** means areas of existing public highway land, which will remain as public highway, but will not be part of either the NDR Alignment or the A47(T) Alignment.
- **“Required for improvements to Restricted By-way surface”** means the lengths of existing Restricted By-ways, which will remain as such, but upon which the Applicant intends to carry out improvement works.

TABLE 2

Acquisition of Rights	
No on Land Plans	Purpose for which land is required
2/26, 2/28 and 2/29	Work No.4
9/5	Work No.14
10/40	Work No.19
12/41 and 12/42	Work No.21

TABLE 2A

Acquisition of Rights	
No on Land Plans	Purpose for which land is required
2/26, 2/28 and 2/29	Required for the connection of Marriott's Way with Marriott's Way Overbridge
9/5	Required for drainage rights
10/40	Required for the NDR Bridge (Over Railway Line)
12/41 and 12/42	Required for the existing Postwick Bridge and the New Postwick Bridge across the Norwich Southern Bypass (A47 Trunk Road)

TABLE 3

Temporary Possession of Land – By Work Number	
1/11, 1/15 and 1/19	Work No.1
2/3, 2/4, 2/6, 2/8, 2/10 and 2/12	Work No.2
2/35 and 3/2	Work No.4
3/4	Work No.5
3/33, 4/9(part) and 4/11(part)	Work No.6
4/9(part), 4/11(part) and 4/24	Work No.7
4/39,5/2, 5/33, 5/34 and 5/43(part)	Work No.9
5/43(part)	Work No.10
6/14, 6/16, 7/17 and 7/33	Work No.12
8/7	Work No.13
9/38, 10/7, 10/25, 10/26(part) and 10/28(part)	Work No.16
10/26(part) and 10/28(part)	Work No.17
10/38, 10/39, 10/52 and 11/7	Work No.18
11/13 and 12/9	Work No.20
12/61	Work No.21

TABLE 3A

Temporary Possession of Land – By Use	
2/35, 7/33(part) and 11/13(part)	Required for bridge compound
9/38	Required for ecological mitigation measures
2/3, 2/4, 2/6, 2/8 and 2/10	Required for a working space area for the Gas Main diversion

6/16	Required for removal of existing hedgerow and Airport fencing
5/43(part)	Required for main site compound , temporary storage, plant yard, crushing plant and recycling plant
3/33	Required for site compound
4/9(part), 4/11 and 10/7	Required for site compound with temporary mitigation measures
10/38 and 10/39(part)	Required for site compound with batching plant, bridge access and access to railway bridge north abutment with temporary mitigation measures
12/61	Required for Postwick site compound with temporary mitigation measures
2/12, 3/2, 4/9(part), 4/39, 5/2, 5/43(part), 6/14, 7/17, 7/33(part), 10/25, 10/26, 10/28, 10/39(part), 10/52, 11/7, 11/13(part) and 12/9	Required for temporary topsoil storage
1/11, 1/15, 1/19, 3/4, 5/33, 5/34 and 8/7	Required for temporary traffic diversion to complete tie-in
4/24	Required for temporary traffic management

Appendix 2

Negotiations with owners of interests in land and other information relating to land interests

1. Part 1: Overview

- 1.1 This Appendix provides a summary of the current position in the Applicant's negotiations with each of the affected land owners.
- 1.2 Although negotiations are ongoing with all persons with an interest in land affected by the Scheme, the Applicant has concluded that acquisition by agreement will not occur in all cases or within the necessary timescales to ensure that the programme for the construction of the Scheme is met. There are also some areas of the Land where it will not be possible to acquire the interest except by way of compulsory acquisition powers, for example where, despite diligent enquiry, it has not been possible to identify the owner of an interest in land.
- 1.3 The properties already acquired by the Applicant, and referred to below in paragraph 21 of Part 2 of this Appendix, are included within the DCO and the other Application documents as being required for compulsory acquisition to ensure that no known or unknown rights exist over such land that could impede the proper implementation of the Scheme.
- 1.4 The plots listed in paragraph 1.5 below cover areas of existing public highway land occupied by the Applicant in its capacity as local highway authority. These plots are either owned by the Applicant, owned by named or unknown parties or are presumed half-width sub-soil ownership by adjoining owners. All these areas will remain as public highway and are included within the DCO Application documents to ensure that any third party interests are acquired. To reduce duplication of entries within this Appendix these plots have been excluded from the Landowner Interest details given in Part 2 of this Appendix.
- 1.5 The existing highway land plots are: 1/1, 1/2, 1/4, 1/5, 1/6, 1/22, 2/14, 2/15, 2/16, 2/31, 2/32, 2/39, 2/40, 3/5, 3/6, 3/7, 3/9, 3/10, 3/20, 3/31, 3/35, 4/6, 4/8, 4/13, 4/14, 4/17, 4/30, 4/32, 4/33, 5/3, 5/6, 5/8, 5/9, 5/10, 5/11, 5/12, 5/14, 5/15, 5/20, 5/26, 5/28, 5/29, 5/30, 5/31, 5/32, 5/34, 5/35, 5/37, 5/39, 6/7, 6/8, 6/9, 6/19, 7/4, 7/5, 7/6, 7/19, 7/21, 7/23, 7/24, 7/25, 7/27, 7/28, 7/29, 8/2, 8/3, 8/4, 8/5, 8/6, 8/8, 8/15, 9/11, 9/12, 9/13, 9/14, 9/17, 9/18, 9/40, 9/41, 10/31, 10/32, 10/33, 10/46, 10/47, 11/10, 11/14, 11/15, 11/17, 11/24, 11/25, 11/26, 12/4, 12/5, 12/6, 12/31, 12/32, 12/33, 12/35, 12/43, 12/48, 12/49, 12/53, 12/55, 12/56, 12/57, 12/58, 12/59 and 12/60.
- 1.6 In addition to the owners, lessees, tenants and occupiers mentioned in Part 2 below, other parties such as mortgage companies, statutory undertakers with apparatus such as pipelines across the land, and those with known rights, whilst included in the consultation, have not been detailed in this Appendix. They are, however, identified in the Book of Reference.

- 1.7 The Applicant remains open to acquiring the required interests in the land by agreement and negotiations with this objective are ongoing.

Part 2: Landowner Interest Details

1. Plot 1/3

- 1.1 Comprises agricultural land to the north of the A1067 Fakenham Road.
- 1.2 The land is owned by Mr G Black, Mrs I E Black and the Denton & Co Trustees Ltd. The land is leased and occupied by Ebony Holdings Limited.
- 1.3 The land is required for the Scheme to be developed as part of the A1067 Fakenham Road improvement.
- 1.4 The existing field access points will remain off the A1067 Fakenham Road.
- 1.5 The owners have appointed a surveyor to act on their behalf and negotiations have commenced regarding the acquisition of the required land.

2. Plot 1/7

- 2.1 Comprises agricultural land to the north of the A1067 Fakenham Road.
- 2.2 The land is owned by Mr C Bunn and Mrs J L Bunn. Mr M Copplestone and Mr I Copplestone have ownership responsibility in respect of the north-west boundary hedge. There are no known tenants.
- 2.3 The land is required for the Scheme for the provision of land for environmental mitigation measures. Part will also be used during the works for temporary topsoil storage.
- 2.4 Both owners have appointed surveyors to act on their behalf and negotiations have commenced regarding the acquisition of the required land.

3. Plots 1/8, 1/9, 1/10 and 1/11

- 3.1 Comprises agricultural land to the north of the A1067 Fakenham Road.
- 3.2 The land is owned by Mr C Bunn and Mrs J L Bunn. There are no known tenants.
- 3.3 The land is required for the Scheme to be developed as part of both the A1067 Fakenham Road improvement and the new NDR highway alignment. This will also include the provision of land for the construction of new drainage lagoons and environmental mitigation measures. Land is also required temporarily to facilitate construction activities.

3.4 The owners have appointed a surveyor to act on their behalf and negotiations have commenced regarding the acquisition of the required land.

4. Plots 1/12, 1/13, 1/14 and 1/15

4.1 Comprises part of a private access track leading north from the A1067 Fakenham Road.

4.2 The land is owned by Mr M Copplestone and Mr I Copplestone. It is subject to rights of access in favour of neighbouring owners and occupiers.

4.3 The land is required for the Scheme to be developed as part of the new NDR highway alignment and the construction of new drainage lagoons. This will also include provision of temporary land to facilitate construction activities

4.4 Both the owner and access right holders have appointed surveyors to act on their behalf and negotiations are ongoing with regard to acquiring their interests.

5. Plots 1/16, 1/17, 1/18, 1/19, 1/20 and 1/24

5.1 Comprises agricultural land north of the A1067 Fakenham Road and west of 'Peacehaven'.

5.2 The land is owned by Mr M A Savage and Mrs J A Savage. There are no known tenants.

5.3 The land is required for the Scheme to be developed as part of the new NDR highway alignment. This will also include the provision of land for the construction of new drainage lagoons and environmental mitigation measures. Land is also required temporarily to facilitate construction activities.

5.4 The owners have appointed a surveyor to act on their behalf and negotiations have commenced regarding the acquisition of the required land.

6. Plot 1/21

6.1 Comprises part of the combined private access track and public highway known as Attlebridge Restricted Byway No 3.

6.2 The land is owned by Mr M B Reynolds and Mrs L-J Reynolds. There are no known tenants. It is used as the access driveway to The Lodge and the Mid Norfolk Shooting School.

6.3 The land is required for the Scheme to be developed as part of the new NDR highway alignment.

- 6.4 Access to the owner's retained land to the north, The Lodge and Mid - Norfolk Shooting School, will be re-provided by a new Private Means of Access.
- 6.5 The owners have not appointed a surveyor but discussions have been held with the landowners regarding the acquisition of their interests.
- 7. Plots 1/23 and 2/1**
- 7.1 Comprises part of the combined private access track and public highway known as Attlebridge Restricted Byway No 3 and part of the grounds to the residential property known as Deighton Hills.
- 7.2 The land is owned by Mr D G Lord and Mrs P A Lord. There are no known tenants.
- 7.3 The land is required for the Scheme to be developed as part of the new NDR highway alignment. This will also include provision of land for environmental mitigation measures.
- 7.4 Access to the owner's retained land to the north, Deighton Hills, will be re-provided by a new Private Means of Access.
- 7.5 The owners have appointed a surveyor to act on their behalf and negotiations have commenced regarding the acquisition of the required land.
- 8. Plots 1/25, 2/2, 2/3 and 2/4**
- 8.1 Comprises agricultural land north of the A1067 Fakenham Road.
- 8.2 The land is owned by Mr J P Ketteringham. It is occupied by Paul Gunther Contracting Limited.
- 8.3 The land is required for the Scheme to be developed as part of the new NDR highway alignment. This will also include provision of land for environmental mitigation measures and the provision of temporary land to facilitate construction activities related to the diversion of the National Grid gas transmission pipeline.
- 8.4 Access to the landowner's retained land to the north, after its temporary use, will be provided by a new Private Means of Access.
- 8.5 Both the owner and occupier have appointed surveyors to act on their behalf. Negotiations are ongoing with regard to acquiring their respective interests.
- 9. Plots 2/5, 2/6, 2/7, 2/10, 2/11, 2/12 and 2/13**
- 9.1 Comprises agricultural land to the west of Fir Covert Road, forming part of Spring Farm.

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- 9.2 The land is owned and occupied by Mr O W Arnold and Mrs H R Arnold.
- 9.3 The land is required for the Scheme to be developed as part of the new NDR highway alignment, extension of bridleway facilities on the C262 Fir Covert Road and construction of a new drainage lagoon. It will also include provision of land for environmental mitigation measures and the provision of temporary land to facilitate construction activities related to the diversion of the National Grid gas transmission pipeline.
- 9.4 Access to the owners' severed land to the south of the road will be provided by a new Private Means of Access.
- 9.5 The owners have appointed a surveyor to act on their behalf and negotiations are ongoing regarding the acquisition of the required land.
- 10. Plots 2/8 and 2/9**
- 10.1 Comprises part of the grounds to the residential property known as Heathwood.
- 10.2 The land is owned and occupied by Mr N H Brummage.
- 10.3 The land is required for the Scheme to be developed as part of the new NDR highway alignment. This will also include the provision of temporary land to facilitate construction activities related to the diversion of the National Grid gas transmission pipeline.
- 10.4 The owner has appointed a surveyor to act on his behalf and negotiations are ongoing regarding the acquisition of the required land.
- 11. Plot 2/17**
- 11.1 Comprises amenity land adjoining the C262 Fir Covert Road
- 11.2 Ownership is uncertain despite diligent enquiry but potential owners are believed to be Mr P Gunther and Mrs L Gunther.
- 11.3 The land is required for the Scheme to be developed as part of the extension of bridleway facilities on the C262 Fir Covert Road.
- 11.4 With uncertainty over ownership investigations are ongoing to resolve matters before negotiations commence.
- 12. Plot 2/18**
- 12.1 Comprises part of the grounds to the residential property known as Chestnut House, located on the C262 Fir Covert Road.
- 12.2 The land is owned and occupied by Mr S Robertson and Mrs E Robertson.

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- 12.3 The land is required for the Scheme to be developed as part of the extension of bridleway facilities on the C262 Fir Covert Road.
- 12.4 A meeting has been held with the owners to discuss the implications of the Scheme on their property. They have now appointed a surveyor to act on their behalf.
- 13. Plots 2/19, 2/20, 2/30, 2/41, 2/42, 3/1, 3/2, 3/3 and 3/4**
- 13.1 Comprises two areas of agricultural land situated between C262 Fir Covert Road and C261 Reepham Road, separated by Breck Farm Lane and Furze Lane (U57168) and the Marriott's Way.
- 13.2 The land is owned by Mr D Acloque and Mr W D Barr, as Trustees of the Gurloque Settlement, who also occupy the land.
- 13.3 The land is required for the Scheme to be developed as part of the new NDR highway alignment. This will also include land for improvements to the C262 Fir Covert Road and C261 Reepham Road, the construction of a new drainage lagoon and the provision of land for environmental mitigation measures. Temporary land is also needed to facilitate construction activities.
- 13.4 Access to the owners' retained land either side of the new road will be re-provided by new Private Means of Accesses.
- 13.5 The owners have appointed a surveyor to act on their behalf and negotiations have been ongoing for many years regarding the land requirements.
- 14. Plot 2/21**
- 14.1 Comprises part of the grounds to the residential property known as High Breck Farm Bungalow, situated on the C262 Fir Covert Road.
- 14.2 The land is owned and occupied by Ms K M Bowhill and Mr M J Williamson.
- 14.3 The land is required for the Scheme to be developed as part of the improvements to the C262 Fir Covert Road.
- 14.4 The owners have not appointed a surveyor but discussions have been held with the landowners over the land requirements.
- 15. Plots 2/22, 2/23, 2/24 and 2/25**
- 15.1 Comprises agricultural land situated to the east of the C262 Fir Covert Road and extending as far as the Marriott's Way.
- 15.2 The land is owned by Mr P Gunther and Mrs D L Gunther and occupied by their company, PLG Farm Supplies.

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- 15.3 The land is required for the Scheme to be developed as part of the new NDR highway alignment and a new bridleway. This will also include provision of land for environmental mitigation measures. Land is also being acquired to provide replacement land for Special Category Land.
- 15.4 The owners have appointed a surveyor to act on their behalf and negotiations are ongoing regarding the acquisition of the required land.
- 16. Plots 2/26, 2/27, 2/28, 2/29 and 10/12**
- 16.1 Comprises part of the public recreational path known as Marriott's Way in Taverham and an area of woodland off Newman Road in Rackheath.
- 16.2 These plots are owned by Broadland District Council. The plots at Marriott's Way are Special Category Land.
- 16.3 The land is required for the Scheme to be developed as part of the new NDR highway alignment at Taverham and for the realigned Newman Road track in Rackheath. Rights are required over lengths of the Marriott's Way to facilitate construction of the Marriott's Way Overbridge. The District Council will receive areas of replacement land, including the Overbridge Deck level, to compensate for the acquisition of the Special Category Land.
- 16.4 The Council have not appointed a surveyor but their officers have been made aware of the proposals and land requirements over a number of years.
- 17. Plot 2/33**
- 17.1 Comprises part of the grounds to the property known as Breck Farm Bungalow located on Breck Farm Lane (U57168).
- 17.2 The plot is owned by Mr D Q Gurney, Mrs J M Gurney and Mr D Acloque and Mr W D Barr, as Trustees of the Gurloque Settlement.
- 17.3 The land is required for the Scheme to provide a new turning head on Breck Farm Lane (U57168).
- 17.4 The owners have appointed a surveyor to act on their behalf and negotiations are ongoing regarding the acquisition of the required land.
- 18. Plots 2/34, 2/35, 2/36, 2/37 and 2/38**
- 18.1 Comprises agricultural land situated between the Marriott's Way and Furze Lane (U57168) to the east.
- 18.2 The land is owned by H G Blake (Holdings) Limited. There are no known tenants.

- 18.3 The land is required for the Scheme to be developed as part of the new NDR highway alignment. This will also include provision of land for environmental mitigation measures and the provision of temporary land to facilitate construction activities. Land is also being acquired to provide replacement land for Special Category Land.
- 18.4 The owners have appointed a surveyor to act on their behalf and negotiations are ongoing into acquiring the required land.
- 19. Plot 3/8**
- 19.1 Comprises agricultural land north of the C261 Reepham Road.
- 19.2 This plot is owned by Ms B Barrett. There are no known tenants.
- 19.3 The land is required for the Scheme to be developed as part of the new NDR highway alignment and improvements to the C261 Reepham Road.
- 19.4 The owner has been made aware of the proposals. She has appointed a surveyor to act on her behalf and negotiations are to commence regarding the acquisition of the required land.
- 20. Plots 3/11, 3/16 and 3/18**
- 20.1 Comprises an area of woodland north of the C261 Reepham Road, known as Drayton Drewary.
- 20.2 These plots are owned by Mr S J Baker and Mr J B Mayhew as Trustees of the Thorpe & Felthorpe Trust. There are no known tenants.
- 20.3 The land is required for the Scheme to be developed as part of the new NDR highway alignment. This will also include provision of land for environmental mitigation measures.
- 20.4 The owners are in the process of appointing a surveyor. They have met with the Applicant previously to discuss the impact of the Scheme on their property.
- 21. Plots 3/12, 3/13, 3/14, 3/15, 3/17, 5/24, 5/25, 9/16, 10/4, 10/13, 10/20, 10/21, 10/22, 10/26 and 10/29**
- 21.1 Comprises agricultural land north of the C261 Reepham Road, woodland adjacent to the A140 Cromer Road, land adjoining the A1151 Wroxham Road, land forming part of the grounds of Gazebo Barn, Rackheath and Hall Farm, Rackheath.
- 21.2 These areas of land are owned by the Applicant in its capacity as landowner, rather than Highway Authority.

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- 21.3 The areas of land adjacent to the A140 Cromer Road and A1151 Wroxham Road were acquired as a result of historic highway improvements schemes but are not subject to existing highway rights.
- 21.4 The plots at Reepham and Rackheath are owned by the Applicant having been acquired either under a Blight Notice or by agreement in advance of the Scheme.
- 21.5 The land at Reepham is let on Farm Business Tenancies to Mr A Lloyd and R.M. Keeler & Sons. These agreements will be terminated before construction works commence. The areas at Rackheath are not occupied by third parties.
- 21.6 The land is to be used for the Scheme to be developed as part of the new NDR highway alignment, improvements to the C261 Reepham Road, Newman Track and improvements to the C283 Salhouse Road. This will also include provision of land for environmental mitigation measures and the construction of new drainage lagoons.
- 22. Plots 3/19 and 3/23**
- 22.1 Comprises agricultural land north of the C261 Reepham Road.
- 22.2 These plots are owned by Mrs S A Bransom. There are no known tenants.
- 22.3 The land is required for the Scheme to be developed as part of the new NDR highway alignment.
- 22.4 The landowner's existing private track between the C261 Reepham Road and Dog Lane (U57176) is severed by the Scheme. An alternative route is provided along Bell Farm Track and Overbridge.
- 22.5 The owner has been made aware of the proposals and land requirements over a number of years. She has appointed a surveyor to act on her behalf and negotiations are to commence regarding the acquisition of the required land.
- 23. Plots 3/21 and 3/22**
- 23.1 Comprises agricultural land north of the C261 Reepham Road and used by the owners as part of their free range chicken farm.
- 23.2 The land is owned and occupied by Mr F Ampofo and Mrs E Ampofo.
- 23.3 The land is required for the Scheme to be developed as part of the new NDR highway alignment. This will also include provision of land for environmental mitigation measures.

- 23.4 The owners have appointed a surveyor to act on their behalf and negotiations are ongoing regarding the acquisition of the required land. Discussions have included the possibility of providing alternative adjoining land to replace that required for the Scheme.
- 24. Plots 3/24 and 3/29**
- 24.1 Comprises agricultural land north of the C261 Reepham Road and west of Bell Farm Track.
- 24.2 These plots are owned by Mr B Bransom. There are no known tenants.
- 24.3 The land is required for the Scheme to be developed as part of the improved Bell Farm Track alignment and for environmental mitigation measures.
- 24.4 The owner has been made aware of the proposals and land requirements over a number of years. He has appointed a surveyor to act on his behalf and negotiations are to commence regarding the acquisition of the required land.
- 25. Plots 3/25, 3/26 and 3/27**
- 25.1 Comprises agricultural land north of the C261 Reepham Road and west of Bell Farm Track. .
- 25.2 These plots are jointly owned by Mr B Bransom and Mrs S A Bransom. There are no known tenants.
- 25.3 The land is required for the Scheme to be developed as part of the new NDR highway alignment. This will also include provision of land for environmental mitigation measures.
- 25.4 The owners have been made aware of the proposals and land requirements over a number of years. They have appointed a surveyor to act on their behalf and negotiations are to commence regarding the acquisition of the required land.
- 26. Plots 3/28 and 3/30**
- 26.1 Comprises agricultural land north of the C261 Reepham Road and west of Bell Farm Track.
- 26.2 These plots are owned by Roozen Flowerbulb Group BV (a Dutch company). They are occupied by Kieft & Sons, their UK company.
- 26.3 The land is required for the Scheme to be developed as part of the new NDR highway alignment and the Bell Farm Overbridge. This will also include provision of land for environmental mitigation measures.

- 26.4 Both the owner and occupier have appointed a surveyor to act on their behalf and negotiations are ongoing with regard to the acquisition of their interests.
- 27. Plots 3/32, 3/33, 3/34, 4/1, 4/2, 4/7, 4/19, 4/20, 5/16, 5/17, 5/22, 5/23 and 5/27**
- 27.1 Comprises various parcels of agricultural land north of the C261 Reepham Road and between the C282 Drayton Lane and B1149 Holt Road.
- 27.2 These plots are owned and occupied by RG Carter Farms Ltd.
- 27.3 The land is required for the Scheme to be developed as part of the new NDR highway alignment, the new Drayton Lane link road, for the construction of two new drainage lagoons and for environmental mitigation measures. It will also include the provision of temporary land to facilitate construction activities.
- 27.4 Access to the landowner's severed land will be provided by new Private Means of Access. Existing field accesses points direct from the C261 Reepham Road are unaffected.
- 27.5 Negotiations regarding the acquisition of these interests are ongoing with the landowner's in-house representatives.
- 28. Plots 4/3 and 4/4**
- 28.1 Comprises agricultural land north of the C261 Reepham Road.
- 28.2 These plots are owned by Mr G Gay, Mr R Binney and Mrs J Burke as Trustees of RGR Carter No 5 Trust and are tenanted by Drayton Farms Ltd.
- 28.3 The land is required for the Scheme to be developed as part of the new NDR highway alignment and construction of a new drainage lagoon. This will also include provision of land for environmental mitigation measures.
- 28.4 Access to the landowner's severed land to the north of the NDR will be provided by a new Private Means of Access. The existing field access point on the C261 Reepham Road is unaffected.
- 28.5 Negotiations are ongoing with both the owner, through their appointed surveyor, and tenant, through their in-house representative, with regard to the acquisition of their interests.
- 29. Plots 4/5, 4/9, 4/10 and 4/29**
- 29.1 Comprises agricultural land. west of the C282 Drayton Lane and north of the C261 Reepham Road.

29.2 These plots are owned by Norwich School and are tenanted by Drayton Farms Ltd.

29.3 The land is required for the Scheme to be developed as part of the new NDR highway alignment, the new Drayton Lane link road and for environmental mitigation measures. Temporary rights will also be acquired for a construction compound and temporary topsoil storage area.

29.4 The owners are aware of the proposals and meetings have been held with them in the past. However no agent has been appointed to act on their behalf. Discussions with the tenant are ongoing with their in-house representative.

30. Plots 4/11 and 4/12

30.1 Comprises paddock land west of the C282 Drayton Lane.

30.2 These plots are owned and occupied by Mrs A K Ellis.

30.3 The land is required for the Scheme to be developed as part of the new Drayton Lane link road. Temporary rights will also be acquired for a construction compound.

30.4 The owner is aware of the proposals and discussions have been held with her regarding the impact of the Scheme on her landholding. However no agent has been appointed to act on her behalf.

31. Plot 4/15

31.1 Comprises an area of woodland adjacent to the B1149 Holt Road.

31.2 Ownership details are unknown despite diligent enquiry by the Applicant.

31.3 The land is required for the Scheme to be developed as part of the new Holt Road/Drayton Lane Roundabout alignment.

31.4 Investigations will continue in an attempt to try and determine ownership details.

32. Plot 4/16

32.1 Comprises an area of woodland within the grounds of the property known as West Wing Horsford Hall, Church Street, Horsford.

32.2 This plot is owned and occupied by Mr D G Pulling and Mr P M Clarke.

32.3 The land is required for the Scheme to be developed as part of the new Holt Road/Drayton Lane Roundabout alignment.

32.4 The owners have been made aware of the proposals. No agent has been appointed to act on their behalf.

33. Plot 4/18

33.1 Comprises an area of woodland within the grounds of the property known as Caiplie Church Street, Horsford.

33.2 This plot is owned and occupied by Mr C P Palmer and Mrs G A Palmer.

33.3 The land is required for the Scheme to be developed as part of the new Holt Road/Drayton Lane Roundabout alignment.

33.4 The owners have been made aware of the proposals. A meeting has been held to discuss the implications but no agent has been appointed to act on their behalf.

34. Plot 4/21

34.1 Comprises agricultural land east of the C282 Drayton Lane and north of the property known as The Homestead.

34.2 This plot is owned by Mr N A Waller-Barratt. There are no known tenants.

34.3 The land is required for the Scheme to be developed as part of the new Drayton Lane link road.

34.4 The owner has appointed a surveyor to act on his behalf and negotiations are ongoing regarding the acquisition of the required land.

35. Plot 4/22

35.1 Comprises part of the grounds of the property known as The Homestead located on Drayton Lane.

35.2 This plot is owned by Mr A Keely and Mrs M Keely. There are no known tenants.

35.3 The land is required for the Scheme to be developed as part of the new Drayton Lane link road.

35.4 The owners have been contacted but to date there have been no negotiations with the owner.

36. Plots 4/23, 4/24, 4/25, 4/26, 4/27, 4/28, 4/36, 4/37, 4/38, 4/39, 5/1, 5/2 and 5/5

36.1 Comprises agricultural land from Glebe Farm, Horsford enclosed between the C282 Drayton Lane, C261 Reepham Road, Holly Lane (U57142) and B1149 Holt Road.

- 36.2 These plots are owned by Ms P Staines, Mr C Birch and Mills & Reeve Trust Corporation Limited as Executors of Anne Pollock dec'd. They are tenanted by D N C Farms Limited.
- 36.3 The land is required for the Scheme to be developed as part of the new NDR highway alignment, the new Drayton Lane link road, the Drayton Lane link road / C261 Reepham Road junction alignment and construction of new drainage lagoons. This will also include provision of land for environmental mitigation measures. Land is also to be used on a temporary basis for traffic management and topsoil storage.
- 36.4 The owners' retained land to the north will continue to be accessed from Glebe Farm and its existing access points.
- 36.5 Access to the owners' retained land, including after its temporary use, to the south will be provided by from the C261 Reepham Road and Holly Lane (U57142).
- 36.6 Both the owner and occupier have appointed surveyors to act on their behalf and negotiations are ongoing with regard to acquiring their interests. Discussions have also been held with the beneficiary of the Estate.
- 37. Plots 4/31, 4/34, 5/4 and 5/7**
- 37.1 Comprises two areas of agricultural land, one south of the C261 Reepham Road, the other south of Holly Lane (U57142).
- 37.2 These plots are owned and occupied by Drayton Farms Ltd.
- 37.3 The land is required for the Scheme to be developed as part of the new NDR alignment, the Drayton Lane link road / C261 Reepham Road junction alignment and a new drainage lagoon.
- 37.4 Negotiations are ongoing through their in-house representative with regard to acquiring their interest.
- 38. Plot 4/35**
- 38.1 Comprises part of the grounds of the property known as Borderlands, Reepham Road.
- 38.2 This plot is owned and occupied by Mr M Roper and Mrs M Roper.
- 38.3 The land is required for the Scheme to be developed as part of the new Drayton Lane link road / C261 Reepham Road junction alignment.
- 38.4 The owners have been contacted but to date there have been no negotiations with the owners.

39. Plot 5/13

- 39.1 Comprises part of the grounds of the property known as New Holme Farm, Holt Road.
- 39.2 This plot is owned and occupied by Mr D Pallet and Ms S Johnston.
- 39.3 The land is required for the Scheme to be developed as part of the new NDR highway alignment and for environmental mitigation measures.
- 39.4 The owners are aware of the proposals and meetings have been held with Ms Johnston in the past. However no agent has been appointed to act on their behalf.

40. Plots 5/18, 5/19 and 5/21

- 40.1 Comprises a drainage lagoon and landscaping area constructed for the existing A140 Cromer Road / B1149 Holt Road roundabout.
- 40.2 These plots are owned by Norwich City Council and are currently maintained by Norfolk County Council under licence.
- 40.3 The land is required for the Scheme to be developed as part of the Cromer Road Overbridge and an enlarged drainage lagoon. This will also include provision of land for environmental mitigation measures.
- 40.4 Negotiations are ongoing with the City Council's property advisors regarding the acquisition of their interest.

41. Plots 5/33, 5/36 and 5/38

- 41.1 Comprises agricultural land to the east of the A140 Cromer Road, north of the unnamed highway (Cromer Road to West Lane (U57647)).
- 41.2 These plots are owned and occupied by R & JM Place Ltd.
- 41.3 The land is required for the Scheme to be developed as part of the new A140 Cromer Road alignment. This will also include provision of temporary land to facilitate construction activities.
- 41.4 The owner has appointed a surveyor to act on their behalf and negotiations are ongoing with regard to acquiring their interest.

42. Plot 5/40

- 42.1 Comprises agricultural land to the east of the A140 Cromer Road south of the unnamed highway (Cromer Road to West Lane (U57647)).
- 42.2 This plot is owned by Mr M J Keeler and Mrs J Keeler. Building Partnerships Ltd has an option on the land.

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- 42.3 The land is required for the Scheme to be developed as part of the new NDR highway alignment.
- 42.4 Access to the retained land is being provided by a new Private Means of Access.
- 42.5 The owners have appointed a surveyor to act on their behalf and negotiations are ongoing regarding the acquisition of the required land. Discussions have also been held with the option holder.
- 43. Plots 5/41, 5/42, 5/43, 5/44, 5/45, 5/46, 6/3 and 6/12**
- 43.1 Comprises agricultural land to the east of the A140 Cromer Road together with areas of former Airport land and the grounds of the City of Norwich Aviation Museum.
- 43.2 The land is owned by Legislator 1657 Ltd, (a company jointly owned by Norfolk County Council and Norwich City Council). Parts are currently leased to Mr G Harwin, Norwich Airport Ltd and the City of Norwich Aviation Museum.
- 43.3 The land is required for the Scheme to be developed as part of the new NDR highway alignment and the link road south from the Airport Roundabout. This will also include provision of land for environmental mitigation measures. Part will also be used temporarily as the main site compound, including areas for topsoil storage.
- 43.4 Part of the acquisition is for the replacement access to the Aeropark development. This development, by Norwich Airport Limited, currently has planning permission for access off the existing A140 Cromer Road Roundabout but this will not be available after the Scheme.
- 43.5 Negotiations regarding the acquisition of this plot are ongoing with all affected parties.
- 44. Plots 5/47**
- 44.1 Comprises part of the private access to Norwich Airport Limited's Control Tower.
- 44.2 The owner is unknown despite diligent enquiry by the Applicant. It is believed that the land was former public highway which was stopped up when the Airport was first constructed as a World War II aerodrome.
- 44.3 The land is required for the Scheme to be developed as part of the new NDR highway alignment.
- 44.4 All neighbouring landowners, who are the most likely potential owners, have been consulted and investigations to resolve the ownership details will continue.

45. Plots 5/48, 5/49, 6/1 and 6/2

- 45.1 Comprises agricultural land to the east of the C250 Old Norwich Road, Horsham St Faiths.
- 45.2 These plots are owned by Mr R T Pointer, Ms A E Burrows and Ms S A Pointer. They are occupied by Mr R T Pointer.
- 45.3 The land is required for the Scheme to be developed as part of the new NDR highway alignment. This will also include provision of land for environmental mitigation measures.
- 45.4 An agent has been appointed to act on their behalf and negotiations are to commence.

46. Plot 6/4

- 46.1 Comprises part of the grounds of Norwich International Airport.
- 46.2 This plot is owned by Norwich Airport Ltd. There are no known tenants.
- 46.3 The land is required for the Scheme to be developed as part of the new NDR highway alignment. This will also include provision of land for environmental mitigation measures.
- 46.4 Negotiations regarding the acquisition of this plot, and other issues affecting the impact of the Scheme on the operational activities of the Airport, are ongoing with the Airport's in-house representatives.

47. Plot 6/5

- 47.1 Comprises agricultural land east of the C250 Old Norwich Road and immediately west of the Petans Training Centre in Horsham St Faiths.
- 47.2 This plot is owned and occupied by Mr L J Howe.
- 47.3 The land is required for the Scheme to be developed as part of the new NDR highway alignment. This will also include provision of land for environmental mitigation measures.
- 47.4 The owners have appointed a surveyor to act on their behalf and negotiations are ongoing regarding the acquisition of the required land.

48. Plots 6/6

- 48.1 Comprises agricultural land east of the C250 Old Norwich Road and immediately west of the Petans Training Centre.
- 48.2 This plot is owned by the Mr J F Parker and Ms P Parkerbrown. It is tenanted by Mr L J Howe.

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- 48.3 The land is required for the Scheme to be developed as part of the new NDR highway alignment. This will also include provision of land for environmental mitigation measures.
- 48.4 Both the owner and tenant have appointed surveyors to act on their behalf and negotiations are ongoing.
- 49. Plots 6/10 and 6/11**
- 49.1 Comprises agricultural land north-east of the C251 Bullock Hill and east of Calf Lane (U57229).
- 49.2 These plots are owned by MA & HV Medlar (Haulage) Limited. There are no known tenants.
- 49.3 The land is required for the Scheme to be developed as part of the new NDR highway alignment and construction of a new drainage lagoon. This will also include provision of land for environmental mitigation measures.
- 49.4 The owners have appointed a surveyor to act on their behalf and negotiations are ongoing regarding the acquisition of the required land.
- 50. Plots: 6/13, 6/14, 6/15, 6/16, 6/17, 6/18, 6/20, 6/21, 7/1, 7/2, 7/3, 7/8, 7/9, 7/10, 7/11, 7/12, 7/13, 7/14, 7/15, 7/20 and 7/22**
- 50.1 Comprises various parcels of agricultural land. north-east and east of Norwich International Airport.
- 50.2 These plots are owned and occupied by Mr P D Cook and Mr A P Cook. Part of the land is leased to Lafarge Aggregates Limited.
- 50.3 The land is required for the Scheme to be developed as part of the new NDR highway alignment, C251 St Faiths Road turning head, Quaker Lane (U57188) turning head and new C246 Buxton Road / Quaker Lane (U57188) junction alignment . This will also include construction of new drainage lagoons, provision of land for environmental mitigation measures and private access to the Aeropark. Temporary use of land will also be made for topsoil storage and removal of the current Airport Security fence.
- 50.4 Access to the landowners' retained land is being provided by the creation of new Private Means of Access.
- 50.5 The owners have appointed a surveyor to act on their behalf and negotiations are ongoing.
- 51. Plot 7/7**
- 51.1 Comprises an electricity sub station.
- 51.2 This plot is owned by Eastern Power Networks Ltd.

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- 51.3 The land is required for the Scheme to be developed for the provision of environmental mitigation measures.
- 51.4 The substation structure itself does not need to be replaced and the existing cable network will be amended accordingly. The precise details of the works will be agreed with the Statutory Undertaker as part of the detailed design.
- 52. Plots 7/16, 7/17, 7/18 and 7/26**
- 52.1 Comprises agricultural land to the west of the C246 Buxton Road, south of Quaker Lane (U57188)..
- 52.2 These plots are owned by Mr M A Dewing and Mr R T Bramley. They are occupied by Mr M A Dewing.
- 52.3 The land is required for the Scheme to be developed as part of the new NDR highway alignment, the new C246 Buxton Road / Quaker Lane (U57188) junction alignment and for a new Private Means of Access. This will also include provision of land for environmental mitigation measures and temporary land to facilitate construction activities.
- 52.4 Access to the retained land is being provided by the new Private Means of Access.
- 52.5 The owners have appointed a surveyor to act on their behalf and negotiations are ongoing regarding the acquisition of the required land.
- 53. Plots 7/30, 7/31, 7/32, 7/33, 8/1, 8/7, 8/9, 8/10, 8/11, 8/12, 8/13, 8/14, 9/1, 9/2, 9/3 and 9/5**
- 53.1 Comprises agricultural land extending from the east of the C246 Buxton Road to the B1150 North Walsham Road and then further eastwards to north of Beeston Lane (U57186), all forming part of the Beeston Estate.
- 53.2 These plots are owned by Mr M A Dewing and Ms H A Barrett as Trustees of the Beeston Estate. They are occupied by Mr M A Dewing. Land to the south comprises land within the proposed Beyond Green development. The developers have Restrictions on the Title.
- 53.3 The land is required for the Scheme to be developed as part of the new NDR highway alignment, improvements to the B1150 North Walsham Road and the construction of four new drainage lagoons. This will also include provision of land for environmental mitigation measures, the acquisition of drainage rights and the temporary use of land to facilitate construction activities.
- 53.4 Access to retained land is being provided by new Private Means of Access.

- 53.5 The owners have appointed a surveyor to act on their behalf and negotiations are ongoing regarding the acquisition of the required land. Contact has also been made with the developers.
- 54. Plots 9/4, 9/6 and 9/7**
- 54.1 Comprises agricultural land to the north of the A1151 Wroxham Road.
- 54.2 These plots are owned by Mrs J R Brooks and are tenanted by Mr C Durrant.
- 54.3 The land is required for the Scheme to be developed as part of the new NDR highway alignment, improvements to the B1151 Wroxham Road and a new bridleway. This will also include provision of land for environmental mitigation measures.
- 54.4 The owner has appointed a surveyor to act on her behalf and negotiations are ongoing regarding the acquisition of the required land. The Applicant has been informed that the tenancy is due to expire before works commence.
- 55. Plots 9/8 and 9/9**
- 55.1 Comprises agricultural land to the north of the A1151 Wroxham Road.
- 55.2 The ownership of these plots is uncertain as Land Registry plans do not abut and the conveyance history has some anomalies. The adjoining landowners have been assumed to be potential owners of these plots. Mr C Durrant is assumed to be the tenant.
- 55.3 The land is required for environmental mitigation measures.
- 55.4 The various potential landowners have been consulted about the Scheme and investigations to try and resolve the ownership issues will continue.
- 56. Plot 9/10**
- 56.1 Comprises woodland and part watercourse, known as The Springs, north of the A1151 Wroxham Road.
- 56.2 This plot is owned by Mr M F Trafford.
- 56.3 The land is required for the Scheme to be developed as part of the new NDR highway alignment, improvements to the B1151 Wroxham Road and to provide a new alignment for the access serving, amongst others, the Sewage Works.
- 56.4 The owners have appointed a surveyor to act on their behalf and negotiations are ongoing regarding the acquisition of the required land.

57. Plot 9/15

57.1 Comprises part of the private access to Hill Farm House, Wroxham Road and is also used as access to Hill Farm Lodge, Wroxham Road.

57.2 This plot is owned by Mr G Taylor and Mr P R Taylor.

57.3 The land is required for the Scheme to be developed as part of the improvements to the B1151 Wroxham Road.

57.4 The owners have been consulted about the Scheme and further contact is being made to open negotiations.

58. Plots 9/19, 9/22, 9/23, 9/27, 9/31, 9/32, 9/42, 10/35, 10/36 and 11/8

58.1 Comprises three separate areas of agricultural land. One is located immediately south of the A1151 Wroxham Road, another south of the C283 Salhouse Road, both in Rackheath, and the other north of the C442 Middle Road in Great Plumstead.

58.2 These plots are owned jointly by Mr P R Key and Mr G B Nicholls and Mr R G Nicholls as Executors of Moira Irene Nicholls dec'd. They are occupied by Mr P R Key.

58.3 The land south of the A1151 Wroxham Road is required for the Scheme to be developed as part of the new NDR highway alignment, improvements to the B1151 Wroxham Road, the construction of three new drainage lagoons, for provision of a new Private Means of Access and for environmental mitigation measures. Land is also to be acquired for the new A1151 Wroxham Road / C258 Green Lane West junction alignment.

58.4 The land south of the C283 Salhouse Road is required for the Scheme to be developed as part of the new NDR highway alignment, improvements to the C283 Salhouse Road, the construction of three new drainage lagoons, and for environmental mitigation measures.

58.5 The land north of the C442 Middle Road is required for the Scheme to be developed as part of the new NDR highway alignment, the Plumstead Road Roundabouts link road, improvements to the C442 Middle Road, the construction of a new drainage lagoon, and for environmental mitigation measures.

58.6 A combination of continued usage of existing field access points and new Private Means of Access will ensure access to the owners' retained land.

58.7 Separate agents have been appointed by the parties. Negotiations regarding the acquisition of this plot are ongoing with all of them.

59. Plots 9/20 and 9/21

59.1 These plots were previously understood to be owned by Mr A.Thornton. However further investigations have recently proved this not to be the case, rather that he worked for a company promoting the land through a planning process.

59.2 The land is required for the Scheme to be developed as improvements to the B1151 Wroxham Road and for the provision of land for environmental mitigation measures.

59.3 Given the ownership issues no discussions have taken place with the owner but investigations into its ownership are continuing.

60. Plots 9/24 and 9/25

60.1 Comprises land within the grounds of the residential property known as Oakwood, to the east of the A1151 Wroxham Road.

60.2 These plots are owned and occupied by Mr K A Basey.

60.3 The land is required for the Scheme to be developed as part of the improvements to the B1151 Wroxham Road and to extend bridleway facilities on the A1151 Wroxham Road.

60.4 The owner has not appointed a surveyor but discussions have been held with him regarding the acquisition of his interests.

61. Plot 9/26

61.1 Comprises parts of a private access track leading from the C258 Green Lane West

61.2 The owner is unknown despite diligent enquiry by the Applicant. Ownership had been assumed to rest with adjoining landowners although all is unregistered.

61.3 The land is required for the Scheme to be developed for a new Private Means of Access.

61.4 All adjoining owners and known users of the track have been consulted about the proposals. Investigations to try and resolve the ownership issues are continuing.

62. Plot 9/28

62.1 Comprises a sewage pumping station east of the A1151 Wroxham Road.

62.2 This plot is owned by Anglian Water Services Ltd.

62.3 The land is identified within the area of environmental mitigation measures. It is envisaged that the pumping station will be able to remain operational in its current location after the works.

62.4 The precise details of the works, and eventual level of acquisition requirement, will be agreed with the owner as part of the detailed design of the Scheme.

63. Plots 9/29, 9/30 and 9/37

63.1 Comprises two areas of agricultural land west of the C258 Green Lane West.

63.2 These plots are owned by SCR Limited, whose directors are Mr S E Cowell and Ms L S Ying. Part is occupied by Mr C P Cole and the rest by Mr I Curl.

63.3 The land is required for the Scheme to be developed as part of the new NDR highway alignment. This will also include provision of land for environmental mitigation measures.

63.4 In addition to the land acquired from the company they also own land to the west of Gazebo Farm, which is not directly affected by the Scheme. The existing access route to the land, from the C258 Green Lane West, is severed by the Scheme so new rights of access are to be provided over the Newman Track Overbridge and along the Private Means of Access.

63.5 The owner has appointed a surveyor to act on its behalf and negotiations are ongoing regarding the acquisition of the required land. No negotiations have been had with the occupiers as the owner has indicated that it will have terminated their agreements before the land is required for the Scheme.

64. Plot 9/33

64.1 Comprises parts of a private access track leading from the C258 Green Lane West

64.2 The owner is unknown despite diligent enquiry by the Applicant. Ownership had been assumed to rest with adjoining landowners although all is unregistered.

64.3 The land is required for the Scheme to be developed for the provision of environmental mitigation measures.

64.4 All adjoining owners and known users of the track have been consulted about the proposals. Investigations to try and resolve the ownership issues are continuing.

65. Plots 9/34, 9/35, 9/36, 9/38, 9/39, 10/1, 10/2, 10/3, 10/5 and 10/16

- 65.1 Comprises grassland areas to the west of the C258 Green Lane West, north of Gazebo Farm.
- 65.2 These plots are owned and occupied by Blanmar1 LLP. Blanmar2 LLP is the owner of the Mines and Minerals in the land.
- 65.3 The land is required for the Scheme to be developed as part of the new NDR highway alignment and provision of a new Private Means of Access. This will also include provision of land for environmental mitigation measures.
- 65.4 The owner has appointed a surveyor to act on its behalf and negotiations are ongoing regarding the acquisition of the required land.

66. Plots 10/6, 10/7 and 10/8

- 66.1 Comprises woodland, amenity land and garden land forming part of the property known as Gazebo Farm, Rackheath.
- 66.2 These plots are owned by Birse Civils Limited, who are the contractors for the Scheme and are using Gazebo Farm as a pre-Scheme site office. Norfolk County Council has an option to acquire those parts required for the Scheme.
- 66.3 The land is required for the Scheme to be developed as part of the new NDR highway alignment. This will also include provision of land for environmental mitigation measures. It will continue to be used as a site compound during the works.
- 66.4 Discussions are ongoing with the owner over the timing and mechanism for the transfer of the areas required for the Scheme.

67. Plots 10/9, 10/11, 10/17 and 10/18

- 67.1 Comprises parts of a private access track leading from Newman Road (U57490) which is to be re-routed over the Newman Track Overbridge.
- 67.2 Ownership had been assumed to rest with adjoining landowners although all is unregistered. Some adjoining owners do claim ownership of various stretches of the track.
- 67.3 The land is required for the Scheme to be developed as part of the new NDR highway alignment and provision of a new Private Means of Access. This will also include provision of land for environmental mitigation measures.
- 67.4 All adjoining owners and known users of the track have been consulted about the proposals. Investigations to try and resolve the ownership issues are continuing.

68. Plot 10/10

- 68.1 Comprises an area of woodland and disused access track west of the C258 Green Lane West.
- 68.2 This plot is owned and occupied by Mr C V Ondhia.
- 68.3 The land is required for the Scheme to provide a new access to land east of the NDR from the new Newman Track alignment.
- 68.4 The owners have been contacted but to date there have been no negotiations with the owner.

69. Plot 10/14

- 69.1 Comprises part of the forecourt to business premises north of the existing Newman Track west of the C258 Green Lane West.
- 69.2 This plot is owned Mr C.T. Brown but is currently unoccupied.
- 69.3 The land is required for the realigned Newman Track.
- 69.4 The owner has been made aware of the proposals but to date there have been no negotiations and no agent has yet been appointed.

70. Plot 10/15

- 70.1 Comprises part of the forecourt to business premises north of the existing Newman Track west of the C258 Green Lane West.
- 70.2 The owner is unknown despite diligent enquiry by the Applicant. The plot is occupied by Classic Car Restorations.
- 70.3 The land is required for the realigned Newman Track.
- 70.4 The investigations into ownership are continuing. The occupier has been made aware of the proposals.

71. Plot 10/19

- 71.1 Comprises woodland west of the C258 Green Lane West and south of the existing Newman Track.
- 71.2 This plot is owned by the Warren House Woodland Syndicate.
- 71.3 The land is required for the Scheme to be developed as part of the new NDR highway alignment, the new Newman Track Overbridge, provision of a new Private Means of Access and land for environmental mitigation measures.
- 71.4 The representative for the Syndicate is aware of the proposals and discussions regarding the Scheme have been taking place over a number of years.

72. Plots 10/23, 10/24 and 10/25

72.1 Comprises land west of the C258 Green Lane West used as a paddock.

72.2 These plots are owned and occupied by Mrs C E Humphrey.

72.3 The land is required for the Scheme to be developed as part of the new NDR highway alignment. This will also include provision of land for environmental mitigation measures and as a temporary topsoil storage area.

72.4 The owner is aware of the proposals and discussions regarding the Scheme have taken place over a number of years. No agent has yet been appointed.

73. Plots 10/27 and 10/28

73.1 Comprises agricultural land north of the C283 Salhouse Road and west of the C258 Green Lane West.

73.2 These plots are owned by Frontbench Limited and occupied by Place UK Ltd.

73.3 The land is required for the Scheme to be developed as part of the new NDR highway alignment, improvements to the C283 Salhouse Road and for environmental mitigation measures. It also includes an area for the provision of land for temporary topsoil storage purposes.

73.4 The owner and occupier (who are linked companies) have appointed a surveyor to act on their behalf and negotiations are ongoing regarding the acquisition of the required land.

74. Plot 10/30

74.1 Comprises an area of woodland north of the C283 Salhouse Road known as March Covert.

74.2 This plot is owned by Ms P F Dewing, Ms A F Guyton, Ms A S Purling and Ms S M Purling.

74.3 The land is required for the Scheme to provide a new Private Means of Access to land west of the NDR off the C283 Salhouse Road.

74.4 The owners are aware of the proposals and discussions have been held with them. No agent has been appointed to act on their behalf.

75. Plot 10/34

75.1 Comprises a strip of agricultural land to the south of the C283 Salhouse Road and west of the C258 Green Lane West.

- 75.2 This plot is owned by the successors to Robert Charles Caston. His two children have registered cautions against the title as it is understood that there are no title deeds.
- 75.3 The land is required for the Scheme to be developed as part of the improvements to the C283 Salhouse Road.
- 75.4 The two Proprietors of Registered Cautions are aware of the proposals and discussions have been held with one of them. No agent has been appointed to act on their behalf.
- 76. Plots 10/37, 10/38, 10/39, 10/41, 10/42, 10/43, 10/44, 10/48, 10/51, 10/52, 11/1, 11/5, 11/6 and 11/7**
- 76.1 Comprises parcels of agricultural land both north and south of the C874 Plumstead Road.
- 76.2 These plots are owned by Mr A H Barker. Part is occupied by MA Roper & Sons and part is occupied by Mr Barker himself.
- 76.3 The land is required for the Scheme to be developed as part of the new NDR highway alignment, including the NDR Bridge (Over Railway Line), the Plumstead Road Roundabouts link road and for improvements to the C874 Plumstead Road. This will also include provision of land for environmental mitigation measures and temporary land to facilitate construction activities. Land is also being acquired to provide replacement land for Special Category Land.
- 76.4 The owner and occupier have appointed a surveyor to act on their behalf and negotiations are ongoing regarding the acquisition of the required land.
- 77. Plot 10/40**
- 77.1 Comprises land above the Norwich to Cromer & Sheringham Railway Line, north of the C874 Plumstead Road.
- 77.2 This plot is owned by Network Rail Infrastructure Ltd.
- 77.3 The rights are required for the Scheme to enable construction of the NDR Railway Overbridge.
- 77.4 There has been no contact with the owner specifically regarding land compensation issues as all discussions have been as part of the Bridge Agreement and Basic Asset Protection Agreement negotiations.
- 78. Plot 10/45**
- 78.1 Comprises agricultural land north of the C874 Plumstead Road and west of the C258 Broad Lane.

78.2 This plot is owned by Mr I N Forder, Rev C Garrod, Mrs S Jacobs and Ms A M Fox as Trustees of the Great Plumstead Fuel Allotment Charity. It is occupied by Mr R Baines.

78.3 The land is required to provide a new Private Means of Access. As the land comprises Special Category Land replacement land is being provided immediately to the west.

78.4 The Trustees and occupier have appointed a surveyor to act on their behalf and negotiations are ongoing regarding the acquisition of the required land.

79. Plots 10/49, 10/50, 11/2, 11/3 and 11/4

79.1 Comprises agricultural land south of the C874 Plumstead Road and west of the C258 Broad Lane.

79.2 The owner is unknown despite diligent enquiry by the Applicant.

79.3 The land is required for the Scheme to be developed as part of the improvements to the C874 Plumstead Road and the construction of a new drainage lagoon. This will also include provision of land for environmental mitigation measures.

79.4 Recent investigations have identified a possible tenant and these are being explored further to try and establish ownership details.

80. Plot 10/53

80.1 Comprises part of access driveway to the residential property known as The Railway Crossing, Plumstead Road, Thorpe End.

80.2 This plot is owned and occupied by Mr C R Scott and Mrs L R Scott.

80.3 The land is required for the Scheme to be developed as part of the C874 Plumstead Road realignment works arising from the new NDR Bridge (Over Plumstead Road).

80.4 The owners have appointed a surveyor to act on their behalf. Discussions with the owner have indicated that a Blight Notice may be served on the Applicant given the proximity of the Scheme to their property. The Applicant has indicated that, in principle, it would be agreeable to the acquisition of the property.

81. Plot 11/9

81.1 Comprises part of the grounds and private access track to the property known as Oaks Farm, Middle Road, Great Plumstead.

81.2 This plot is owned by Mr G.B Nicholls and Mr R.G Nicholls as Executors of Moira Irene Nicholls dec'd.

81.3 The land is required for the Scheme to be developed as part improvements to the C442 Middle Road highway alignment. This will also include provision of land for environmental mitigation measures.

81.4 The Executors have appointed a surveyor to act on their behalf and negotiations are ongoing regarding the acquisition of the required land.

82. Plots 11/11, 11/12, 11/13, 11/16 and 11/18

82.1 Comprises two parcels of agricultural land. One is south of the C442 Middle Road and the other south of Low Road (U59392).

82.2 These plots are owned and occupied by Mr P R Key.

82.3 The land is required for the Scheme to be developed as part of the new NDR highway alignment, improvements to the C442 Middle Road and provision of a turning head on Low Road (U59392). This will also include land for the construction of a new drainage lagoon, provision of land for environmental mitigation measures, a compound and temporary topsoil storage area.

82.4 The owner has appointed a surveyor to act on his behalf and negotiations are ongoing regarding the acquisition of the required land.

83. Plots 11/19, 11/20, 11/21 and 12/3

83.1 Comprises agricultural land east of Green Lane (U59278) and south of Low Road (U59392).

83.2 These plots are owned by Mr D W Jacobs and Mrs S A Jacobs. They are occupied by R Jones & Son.

83.3 The land is required for the Scheme to be developed as part of the new NDR highway alignment and a new bridleway. This will also include land for the construction of a new drainage lagoon and provision of land for environmental mitigation measures.

83.4 Both the owner and occupier have appointed surveyors to act on their behalf and negotiations are ongoing regarding the acquisition of the required land.

84. Plots 11/22, 11/23, 12/1 and 12/2

84.1 Comprises agricultural land east of Green Lane (U59278) and north of Smeeth Lane (U59400).

84.2 These plots are owned by Mr F D Feilden and Mrs J M Feilden and occupied by R Jones & Son.

- 84.3 The land is required for the Scheme to be developed as part of the new NDR highway alignment. This will also include land for the construction of a new drainage lagoon and provision of land for environmental mitigation measures.
- 84.4 Both the owner and occupier have appointed surveyors to act on their behalf and negotiations are ongoing regarding the acquisition of the required land.
- 85. Plots 12/7, 12/8, 12/9, 12/10, 12/11, 12/12, 12/13, 12/14, 12/15, 12/16, 12/30, 12/50, 12/51, 12/52 and 12/54**
- 85.1 Comprises two blocks of agricultural land. The first is east of the C830 Broadland Way, south of Smea Lane (U59400) and north of the A47(T) Norwich Southern Bypass. The second is the area enclosed south of the A47(T) Norwich Southern Bypass and north of its Westbound Diverge Slip Road (the A1042 Yarmouth Road), north east of the Postwick Park & Ride Site.
- 85.2 These plots are owned and occupied by WR & PJ Tann Ltd. Ifield Estates Ltd have options on the land and a consented planning permission for the development of a new business park - the Broadland Gate Development.
- 85.3 The land is required for the Scheme to be developed as part of the new NDR highway alignment, the Broadland Gate Link Road (leading from the Peachman Way Roundabout to the Business Park Roundabout), the new A47(T) Trunk Road Eastbound Diverge and Merge Slip Roads and the construction of 3 new drainage lagoons. This will also include provision of land for environmental mitigation measures and temporary land to facilitate construction activities.
- 85.4 The Applicant has an existing Conditional Contract with the owner and option holder in respect of the acquisition of the highway land required for the Broadland Gate Development. The owner has appointed a surveyor to act on his behalf and negotiations are ongoing with regard to the acquisition of any land falling outside of the Conditional Contract.
- 86. Plots 12/17**
- 86.1 Comprises agricultural land north of the A47(T) Norwich Southern Bypass, south of The Grange.
- 86.2 The plot is owned and occupied by Mr P P Walker.
- 86.3 The land is required for the Scheme to be developed as part of the new Private Means of Access to The Grange.

- 86.4 The Applicant has an existing Conditional Contract with the Landowner in respect of the acquisition of the land required for the new Private Means of Access. The owner has appointed a surveyor to act on his behalf.
- 87. Plot 12/18**
- 87.1 Comprises part of the existing private driveway to the property known as The Grange, Yarmouth Road, Postwick.
- 87.2 The plot is owned by Mrs E J M Cuppens-Ebus.
- 87.3 The land is required for the Scheme to be developed to enable the new Private Means of Access to The Grange to be tied in to the existing driveway.
- 87.4 The Applicant has an existing Conditional Contract with the owner covering the development and transfer of the new Private Means of Access.
- 88. Plots 12/19, 12/20, 12/21, 12/22, 12/23, 12/24, 12/25, 12/26, 12/27, 12/28, 12/29, 12/34, 12/37, 12/38, 12/39, 12/41, 12/42, 12/44, 12/46 and 12/47**
- 88.1 Comprises existing A47(T) Norwich Southern Bypass highway land.
- 88.2 These plots are owned and occupied by the Secretary of State for Transport, in his capacity as Highway Authority.
- 88.3 The land is required for the Scheme to be developed as part of the new A47 Trunk Road highway alignment. This will also include the provision of land for environmental mitigation measures.
- 88.4 The Applicant and the Highways Agency, on behalf of the Secretary of State for Transport, have agreed that the works on these areas of land will be carried out pursuant to the terms of an Agreement under Section 6 of the Highways Act 1980.
- 89. Plots 12/36, 12/40 and 12/45**
- 89.1 Comprises existing A47(T) Norwich Southern Bypass highway land.
- 89.2 These ownership of these plots are unknown but they are occupied by the Secretary of State for Transport, in his capacity as Highway Authority.
- 89.3 The land is required for the Scheme to be developed as part of the new A47 Trunk Road highway alignment.

89.4 The Applicant and the Highways Agency, on behalf of the Secretary of State for Transport, have agreed that the works on these areas of land will be carried out pursuant to the terms of an Agreement under Section 6 of the Highways Act 1980.

90. Plot 12/61

90.1 Comprises land south of the A1042 Yarmouth Road (A47(T) Westbound Diverge Slip Road).

90.2 The plot is owned by Mr H M Coghill and Mr J P Heal. The Applicant has an option on the land in connection with the Postwick Park & Ride extension scheme.

90.3 The land is required temporarily for the Scheme to be used as a Site Compound.

90.4 The Applicant has an existing Conditional Contract with the owners covering the land.

Appendix 3

Explanations relating to alternative routes for Stopped Up Streets, Streets subject to prohibition of use through Traffic Regulation Measures and Private Accesses to be stopped up

Introduction: Schedule 6 to the DCO – Streets and private access to be stopped up for which a substitute is to be provided and other new streets and access to be provided; and private access to be stopped up for which no substitute is to be provided.

Streets to be stopped up and new streets to be substituted and other new streets to be provided

1. Part 1 of Schedule 6 to the DCO sets out the streets which are to be stopped up and for which a substitute is to be provided, and details other new streets which are to be provided as a consequence of the NDR. Column (5) of Part 1 of the Schedule gives the reference letter of the substitute, or other new, street which is being provided and that street will be an all-purpose street, i.e. a street subject to motorised vehicular use, other than where another status, e.g. 'bridleway', appears in brackets beneath its reference letter. The reference letter which appears in column (5), for substitute and other streets, appears on the Street Plans against the particular new street concerned. Where the substitute street is the NDR, or a component of it, then that description for the substitute street appears in column (5).
2. In all cases of where a street is being stopped up, a substitute street, or streets, is being provided for *some*, or *all*, types of user of the original street. In a small number of cases, a length of all-purpose street is being stopped up and its remaining part(s) will not connect with, or cross over or under, the NDR, but a substitute street for those of its pedestrian, equestrian and/or cyclist users is still to be provided, by way of a new bridleway, or cycle track, to connect with and/or cross over/under the NDR, as an alternative route for those particular users.

Private access to be stopped up for which a substitute is to be provided and other new means of access to be provided; and private access to be stopped up for which no substitute is to be provided

3. Part 2 of Schedule 6 to the DCO sets out the private access which are to be stopped up and for which a substitute is to be provided, and details other new means of access which are to be provided as a consequence of the NDR. Column (3) of Part 2 of the Schedule gives the reference of the access to be stopped up and which is identified on the Street Plans by that same reference, and column (5) of that part gives the reference number of the substitute, or other, new means of access and which is also identified on the Street Plans with that same reference number. Part 3 of Schedule 6 describes the private access to be stopped up and for which no substitute is to be provided, and identifies those access on the Street Plans by the reference given to them in column (3) of that part of Schedule 6.

General description of the street and private access stopping ups and of substitute and other streets and new means of access

4. The general affect of the NDR upon streets and private access, and of substitute proposals, working from the westerly commencement point of the NDR on the A1067 Fakenham Road eastwards, then southwards, to the A47 Trunk Road at Postwick, is set out below, by reference to the Street Plans, with an explanation and reasons given where no substitute street, or access, is being provided for a one which is to be stopped up.

5. Street Plans (Sheet 1 of 12) Fakenham Road

- Attlebridge Restricted Byway No.3 will be diverted, for its south easterly length, from its current connection with the A1067 Fakenham Road, to connect with the northern arc of the A1067 Fakenham Road Roundabout, proposed under the NDR Scheme. This will result in a shorter route for users travelling to and from the north west along the A1067 Fakenham Road, from and to the diverted restricted byway route, and add some 250 metres to the journey of those travelling to and from the south east along the A1067 Fakenham Road, who otherwise choose not to travel along the NDR from junction connections to the east.

- Private access tracks to be stopped up in this vicinity, to the north of the NDR, will be substituted by a new means of access track, to be co-existent with diverted Attlebridge Restricted Byway No.3, to access premises to the north of the NDR. Other field access stopped up to agricultural land on the north of the A1067 Fakenham Road, will be substituted with a new means of access (X0 on the Street Plans), set back at the same point on the new northern boundary of the A1067 Fakenham Road. The south easterly access on the private service road to Old Hall Farm to be stopped up (PMA 1 on the Street Plans) will not be substituted, as alternative means of access exists via the main access track to Old Hall Farm.

6. Street Plans (Sheet 2 of 12) Fir Covert Road to Breck Farm Lane and Marriott's Way

- A length of the C262 Fir Covert Road will be stopped up, where crossed by the NDR Fir Covert Road Roundabout. Remaining C262 Fir Covert Road will be connected from the north and south with the NDR Fir Covert Road Roundabout, providing an all-movement entry/exit roundabout junction with the NDR and maintaining cross-NDR community connections.
- A length of Breck Farm Lane/Furze Lane (U57168) will be stopped up, from just north east of Breck Farm Bungalow to a point on the north side of the NDR. Pedestrian, equestrian and cyclist crossing of the NDR will be provided by new bridleway routes to be provided along the south and north sides of the NDR (C, D, E, F and H on the Street Plans) leading to crossing points to the west, at the NDR Fir Covert Roundabout, and to the east, at the NDR Reepham Road Roundabout, as well as in the new Marriott's Way (recreational public amenity path) overbridge crossing of the NDR. Alternative vehicular traffic routes, for the length of remaining Breck Farm Lane (U57168) south of the NDR, are provided by way of use of the A1067 Fakenham Road to the south and access across and to connect with the NDR at the Fir Covert Road Roundabout to the west, as well as by means of the private means of access track to be provided along stopped up Breck Farm Lane (U57168) (X8 on the Street Plans) and running along the south side of the NDR to junction with the C261 Reepham Road. For the length of remaining Furze Lane (U57168) to the north of the NDR, alternative vehicular routes are provided by way of use of the C261 Reepham Road to the north and access across and to connect with the NDR at the Fir Covert Road Roundabout.
- Private access stopped up to premises south and north of the NDR will be substituted in all cases.

7. Street Plans (Sheet 3 of 12) Reepham Road to Bell Farm Track

- A length of the C261 Reepham Road will be stopped up, where crossed, and will be substituted by, the NDR Reepham Road Roundabout. Remaining C261 Reepham Road will be connected from the south east and north west with the NDR Reepham Road Roundabout, providing all-movement access to and from the NDR and maintaining local community connections.
- Drayton Restricted Byway No.6 will be diverted, for its south westerly length, from its current connection with the C261 Reepham Road, to connect with the north side of the NDR Reepham Road Roundabout (J on the Street Plans), resulting in a slightly shortened route and journey distance for users of the diverted restricted byway. The diverted route for the restricted byway will be co-existent with a new means of access (X11 and X12 on the Street Plans), which will substitute the private access to be stopped up which currently co-exists along the length of the restricted byway which will be diverted.
- Other private access stopped up to premises will be substituted with new private access, with the exception of the westerly access track to Bell Farm (PMA 16 on the Street Plans), which is severed by the NDR, and which premises benefits from another access over the NDR, by means of the realigned Bell Farm Track access (X15 on the Street Plans).
- Horsford Restricted Byway No.5 and private access track Bell Farm Track will be maintained over the NDR, on a slightly diverted and similar length route (K and X15 on the Street Plans), but returning to their same connection points with Dog Lane (U57176) and the C261 Reepham Road.

8. Street Plans (Sheet 4 of 12) East of Bell Farm Track to Drayton Lane

- C262 Drayton Lane (North) will be stopped up between its junction with the C261 Reepham Road and, in the north east, at the southern curtilage of the property 'Rookery North'. New Link Roads (N and P on the Street Plans) will be provided between the B1149 Holt Road and the NDR Drayton Lane Roundabout, and between that roundabout and the C261 Reepham Road, providing access to and from the NDR and maintaining local community connections.
- A length of Horsford Restricted Byway No.7 will be stopped up from its connection with the existing C282 Drayton Lane, but will maintain a connection with the new Drayton Lane Link Road, north of the NDR Drayton Lane Roundabout, which will provide continuity for that restricted byway, together with other new bridleways and cycle tracks on both the north and south sides of the NDR for those particular types of user.

- The C262 Drayton Lane (South) will be stopped up at its junction with the C261 Reepham Road, with the remaining lane providing use for agricultural access to land either side of, and which are the only premises along its remaining length. A new cycle track (S on the Street Plans) will maintain a route for cyclists and pedestrians to connect remaining C262 Drayton Lane (South) with the C261 Reepham Road.
- Private access stopped up to premises will be replaced with new private access, other than for a field access (PMA 23 on the Street Plans) and a length of access track (PMA 26 on the Street Plans), both being accesses to land of Glebe Farm, and which farm holding retains other access to its severed parts north and south of the NDR and which will be connected via the new Drayton Lane Link Roads and the NDR Drayton Lane Roundabout.

9. Street Plans (Sheet 5 of 12) Cromer Road Interchange to Old Norwich Road

- Lengths of the A140 Cromer Road and the B1149 Holt Road will be stopped up at the NDR Cromer Road grade separated interchange. The A140 Cromer Road will maintain its connection north to south across the NDR via a new length of street (new street W on the Street Plans) which will provide its connection with northerly and southerly roundabouts which will have slip road connections to the eastbound and westbound carriageways of the NDR and which, together, will form the grade separated junction at that location. The B1149 Holt Road will terminate on the north side of the NDR at New Holme Farm, with the alternative route for vehicular traffic being provided via the NDR Drayton Lane Link Roads and Roundabout to the west, providing access to and from the NDR and maintaining local community connections.
- Holly Lane (U57142) will be stopped up south west of the NDR in the vicinity of Manor Farm, with the remaining lane providing use for access to agricultural land either side of its remaining length. For the length of remaining Holly Lane (U57142) to the south of the NDR, alternative vehicular routes are provided by way of use of the C261 Reepham Road to the south west and which will provide connections with the new Drayton Lane Link Roads and NDR Drayton Lane Roundabout to the west, and with the A140 Holt Road and its connection with the NDR Cromer Road grade separated junction to the east, both of which junctions will provide access to and from the NDR and maintain local community connections across it.
- Private access to be stopped up are to be substituted with new means of access, other than where the fields which they serve (PMA 28, PMA 29 and PMA 30 on the Street Plans) are to be acquired for the NDR, or where (PMA 28 and PMA 33 on the Street Plans) other means of access already exist to the land concerned.

10. Street Plans (Sheet 6 of 12) Access to Norwich International Airport and St. Faiths Road, and (Sheet 7 of 12) Buxton Road

- The south easterly length of the C251 Bullock Hill will be stopped up on the north side of the NDR. New streets (Y and Z on the Street Plans) will be provided from the south side of the NDR Airport Roundabout, leading to Petans the Training Centre and to the Airport Mast and curtilage road of Norwich International Airport, providing the alternative route and continuing access to those facilities, previously served by the C251 Bullock Hill.
- Horsham St. Faith and Newton St. Faith Bridleway No.6 and Spixworth Bridleway No.1, which lead north westwards off the corner of the C251 St. Faiths Road and Quaker Lane(U57188), will be stopped up. A new cycle track (AA on the Street Plans), on the south side of the NDR, and a new bridleway (X on the Street Plans), on the north side of the NDR, leading to and from the NDR Airport Roundabout to the north west, and a new bridleway (BB on the Street Plans), on the south side of the NDR, leading to the C246 Buxton Road to the east, will provide alternative route connections for equestrian, pedestrian, and cyclist, users of the former bridleways.
- A length of the C246 Buxton Road, where to be crossed by the NDR corridor, will be stopped up. A new length of street (DD on the Street Plans), to the east of its present location, will be provided, together with the realignment eastwards of lengths of the C246 Buxton Road, which will provide continuity of the C246 Buxton Road over the NDR on a new overbridge, retaining the same route connections as it had before.
- A length of Quaker Lane (U57188) will be stopped up at its junction with the C246 Buxton Road and will be substituted by a new length of street (CC on the Street Plans), just to the south of the stopped up length, which will provide its new substitute connection with the C246 Buxton Road.
- Private access to be stopped up will be substituted by new means of access, with the exception of the access to be stopped up to Red Hall Farm (PMA 38 on the Street Plans) and which benefits from existing access to its lands south of the NDR.

11. Street Plans (Sheet 8 of 12) North Walsham Road to Beeston Lane and North Walsham Road/Rackheath Lane/Crostwick Lane Junction Improvement

- A length of the B1150 North Walsham Road will be stopped up, where crossed by the NDR North Walsham Roundabout. Remaining B1150 North Walsham Road will be connected from the north and south with the NDR North Walsham Road Roundabout, providing an all-movement entry/exit roundabout junction with the NDR and maintaining cross-NDR community connections.

- The C249 Rackheath Lane will be closed (by traffic regulation) at its junction with B1150 North Walsham Road. The remaining length of lane largely serves the agricultural community in the area. Alternative routes to connect with the NDR, and to connect with the local street network, exist to the east.
- Private access stopped up to premises south and north of the NDR will be substituted with new means of access, other than for the access track to Red Hall Farm (PMA 39 on the Street Plans), to the north side of the NDR, and which farm holding benefits from existing access to the north side of the NDR, off the B1150 North Walsham Road.

12 Street Plans (Sheet 9 of 12) Wroxham Road and Wroxham Road/Green Lane West Junction Improvement

- A length of the A1151 Wroxham Road will be stopped up, where crossed by the NDR Wroxham Roundabout. Remaining A1151 Wroxham Road will be connected from the north and south with the NDR Wroxham Road Roundabout, providing an all-movement entry/exit roundabout junction with the NDR and maintaining cross-NDR community connections.
- Private access stopped up to premises north and east and west of the NDR will be substituted in all cases.
- The C258 Green Lane West will be closed, by traffic regulation, at its junction with the A1151 Wroxham Road. A new Link Road (GG on the Street Plans) will provide the new connection of the C258 Green Lane West with the A1151 Wroxham Road.

13 Street Plans (Sheet 10 of 12) Newman Road, Salhouse Road and Railway Crossing

- Newman Road (U57490) will be stopped up south westwards from its junction with Long's Crescent, both as a street and as a private access track. A substitute bridleway (II on the Street Plans), and new private access track (X47, X47a – X47i series on the Street Plans), will be provided along that route, to cross over the NDR on a new Newman Track overbridge, providing access to premises on both the east and west side of the NDR and, for equestrian, pedestrian and cyclist users, to connect with the new bridleway leading north westwards (HH on the Street Plans) and the new cycle track leading south eastwards (JJ on the Street Plans), alongside the west side of the NDR from the west side of the overbridge.
- A length of the C283 Salhouse Road will be stopped up, where crossed by the NDR Salhouse Road Roundabout. Remaining C283 Salhouse Road will be connected from the south west and north east with the NDR Salhouse Road Roundabout, providing an all-movement entry/exit roundabout junction with the NDR and maintaining cross-NDR community connections.

- The C258 Broad Lane is to be subject of closure, by traffic regulation, at its north westerly junction with the C874 Plumstead Road. Local connections to the NDR to the south of the closed junction will be via the Plumstead Road connections with the NDR and, to the north of the junction, via the Salhouse Road Roundabout connection with the NDR.
- Private accesses to be stopped up are to be substituted with new means of access, other than where existing means of access to the relevant land exists.

14 Street Plans (Sheet 11 of 12) Plumstead Road, Middle Road and Low Road and Thorpe End Highway Improvement Measures

- Low Road (U59392) will be stopped up from just east of Green Lane (U59278), just to the west of the Laurel Farm group of properties, to a point on the east side of the NDR. Remaining Low Road (U59392) to the east of the NDR will continue to serve residential properties and agricultural land off that street, to the east of the NDR, whilst the Laurel Farm group of properties and agricultural land to the west of the NDR will be served by a new private means of access to be provided along stopped up Low Road (U59393). The substitute vehicular route for cross-NDR community connections, will be to the north, via the new C442 Middle Road overbridge of the NDR. For connections with the NDR, vehicular traffic from Low Road (U59392) will proceed via the C874 Plumstead Road Roundabout North and the proposed Link Road to the NDR Plumstead Road Roundabout South, to join or leave the NDR and for traffic from the Laurel Farm group of properties on the west of the NDR, will have the opportunity to proceed via Green Lane (U59278) and the C830 Broadland Way, to join the Broadland Gate Link Road and the NDR at the Business Park Roundabout.
- Cross-NDR connections for non-vehicular traffic will be provided, by means of a new bridleway (PP on the Street Plans), along stopped up Low Road (U59392) on the west side of the NDR, connecting with a new bridleway running along the west side of the NDR (OO on the Street Plans), northwards to the C442 Middle Road overbridge crossing of the NDR, to return southwards via a new bridleway (NN on the Street Plans) on the east side of the NDR, to rejoin Low Road (U59392) on the east side of the NDR.

15 Street Plans (Sheet 12 of 12) Smea Lane and Postwick Interchange

- A length of Great and Little Plumstead Footpath No.5 will be stopped up (part shown on Street Plans (Sheet 11 of 12)) from the east side of the NDR to its junction with Smee Lane (U59400). A new bridleway route (OO on the Street Plans), along the west side of the NDR between the C442 Middle Road overbridge in the north and Smee Lane (U59400) in the south; and a new bridleway route (NN on the Street Plans), along the east side of the NDR between the C442 Middle Road overbridge in the north and Smee Lane (U59400), together with a new cycle track (RR on the Street Plans) from that point down to the NDR Business Park Roundabout, and beyond, will provide for cross-NDR connections via that overbridge crossing and roundabout, for pedestrian users of the former footpath, as well as equestrians and cyclists.
- A length of Smee Lane (U59400) will be stopped up from just east of the Nursery on the north side of the lane, to a point on the east side of the NDR. Remaining Smee Lane (U59400) to the east of the NDR will continue to serve a small number of residential and agricultural properties and land along its length, whilst its remaining length on the west of the NDR will continue to serve the Nursery and 'Fairview House' and agricultural land lying off its length. Vehicular alternative routes to connect with the NDR will be, to the north, at the Plumstead Road junctions and, to the south, with the NDR Business Park Roundabout, from that length of remaining Smee Lane (U59400) on the west side of the NDR.
- A length of Postwick Footpath No.2, from its junction with the NDR Business Park Roundabout, southwards to its junction with the A1042 Yarmouth Road on the south side of the NDR will be stopped up. The remaining length of the footpath will be connected to the new cycle track (RR on the Street Plans) running along the east side of the NDR, at the NDR Business Park Roundabout, and which will provide a continuous route for pedestrian users of the former footpath, as well as cyclists, down to and across the new NDR bridge crossing of the A47 Trunk Road, to join the new footway/cycleway within the northern side of the A1042 Yarmouth Road to its junction with the C440 Church Road, thereby providing a grade-separated route crossing of the A47 Trunk Road, as opposed to the former at-grade crossing of the A47 Trunk Road of the former footpath.
- The A47(T) eastbound diverge slip road, leading from the eastbound carriageway of the A47(T) to the Postwick North West Roundabout on the A1042 Yarmouth Road, will be stopped up. A new A47(T) eastbound diverge slip road, to the NDR Postwick North East Roundabout, will provide the substitute route. A new cycle track (TT on the Street Plans) will be provided along the stopped up A47(T) eastbound diverge slip road, providing a segregated cyclist facility to join the existing footway/cycleways at the Postwick North West Roundabout and with a new footway/cycleway which is to be provided across the south west arc of that roundabout across the junction of the former stopped up slip road.

- The A47(T) eastbound merge slip road, from the Postwick North West Roundabout on the A1042 Yarmouth Road to the eastbound carriageway of the A47(T), will be stopped up. A new A47(T) eastbound merge slip road, from the NDR Postwick North East Roundabout to the eastbound carriageway of the A47(T), will provide the substitute route.

The Norfolk County Council (Norwich Northern Distributor Road (A1067 to A47(T))) Order

4.2 Funding Statement

Planning Act 2008

Infrastructure Planning

The Infrastructure Planning (Applications: Prescribed Forms and Procedure)
Regulations 2009

PINS Reference Number: TR010015

Document Reference: 4.2

Regulation Number: 5(2)(h)

Author: Norfolk County Council

Revision	Date	Description
A	08 January 2014	Revision for Submission

INTRODUCTION

This document is submitted in relation to the application for a proposed Development Consent Order by Norfolk County Council to the Planning Inspectorate Secretary of State, under the Planning Act 2008.

The application is for the Norfolk County Council (Norwich Northern Distributor Road (A1067 to A47(T))) Order, to grant development consent for the construction of a new highway running west to east, to south, between the A1067 Fakenham Road and the A47 Trunk Road at Postwick, including improvements to the existing highway network to the north and north east of Norwich.

This document comprises part of the application documents and relates to Regulation 5(2)(h) of the Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009.

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1 Introduction

1.1 Summary

- 1.1.1 This Funding Statement (this Statement) relates to an application (the Application) by Norfolk County Council (NCC or Applicant) to the Secretary of State under the Planning Act 2008 (PA2008) for development consent for the Norwich Northern Distributor Road (the Scheme), which would grant powers to NCC to construct and operate the Scheme.
- 1.1.2 This Statement has been prepared in compliance with the requirements of Regulation 5(2)(h) of the Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 and in accordance with the Department for Communities and Local Government guidance, 'Planning Act 2008: Application form Guidance' (June 2013) and 'Planning Act 2008: Guidance related to procedures for the compulsory acquisition of land' (September 2013) .
- 1.1.3 It is required because the development consent order (DCO) for the Scheme would authorise the compulsory acquisition of land or interests in land. Regulation 5(2)(h) therefore requires the Applicant to provide a statement indicating how the implementation of the powers conferred by the DCO would be funded.
- 1.1.4 This Statement forms part of a suite of Application documents. It should be read alongside and is informed by those documents. In particular, this Statement supplements the Statement of Reasons for Compulsory Acquisition (4.1 Statement of Reasons).

2 Capital funding

2.1 Scheme Cost

2.1.1 The current cost estimate for the Scheme that is the subject of the Application is £148.55 million. This cost estimate includes construction costs, preparation costs since 2012/13, supervision costs and land acquisition costs. This is an estimate of the anticipated outturn cost and therefore includes an allowance for inflation.

2.2 Scheme Funding

2.2.1 The capital costs of the Scheme will be jointly funded by the Department of Transport (DfT) and NCC.

2.2.2 In September 2011, NCC submitted a Development Pool bid for Government funding for Local Authority major transport schemes in respect of the Scheme (Appendix A).

2.2.3 This bid was approved by DfT in December 2011, with the Scheme being given "Programme Entry " status and an award of provisional funding (with a fixed maximum DfT contribution) (Appendix B)

2.2.4 DfT's funding grant is capped at £86.5m and is subject to satisfactory completion of all remaining statutory processes, and is made on condition that before 'Full Approval' will be granted, NCC is required to commit to a funded and programmed package of sustainable transport measures in Norwich city centre, as proposed in the Norwich Area Transportation Strategy (NATS).

2.2.5 NATS has evolved and delivered improvements over a number of years. NATS4, the latest version of the Strategy, was adopted in 2004 and its Implementation Plan (NATSIP) was adopted in March 2010 with the most recent update in November 2013 which identified progress on delivery, sets out the current and emerging programme, and highlights the relationship between NATS' schemes and the wider growth and development agenda. NATSIP takes account of the implications of emerging funding opportunities including the Community Infrastructure Levy.

2.2.6 The key features of NATSIP are;

City centre improvements

A bus rapid transit (BRT) network

A core bus network

A package of cycling and walking improvements

Specific rail service improvements

Smarter choices initiatives, like travel planning

Highway network improvements

The Northern Distributor Road

- 2.2.7 As part of the funding conditions from DfT, there is a requirement to continue to deliver the NATS package of measures. NATS IP sets out the overall basis for scheme delivery across the Norwich Policy Area over the next 10-15 years. A detailed, two-year programme of schemes for delivery is rolled-forward each year, which Members are asked to agree annually as part of the annual Local Transport Plan capital programme.
- 2.2.8 As part of this requirement, a progress tracker was developed to clearly show the schemes delivered in the past, what NCC is delivering presently and what NCC propose to implement with potential funding sources in the next ten to fifteen years.
- 2.2.9 Given NCC's commitment to fund and programme a package of sustainable transport measures as required by the DfT condition and as explained above, if DCO is granted for the Scheme, NCC will immediately submit an application for Full Approval to the DfT. Whilst the DfT Programme Entry funding decision related to a road from the junction with the A47(T) at Postwick to the A140 (Cromer Road) near Norwich International Airport to the north of the City, NCC's Cabinet considered a report on 2 April 2012 which included details for the section from the A140 to the A1067. The Cabinet resolved to submit the Application for the Scheme (to the A1067) and underwrite the additional costs (Appendix C).
- 2.2.10 NCC's Cabinet considered further reports in December 2012 and September 2013 which discussed possible design changes following public consultation and the additional cost implications. A further report to NCC's Cabinet on 4 November 2013 consolidated all the additional costs into a revised cost profile (Appendix D). On 4 November 2013 the Cabinet resolved to underwrite

£60.34m towards the scheme in accordance with the funding profile set out in Appendix D.

3 Land acquisition

- 3.1.1 The current cost estimate (see paragraph 2.1.1) includes an amount to cover the total cost of the payment of compensation for the compulsory acquisition of land, interests in land and rights over land.
- 3.1.2 To date, four pieces of land have been purchased relating to the Scheme, as they would have been affected by blight. Should any future claims for blight arise, the costs of meeting any valid claims will be met by NCC.

4 Appendices

4.1 Appendix A – Development Pool Bid

**LOCAL AUTHORITY MAJOR SCHEMES
BEST AND FINAL FUNDING BID
SEPTEMBER 2011**

Scheme Name	Norwich Area Transportation Strategy - Norwich Northern Distributor Route (NDR)
Local Authority	Norfolk County Council (NCC)

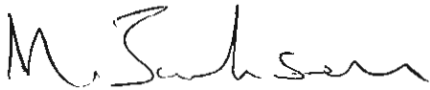
SCHEME COST SUMMARY (£m)		
	Scheme As Previously Configured (from section 1.4)	Revised Scheme (from section 4.4)
LA contribution *	£18.8*	£22.0*
Third Party Contribution		
- Growth Point	£4.5	£4.0
- CIF (CLG)	£21.9	£19.0
DfT Funding Contribution	£70.4	£67.5
Total	£115.6	£112.5
<p>* NOTE: The LA Contribution figures do not include Part 1 claims. Both sets of figures include inflation increases assuming a scheme opening in 2017</p>		

CONTACT DETAILS FOR FURTHER ENQUIRIES	
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NOTE: Bids should be received by the Department by Noon on 9th September 2011.


SENIOR RESPONSIBLE OWNER DECLARATION

As Senior Responsible Owner for the Norwich Northern Distributor Route (NDR) I hereby submit this Best and Final Funding Bid to DfT on behalf of Norfolk County Council and confirm that I have the necessary authority to do so.

Name: Mike Jackson	Signed: 
Position: Director of Environment, Transport and Development	

SECTION 151 OFFICER DECLARATION

As Section 151 Officer for Norfolk County Council I declare that the scheme cost estimates quoted in this bid are accurate to the best of my knowledge and that Norfolk County Council has the intention and the means to deliver this scheme on the basis of its proposed funding contribution at section 4.3 (a) above, as well as meeting any ongoing revenue requirements on the understanding that no further increase in DfT funding will be considered beyond the maximum contribution requested at 4.3 (c) (including if third party contributions should no longer be available).

Name: Paul Brittain	Signed: 
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Please Note: The promoting authority should ensure that a copy of this BAFB form and all supporting information is available on its website by 5pm on 12 September 2011.

Please detail the appropriate location where these documents can be located. The Department may provide a link to these pages from its own website.

Norfolk County Council Website address for data:

http://www.norfolk.gov.uk/Travel_and_transport/Transport_future_for_Norfolk/Norwich_Area_Transport_Strategy/Northern_Distributor_Road/DfT_Development_Pool_Bid/index.htm

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SECTION 1: THE SCHEME AS PREVIOUSLY CONFIGURED

i.e. BEFORE 10 JUNE 2010

This section should EITHER describe the scheme as approved at Programme Entry OR as submitted in a business case bid for Programme Entry OR on the latest design on which the last QMR submitted to the Department was based.

Note: this information should be consistent with what was included in previous EoI with any differences explained.

Date of Programme Entry or PE Bid or last QMR Submission (where applicable)	PE 16 December 2009 (letter confirmation from DfT 8 Feb 2010)
Estimated total scheme cost (inclusive of eligible preparatory costs)	£106.3m
DfT contribution	£67.5m
Local Authority Contribution (excluding the costs of any Part 1 Claims that you may have included at this time) (NOTE: Total reduced due to Part 1 Claims)	£16.8m
Third party contribution (Includes £1m Growth Point and £21m CIF allocation)	£22.0m

1.1 Brief description of the scheme as previously configured *This should clearly state the scope of the scheme and describe all of its key components.*

The Norwich Northern Distributor Road (NDR), as part of the Norwich Area Transportation Strategy (NATS), is crucial to delivering housing and jobs growth in Norwich. It is the key piece of infrastructure necessary to enable the overall delivery of the 37,000 houses and 27,000 jobs identified in the Joint Core Strategy (JCS). It forms part of a package to deliver sustainable transport measures including bus rapid transit, walking and cycling measures, and a comprehensive transport plan aimed to boost and sustain the city centre economy.

The NDR scheme is a dual carriageway distributor road from the A47 at Postwick to the A140 junction near Norwich International Airport to the north of the city. It is 14km in length and includes at-grade roundabout junctions at intersections with existing radial routes (see attached plan Ref 04). The NDR scheme has an excellent overall value for money **BCR of 7.42** (refer Section 3.2) which categorises it as **Very High** value for money.

The government funding being sought for the scheme, totalling £86.49m (£67.49 DfT and £19.00m CLG), will provide the potential to unlock growth that as a conservative estimate amounts to **£1.3bn** of additional investment in the Norfolk economy.

At Postwick the NDR will link with the A47 and wider Trunk Road network via a significant junction upgrade (called Postwick Hub). This includes dual carriageway roads linking to the existing highway network and facilitating access to a new business park development and the extension of an existing business park. This junction upgrade has been awarded CIF growth point funding, which is currently held by DfT pending resolution of the Development Pool process.

In addition to the distributor road, the following elements will be delivered, which are also part of NATS and immediately lock-in the benefits of the NDR and Postwick Hub:

- A range of city centre measures to provide immediate benefits for walkers, cyclists and bus users/operators
- Other linked highway improvements to improve access
- Traffic speed reduction measures in the northern suburbs to ensure appropriate use of the highway network and improve local communities
- A £2m contribution towards Postwick Park and Ride expansion

As well as the economic cost of the congestion in northern Norwich, the NDR also delivers local environmental benefits to those suburbs and communities that it relieves.

The NDR is key to future economic growth in the Norwich area and protecting the historic city centre environment. It opens up strategic employment sites at Norwich International Airport, Rackheath and Broadland Business Park – facilitating the land to provide for over 12,000 jobs and enables the delivery of up to 10,000 new homes (as set out in the JCS). It will also provide greatly improved access for north east Norfolk to the strategic road network, taking full advantage of the forthcoming dualling of the A11.

In doing so, the NDR will provide improved accessibility from North Norfolk to employment opportunities at Norwich Research Park and the Norfolk and Norwich University Hospital as well as those in Broadland.

1.2 What are/were the primary objectives of the scheme?

Please limit this to the primary objectives (ideally no more than 3) the problems to which this scheme is the solution. If the primary objectives have changed please explain why. Do not include secondary objectives i.e. things to which the scheme will contribute.

The strategic case for the NDR scheme has been set out in an updated document (see attached Ref 01) which clearly defines the objectives of the NDR. These can be grouped under the following three primary objectives, which reflect the Governments recently published white paper 'Creating Growth, Cutting Carbon' published in January 2011:

1. **To deliver economic growth.** 10,000 new homes and 12,000 new jobs are directly dependent on the implementation of Postwick Hub and the NDR. The NDR will directly link strategic employment sites, Norwich International Airport and major housing growth areas to the trunk road. The new road will provide strategic access to large parts of north and north-east Norfolk, including its essential tourism centres directly facilitating access to employment as well as improving employers' access to labour markets.
2. **To provide sustainable transport benefits.** The NDR is vital to enable the delivery of the full package of NATS measures including bus rapid transit, walking and cycling measures and improvements within the city centre. Without the NDR and this package of measures the transport system in Norwich does not have the capacity to allow the housing and jobs growth and would become a barrier to delivering the JCS.

3. **To improve the quality of life for communities.** Traffic is known to be using inappropriate routes through housing areas and villages in northern areas of Norwich to avoid traffic delays on radial roads and the inner and outer ring roads. This is diminishing the quality of life for residents by increasing the potential for accidents, noise and pollution, reducing their likelihood of walking or cycling and creating severance within their communities. The NDR improves the quality of the environment for those living, working and visiting Norwich city centre, by removing cross-city traffic and directly enabling the significant walking, cycling and bus transport enhancements promoted in NATS.

The strategic case for the NDR concludes that the scheme is an essential piece of infrastructure to facilitate the Joint Core Strategy (JCS) for the Norwich area which has been examined in a public forum and found to be a sound planning strategy. Implementation of the JCS will deliver 27,000 new jobs and 37,000 new homes up to 2026.

The identified problems that the road and the overall NATS strategy address are:

- Traffic congestion causing delay to public transport services
- Constraints on allocated employment development sites
- Transport issues inhibiting business growth
- Providing headroom to accommodate planned growth

1.3 Please describe the process by which this scheme came to be the preferred option for meeting those objectives including reasons why alternatives were not progressed.

This may simply be an extract from what has already been described in previous Major Scheme Business Cases. However please take the opportunity to expand on that previous material as necessary.

An extract from the Major Scheme Business Case (originally submitted in July 2008) provides a summary of the process completed to develop the preferred option. Details from the MSBC Executive Summary are:

“Proposals for an NDR first came to prominence as an issue for the Norwich area in the 1991 NATS. The preferred strategy produced by consultants after a 2 year study recommended inclusion of an NDR scheme but the scheme was not included as part of the adopted strategy pending further investigation into its impact. Reviews of the NATS strategy in 1994 and 1997 maintained this position until NATS 4 strategy was reviewed and adopted in 2004. The NDR scheme was included in NATS 4 as a means of achieving other elements of the strategy, which had not been successfully achieved under NATS 3.

The inclusion of the NDR scheme took place after a rigorous process of review, following webTAG guidance, which involved the appraisal of six strategic options including a number based around public transport. The preferred strategy option including the NDR scheme was deemed to best meet the aims and objectives of the NATS strategy, and following extensive public consultation, was adopted by the County Council in October 2004.

The public consultation for the NATS Review invited consultees to comment on whether an NDR scheme should be part of the strategy. To help consultees

come to a view, a number of route corridors were included in the consultation document – 3 to the east and 4 to the west. Whilst there was strong support for an NDR scheme (78% of respondents) there was no strong preference on which route should be preferred and a large number of variations were proposed.

Having adopted the preferred NATS strategy, the County Council then undertook a Stage 2 Assessment of the route alternatives prior to carrying out an extensive public consultation on a number of possible routes. That consultation resulted in strong environmental concerns being expressed about the impact of a new road across the River Wensum Special Area of Conservation (SAC) to which the County Council responded by carrying out further assessment beyond a Stage 2 level to ascertain whether the impact on the SAC could be mitigated. The conclusion was that it could not be demonstrated that the new road would not affect the integrity of the SAC.

Alongside this, traffic modelling indicated that a road starting at the A1067 in the west rather than the A47 gave significant benefits and delivered most of the objectives of the NDR scheme and these were key factors in the decision to choose the preferred route as now proposed.

Removing motorised through traffic from the city centre is an essential element of NATS in support of policies within the City of Norwich Local Plan and City Centre Spatial Strategy to make the city centre a more liveable space. The construction of the NDR scheme will enable measures to be implemented to deter through traffic from travelling via the city centre, creating a safer and more environmentally attractive environment for residents, pedestrians and cyclists.”

Between the submission of the major scheme business case (MSBC) for the NDR in July 2008 and confirmation of Programme Entry in December 2009, there was significant dialogue with DfT and a considerable number of further sensitivity tests were completed to demonstrate the robustness of the assessment work. In summary this work included:

- Core Scenario (updating MSBC data and Traffic Forecast information)
- Dependent Development
- Part NDR from A140 to A47
- Further Tests 2 to 6 (varying growth rates and other assumptions)

The options considered in the original MSBC and the additional assessment work completed prior to the confirmation of Programme Entry, have confirmed that the preferred option provides the best solution to meet the objectives.

The updated strategic case also concludes that the preferred dual carriageway option for the NDR scheme best meets the Councils’ and wider stakeholder objectives.

During 2009 and 2010 the NDR was included as part of a detailed development of the NATS Implementation Plan to deliver the significant changes needed to improve transport in and around Norwich. The consultation, level of support and adoption of the Plan is discussed in more detail in section 5 of this bid.

The NDR was also included as part of an Examination in Public for the Joint Core Strategy for the Norwich Policy Area towards the end of 2010. It is worth noting the JCS Inspectors' found the proposals to be 'sound' and specifically commented that they are not convinced that a non-NDR package of transport interventions would be a realistic solution in terms of the necessary infrastructure to support the planned growth in the Norwich area.

1.4 What was the last total estimated cost of the scheme as previously configured including where changed since the award of Programme Entry?

Please provide the latest cost of the scheme with a summary and where, appropriate, an explanation of the key changes from the previous cost breakdown. Please use this section to identify any cost savings that you have already made since the award of Programme Entry. Figures should be outturn costs. Please adjust to exclude the costs of any Part 1 Claims that you may have included at this time.

£m	Pre 2011/12	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	Total	%
LA contribution	7.3		0.956	1.486	3.610	3.079	2.369			18.8	16.3
Third Party contribution	1.6	0.7	1.1	1.1						4.5	3.9
CIF funding allocation			11.471	10.428						21.9	18.9
DfT funding requested					14.810	30.872	24.718			70.4	60.9
Annual Totals	8.9	0.7	13.527	13.014	18.420	33.951	27.087			115.6	100.0

Key changes to the cost breakdown since the original Programme Entry (December 2009) compared with the figures set out in the table above are:

- The scheme includes the Postwick Park and Ride extension access improvements (which form an essential part of the Postwick Hub). It also includes funding for City Centre and Traffic Speed reduction measures which were not included in the original scheme approved for Programme Entry.
- The scheme has effectively been delayed by 2 years. The original intention was to commence with the construction of Postwick Hub during 2010, however this has not been possible due to the spending review and the instruction that Public Inquiries would not be commenced by the Secretary of State. The intention now is to commence Postwick in 2012.
- This 2 year delay has therefore generated additional inflationary pressures which have been factored into the figures above. This assumes an inflation increase of approximately £5m for the two years, reflecting a range of construction sector increases, but also considering the financial climate from 2010 to 2012.

1.5 Please describe any developments (such as housing) linked with the scheme as described above and explain any changes impacting on these developments (eg policy changes such as housing allocations, changes to redevelopment plans)?

This should explain any links that the planned scheme had to major developments and provide details of changes to these plans such as through changes in policy relating to housing, changes to developer plans etc

The Joint Core Strategy (adopted March 2011)

The Joint Core Strategy for Broadland, Norwich and South Norfolk has been developed by Broadland District Council, Norwich City Council and South Norfolk Council, working together with Norfolk County Council as the Greater Norwich Development Partnership.

The JCS sets out the required levels of growth and its location in terms of both housing (37,000 properties) and employment (27,000 jobs) in and around Norwich. The Inspectors for the JCS provided their findings in a final report published in mid-February 2011 and considered the JCS to be sound (see Inspectors Report February 2011 – Ref 08).

Paragraph 9 of the Inspectors' Report says, "The authorities have seized the initiative, risen to the challenges presented by the demographic forecasts for the area and made a proactive response which recognises the scale of the issues. The JCS sets out a sound long-term strategy for this growth and the GNDP position on this issue is worthy of support."

The largest concentration of growth in the JCS is within the Old Catton, Sprowston, Rackheath and Thorpe St Andrew Growth Triangle. The NDR is integral and essential to the growth area. Development within the growth area will include 7,000 dwellings (with an additional 3,000 after 2026) and expansion at strategic employment areas as set out in the table below. The Growth Triangle is also adjacent to Norwich International Airport and associated employment growth. Paragraph 72 of the Inspectors Report concludes that "there are strong reasons to support the selection of this area as a location for a major urban extension Concentrating the development at this major growth location is the most effective way of maximising its contribution to the [Norwich Policy Areas] sustainability and providing infrastructure economically".

Throughout the process there has been ongoing dialogue with developers who are keen to ensure that the housing and employment growth is delivered. Whilst the current economic climate is very challenging, the JCS spans a period of 15 years (ie to 2026) and sets out possible further growth beyond that period (to 2031). The need for the NDR as a key part of NATS must therefore be seen in the context of a much longer timescale that will extend beyond the immediate financial difficulties.

The JCS identifies the NDR and Postwick Hub as essential elements of transport infrastructure. Without them there are limited levels of housing and employment growth that are possible in the north and east of Norwich, but with them up to 10,000 homes and significant employment can be delivered. The following table sets out the interim scales of development identified in the JCS that are released by Postwick Hub and completion of the NDR.

Planned and Committed Development Dependencies

	Housing	Employment Land	Estimated jobs
Do Nothing	200 exemplar at Rackheath Existing commitments of 1400 houses	New and existing allocations constrained	
Postwick Hub	At least 1600 dwellings	Release development of 15Ha including allocation at Broadland Business Park	1800
		New allocation of 25ha including approximately 50,000m ² B1 adjacent to Broadland Business Park	3200
NDR	A further 8,200 dwellings	New employment allocation of 25Ha at Rackheath	3300
		New employment allocation 30Ha at Norwich International Airport	3900
Totals	11,400	95Ha	12,200

The above does not include additional jobs that can be expected from intensification on existing sites, or in existing businesses throughout the northern suburbs and fringes as a result of enhanced access.

In addition to the longer term jobs created from new business development areas, there are additional jobs associated with the construction of Postwick Hub and the NDR. These have been set out by the already appointed contractor, Birse Civils Ltd, as up to 400 jobs for residents and businesses within the locality of the scheme. This represents 80% of the total staff employed on the scheme.

There will also be significant job creation in the construction of housing, commercial development, services and infrastructure such as transport and utilities necessary for supporting growth.

Alongside the county's then economic partnership, Shaping Norfolk's Future, and following widespread consultation with business, the GNDP authorities adopted the Greater Norwich Economic Strategy (GNES) in 2009. The GNES supporting action plan includes delivery of the NDR as a critical element.

Postwick Hub

Postwick Hub (promoted by the County Council) and the associated Broadland Gate Business Park Development (promoted by a private sector developer partner) has planning consent and is effectively ready to start construction. This releases 25 hectares of employment land.

Linked to this, another Planning Application, 'Brook Farm', also has a resolution to grant permission for 600 houses and Broadland Business Park Phase 2 (a further 15 hectares). Both of these are within the Growth Triangle and dependent, by planning condition, on the Postwick Hub trunk road junction improvement.

The overall scale of development that is released by the Postwick Hub improvements are to be explored in more detail through the Area Action Plan for the Growth Triangle being prepared by Broadland District Council. The GNDP has also initiated a Postwick Developer Forum to further consider the scale of growth that can be delivered by the Postwick Hub junction improvement.

SECTION 2: REVISED SCHEME PROPOSAL

This section should describe the changes you are proposing to make for the purposes of your Best and Final Funding Bid.

2.1 Are you proposing any changes of scope from the scheme as described in Section 1? *If yes, please describe in detail the changes you are proposing. Please also attach explanatory maps, diagrams etc. as appropriate.*

The changes to the scope from scheme as previously configured are:

a) Postwick Hub with inclusion of P&R entrance arrangements

Postwick Hub has previously received funding as a stand alone project that delivers immediate economic growth potential. Included as part of the original scheme was an extension to the existing Park and Ride site. It is proposed to amend the scope of this to reduce the initial demand on funding the junction and park and ride expansion. The details of what is to be included are shown on the plan attached (Ref 40). This shows the proposed highway related improvements associated with the Postwick Hub and P&R access. The delivery of the increased P&R parking facilities will follow at a later date (currently projected to be 2015).

b) Detailed design scope changes

The detailed design for the NDR is well advanced and this has enabled a value engineering review with the contractor to assess potential changes in scope that deliver cost savings. The outcome of this work has identified the following main proposals:

- Reductions in carriageway pavement widths.
- Reduction in the design life of the carriageway pavement and changes to the specification of materials being used.
- Removal of previously included segregated left turn lanes on the roundabout junctions.
- Drainage design reductions in scope and detailed amendments.
- The removal of streetlighting, particularly at the roundabout junctions (except the A140).

c) Redesign of A140 junction

The A140 junction has been completely redesigned following the DfT Programme Entry announcement of only providing funding to this point. It has changed from a previous 'grade separated' junction to an 'at-grade' solution. Details are provided on plan Ref 06.

The redesign maintains the potential for the County Council to continue to deliver the section of the NDR from the A140 junction to the A1067 as a further phase of the project. This junction design is also capable of accommodating future business park development, associated with the airport, which has already been detailed in section 1 above.

Savings associated with these scope changes are set out in section 2.3 below.

2.2 What, if any, additional changes of scope have you ruled out for the purposes of your Best and Final Funding Bid? Please give reasons.

Single Carriageway NDR

A single carriageway proposed from the Postwick Hub junction (at the A47) to the A140. This does not provide for the potential of the wider NATS Implementation Plan and cater for the extent of growth set out in the JCS. As set out in other sections of this submission, the NDR is integral to unlocking the growth potential of the Greater Norwich area. A reduction to single carriageway compromises the ability to free up the roadspace to enable public transport, walking and cycling improvements in the city, and on the main approaches into the city.

Modelling carried out during the development of the NDR has shown that increasing the capacity of the NDR, makes it more effective in attracting trips off the existing unsuitable roads in the Northern Suburbs of Norwich. A single carriageway option is not effective in meeting this objective. The original MSBC submission included a low cost option which consisted of a single carriageway road. The MSBC Value for Money Case concluded that this option “performs poorly, failing to deliver journey time savings, due to the impacts of additional traffic using existing road links.”

Realignment of the NDR

A number of options were previously consulted and discounted during the original development of the NDR. Previous County Council Cabinet reports (see Ref 10 (7 March 2005) & Ref 11 (19 September 2005)) provide a summary of the extent of this work.

As part of the work completed in developing the NDR, the preferred route alignment was chosen on the basis of being able to accommodate most of the proposed housing growth areas (with the exception of the more recent Eco-Community development). The alignment also provides a less significant impact on the environment than the other options considered. This can also be seen from the Landscape Impact Assessment (see Ref 37) work completed as part of the BCR appraisal.

A change to the alignment of the NDR would also impact on the locational strategy adopted within the JCS.

Removal of the Plumstead Road intermediate NDR junction

This option was considered as it could have removed a roundabout from the NDR, a short length of link road and a small connecting roundabout on Plumstead Road. It was considered possible depending on the delivery of the new Brook Farm link road that links Postwick junction to the Plumstead Road and will be delivered by that development (a planning application has already been approved for this development).

The assessment work completed for this has indicated that the traffic that would have used the Plumstead Road junction displaces onto inappropriate routes

through the existing villages of Salhouse and Rackheath. For this reason, it was considered that this option should not be considered further at this stage.

Reduction of speed limit

This was considered in order to assess whether the design standards could be reviewed to reduce the overall costs of the scheme. However a brief assessment highlighted that there are only likely to be minimal reductions in the scheme construction costs as there is a need to continue to provide a dual carriageway, with the associated design and safety standards.

In addition, reductions in the scheme benefits (due to increased journey time) would outweigh any minimal savings in construction costs. There are also concerns about the ability to enforce speed limits and the public acceptance of lower speed limits on a new dual carriageway.

Three-lane carriageway instead of dual carriageway

This option was suggested as an alternative to a single carriageway. However experience of these roads in Norfolk has been that they generate higher accident rates and Norfolk has an outstanding record in terms of its casualty reduction targets and achievements. It is not therefore considered appropriate to introduce a road standard that is known to have a poor accident safety record.

Within Norfolk, as part of its long standing efforts to reduce highway casualties, existing three-lane carriageways are being removed.

Signal junction control instead of roundabouts

In order to reduce the overall footprint of junctions and their associated construction and land costs, an option to use traffic signals has been considered. This has been rejected due to the potential reductions in junction capacity, the off-peak impact to traffic flows, the higher ongoing revenue costs associated with operating and maintaining the signals (compared with roundabouts) and the reduction in safety and likelihood of higher accident rates at the junctions.

Reducing the junction designs to smaller roundabouts

All intermediate junctions on the NDR are already 'at-grade' and have been designed with minimal footprints. The potential to reduce these further is therefore limited. Any further reduction would result in insufficient highway capacity as the junctions are already designed to an optimum.

Review of environmental mitigation

Significant value engineering has already been completed on the project and further reductions in the level of environmental mitigation would compromise the work already completed with statutory bodies in developing the proposals currently set out. It would generate too much risk through the planning process if the scope of mitigation was reduced any further.

More phasing of the construction of the NDR

The potential to deliver the NDR in phases has been considered. We have set out that the Postwick Hub can be delivered as a stand alone scheme ahead of the rest of the NDR because of the immediate benefits it brings in terms of unlocking employment and housing growth (as set out in the JCS).

Further phasing of elements of the NDR has also been reviewed, however it is clear from discussions with our already appointed contractor that the cost of delivering the NDR in a series of phases gets more and more inefficient as the number of phases increases. For this reason, when trying to keep costs to a minimum, it has been considered that proposing phasing as part of this submission is fundamentally unsound.

Use of tolling on the NDR

This has been considered as part of a broad overview of options. In terms of the number of intermediate junctions necessary to ensure the road operates as a distributor, the potential for tolling is not considered viable.

The cost of implementing a suitable tolling arrangement, administering its operation and the likely detrimental impact on the number of people using the road would all conspire to prevent it from offering a sound business case. There are also a high number of lower standard roads that create a network of alternative routes, which drivers may continue to be inclined to use, which is a key element that the NDR is intended to resolve.

2.3 Whether or not you are proposing a change of scope, please identify any savings that have been made to the total cost of the scheme, for example through value engineering.

Please provide details with a summary and explanation of the further savings beyond those already identified at 2.1 above or, if no scope changes are proposed, with reference to the cost breakdown provided in the latest cost estimate at 1.4 above.

We have made total scheme savings of **£5.1m** in the funding requested from DfT as part of this bid and these are set out below in the same format as the details provided in section 2.1:

a) Postwick Hub with inclusion of P&R entrance arrangements

In relation to the previously allocated £21m CIF funding from CLG, now held by DfT, we have reviewed the timing of the works to expand the existing Park and Ride site. This means that £2m of the £21m is not required and therefore the County Council is prepared to remove the need for this funding as part of the overall CIF project and will finance the Park and Ride works at a later date. This is expected to be between 2015 and 2020 when Park and Ride demand increases again to a level at which further parking is required.

This provides a reduction in requested funding from CLG via DfT of £2.0m.

b) Detailed design scope changes

The NDR has been developed over a number of years and this work has been completed in recent years with the appointed contractor (Birse Civils Ltd) working with the design team through Early Contractor Involvement.

This has generated savings over recent years that have enabled the scheme to stay within budget, taking into account annual inflationary increases. Therefore since Programme Entry additional significant savings have proved difficult to realise. However, a further detailed VE exercise has been completed as part of the work to develop this bid proposal. The identified savings are summarised below.

Reduced carriageway pavement width and reduced design life of the carriageway pavement, including changes to the specification of materials being used – saving £1.4m.

Removal of segregated left turn lanes at roundabout junctions – saving £0.2m (see plan Ref 05).

Reduced scope and detail amendments to the drainage design – saving £0.4m.
The removal of streetlighting – saving £0.5m.

Total additional savings from this latest VE work therefore equate to £2.5m.

c) Redesign of A140 junction

The A140 junction was previously designed as a grade separated junction to minimise the conflicting traffic flows from the A140 with the NDR, which was set out in the MSBC submission continuing to the A1067. The Programme Entry letter provided by DfT in February 2010 (see Ref 13), provided funding on the basis of the scheme stopping at the A140 and required a review of the junction design.

As part of the updated work associated with this submission, the A140 junction has been reduced to a large at-grade roundabout which has enabled a review of the relative costs of both junction designs. Whilst there has been a removal of bridge structures, there has been an increase in the overall scale of the at-grade junction.

This has resulted in a net saving of £0.6m.

2.4 Please provide separate details of any further changes you are proposing to the scheme from that submitted in January 2011.

Alternative proposals were appraised in significant detail as part of the original MSBC submission and these were tested further as part of the sensitivity analysis requested by DfT prior to Programme Entry being granted in December 2009. In view of this, and following an endorsement of the JCS by the Planning Inspectorate following the Examination in Public during 2010, it is considered that the optimum and best solution that achieves the essential outcomes has been thoroughly developed and tested. Therefore, no further changes have been identified.

2.5 What is your latest assessment of the cost, feasibility and value for money of any alternatives to the proposed scheme?

This should include any previous options subsequently discarded and / or those proposed by third parties. Please explain why this / these options have not been progressed. Please detail any elements that have been included in your proposed scheme. Please make reference to any material differences with the preferred scheme in costs or benefits such as carbon impacts.

The NDR

Prior to the submission of the NDR MSBC in 2008, an options assessment was completed for NATS in 2005. The options assessment report (see Ref 15) concluded that “The assessment indicates that the strategy options including the NDR and complementary transport measures give the most economic benefit...”

In addition, work completed during the development of route options for the NDR showed that there was greater public support for the route alignment that formed the basis of the MSBC submission from the A47 east of Norwich to the A140. This route received 50% more overall votes than the next nearest option. Details are set out in the 19 September 2005 Cabinet report (see Ref 11).

The original 2008 MSBC submission (Ref 14) also included options assessments. The Executive Summary concluded that “The analysis indicates that the proposed scheme performs significantly better than the other options including the public transport option, in benefit to cost terms and operational and safety terms.”

Extensive further work considering options in more detail was also completed at the request of DfT prior to Programme Entry being granted for the NDR in December 2009.

The Core Scenario (the defined scheme) at that stage was the NDR from the A47 at Postwick to the A1067. This was the basis of the original 2008 MSBC, however during the assessment the County Council were requested to also develop an option for the NDR that extended only as far as the A140 junction. This ‘part NDR’ option had a lower BCR of 4.6, compared with the previous Core Scenario, which was 6.1.

Further sensitivity tests were also undertaken to review the scheme as part of the programme entry analysis. Details are set out below.

Extract from ‘NDR Sensitivity Tests for DfT - Tests 2-6 Main Report – Volume 1’

Economic assessment results of previous sensitivity tests are as follows:-

Sensitivity Test Number	Scenario	Benefit / Cost Ratio (BCR)	Scenario	Benefit / Cost Ratio (BCR)
1	Core Scenario	6.1	-	-
2	Test 2 Pessimistic Local Development	6.1	-	-
3	Test 3A Low Growth	4.5	Test 3B High Growth	8.2

4	Test 4A Lower Trip Rates	6.1	Test 4B Higher Trip Rates	6.2
5	Test 5A Core Scenario without City Centre measures	8.6	Test 5B Core Scenario without any complementary measures	8.9
6	Test 6 Varied Parameters	6.6	-	-

The previous Core Scenario has a positive Cost Benefit Ratio (BCR) of 6.1 which categorises the scheme as “Very High Value for Money” in accordance with the DfT’s current Value for Money guidance. The BCRs of Tests 2 to 6 range from 4.5 to 8.9, confirming that the Very High category is appropriate. The results of the sensitivity tests carried out as part of the current bid process are set out in Sensitivity Tests Main Report (Ref 30)

In addition to the sensitivity work set out above, the PT option in the MSBC was also analysed in more detail. Reports were submitted to DfT (see reports – Ref 16, 17, 18 & 19) and these summarised that the PT option would need either unrealistic amounts of subsidy, or unrealistic increases in patronage simply to achieve BCRs of 1.5, which is significantly less than the Core Scenario and Part NDR set out above.

The NDR, as proposed, has been through an extensive Examination in Public as part of the JCS process and the Inspectors found in favour of the proposals as presented.

The Postwick Hub

This scheme has been developed following analysis of 15 options, with a range of sub-options that total 39 variants. The selected option is the only one that has been developed that has met with the scrutiny and therefore been approved by the Highways Agency. No other options have been presented and tested in any detail such that they satisfy the requirements of the Highways Agency (HA).

As part of the analysis of the NDR prior to it receiving Programme Entry, the DfT requested a report to be completed independently by Highways Agency to review the Postwick Hub junction design and determine whether a more cost effective solution was possible. This included a review of alternative suggestions and also included a review by HA of a large oval roundabout junction. They concluded that whatever the proposals are for the junction it would require a junction on the scale of Postwick Hub and any alternative, if developed, would need to be of a similar scale and cost.

At the JCS examination in public, a landowner put forward sketches of an alternative layout for improvement of Postwick (see Ref 20). It was suggested that the proposal was a low cost alternative but no supporting technical information was supplied. However based on knowledge of the design constraints a high level assessment of the layout was carried out. The County Council’s assessment of the proposal highlighted a number of serious concerns. These included the designs apparent lack of ability to ensure free flow and safety on the A47 and the need to acquire 3rd party land for its delivery.

In addition to the above, Thorpe St Andrew Town Council have raised their opposition to the closure of the A47 diverge slip road proposed as part of the Postwick Hub junction improvement. An alternative sketch proposal has been suggested by a local Town Councillor to avoid the need to close the slip road. This alternative proposal would not meet design safety standards required by Highways Agency (HA). This was confirmed by a HA representative at the Examination in Public of the Joint Core Strategy.

The design proposal presented by the County Council takes into account significant constraints at the junction and also provides a solution that provides for a new business park and the associated employment benefits. It also provides the necessary link to the NDR with only minor modification, which makes it a more cost effective solution.

No other viable alternatives have been provided by others with sufficient detail that can be, or have been, tested in any detail to satisfy the Highways Agency.

SECTION 3: IMPACT OF CHANGES PROPOSED AND DELIVERY OF THE SCHEME

This section should describe the impact of the changes you are proposing in Section 2 above compared to the previously configured scheme as described in Section 1

3.1 What impact, if any, would the proposed changes have upon achievement of your primary objectives? *This should refer to the scheme as identified in section 2.1*

There is no significant impact on the primary objectives of the scheme due to the proposed changes. The details are set out below, again following the format set out in section 2.1:

a) Postwick Hub with inclusion of P&R entrance arrangements

The phasing of the delivery has a benefit to the ability to deliver the primary objectives. If Postwick Hub can be delivered during 2012 and opened in 2013 it unlocks potential employment and housing growth, thereby realising immediate benefits to the economy and so directly contributing to the primary objective of economic growth.

This early delivery of Postwick Hub also enables the new Broadland Gate development and a further phase of the existing Broadland Business Park to commence, both of which will contribute via Section 106 payments to public transport infrastructure. Broadland Gate alone has a S.106 contribution associated with the development of £2m towards public transport.

b) Detailed design scope changes

These changes are minimal in terms of their overall impact on the primary objectives. They do reduce the initial costs of the project but will bring about earlier maintenance interventions in relation to the pavement design life. This is something that the County Council will build into its future maintenance regimes, but some of this cost will be offset due to savings in not maintaining street lighting and reduced revenue costs.

c) Redesign of A140 junction

Changes to the A140 junction have been developed which have enabled the junction to be at-grade instead of the previously proposed grade separated. The design is such that it can provide sufficient capacity to enable a future extension from the A140 to the A1067 (part of the original scheme proposal in the 2008 MSBC).

The A140 design is also now consistent with all other junctions along the NDR (ie at-grade), which is a potential benefit for driver perception. It is also in keeping with the other junctions in that it is not designed with reserves of capacity and is therefore the optimum design necessary to find a balance in the longer term between people using their cars and changing to public transport. In re-appraising the junction design, we are also confident that it also has the potential to provide the necessary access capacity for an adjacent site allocated as a new business park. This will assist in facilitating future employment growth and provides a benefit

to the primary objectives in this regard.

3.2 Please provide a short description of your assessment of the value for money of the revised scheme including your estimate of the Benefit Cost Ratio.

This should cover both monetised and non-monetised costs and benefits and should briefly explain the reasons for significant changes since your most recent Business Case submitted to the Department. The full assessment, as set out in the Value For Money guidance should be provided as an Appendix. Valuation of any dependent development should be reported here, separately from the central value for money evidence and supporting evidence, and a full description of the approach taken should be included in the Appendix.

A summary of the assessment of value for money is set out in the table below, which updates the assessment provided by DfT as part of their review of the NDR Benefit Cost Ratio provided ahead of the Development Pool process.

	Benefits (£000s)	Costs (£000s)
TUBA	386,397	70,883
Wider Impacts	72,946	
Reliability	24,569	
Accidents	36,697	
Landscape	-12,105	
Noise	16,540	
Air Quality	812	
Total	525,856	70,883

All values in 2002 prices discounted to 2002.

Adjusted BCR	7.42
VFM category	Very High

Notes:

TUBA	PVB from TUBA, includes consumer and business impacts, greenhouse gases and indirect tax revenues. The corresponding unadjusted Transport User Benefit BCR of 5.45 obtained directly from TUBA is well above the value of 4 above which the DfT classify schemes as Very High value for money.
Wider Impacts	Assessment carried using WITA program.
Reliability	Assessment carried out using methodologies set out in WebTAG unit 3.5.7.
Accidents	Accidents benefits have been calculated using COBA
Landscape	Landscape character is mainly open arable farmland, with pockets of more enclosed well wooded farmland resulting from the presence of former estates, particularly Beeston Park and Rackheath Hall. These give rise to some areas of good landscape quality (although the more attractive parkland areas are avoided by the route) and elsewhere a combination of earth shaping and planting would mitigate the impacts.

Noise	Noise benefits of the NNDR scheme were calculated using the methodologies set out in WebTAG 3.3.2 (April 2011)
Air Quality	Air Quality benefits were calculated using WebTAG unit 3.3.3 (April 2011)
Modelling assessment	The model is a production-attraction variable demand transport model which fully aligns with Departmental guidance. The model includes variable demand responses which would be expected for a scheme of this size.
Cost assessment	The cost details in the table above have been amended from previous submissions to allow for : <ul style="list-style-type: none"> - Reduced level of optimism bias (from 25% to 20%) - Revised spend profile - Adjustment to assessment of construction inflation (was previously ahead of RPI, now this effect has reversed).

As requested, the full assessment in accordance with the Value for Money guidance is provided at document Ref 02. In summary, the key Value for Money benefits are:

- ✓ **Improved accessibility and connectivity for business**, aiding economic growth and in particular creation of new private sector jobs in emerging advanced engineering and other value added sectors.
- ✓ **Enable delivery of the Joint Core Strategy** which is envisaged to deliver 37,000 new homes and 27,000 new jobs over the plan period through to 2026.
- ✓ **Reduction in congestion on key routes within Norwich** promoting future sustainable transport provision, in particular serving new housing and employment growth areas.
- ✓ **Enhancement and protection of the historic environment and commercial vitality of the city centre** by facilitating implementation of a broad range of traffic management measures which remove cross-city traffic.
- ✓ **Improvement in the quality of life for communities** by removing traffic known to be using inappropriate routes through housing areas and villages in northern areas of Norwich.

3.3 What impact, if any, would the proposed changes have on the statutory orders or permissions required or the timetable for obtaining these?

For example would fresh planning consent need to be sought?

There are no impacts to the statutory orders for the scheme. These can be dealt with as two distinct elements, the Postwick Hub and the NDR:

Postwick Hub

Postwick Hub and the Park and Ride have been through their necessary planning processes. The changes in scope set out in section 2 do not affect these permissions.

The Side Roads Order for Postwick Hub is subject to a Public Inquiry, however the changes in scope to the delivery of the Park and Ride site, set out previously in section 2.1 (item a), do not affect this. The County Council has been working with the Highways Agency (the promoters of the Orders for Postwick Hub) and it is anticipated that the Public Inquiry process will be completed early in 2012. This will enable construction to commence as planned early in the 2012/13 financial year.

The changes proposed do not change the land required for the junction improvement, which has been secured by jointly working with a developer. There is no need for a Compulsory Purchase process and therefore no impact to this.

NDR

The timescales for the delivery of the NDR are set out in 3.7 below. This part of the project still has to go through its planning processes, CPO and SRO and any possible related Inquiries. The timescales set out are therefore realistic and represent our estimate of when this part of the scheme can be delivered. The proposed changes do not impact on these timescales.

3.4 What are the procurement arrangements for the revised scheme and what, if any, changes have been made from the arrangements or timetable proposed for the original scheme?

For example would any retendering be required? Have you supplied details of your procurement strategy and arrangements to the Department?

The County Council has already entered into a contract with Birse Civils Ltd, who have a proven track record in major highway infrastructure projects and are the preferred contractor for the forthcoming A11 dual carriageway contract for the Highways Agency.

The contract is structured around two stages, the first incorporating input to the design process (Early Contractor Involvement), with the second phase being construction, which has the flexibility to be delivered in stages. The contract is the industry best practice New Engineering Contract (NEC). It utilises Option C – Target Costing, which is developed during phase 1.

There is no need for further tendering processes to be completed and the input to the design process has enabled significant value engineering to be completed, as set out in earlier sections of this bid document.

The contract offers significant flexibility for the County Council, follows best practice and establishes a clear target cost for the works before any construction phases commence.

3.5 Please describe the internal / external expertise & skills that will be assigned to the project to allow for its effective delivery. *This should detail who / what roles will have overall responsibility for the project and what other skills will be available.*

The following table and details are an update from the original MSBC submission:

NDR Project Structure	Name(s)/ Team Leader
Portfolio Holder	Cllr Graham Plant
Project Sponsor	Mike Jackson – Director (NCC)
Project Director/ Senior Responsible Officer	John Joyce – Assistant Director (NCC)
Inquiry Team	David Allfrey – Team Leader (NCC) Chris White – Transport/ Economics (MM) James Montgomery – Environmental Lead and Water Quality (MM) Max Forni – Noise (MM) David Boyland – Air Quality (MM) Ian Hesling-Gibson – Landscape and Townscape (MM) Mark Johnston – Ecology (MM) Nigel Page – Heritage and Archaeology (NAU) John Rhodes – Planning (RPS/Q) Iain Gilby – Solicitor (SS/PM) Heidi Slater – Solicitor (SS/PM) Anthony Porten QC – Legal Counsel Michael Bedford – Legal Counsel
Delivery Board	Mike Jackson (NCC) John Joyce (NCC) Tracy Jessop (NCC) Sandra Eastaugh (GNDD/JCS) Nick Osborne (Birse Civils Ltd) Ann Carruthers (NCC) John Birchall (NCC) David Allfrey (NCC) Gerry Kelly (MM)
Project Manager (including CDM Coordinator)	David Allfrey (NCC)
Deputy Project Manager (incl. Design Manager)	Mark Kemp (NCC)
Design Team	Mark Kemp (NCC) – Overall/ Highways Marcin Kurek (NCC) – Overall/ Highways Shaun Dean (NCC) – Bridges
Construction Supervision/ Contract Administration	Ian Taylor (NCC) – NEC Project Manager Tim Ellis (NCC) – Asst NEC Project Manager

MSBC Manager	David Allfrey (NCC)
Environmental Co-ordinator	Jacqueline Fookes (MM)
Contractor Team	Don Henry (BCL) – Project Director Richard Moore (BCL) – Project Manager Martin Pratt (BCL) – Finance Manager Nick Gibbins (BCL) – Programme Manager
Policy Manager	David Cumming (NCC)
Gateway Review	Angela Hutchings (LP)

NCC – Norfolk County Council

MM – Mott MacDonald

GNDP – Greater Norwich Development Partnership

BCL – Birse Civils Ltd

RPS/Q – RPS Planning and Development (via QUOD Planning)

SS – Shoosmiths/Pinsent Masons

NAU – Norfolk Archaeological Unit

LP – Local Partnerships

In addition to the above, the Joint Core Strategy team is available to advise the NCC team in delivering the project in the strategic context of the JCS. The team has experience of taking the JCS through an Examination in Public, which included working on specific detailed analysis of the NDR and Postwick Hub.

3.6 Please supply a note setting out the governance arrangements for the scheme. *This should also link roles and responsibilities with accountability and arrangements for Reviews as appropriate.*

Norfolk County Council has an excellent and proven track record for delivering major projects. The team is therefore more than capable of ensuring the delivery of this scheme and is rightly proud of its good reputation.

The scheme governance is set out in the original MSBC submission documents (Ref 14) in the ‘Delivery Case’ section 4.1. The ‘project management’ section of that document sets out that:

“ The NDR scheme is a large capital project with a high political profile and stakeholder interest. To properly meet the demands of such a prominent scheme a dedicated team has been identified and will report to the NDR Delivery Board (synonymous with Project Board in PRINCE2 methodology) as shown in Figure 4.1. The presence of a high level Sponsor’s Board ensures that the project sponsors (the DfT and Norfolk County Council through the Cabinet Member for Planning and Transportation) are kept involved in the development of this high profile project.”

Since the submission of that document, the key change is that the procurement process to appoint a main contractor has been completed, hence reference to procurement in figure 4.1 can be ignored.

Other changes to the team, as set out in section 4.2 of the MSBC document have been updated and are set out in section 3.5 above.

3.7 What is the estimated start and completion date of the scheme as now proposed, taking into account any of the impacts described above?

For the purposes of this question assume that decisions on BAFB will be made in December 2011 and that no DfT funding will be available before 2012/13. Please complete the list of milestones below adding any additional ones where appropriate and setting out separate start and completion dates where there are separate elements in the schemes. Please enter "n/a" if not applicable rather than deleting lines.

The dates set out below have been split into two phases for clarity and to indicate the readiness for construction of Postwick Hub.

The early construction of Postwick Hub (in 2012/13) directly facilitates the delivery of a minimum of 1600 new homes (as defined within the Joint Core Strategy) and employment at the new Broadland Gate Business Park and the expansion of the existing Broadland Business Park. In addition, there is immediate employment in delivering the construction work for the Postwick Hub and the associated housing and business park developments.

The timescales for the NDR assume that there will be a public inquiry into the planning process and/or CPO and SRO. They represent the longest necessary timescales to deliver the project, however in view implications to the available budget set out by DfT following the June submission, the County Council would welcome the opportunity to discuss these dates further with DfT if it assists in the overall assessment of the Development Pool.

Milestone	Expected Completion Date
<u>Postwick Hub</u>	
Approval of BAFB from DfT	December 2011
Statutory Orders (Side Road Orders) published	Autumn 2009
Planning Approval (reconfirmed)	August 2011
Public Inquiry Starts	January 2012
Confirmation of Side Road Orders	March 2012
Complete Procurement <i>(include separate elements if appropriate)</i>	n/a (Completed)
Agree works Target Cost	February 2012
Submit Full Approval application to DfT	March 2012
Work Starts on Site	May 2012
Work Completed	November 2013
Opening / commencement of operations <i>(including phases of opening as appropriate)</i>	November 2013
Milestone	Expected Completion Date
<u>NDR</u>	
Approval of BAFB from DfT	December 2011
Submit Planning Application	Autumn 2012
Determination of Planning Application	Winter 2012/13
Statutory Orders published	Winter 2012/13
Public Inquiry Starts	Summer 2013
Agree Target Cost	Autumn 2013
Confirmation of Orders	Spring 2014
Complete Procurement <i>(include separate elements if appropriate)</i>	n/a (Completed)
Submit Full Approval application to DfT	Summer 2014

Site Clearance Works/Mobilisation Start	Autumn/Winter 2014
Work Starts on Site	Spring 2015
Work Completed	Spring 2017
Opening / commencement of operations (including phases of opening as appropriate)	Spring 2017

3.8 What are the key risks to the delivery to this timetable, aside from the availability or otherwise of DfT funding?

Please list the biggest risks (ideally no more than three) that have a potentially significant impact on the timing of the scheme. For each risk please describe its likelihood, quantify the potential time delay, and explain how you are mitigating the risk including how risks are transferred as part of your procurement strategy?

Risk Register

The attached risk register (doc Ref 34) provides details of the range of project risks that the project team have identified. This has been developed as part of the project governance to ensure all risks are managed throughout the life of the project. The most pertinent risks identified in the risk register that are likely to affect the delivery timetable are:

- Postwick Hub – Potential for extended inputs to complete the Side Roads Order process, taking it beyond the programmed duration and therefore delaying the planned start of works.
- NDR – Potential for extended inputs required to complete the planning and statutory orders processes.

Whilst these are identified risks, we nevertheless consider that the quoted delivery dates provide for realistic periods to complete these processes.

3.9 Please indicate the level of allowance you have made within your own budgets to cover the cost of scheme evaluation including your initial estimates of the costs of:

- a) **full scheme impact evaluation**
- b) **pre and post scheme opening monitoring reports**

Please note that funding for scheme evaluation and monitoring will not be available from DfT.

The County Council has extensively monitored transport in and around Norwich over a number of years and the data has highlighted transport trends. Principally, the monitoring is focussed on two cordons around Norwich – the inner ring road and the outer ring road – on which we have counted the numbers of vehicles and cycles (and in the case of the inner ring road, pedestrians) crossing the cordons.

A review has recently been carried out to identify a monitoring programme that can be undertaken within tightened financial constraints. We have made an allowance in our budgets to continue the cordon counts on the Norwich inner and outer ring roads. We will be making use of new technology by using video monitoring to count vehicle numbers as part of an annual review. We will also supplement this with counts of pedestrians and cycles every two years.

We will also make use of data from other sources and publish monitoring information in an annually updated transport monitoring report. For Norwich, this

will include:

- Counts of traffic, cyclists and pedestrians crossing the inner and outer ring road cordons, as described above
- Cycle counts on six main off-road cycle routes (automatic counters, reported annually)
- Bus passenger counts (from operators' ticket sale information, reported annually)
- Rail patronage (from rail station ticket sales, Office of Rail Regulation, reported annually)
- Park and Ride patronage
- Bus reliability (from BusNet data – which currently shows that buses in the north of Norwich suffer greater delays than those in the south).

In addition to the above, the GNDP Partners will jointly produce annual monitoring reports for the Joint Core Strategy and the Greater Norwich Economic Strategy (GNES). Monitoring targets are set out in Appendix 8 of the JCS and in the “GNES Action Plan Performance Management Update”. These include (but are not limited to):

- Housing supply
- Affordable housing completions
- New business registrations
- New retail development
- Job creation

Collectively these existing, budgeted monitoring activities will enable a full evaluation of the impacts of the scheme as part of the authorities' normal working practices.

SECTION 4: FUNDING FOR REVISED SCHEME PROPOSAL

This section is to detail the cost, revenues and funding requirements for your revised proposal as described in Section 2 above. Please quote all amounts in £m to three decimal points (i.e. to the nearest £1000)

4.1 What is your estimate of the total outturn cost of the revised scheme? After taking into account all the proposed changes described in Section 2 above. Do not include any pre-Programme Entry costs. Please provide a breakdown of the total cost, split between different elements of the scheme and separately identify preliminaries, project management, risk and inflation. Please also provide your full cost breakdown as an annex.

£112.523m

(Cost break down included in attached MSBC Addendum report Ref 03)

Base Cost Summary

Base Costs	Value [£m]
Construction Cost	73.7
Land cost	9.0
Preparation Cost	4.4
Supervision	1.0
Base Cost Total	88.1

Construction Cost Breakdown

Element of construction cost	Value [£m]
Preliminaries	13.8
Site Clearance	1.4
Fencing	1.5
Safety Fencing	1.6
Drainage	4.6
Earthworks	9.1
Pavements	13.4
Kerbs and Footways	2.8
Traffic Signs and Road Markings	2.3
Lighting	1.1
Structures	10.2
Landscaping	2.4
Accommodation Works	2.9
Statutory Services	5.0
Environmental Mitigation	1.6
Construction Costs Total	73.7

Quantified Cost Estimate

Quantified Cost Estimate	Value [£m]
Preparatory Costs up to and including 2011/12	9.6
Base costs (incl. Eligible Preparation Costs)	88.1
Quantified Risk Assessment	7.7
Inflation at 2.0%	7.1
Total	112.5

<p>4.2 Please state what inflation assumptions you are using. <i>Inflation rates for different categories (e.g. general inflation, construction cost, operating cost) should be separately identified.</i></p> <p>BCIS and other relevant construction inflation indices show forecast construction inflation to be at a lower level than forecast background inflation from RPI over the 2011 to 2017 period (source: Table M3: Medium Term Forecasts for CPI and RPI, HM Treasury Document).</p>	<p>2% allowance for construction cost, land and preparation</p>
<p>4.3 Please provide a breakdown of the proposed funding sources for the scheme</p>	
<p>(a) Local Authority contribution <i>This needs to cover the difference between the total cost of the scheme as stated above and the total of the requested DfT and agreed third party contributions. It should include the LA costs incurred or expected to be incurred after Programme Entry excluding ineligible preparatory costs as defined by previous guidance. Where a local authority is promoting more than one scheme, please detail the level of contribution required if all schemes are successful as part of this funding process. Please do not include the cost of any Part 1 Claims.</i></p> <p>NOTE: The County Council Cabinet has agreed to underwrite the cost of the NDR to the A1067 – the scheme originally set out in the MSBC of 2008. The allocation shown here represents the pro-rata allocation of the County Council towards the cost of the NDR to the A140. It is essential to also allow an allocation to deliver the NDR from the A140 to the A1067 as this will also enable the delivery of the full scale of growth set out in the JCS and thereby releasing the full potential contribution from CIL.</p>	<p>£22.038m</p>
<p>(b) Agreed third party contributions <i>Please name each contributor on a separate line and provide evidence of agreement (e.g. a letter from the funder outlining the degree of commitment, timing for release of funds and any other conditions etc). Note: you will be required to underwrite all third party contributions should these not materialise.</i></p>	<p>£3.995m (Growth Point funding via GNDP)</p>
<p>(c) DfT funding requested <i>You are reminded that, as set out in the document “Investment in Local Major Transport Schemes” the risk layer cost sharing mechanism is being discontinued and the figure you enter here will, if accepted, be the maximum funding that DfT will provide for the scheme. If you wish eligible preparatory costs (as defined by previous guidance) to be paid these will need to be consolidated within this funding request.</i></p> <p>NOTE: The funding requested from DfT reflects a total contribution. The previous Programme Entry announcement included a provision from DfT for £67.490m plus an additional £5.69m allocated for</p>	<p>£67.490m (Previous Programme Entry allocation)</p> <p>£19.000m (CIF ringfenced allocation)</p>

additional risk layer (ARL) Total £73.159m. The bid is therefore removing this risk from DfT. Whilst this figure is not shown in the various funding details elsewhere in this report, this represents a potential further saving to DfT of £5.66m.

4.4 What is the estimated funding profile.

Assume that no DfT funding will be available before 2012/13. Please specify the third party contributor(s) and list each one (if more than one) on a separate line. Please assume that the DfT and LA contributions will be in the same proportion in each year from 2012/13 and provide an explanation if this is not the case. Although the total level of DfT funding will be fixed, profiles across years may be subject to further discussion and agreement. Please do not include the cost of any Part 1 Claims.

£m	Pre 2011/12	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	Total	%
LA contribution	7.300		1.481	1.982	1.218	4.085	3.406	2.566		22.038	19.6
Third Party contribution - Growth Point	1.600	0.730	1.665							3.995	3.5
CIF funding allocation			10.000	9.000						19.000	16.9
DfT funding requested					9.442	31.655	26.393			67.490	60
TOTAL	8.900	0.730	13.146	10.982	10.660	35.740	29.799	2.566		112.523	100

4.5 If any DfT funding were available in 2011/12 would you be in a position to reach Full Approval and begin claiming such funding and if so how would your funding profile change?

(If appropriate please set out a funding profile similar to that in section 4.4)

We will be able to start construction of Postwick Hub during 2011/12, assuming the Side Roads Order (SRO) Public Inquiry (PI) is started and completed promptly. There are no statutory objections and the objections received are primarily related to planning matters. With the early completion of the SRO PI, we will be able to start the Postwick Hub junction construction works before the end of the 2011/12 financial year.

In this scenario it would be possible to mobilise the works in March 2012. There is therefore potential for between £1m and £2m to be spent within 2011/12 if consideration could be given to pre-ordering materials required for the works.

The profile would be similar to that shown in 4.4 above, except any spend completed in 2011/12 would be deducted from the £9m shown against 2012/13. The allocation of £10m in 2012/13 would not be affected. Exact arrangements for this spending profile could be discussed in more detail if funding in 2011/12 can be made available.

4.6 Please indicate the level of flexibility with regard to the phasing of the local contribution of the bid (including the third party contribution), should the DfT have a need to vary the phasing of its own contribution for budgetary reasons.

Please detail the level of change in DfT support per funding year you could accommodate within the project and from which sources any change would be made up.

This scheme remains the primary transport priority for the County Council and it

forms part of the first priority transport infrastructure within the Joint Core Strategy. Therefore the phasing of the LA funding contributions can be considered to be as flexible as possible as and the County Council would be pleased to discuss flexibility further with DfT if the funding profile requires some amendment once all of the bid submissions have been considered.

4.7 Please set out the efforts you have undertaken to obtain (additional) third party funding and, where appropriate, why it is not available.

The GNDP authorities are committed to introduce a coordinated CIL by summer 2012. The early introduction of a CIL will enable maximum developer contributions to be realised from the substantial planned growth.

Income and expenditure models of CIL are being run and the work has shown that there is a significant funding gap for infrastructure necessary to deliver growth. The NDR and the other major NATS interventions such as BRT are included in this modelling.

The CIL modelling demonstrates that should major scheme funding be significantly reduced, suffer an extended delay or not be forthcoming, CIL would not be sufficient to backfill a shortfall. If the NDR does not progress in a timely fashion it will undermine delivery of the JCS and the potential for growth of the area will not be realised.

Whilst the Transport Minister has announced that there is to be no further 'urban road pricing schemes', the County Council has previously undertake a significant study to consider whether a road congestion charging scheme for Norwich was viable. The outcome of this work was agreed with DfT and it confirmed that such a scheme could not be made to work in Norwich.

In relation to Postwick Hub, the County Council has been able to secure a land contribution from a private developer necessary for the new junction improvement. This developer is also making a £2m contribution via Section 106 arrangements to public transport improvements – the largest single contribution towards public transport investment ever secured by the County Council. An adjacent development also has planning permission and will be making approximately £1.3m in contributions towards public transport improvements.

In the current climate these are real benefits that contribute to the scheme and also to a range of projects that will help to deliver the wider NATS Implementation Plan. Developers will be making major contributions via the CIL mechanism as outlined above.

4.8 Please supply details of likely revenue generated, any ongoing revenue liability associated with the operation of the scheme (other than routine maintenance) and how you intend to fund it. If revenues fall short of those forecast (especially in the early years after implementation) how will these be funded? *(This is of particular relevance to public transport schemes but could apply to package schemes.)*

There are no revenue funding implications related to this scheme except for routine maintenance. These annual costs will be absorbed within the County Councils

overall maintenance budgets.

4.9 Please detail any other funding information you think to be of relevance to the bid

(For example other costs or revenue risks etc being taken by the local authority or other parties but not included within the funding table above.)

None

4.10 Please explain how the Local Authority contribution will be funded.

Explain where local contributions are dependent on a particular source of income and contingency plans if that income is not forthcoming. Please also include any contingency plans for meeting third party costs that fail to materialise.

The County Council, at its April 2010 Cabinet meeting (refer to Ref 09), agreed to underwrite the cost of the funding shortfall for the NDR. This equated to £39.7m at that time and included funding the NDR as far as the A1067. This bid covers the NDR as far as the A140, removing the 6 km section to the A1067. This bid therefore includes the NCC contribution relative to the delivery of the NDR to the A140.

The County Council has the capability to provide the necessary funding through prudential borrowing, which has been confirmed by the Section 151 Officer.

The Growth Point funding is already allocated to the delivery of projects in the Norwich area. This funding is held in accounts managed by the GNDP and is allocated to projects that contribute to Growth. The funding outlined in this bid is therefore based on an already confirmed budget allocation.

The funding for the Local Authority and Third Party contributions is therefore confirmed.

SECTION 5: STAKEHOLDER MANAGEMENT

5.1 Consultation

Please provide a brief overview of the consultation you have undertaken to date with

- (a) the public,*
- (b) statutory environmental bodies and*
- (c) other stakeholders;*

*This should include dates detailing when consultation was carried out
Please also summarise any further consultation you plan to undertake.*

The NDR scheme has undergone extensive consultation throughout its development within the Norwich Area Transportation Strategy (NATS) and this is documented in further detail in the Strategic Case document (Ref 01) that supports this submission.

The key elements of this engagement are:

(a) the public

- Public consultation in 2003 where 140,000 leaflets were distributed to stakeholders and residents in and around Norwich. This was to highlight the preferred NATS strategy which included the NDR. 78% of respondents supported the NDR. Consultation report is at the following weblink:
<http://www.norfolk.gov.uk/Consumption/groups/public/documents/article/ncc072102.pdf>
- Public, stakeholder and statutory environmental bodies (SEB) consultation in 2004 where 130,000 leaflets were distributed. This also included meetings with affected parish councils and was to seek views on the possible routes for an NDR. Consultation report is at the following weblink:
<http://www.norfolk.gov.uk/Consumption/groups/public/documents/article/ncc072103.pdf>
- Public and business consultation October 2009 on the NATS Implementation Plan in the form of exhibitions and a questionnaire. Over 160,000 booklets were distributed to residents by post, with nearly 12,000 responses received. The overall strategy, which includes the NDR, and the support for BRT were over 60% and the city centre proposals over 70%. In addition to this, a separate business community consultation was completed. The NDR was highlighted as the most important scheme within NATS by business, with over 80% agreeing that the Plan would improve the local and regional economy. Consultation report is at the following weblink:
<http://www.norfolk.gov.uk/Consumption/groups/public/documents/article/ncc076886.pdf>

(b) statutory environmental bodies

- Consultation with statutory environmental bodies in 2005 to scope the environmental assessment work to be submitted to the planning authority
- 2007 to 2008, there were meetings and dialogue with Natural England (NE) and the Environment Agency (EA) to discuss and prepare information to inform an Appropriate Assessment for the NDR. February 2008 received a letter from the Environment Agency (EA) on the Draft Appropriate

Assessment (AA) stating that it adequately addressed all the issues set out previously and agreed that the scheme is unlikely to have an adverse impact on the integrity of the Wensum SAC. NE also responded and said that the draft contained a comprehensive assessment of the likely significant effects which were limited to potential impacts on water quality.

- 2007 dialogue with EA on drainage issues. Agreed the use of Sustainable Drainage Systems (SUDS) and confirmed responsibility for future maintenance. Overall the EA was content with the draft drainage proposals.
- 2007 prepared draft species survey reports and consulted Natural England, the Biodiversity Action Plan (BAP) partnership, and the Norfolk Wildlife trust (NWT). A letter from Natural England in Jan 2008 concluded that the survey reports on aquatic invertebrates, deer, badgers, great crested newts, barn owls, over wintering and breeding birds and reptiles were satisfactory. The NWT had no specific comments to make but supported the recommendations for habitat enhancement.
- In May 2008 Natural England (NE) commented on our draft “Bat Survey Report” and expressed concern about the content with respect to Barbastelle bats. A supplementary report was prepared and consulted upon in September 2008. NE considered that the proposed mitigation was adequate for all species except bats and that additional surveys were required.
- Extensive consultation continued with NE during 2009/10 to establish appropriate ongoing survey methodologies for determining bat populations along the NDR route. This work included applications for licenses to trap, radio tag and track Barbastelle bats. An extensive report detailing the bat survey results was prepared to help understand species distribution and sent to EN for their consideration.

(c) other stakeholders

NCC has been in constant contact with directly affected landowners, issues raised by them have been considered and addressed and where appropriate have been incorporated into the Scheme design.

The NDR scheme and the Norwich Area Transportation Strategy (NATS) Implementation Plan have been embodied in the Joint Core Strategy for the Norwich Area which has undergone the full statutory LDF consultation processes.

The JCS underwent an Examination in Public in November 2010, was found sound by the Inspectors, and been adopted by the local authorities in March 2011.

5.2 Letters of support

Please append any letters of support explaining strategic importance of scheme especially from the Local Enterprise Partnership and business groups.

These should detail, where possible, the particular outcomes they believe the scheme will deliver. Where a LEP includes more than one scheme it will be important that they differentiate between schemes, and prioritise if possible.

The Chamber of Commerce has continued to express the concern that some businesses in the Norwich area are either not expanding or are considering leaving Norwich altogether as a consequence of constraints on the highway network. There

are also a number of companies who have said to us directly that their businesses would benefit from the implementation of the NDR.

The Chamber of Commerce has also written again to support the NDR scheme and quotes a number of businesses and what delivery of the NDR means to them. The views of these businesses are also shown in Appendix A to the Strategic Case.

The New Anglia LEP which covers Norfolk and Suffolk has set up a Transport Forum and agreed its most current priorities. It emphasises the critical importance of the NDR scheme to the economic success of the sub-region. The New Anglia letter of support for the NDR is Ref 12.

The most recent consultation with business was during summer 2011 where businesses in Norwich and Norfolk were contacted to get an update on their views on the NDR. To date 32 responses have been received of which 29 were fully supportive. Some of the significant responses are highlighted in Section 11.5 of the Strategic Case document (Ref 01) and a spreadsheet containing fuller details of the individual responses is included as Appendix A to the Strategic Case document.

The consistent messages are:

- The current transport network places additional costs and delay on businesses which makes it hard for them to grow and prosper.
- Some are considering relocating to more accessible location
- The better road links that the NDR provides will be beneficial for economic growth and employment

The response from the newspaper group **Archant** which employs 800 staff and produces the Eastern Daily Press, the Evening News and various other regional publications is a good illustration of a business view and encapsulates most of the issues.

Archant Norfolk – with its stable of newspapers, magazines and websites – is fully supportive of Norfolk County Councils’ bid to the DfT for a proportion of the funding to build the NDR.

The NDR is essential for the economic development of our county. Over the years there has been woeful under-investment in transport infrastructure in Norfolk compared with other parts of the country. Our near neighbours Cambridgeshire and Peterborough have benefited from significant road projects that have reaped dividends for their business communities.

Our county has been treated as a sleepy backwater by successive governments and yet it has the potential to be a vibrant economic powerhouse, capitalising particularly on mixed energy, tourism, advanced engineering and food and agriculture.

Without better road links to the east and north of Norwich it is unlikely we will fully reap the benefits of these opportunities.

5.3 Opposition

Please describe any significant opposition to the proposed scheme, the reasons for this opposition and how you are dealing with their concerns?

Please describe any mitigation measures you have included in your plans in response to these concerns.

There is opposition to the NDR from the Norfolk and Norwich Transport Action Group (NNTAG) and a campaign group Stop Norwich Urbanisation (SNUB) who are against growth in the northeast of Norwich and have opposed the NDR because they have associated it only with the role of enabling growth. However, public consultations have also indicated strong overall support for the NDR from the public and from business.

The main reason for the opposition from NNTAG is that they believe the Norwich Area Transport Strategy should not include the NDR and should rely on public and sustainable transport enhancements alone.

Assessment work on NATS has demonstrated that the NDR is a necessary component of the NATS Implementation Plan and that together they address:

- Traffic congestion causing delay to public transport services
- Constraints on allocated employment development sites
- Transport issues inhibiting business growth
- Providing headroom to accommodate planned growth

This view has also been arrived at by the Inspectors at the JCS EiP. After hearing all of the evidence provided by the objectors, they commented in their final report that they are not convinced that a non-NDR package of transport interventions would be a realistic solution in terms of the necessary infrastructure to support the planned growth in the Norwich area.

SECTION 6: ADDITIONAL INFORMATION

6.1 Please add any additional information that is relevant to your Best and Final Funding Bid that is not covered elsewhere in the form.

The NDR scheme, as an essential element of transport infrastructure, will directly support the planned creation of in excess of 12,000 new jobs at strategic employment sites under the JCS. Up to 40% (approx 5,000) of these jobs could be delivered by 2014 with the balance being delivered by 2017 and with further growth to follow. It is estimated that development of 292,000m² of new business space, will be required to accompany the job creation.

This development is crucial if Greater Norwich is to rebalance the economy toward private sector jobs and attract high value added businesses of the future including the knowledge economy, health and life sciences, advanced engineering, renewables and creative industries. The NDR scheme should be seen as a key enabler in this respect.

The NDR scheme will also stimulate growth in employment opportunities in tourism and local services. Many disadvantaged and benefit-dependent residents of Norwich and the immediate vicinity will be able to take these jobs. We estimate that around 15% - 20% of jobs will be taken by residents in these categories.

There will also be significant job creation in the construction of the 9,800 homes directly related to delivery of the NDR and Postwick Hub, plus the associated commercial development, services and infrastructure such as transport and utilities necessary to deliver this housing growth.

The requested funding for the scheme, totalling £86.49m (£67.49 DfT and £19.00m CLG) provides the potential to unlock growth that as a conservative estimate, based on the above housing and job creation figures and published unit costs, would directly support **£1.3bn** of additional investment in the Norfolk economy and the catalyst to provide for greater private sector jobs for this area.

By unlocking Joint Core Strategy development the NDR scheme will:

- Raise the pace of annual employment growth by about 0.5 percentage points.
- Offer suitable jobs to several thousand people with poor skills at present.
- Raise the trend rate of GVA growth in Norfolk by about 0.5%, progressively raising per capita GVA from its current level of 78.5% of the national average to 83.5% by 2026.

The NDR is part of the NATS package of measures to develop a transport network that responds to existing problems and Issues and also meets the objectives and manages the pressures of significant planned growth.

The NDR is a significant element of NATS, but is only £127m of an overall cost of the NATS package of £342m. Through its work with the GNDR the County Council has identified priorities in NATS to support the NDR to achieve its objectives and to ensure planned growth can occur. This subset of NATS (excluding NDR) cost estimate is £145m and can be funded from predicted CIL income.

So whilst major scheme funding is sought for NDR the majority of supporting interventions that collectively total more than the cost of NDR but are vital to it achieving its objectives will be funded locally. This whole stream of investment is at risk if major scheme funding cannot be secured.

Commitment to delivering NATS - Work already completed and in progress

The adoption of the NATS Implementation Plan in April 2010 has enabled the County Council to secure funding for a range of projects within Norwich in order to improve bus and walking/cycling provision. The focus for this has been in those locations that are not immediately dependent on the NDR to free up the necessary traffic space required. Examples of some of the larger schemes already developed include the following:

- Developing the details of a Bus Rapid Transit corridor in Dereham Road in the west of Norwich. The first phase of this is expected to be delivered during 2011.
- Work has also started in developing the proposals for bus only corridors within the city centre. Part of this work includes involvement with private sector retail/commercial businesses to determine levels of financial support to the project.
- Improvements to the A11 proposed Bus Rapid Transit corridor in the south of Norwich have already been completed in 2010.
- Completion of St Augustine's Gyratory to improve local air quality
- Whitefriars Roundabout and Barrack Street's junction with Silver Road to improve the efficiency of the network
- Continued investment in Park & Ride sites and Bus Station (previously delivered through NATS)

This reflects the County Councils (and its partners) clear determination to ensure an improved sustainable transport system for Norwich in the future. However, without the NDR, these improvements to corridors in the north and east of the city will not be possible.

Further work has also been ongoing with the HA as part of the JCS. A Developer Forum has been initiated to specifically look at the needs of the A11 and A47, in particular where they meet at the A11/A47 'Thickthorn' roundabout junction. Work is also ongoing with HA to review the Longwater junction at the western end of the A47 Norwich Southern bypass.

This strategic approach is an example of the wide ranging work that has been completed and is continuing to be developed as part of the growth agenda to ensure the targets set out in the JCS are achieved.

6.2 Please provide details of any other information that has been submitted to the Department since January 2011 that forms part of your submission *(This should include name of the document and date of submission.)*

Document Title	Date Submitted	Location on Promoter Website
All previous interim documents provided earlier in the bid process are superseded by the following:		
MSBC Strategic Case (September 2011) Appendix A – 2011 Business responses	September 2011	All documents can be accessed using the following link: http://www.norfolk.gov.uk/Travel and transport/Transport future for Norfolk/Norwich Area Transport Strategy/Northern Distributor Road/DfT Development Pool Bid/index.htm
MSBC Economic Case Update (including Value for Money Statement)	September 2011	See link above
MSBC Addendum to 2008 Financial, Delivery and Commercial Case (September 2011) Appendix A – Quantified Risk Assessment	September 2011	See link above
Scheme Plan showing NDR route A47 Postwick to A140 Cromer Road (Drawing Number R1C093-R1-1357A)	September 2011	See link above
Plan showing typical left turn segregation lane removed as part of the proposed scope changes (Drawing Number R1C093-R1-3022)	September 2011	See link above
Sketch proposal showing	September 2011	See link above

A140 Roundabout Junction (Drawing Number R1C093- R1-3021)		
Letter of 21-01-2011 Response from Gleg Clark re CIF	September 2011	See link above
JCS Inspectors Report (February 2011)	September 2011	See link above
NATS IP Cabinet Report (6 April 2010)	September 2011	See link above
NDR Cabinet Report (7 March 2005)	September 2011	See link above
NDR Cabinet Report (19 September 2005)	September 2011	See link above
New Anglia LEP supporting letter	September 2011	See link above
DfT Programme Entry letter dated 8 February 2010	September 2011	See link above
Link to previous NDR pre- Programme Entry work/reports	September 2011	See link above
NATS Options Assessment Report Rev E (August 2005)	September 2011	See link above
Appraisal of Public Transport Alternative Options	September 2011	See link above
Sensitivity Testing of BCR for PT Option	September 2011	See link above
Technical Note on Assessment of PT Options	September 2011	See link above
Position Statement on Development of Public Transport Option Rev A	September 2011	See link above
Alternative Postwick Hub proposals tabled at JCS EIP	September 2011	See link above
PT Local Model Validation Report	September 2011	See link above

Highway Local Model Validation Report	September 2011	See link above
Demand Model Realism Testing Report	September 2011	See link above
Do Minimum Model Assumptions Report	September 2011	See link above
Future Development Assumptions Report	September 2011	See link above
Forecasting Report Main Report (Volume 1) Appendices A to F (Volume 2) Appendices G to M (Volume 3)	September 2011	See link above
Economic Appraisal Report	September 2011	See link above
NDR Supplementary Data Collection Report	September 2011	See link above
Sensitivity Tests Main Report (Volume 1) Appendix for Test 1 (Volume 2) Appendix for Test 2 (Volume 3) Appendix for Test 3 (Volume 4) Appendix for Test 4 (Volume 5)	September 2011	See link above
Economic appraisal – native format electronic files	September 2011	See link above
Existing Data and Traffic Surveys Report July 2007	September 2011	See link above
Risk Register	September 2011	See link above
Appraisal Summary Table, Worksheets and Environmental Constraints Maps	September 2011	See link above

NNDR - Social Distributional Impacts, Full Screening Report August 2011	September 2011	See link above
A47 / A1042 Postwick Interchange General Junction Layout (Drawing Number RIC093-RI-2011C)	September 2011	See link above

Notes:

BAFB Form and Link to the 5 Case Model

The following section provided to bidders to detail which elements of the form relate to the 5 cases used in decision making.

Case	Elements of the BAFB Form
Strategic Case	1.1, 1.2, 1.3, 1.5, 2.1,2.2, 2.4, 2.5, 3.1, 3.2, 5.1, 5.2, 5.3
Financial Case	1.4, 2.2, 2.3, 2.4, Section 4
Economic Case	3.2 (and Appendices)
Management Case	3.3, 3.5, 3.6, 3.7, 3.8, 5.1, 5.3
Commercial Case	3.4, 3.5,3.7,3.8

4.2 Appendix B – DfT confirmation

4.3 Appendix C – Cabinet report and minutes April 2012

Norwich Area Transportation Strategy (NATS) Implementation Plan and Norwich Northern Distributor Route (NDR)/Postwick Hub Update

Report by the Director of Environment, Transport and Development

Summary

This report provides an update on the progress made to date in delivery of the NATS Implementation Plan, adopted by the County Council by Cabinet in April 2010. Some key achievements have already been made and these are included within the report, including delivery of elements of the Bus Rapid Transit corridors, highway improvements and other bus and cycle improvements. In addition, details are provided about forthcoming bids for funding under the Local Sustainable Transport Fund and the Better Bus Area bid.

The NDR, a key element of the NATS Implementation Plan, has been through the Department for Transport's (DfT) Development Pool bidding process. DfT confirmed in December 2011 that it was providing £86.5m towards the cost of delivering the NDR and Postwick Hub junction (which accounts for £19m of the DfT contribution). The report sets out the latest position for both the NDR and Postwick.

Postwick Hub has planning consent and now has a final stage of completing the Public Inquiry for the Side Roads Order. It is expected that this will take until the summer to complete and, if so, there is potential for the works to start by the end of 2012. This would result in a completion of the junction by the Spring of 2014.

The NDR still has to go through its own planning process (and completion of the necessary statutory Orders). It is anticipated that the planning application will be submitted in the Autumn of 2012. A communications plan has been developed to ensure that the public have the opportunity to review the proposals as part of a pre-planning consultation. These exhibitions are set out in the report and are planned between mid-April and mid-May 2012.

Whilst the DfT funding is for the project to the A140, the report also includes details for the section from the A140 to the A1067 and invites Members to indicate whether this should be included as part of the planning application, the timing of its delivery and its funding.

Recommendation

Members are requested to:

- (i) Comment on the delivery of NATS Implementation Plan.
- (ii) Recommend submitting a planning application for the NDR to the A1067.
- (iii) Recommend whether to continue to progress a dual carriageway NDR between the A140 and A1067 as part of the planning submission, or consider a single carriageway option.
- (iv) Recommend delivering construction of the NDR as a single project to A1067, or consider a staged delivery (ie to the A140 first, then to the A1067 at a later date).
- (v) Recommend the forward funding profile as provided in the DfT bid for the A140 NDR project (Appendix A) and for the A1067 NDR (Appendix B).
- (vi) Recommend to continue to underwrite the NDR (value depending on dual or single option between A140 and A1067), but taking note of the GNDP in principle funding of up to £40m towards the NDR and related measures.

1. **Background**

- 1.1. In April 2010 Cabinet approved recommendations to adopt the NATS Implementation Plan, make changes to a small number of NATS policies and approve the application for planning permission for the NDR to the A1067. The report also included an agreement of Cabinet to underwrite the funding shortfall of £39.7m for the NDR by use of prudential borrowing.
- 1.2. Since that time a number of events have taken place that have impacted on the delivery of the project and this report sets those out and provides an update of the current position. It also sets out the work already completed as part of the NATS Implementation Plan delivery and what is planned in the forthcoming period. The Plan is an essential and key element of the economic growth strategy for Norfolk, and is vital in order to achieve LTP targets.
- 1.3. The report asks Cabinet to comment on progress to date with NATS and agree the recommendations made to progress the NDR planning application.

2. **NATS Implementation Plan**

- 2.1. The Implementation Plan identifies a range of transport measures, some of which are only made possible by the NDR.
The key features of the Plan are:
 - A bus rapid transit (BRT) network
 - Improvements to a core bus network as well as integrated ticketing and improved information
 - City centre improvements
 - A package of cycling and walking improvements
 - Specific rail service improvements
 - Smarter Choices initiatives, like travel planning
 - The NDR
- 2.2. Since adopting the plan, a lot has already been achieved and the following schemes have been completed, or are nearing completion:
 - St Augustines Gyrotory
 - A11 Newmarket Road (BRT) bus lane extension
 - Dereham Road (BRT) junction improvement at Barn Road and new bus lane
 - Dereham Road (BRT) junction proposal consultation for Old Palace Road
 - Development of elements of the Rackheath BRT corridor
 - Improved multi-trip/operator ticketing for bus journeys
 - Improved off-bus ticketing facilities
 - Continued work with businesses to develop smarter travel plans
 - Development of a cycling network for Norwich
 - Walking schemes such as Aylsham Rd/Woodcock Rd and Newmarket Rd/Eaton Rd crossing improvements
 - Lady Julian Bridge at Riverside with associated walking/cycle links
 - Cycling schemes including Lakenham Way Cycle Route combined and Improved City Centre Cycle Parking
 - Bus traffic light priority city wide
 - Improved bus shelters through negotiated contract.
 - Castle meadow low emission zone

- Real time car parking information

2.3. In addition to the details in 2.2, work has also progressed on other major projects which are the subject of funding bids. These include:

Local Sustainable Transport Fund (LSTF)

The County Council is bidding for approximately £4.1m of government funding under the LSTF initiative. This includes details for a scheme to deliver two-way bus movements and the removal of general through traffic from Chapelfield North. The scheme will also provide access to/from the Chapelfield shopping centre for deliveries. It includes improvements to the Grapes Hill Inner Ring Road roundabout junction and changes to traffic movements through Westlegate. This provides significant bus priority benefits and journey time and journey reliability improvements for bus passengers. It is hoped that if the bid is successful, the scheme can start construction towards the end of the 2012/13 financial year. The proposals have already been approved by the Norwich Highways Agency Joint Committee.

Better Bus Area

This is a further bid to government for approximately £2.9m for bus related improvements which include some large bus priority capital infrastructure improvements in Norwich. The bid is also likely to include quality bus partnerships on some corridors into Norwich, traffic signal prioritisation, enhanced passenger information and bus stop improvements and enhanced ticketing and bus journey options. The bid was submitted on 24 February and a funding decision is expected by 31 March 2012.

Schemes promoted as part of these bids will be subject to further local consultation before details are taken forward through the construction phases. All details will be considered by the Norwich Highways Agency Joint Committee.

2.4. This is an ongoing delivery programme. Some elements of the Plan are dependent upon the delivery of the NDR and the benefits this brings in reducing traffic levels on key radial routes and on the ring roads. Some City Centre enhancements will need to be considered in the context of traffic reductions made possible by the NDR.

Delivery of the Plan is anticipated to need up to 15 years to fully implement and it is anticipated that there will be a range of funding opportunities that will become available during the period. Part of the funding plan will be the possible use of income generated by the Community Infrastructure Levy (CIL) made possible following the adoption of the Joint Core Strategy.

3. NDR Update

3.1. Department for Transport (DfT) Approval

3.1.1. In the April 2010 Cabinet report, details were provided that set out the approval of the Major Scheme Business Case for the NDR by the Department for Transport (DfT). The report also set out the funding requirements for the project and the need for the County Council to underwrite £39.7m towards the cost of the project. Since

that time, the change of government and the subsequent Spending Review resulted in a need to slow down project delivery and respond to the new requirements set out by government – called the ‘Development Pool’ bidding process.

- 3.1.2. The original funding for 2010/11 was set out at £3.2m, however this was significantly reduced as a result of the spending review to £1.6m part way through that year. A funding allocation of £750k, from Growth Point funds, was agreed for the 2011/12 financial year to complete the DfT bidding process for the NDR and Postwick Hub.
- 3.1.3. This bid was submitted in September 2011 and DfT confirmed in December 2011 that the bid was successful and that Programme Entry status was re-confirmed. DfT have provided a funding allocation of £86.5m, which includes £19m towards the delivery of the Postwick Hub junction. The DfT project assessment is published on their website. It includes a number of positive statements in relation to the project, which still retains a cost benefit ratio of 5.4, representing very high value for money.
- 3.1.4. In their confirmation letter, DfT have set out a requirement for NCC to commit to ‘a funded and programmed package of sustainable transport in the city centre, on the basis of the Norwich Area Transportation Strategy’. This commitment is necessary prior to Full Approval of the project. NCC has an extremely good track record of delivering the NATS Implementation Plan and such a commitment has already been made since the adoption of the Plan (as set out earlier in this report).
- 3.1.5. Discussions have already been held with DfT to establish their requirements in relation to the sustainable transport commitment. This has established a need to develop and publish a tracker that shows the extent of work already completed as part of NATS and what else is planned, when and how it will be funded. This is currently being developed and will be regularly updated.
- 3.1.6. The funding to deliver the NDR and Postwick was set out in the Development Pool bid document. An extract of that profile is included at Appendix A. This sets out that funding of £1.481m for the NDR for the forthcoming year will be necessary. Funding for Postwick Hub will be further balanced through Growth Point funds until the Public Inquiry process is completed and full funding from DfT can be drawn down (see section 4 below).

3.2. **A140 to A1067**

- 3.2.1. The next stage for the NDR is the submission of the planning application. This is programmed for the Autumn 2012. A key decision in taking this forward is the extent of the scheme being promoted. The County Council has made a commitment to deliver the NDR to the A1067 and this is also the scheme set out in the Joint Core Strategy. Our analysis indicates that the benefits of this scheme are greater than those of the scheme that stops at the A140.
- 3.2.2. The A140 NDR scheme is the limit to which government funding will be provided. This was as set out in the original Programme Entry for the Scheme (confirmed in 2010) and also as part of the Development Pool process (and was therefore the scheme that DfT asked the County Council to submit).
- 3.2.3. Cabinet can decide which scheme should be taken forward to planning. It is clear that the A1067 NDR is consistent with the JCS and also provides greater economic

benefits. However, in order to keep the costs of the section from the A140 to the A1067 within reasonable limits of the overall budget it would be necessary to consider this section as a single carriageway, rather than dual, as originally proposed. The decision to change to a single carriageway would also enable the delivery of an at-grade junction at the A140 – something that DfT also requested that the County Council investigated as part of its funding bid. A dual carriageway would most likely require a grade separated junction (as previously proposed) due to the additional traffic demand and the necessary structures for this make it significantly more expensive.

3.2.4. In addition, the section of the A140 to the A1067 has some of the more significant environmental mitigation requirements, particularly for bats. The dual carriageway scheme would require more substantial bat bridges whereas a single carriageway could possibly adopt less expensive alternatives.

3.2.5. In view of the details in section 3.2.1 & 3.2.4, Members need to decide:

- Should the NDR planning application be for Postwick to the A140 or Postwick to the A1067
- Should the section from the A140 to the A1067 be single carriageway or dual carriageway

Depending on this decision, further work will need to be completed to assess whether the A140 junction could be promoted as an at-grade roundabout design with a dual carriageway from the A1067, which takes account of the cost reduction exercise required by DfT for this junction.

3.2.6. There is scope to stage the delivery of the NDR. The A140 to A1067 section could be delivered at a later date following completion of the NDR to the A140. However, the immediate benefits of the section to the A1067 would not be realised and the costs of a later scheme would be higher as it would require a further contract stage and would need to allow for additional mobilisation costs for the works. It would also lose the economies of scale effect that is gained from delivering the scheme as one. It is therefore recommended, subject to establishment of funding, that the scheme is taken forward as one to the A1067.

3.2.7. The costs of delivering a scheme to the A1067 are estimated to be £30m for a single carriageway and £40m for a dual carriageway and are in addition to the costs set out in Appendix A (which is only for the DfT scheme to the A140). Significant efforts have been made to constrain the costs, however the delays to the project have created inflationary impacts.

3.3. **Funding**

3.3.1. The County Council has previously underwritten £39.7m towards the NDR (agreed by Cabinet in April 2010). The Greater Norwich Development Partnership (GNDP) has agreed in principle a commitment to provide up to £40m towards the cost of the NDR and related measures, as priority 1 key infrastructure projects essential to delivering the objectives set out in the JCS.

3.3.2. A new delivery funding profile for the scheme to the A1067 is shown at Appendix B. It includes the early estimates for the additional cost of the A1067 project and an

indication of the funding that the County Council will need to underwrite. The two tables provided set out a total cost to deliver the project to the A1067, one assuming a dual carriageway to the A1067, the other a single carriageway. Detailed cost information for the section from the A140 to A1067 is still to be finalised. The tables indicate the cost to deliver the scheme from April 2012 to construction completion.

- 3.3.3. The figures provided also assume that the A1067 scheme is delivered as part of the A140 project. This minimises the overall construction costs, however there is potential to delay the delivery of the section to the A1067, but this would increase the total project costs. Additional works mobilisation, loss of economies of scale and balance of materials usage, purchasing power, and possibly re-procurement would add to delivery costs. There would also be an additional inflation impact which would depend on the period between delivering the A140 project and completing the A1067 section.
- 3.3.4. As set out in Appendix B, it is anticipated that the cost of a dual carriageway scheme from the A140 to the A1067 will require approximately an additional £10m of investment compared with a single carriageway scheme. This is due to the additional carriageway and earthworks construction, but also due to the more significant environmental mitigation measures that are necessary for a dual carriageway option between the A140 and A1067, and the potential additional cost of a grade separated A140 junction. There is a risk that further work on these elements will increase the overall project costs. In addition, Members should be aware that the NDR to the A140 will cost some £101m from now of which the County Council needs to underwrite approximately £13m, but the full cost of the A140 to A1067 section will be borne by the County Council.

3.4. Delivery Timescales

- 3.4.1. Assuming the recommendations set out in this report are taken forward, the programme for delivering the NDR is set out below:

Milestone	Expected Completion Date
NDR	
Approval of BAFB from DfT	December 2011
Submit Planning Application	Late 2012
Determination of Planning Application	Spring 2013
Statutory Orders published	Spring 2013
Public Inquiry Starts	Late Summer 2013
Agree Target Cost	Autumn 2013
Confirmation of Orders	Spring 2014
Submit Full Approval application to DfT	Summer 2014
Site Clearance Works/Mobilisation Start	Autumn/Winter 2014
Work Starts on Site	Spring 2015
Work Completed	Spring 2017
Opening / commencement of operations	Spring 2017

- 3.4.2. Prior to the planning application submission, set out in the table above, there is a need to complete a planning pre-consultation exercise. A communications plan has

been developed to support this process and a series of exhibitions are planned in April and May 2012. These are:

19 Apr 12	Rackheath	12:00-19:30	Holy Trinity Church Hall
23 Apr 12	Taverham	12:30-19:00	Taverham Village Hall
26 Apr 12	Sprowston	12:00-19:30	Parish Council Offices
30 Apr 12	Horsford	12:00-19:30	Horsford Village Hall
02 May 12	Spixworth	12:30-19:00	Spixworth Village Hall
04 May 12	Postwick	12:00-19:30	Postwick Village Hall
08 May 12	Great Plumstead	12:00-19:30	Gt Plumstead Village Hall
11 May 12	Horsham st Faith	12:00-19:30	St Faith's Centre

4. **Postwick Hub Update**

- 4.1. In the April 2010 report to Cabinet, the planning consent for Postwick Hub had been granted and a decision whether or not a public inquiry into the Side Roads Orders (SROs) was still awaited. The scheme has moved forward since that time as set out below.
- 4.2. The planning consent was the subject of a legal challenge. This was largely focussed on procedural issues relating to the planning process and the way information was presented to the Planning Committee. A decision was taken to accept the legal challenge and request the courts quash the planning consent, such that an updated application could be re-presented to the Planning Committee.
- 4.3. This happened in August 2011 and planning permission was granted again in October 2011 (following completion of signing the necessary land and Section 106 agreements). A further legal challenge period of 3 months has since elapsed and no challenges have been received and therefore the planning consent is now confirmed.
- 4.4. It is worth also noting that the planning consent decision was also referred to the Secretary of State (SoS) to determine whether the planning permission should be the subject of a public inquiry. The SoS determined that an inquiry was not required.
- 4.5. In addition to the updated application for the Broadland Gate/Postwick Hub scheme, an application was also submitted for the Brook Farm development. This includes the extension of the existing Broadland Business Park and a new housing development of 600 properties just north of the business park.
- 4.6. Planning consent has also been granted for the Postwick Park and Ride extension. As part of the DfT Development Pool bid process however, a decision has been taken to deliver the access road element of the Park and Ride (P&R) site as part of the construction of the Postwick Hub junction improvement and defer the delivery of the additional parking spaces until approximately 2015 (depending on demand for additional spaces at the site). This rationale was set out in the bid and accepted by DfT as part of that process. It provides sufficient flexibility to deliver the P&R

extension to meet demand.

- 4.7. A decision regarding the need for a public inquiry into the SROs was also taken by the Secretary of State (SoS). In making this decision the SoS determined that even though there were no statutory objectors, the number of non-statutory objections were sufficient for the SoS to decide that a public inquiry should be held.
- 4.8. As part of the spending review announcement, initially Government confirmed that no new public inquiries would be instructed. This position has since changed and now that the funding of the project has been re-confirmed, following the DfT Development Pool announcement, the public inquiry process has now commenced.
- 4.9. The County Council is working with the Highways Agency (HA) to progress the inquiry. The HA are leading this process as the SROs have been published by them because the junction is linked to their network (ie the A47 southern bypass). Due to the delays in moving forward with the public inquiry, a further round of publishing the orders (ahead of the inquiry process) is reasonable to ensure objectors have the opportunity to maintain or withdraw their objection and to ensure they have sufficient time to prepare for the inquiry. This re-advertising/posting of the notices process will be completed by the end of March 2012.
- 4.10. The timescales for the delivery of the Postwick Hub project are set out below:

Milestone	Expected Completion Date
Postwick Hub	
Statutory Orders (Side Roads Orders) published	Autumn 2009
Planning Approval (reconfirmed)	October 2011
Approval of BAFB from DfT	December 2011
Re-advertise Side Roads Orders	February 2012
Public Inquiry Starts	Summer 2012
Agree works Target Cost	Summer 2012
Submit Full Approval application to DfT	Late Summer 2012
Confirmation of Side Road Orders	Autumn 2012
Work Starts on Site	Late 2012
Opening / commencement of operations	Spring 2014

- 4.11. Funding the Postwick Hub junction works will be via a £19m allocation from DfT – set out in their funding approval following the Development Pool announcement. This however cannot be drawn down until the public inquiry process has been completed. Prior to this, funding towards the P&R extension works (ie delivery of the new access) from Growth Point will be utilised to support the project delivery through public inquiry. This therefore means that the County Council will not be required to find funding towards Postwick Hub during 2012/13.

5. **Joint Core Strategy (JCS) Legal Challenge**

- 5.1. The JCS completed its examination in public late in 2010 and was adopted by the Local Planning Authorities (Norwich City Council, Broadland District Council and South Norfolk District Council) in March 2011. Since its adoption, a legal challenge was submitted and this has been heard at the High Court (in December 2011).
- 5.2. The Judgement following the High Court has dismissed the challenge in relation to the NDR, but it does uphold the challenge regarding the JCS Sustainability Appraisal (SA) and the assessment of the 'growth triangle', in particular the

assessment and presentation of housing allocation options.

- 5.3. At a further hearing on Wednesday 29th February the judge ruled that the elements of the JCS that related to Growth in Broadland part of the Norwich Policy Area (NPA) including the North East Growth Triangle are remitted back to pre submission stage and cannot be treated as adopted. This means that further work will need to be carried out to ensure that the SA is in compliance with the European Directive. Following that the remitted elements of the plan would need to be published and then submitted to the Secretary of State for examination in public. It is estimated this process could take 12 months to complete. It should be noted that the Judge did not quash any element of the JCS. The JCS remains adopted, overall housing totals remain for the NPA and only the wording relating to growth in Broadland part of the NPA including the North East Growth Triangle are remitted back to pre submission stage. The exact wording is set out in a schedule that accompanies the court Order.

6. **Resource Implications**

- 6.1. **Finance** : The financial details for the project are set out in the main text of the report above. The profile to deliver the project from 2012 to 2018 is shown at Appendix B. This shows the cost to take the project forwards from this point, with a total value of £131.5m to deliver Postwick Hub junction and the rest of the NDR to the A1067 with a single carriageway to the west of the A140, or £141.5m for a dual carriageway. The funding is comprised of £86.5m from DfT, £1.67m of Growth Point funding and a balance of £43.33m (single A1067 section), or £53.33m (dual A1067 section) which will be covered by the NCC underwritten funding, supported by a commitment in principle by the GNDDP to provide up to £40m of funding towards the NDR and related measures, as priority 1 key infrastructure projects in the Joint Core Strategy.
- 6.2. **Staff** : Staffing levels for the NDR project were significantly reduced as part of the Spending Review process. Following confirmation of funding from DfT a team capable of delivering the NDR is being developed with the necessary support provided by partners Mott MacDonald. It is anticipated that this team will be in place during March to enable the projects to be delivered to meet the programme set out in this report.
- 6.3. **Property** : Land acquisition for the NDR and Postwick Hub has continued. This is supported where necessary by CPO (for the NDR). Postwick Hub land has been agreed. These costs are included in the overall project costs.
- 6.4. **IT** : Additional PC's are required to support the NDR team. This has been organised and does not require the purchase of additional equipment as it is being drawn from storage.

7. **Other Implications**

- 7.1. **Legal Implications** : NP Law have been engaged as part of the project team to support and manager the specialist legal advisors also appointed.
- 7.2. **Human Rights** : None
- 7.3. **Equality Impact Assessment (EqIA)** : An EqIA has been completed for the NATS Implementation Plan and includes the NDR and Postwick Hub.

- 7.4. **Communications** : A communications plan has been developed that includes Member briefings (already completed), briefings with affected Parish Councils and a series of Exhibitions in late April/early May that form part of the pre-planning consultation for the NDR. The plan identifies key stakeholders and mechanisms for making/maintaining communication and will continue to evolve and adapt as the project progresses.
- 7.5. **Health and safety implications** : Nothing at this stage, however detailed Health and Safety plans are being developed under the Construction, Design and Management Regulations that apply to all construction projects. A Health and Safety Executive (HSE) project notification has been issued for Postwick Hub and the NDR.
- 7.6. **Any other implications** : Officers have considered all the implications which members should be aware of. Apart from those listed in the report (above), there are no other implications to take into account.

8. **Section 17 – Crime and Disorder Act**

- 8.1. Requirements of the Act as it relates to the design and operation of the NDR and other NATS schemes will continue to be taken into account in the development of the project.

9. **Risk Implications/Assessment**

- 9.1. In the context of the NATS implementation plan, key risks associated with the NDR and other NATS schemes are around funding (for NATS IP projects) and planning and other statutory processes for the NDR and Postwick Hub. The scale and complexity of the project means that there are significant risks around cost and timescale, which are being closely managed through active project management and ongoing engagement with the GNPD, government bodies and specialist advisors.

10. **Overview and Scrutiny Panel and Norwich Highway Agency Committee Comments**

- 10.1. Environment, Transport and Development Overview and Scrutiny Panel (ETD O&S Panel) at its meeting on 14 March 2012 reviewed the recommendations set out in this Cabinet report. It was formally proposed that a single project that included a dual carriageway between the A140 and A1067 should be taken forward and that this should be completed as soon as possible. This proposal was put to a vote and received 14 votes for, 1 against, with no abstentions. A question was also raised about what would be done to ease concerns about rat-running and it was confirmed that this would be considered as part of the planning process for the project.
- 10.2. Norwich Highway Agency Committee (NHAC) at its meeting on 22 March 2012 confirmed, by a vote of 4 for and 0 against, to support the recommendations within the report for Cabinet to consider. A point was raised in regard to the LSTF bid and that whilst NHAC has agreed to the principle of the Chapelfield North scheme, they do expect there to be a consultation on the scheme and the results of that presented to a future NHAC meeting.

11. **Alternative Options**

- 11.1. Alternatives to the NDR have been examined through the Major Scheme Business Case process and further examination by DfT as part of the Development Pool bidding process. The Postwick Hub has been developed following examination of numerous alternatives and the current proposal is the only one that meets HA design standards, has planning approval and resolves the significant site constraints.

12. **Reasons for Decision**

- 12.1. The NDR is an essential element of the NATS Implementation Plan and forms a key part of the Joint Core Strategy for the Norwich Policy Area. The decision to continue the project and complete the road to the A1067 is essential to be able to realise the full benefits of the Implementation Plan and to accommodate future growth in housing and employment, which are essential to economic growth in Norfolk and vital to achieving LTP targets.

Recommendation

Members are requested to:

- (i) Comment on the delivery of NATS Implementation Plan.
- (ii) Recommend submitting a planning application for the NDR to the A1067.
- (iii) Recommend whether to continue to progress a dual carriageway NDR between the A140 and A1067 as part of the planning submission, or consider a single carriageway option.
- (iv) Recommend delivering construction of the NDR as a single project to A1067, or consider a staged delivery (ie to the A140 first, then to the A1067 at a later date).
- (v) Recommend the forward funding profile as provided in the DfT bid for the A140 NDR project (Appendix A) and for the A1067 NDR (Appendix B).
- (vi) Recommend to continue to underwrite the NDR (value depending on dual or single option between A140 and A1067), but taking note of the GNDP in principle funding of up to £40m towards the NDR and related measures.

Background Papers

County Council Cabinet report dated 6 April 2010.

Officer Contact

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Appendix A

Project costs as defined following completion of DfT Development Pool bid process.
Note that figures below relate to NDR scheme to A140 only (as required by DfT).

£m	2012/ 13	2013/ 14	2014/ 15	2015/ 16	2016/ 17	2017/ 18	2018/ 19	Total
LA contribution	1.481	1.982	1.069	3.584	2.988	2.251		13.355
Third Party contribution - Growth Point	1.665							1.665
CIF funding allocation (Postwick Hub)	10.000	9.000						19.000
DfT funding allocation			9.442	31.655	26.393			67.490
TOTAL	13.146	10.982	10.511	35.239	29.381	2.251		101.510

Appendix B

Project Delivery - Financial profile for Single Carriageway (A140 to A1067)

	Financial Year								
	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19		Total
Capital Spend Profile with identified funding sources shown below									
DfT			9.44	31.67	26.39				67.50
Postwick Hub CIF Funding	10.00	9.00							19.00
Growth Point Funding	1.67								1.67
NCC (LA Contribution) – Supported by GNDP funding up to £40m	1.48	2.02	9.10	9.50	13.50	7.73			43.33
TOTAL	13.15	11.02	18.54	41.17	39.89	7.74			131.50

Project Delivery - Financial profile for Dual Carriageway (A140 to A1067)

	Financial Year								
	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19		Total
Capital Spend Profile with identified funding sources shown below									
DfT			9.44	31.67	26.39				67.50
Postwick Hub CIF Funding	10.00	9.00							19.00
Growth Point Funding	1.67								1.67
NCC (LA Contribution) – Supported by GNDP funding up to £40m	1.48	2.02	9.10	9.50	17.50	13.73			53.33
TOTAL	13.15	11.02	18.54	41.17	43.89	13.73			141.50

4.4 Appendix D – Cabinet report November 2013 including funding profile

Norwich Area Transportation Strategy (NATS) Implementation Plan and Norwich Northern Distributor Route (NDR) Update

Report by the Director of Environment, Transport and Development

Summary

The implementation plan for the Norwich Area Transportation Strategy (NATSIP) was agreed by Cabinet in April 2010. The plan sets out the range of transport measures, together with their general intended phasing, for delivery over the short to medium term. Good progress has been made delivering the plan. It has now been updated to take account of what has been delivered since 2010, and to reflect the latest position on future scheme delivery, given progress with implementation, and now that the growth plans for the area are more clear.

The update is not a new plan. Rather, it takes account of progress with scheme delivery, outlines the relationship between NATS schemes and the wider growth and development agenda, and takes account of the implications of emerging funding opportunities including the Community Infrastructure Levy. The major difference between the NATSIP adopted in 2010 and the update is in the phasing of delivery of the schemes. For example, the recent government awards of funding for better Bus Area and Cycle City Ambition has allowed significant acceleration of delivery on schemes.

The key features of the Implementation Plan are also unchanged and include city centre improvements; a bus rapid transit (BRT) network; a core bus network, integrated ticketing and information; a package of cycling and walking improvements; specific rail service improvements; "Smarter Choices" initiatives, like travel planning; major road network; the Northern Distributor Road.

The Implementation Plan is included as Appendix A. It sets out the overall basis for scheme delivery across the Norwich Policy Area over the next 10-15 years. A detailed, two-year programme of schemes for delivery will be rolled-forward each year, which Members will be asked to agree annually as part of the annual Local Transport Plan capital programme.

The NDR update at section 3 includes details following completion of the Nationally Significant Infrastructure Project (NSIP) consultation (see Appendix B). It sets out some minor changes to the NDR project as a result of the consultation. It is proposed that the finalised NDR project will be submitted to the Planning Inspectorate in late November/early December 2013.

Having also completed the consultation and finalised the details of the NDR, an updated cost profile for the project is included (see Appendix C). This now incorporates the additional costs of the roundabout at Fir Covert Road and the airport radar replacement, which were reported and agreed at Cabinet in September, which combined have added £2m to the overall project costs.

Recommendation / Action Required

- i) Cabinet is asked to adopt the updated NATS Implementation Plan.
- ii) Cabinet is asked to agree the revised NDR cost profile.
- iii) Cabinet is asked to confirm it is content for the Development Consent Order for the finalised NDR scheme to be submitted.

1. **Background**

- 1.1. The Norwich Area Transportation Strategy (NATS) was first adopted by the local authorities in the area in 1975, continuously evolving and delivering improvements since then. NATS4, the latest version of the Strategy, was adopted in 2004 and its Implementation Plan was adopted in March 2010.
- 1.2. NATS4 and its Implementation Plan were developed alongside and deliver the transport element of the wider sustainable development agenda for the Norwich area as expressed in the Joint Core Strategy (JCS) and the Greater Norwich Economic Strategy. Integration of these strategies has been greatly aided by the close working relationship between the County, City and District Councils through the Greater Norwich Development Partnership.
- 1.3. NATS4 provided a baseline for the development of the JCS. The more detailed proposals in the Implementation Plan were developed alongside the JCS to support its policies and proposals. This was a two way process and the opportunity was taken in 2010 to realign a number of NATS policies with the JCS. The JCS was submitted in late 2009 and adopted in March 2011, although following a legal challenge, part of the JCS relating in particular to the North East Growth Triangle was remitted. This text was re-submitted and was subject to an examination in public beginning in May 2013. The Greater Norwich Economic Strategy was also developed in the same period and adopted in 2009. These strategies complement and support each other to deliver sustainable development across the area.
- 1.4. The NDR progress was updated in a report to Cabinet in September 2013. This set out that the project, a key element of the NATSIP, has been confirmed by the Secretary of State as being of national significance. This has enabled the project, following an earlier decision by Cabinet in December 2012, to continue to complete the necessary Nationally Significant Infrastructure Project consultation process, which commenced in July 2013 and closed on 20 September. This report therefore provides an update on the findings of the consultation and the changes that have been made to the NDR project as a result of the consultation. This has also enabled the NDR project to be defined in its final form prior to submission to the Planning Inspectorate in late November/early December 2013. An updated cost profile for the project has been developed.

2. **Updated NATS Implementation Plan**

- 2.1. The Plan has now been updated to take account of what has been delivered since 2010, and to reflect the latest position on future scheme delivery given progress with implementation and that the growth plans for the area are more clear.
- 2.2. Work on the update shows that overall the County Council and its various partners have delivered NATSIP as originally envisaged, and that future delivery will continue to roll-out the plan as agreed in April 2010. That is, there have been no substantive changes to the content of the plan, either in its delivery to date, or its planned future delivery.
- 2.3. The only change is to the phasing of schemes within the plan. The reduction in available funding for transport over recent years, through the Local Transport Plan, has resulted in some schemes having to be put back. However, it has been possible

to bring forward some schemes in the plan for earlier delivery, such as the measures currently being undertaken as part of our successful bid for Better Bus Area funding. Similarly, the recent successful Cycle City Ambition Grant secured £3.7m of government funding and will allow acceleration of schemes to upgrade cycling infrastructure across Norwich, including an eight-mile route through the city centre linking people with growth areas from the Norwich Research Park to Heartsease.

- 2.4. The plan has been developed to deliver the required step-change in transport provision to realise the full potential of NATS and cater for the transport needs of a vibrant and growing regional centre. The timing of some transport schemes is therefore dependent on the timing of when major growth comes forward. The timing of the delivery of the major housing and jobs growth, which is largely outside the council's control, has affected the timing of delivery of some of the individual schemes as part of the plan.
- 2.5. Looking forward, many elements of the plan's delivery will continue to be contingent on the timing for when growth comes forward, or when funding becomes available. Whilst the plan sets out the overall basis for transport delivery, the exact phasing may change due to these factors. Members will be asked to agree the detailed programme of schemes in the normal way, as part of the overall countywide annual capital programme, which is agreed each year, and in response to ad hoc funding opportunities.
- 2.6. The key features of the Implementation Plan are:
 - City centre improvements
 - A bus rapid transit (BRT) network
 - A core bus network, integrated ticketing and information
 - A package of cycling and walking improvements
 - Specific rail service improvements
 - Smarter Choices initiatives, like travel planning
 - The highway network
 - The Northern Distributor Road.
- 2.7. A copy of the updated NATS Implementation Plan, intended as a stand-alone document is attached as Appendix A. It was reported to ETDOS Panel and the Norwich Highways Agency Committee (NHAC) in September. Panel and NHAC were asked to recommend the updated plan's adoption to Cabinet. Both meetings had similar discussions about the updated NATS Implementation Plan where Members discussed some of the detailed aspects of the plan; particularly in relation to their views regarding the city centre proposals. Members were reminded that the plan is not a new plan, but an update of the Implementation Plan agreed by Cabinet following extensive public and business consultation. Further detailed work to examine the implications of individual measures would be undertaken as and when these proposals are taken forward, at which point there will be opportunity for further Member engagement and discussion. It is anticipated that a further update of the plan will be done – on a similar basis to this one – in another three years as appropriate. At the Panel meeting, members also agreed that they would like to see the NDR construction started as soon as possible and therefore agreed April 2015 as their expected start date.

3. **NDR update**

3.1. As reported to Cabinet in September 2013, the NDR NSIP consultation process has continued following confirmation by the Secretary of State that the project is of national significance. The consultation closing date was originally set as 20 September, however due to issues associated with correct identification of some landowners and some requests for additional time to respond, there was some added provision of time provided for some of the consultees. The details of the results of the NDR consultations have been collated and summarised in Appendix B to this report. These details are important in informing the final version of the NDR scheme that will be submitted under the Development Consent Order process to the Planning Inspectorate in late November/early December.

3.2. The main points to note from the consultation are that the NDR scheme as proposed has not changed significantly, however there are some minor detail changes that have been made in response to the feedback received. Specifically the proposal to include a roundabout at Fir Covert Road as well as at the A1067 Fakenham Road junction has been adopted as part of the final scheme proposals. The NDR remains dual carriageway throughout its length, including the section from Fir Covert Road to the A1067, which was a specific point considered through the consultation and which received overwhelming support from those who responded.

3.3. Other more detailed changes made include:

- changes to drainage lagoons size and positions
- widening of certain private means of access tracks
- new agricultural accesses to fields
- minor amendments to the horizontal alignment of the Holt Road/Drayton Lane Roundabout
- amendments to the Norwich Aeropark and Petans access from the Airport Roundabout
- changes to detailed planting proposals on earth bund to the north of Beeston Lane

Due to the relatively minor nature of these changes, they have a broadly neutral impact on the project costs and therefore there is no change in the overall cost profile as a result of these changes.

3.4. In summary, the consultation has helped inform the final development stages of the NDR scheme. Whilst some changes have been made, they are not considered to be significant and have not had a major impact on the cost of the project. It is therefore proposed to submit the final NDR scheme with the minor changes included to the Planning Inspectorate to ensure the NDR delivery programme, as set out in the September Cabinet report remains broadly on target, with construction due to start in the Spring of 2015.

3.5. The costs of the NDR scheme have been updated as a consequence of finalising the details for submission to the Planning Inspectorate and the detailed cost profile is included at Appendix C. This profile was last update in the April 2012 Cabinet report. The key changes since then have been an addition of £5m agreed by Cabinet in December 2012, following completion of the 2012 consultation, and the more recent costs added (September 2013 Cabinet) for the Fir Covert Road roundabout and airport radar, that add a further £2m.

- 3.6. It should also be noted that the spend profile has also been adjusted to take account of the NSIP process, which has required more 'front end' work to deliver the planning application and this is therefore different to that which was set out in April 2012, which pre-dated the decision to follow the NSIP process. The main change in respect of this therefore is that the 2013/14 NCC costs have increased from £2m to £3.55m, however, correspondingly, the 2014/15 costs have been reduced by the same amount (i.e. £1.55m). There is no cost increase to the project as a consequence of the NSIP application, just a change to the spend profile.
- 3.7. The overall cost of the project has therefore changed and this is now £148.55m. The spend profile at Appendix C also reflects the timing of the draw down of the DfT funding for the Postwick Hub junction, which is anticipated to be able to commence in Spring 2014, but is subject to the Secretary of State confirming the Side and Slip Road Orders.
- 3.8. At its 16 September 2013 meeting, Council received a motion requesting that; 1) Subject to the outcome of the current consultation, submit an application for a Development Consent Order under the Planning Act 2008 in respect of the NDR as proposed, to allow the scheme to be implemented as soon as possible; and 2) Commission a report on the feasibility of providing a link across the Wensum Valley from the A1067 to the A47 southern bypass. In response, Cabinet set out that it remains committed to the delivery of the NDR from Postwick to the A1067 and would like to see this delivered as soon as possible. In addition, a feasibility study into possible connections between the A1067 and the A47 west of Norwich was agreed by Cabinet, with an expectation that Members and other stakeholders will be consulted on the scope of the feasibility study as soon as resources allow, accepting that key resources were currently focussed on delivering the first part of the motion.

4. **Resource Implications**

- 4.1. **Finance:** Funding for the Plan will come from a variety of sources, including the Local Transport Plan allocation, funding from developers, or through the Single Local Growth Fund and other opportunities such as any government funding bids. Implementation will be phased over 10-15 years as funding becomes available. The implementation plan has been largely designed around this phased approach although some of the larger schemes will require larger chunks of funding. The council is working with partners on how to deliver such schemes, including through its work on City Deals and the Single Local Growth Fund (SLGF). A NATS public transport package and Norwich Southern Bypass junctions have been identified as priorities for part-funding from the local major transport scheme element of the SLGF.
- 4.2. The County Council has previously agreed to underwrite £53m of the cost of the NDR, with the GNDP having committed in principle to provide up to £40m. In addition, in December 2012, Cabinet also agreed to add a further £5m of project cost following the results of the community consultation and associated changes to the project. DfT has also recently confirmed that any of the government funding for the project (amounting to some £86.5m in total) that extends outside of the current spending review period (i.e. 2015), will be paid to the Local Enterprise Partnership as part of the Local Growth Fund. Government will provide further detail of any further approval requirements for the release of these funds.

- 4.3. **NDR cost profile update:** The impact to the NDR of the changes made to finalise the scheme ready to submit to the Planning Inspectorate in November/December have been set out in section 3 above. The revised profile is therefore included in Appendix C and this shows a change of £2m to the overall cost of the NDR, amended to £148.55m. As set out above, there was previous agreement to underwrite £58.33m (£53.33m + £5m), with £40m committed in principle from the GNDP. The new profile therefore requires that Cabinet approve a revised underwritten amount of £60.34m.
- 4.4. **Staff:** Staff across the ETD Strategic Partnership and partners – particularly Norwich City Council – will be involved in taking the Plan forward for delivery. The NDR project continues to be staffed from the ETD Strategic Partnership and Birse Civils Ltd. For specific schemes, the feasibility, consultation and scheme delivery will be met from existing resources. A team capable of delivering the NDR and Postwick Hub has been identified and has the necessary support provided by partners Mott MacDonald.
- 4.5. **Property:** No implications arising from the Plan update. Implications may arise from specific scheme as they are brought forward for delivery. Landowner negotiations and land registry checks are continuing in relation to the NDR.

5. **Other Implications**

- 5.1. **Equality Impact Assessment (EqIA):** An EqIA was completed for NATSIP 2010. This has been reviewed and refreshed for the updated plan. It identified that transport is a major concern for key groups including disabled and older people. To mitigate negative impacts the implications should be considered in detail as and when projects are taken forward.
- 5.2. **Communications:** All appropriate communications will be undertaken as NSIP schemes undergo feasibility and delivery. A communications plan has been developed for the NDR and it identifies key stakeholders and mechanisms for making/ maintaining communication and this will continue to evolve and adapt as the project progresses.
- 5.3. **Health and Safety Implications:** The NDR and some NATSIP projects are subject to the Construction (Design and Management) Regulations (CDM) and the schemes are regularly assessed in accordance with these regulations by an appointed CDM Coordinator.
- 5.4. **Environmental Implications:** A Strategic Environmental Assessment was undertaken on NATSIP prior to its adoption in 2010. As it is not a new plan, and the only thing that has changed is to the phasing of schemes within the plan it is not intended to update the Strategic Environmental Assessment as the original remains fit for purpose. The statutory environmental bodies have been consulted on this proposed approach. One response was received, from Natural England, who agreed that the phasing of schemes within the plan is unlikely to result in a significant environmental effect.

The NDR project has included significant work in completing Environmental Impact Assessments and details of these will be included as part of the formal consent order process.

5.5. **Any other implications:** Officers have considered all the implications which members should be aware of. Apart from those listed in the report (above), there are no other implications to take into account.

6. **Section 17 – Crime and Disorder Act**

6.1. Requirements of the Act as it relates to the design and operation of the NDR and other NATS schemes will continue to be taken into account in the development of the projects.

7. **Risk Implications/Assessment**

7.1. In the context of the NATS implementation plan, key risks associated with the NDR and other NATS schemes are around funding and the statutory planning process. These risks are being managed through active project management and engagement. It has been confirmed that the NDR will be taken through the Nationally Strategic Infrastructure Projects route for planning consent, which will mitigate the risks around this.

8. **Overview and Scrutiny Panel Comments**

8.1. The NATSIP was considered by the ETDOS Panel on 26 September and NHAC on 19 September. Both meetings had similar discussions about the updated NATS Implementation Plan where Members discussed some of the detailed aspects of the plan; particularly in relation to their views regarding the city centre proposals. Members were reminded that the plan is not a new plan, but an update of the Implementation Plan agreed by Cabinet following extensive public and business consultation. Further detailed work to examine the implications of individual measures would be undertaken as and when these proposals are taken forward, at which point there will be opportunity for further Member engagement and discussion. At the Panel meeting, members also agreed that they would like to see the NDR construction started as soon as possible and therefore agreed April 2015 as their expected start date.

9. **Alternative Options**

9.1. NATSIP was adopted in 2010 following extensive testing of alternative options and extensive public consultation. This plan has been updated; the main changes being to phasing of delivery. As such, the Plan continues to include the package of measures that best meet objectives, have public and stakeholder support, and can be delivered within the likely available resources. Alternatives to the NDR have been examined through the Major Scheme Business Case process and further examination by DfT as part of the Development Pool bidding process.

10. **Reason for Decision**

10.1. NATSIP was adopted by the County Council in April 2010. It is important to keep the plan up to date to reflect the progress made on delivery and to ensure it continues to provide a guide to future delivery reflecting the growth plans for the area. The NDR is an essential element of the NATSIP and forms a key part of the Joint Core Strategy for the Norwich Policy Area. The decision to continue the development consent order application for the project is essential to be able to realise the full benefits of the Implementation Plan, to provide the transport infrastructure for

Norwich to enable its prosperity into the future, taking account of existing transport problems and accommodating future growth in housing and employment, which are essential to economic growth in Norfolk and vital to achieving LTP targets.

Recommendation / Action Required

- (i) Cabinet is asked to adopt the updated NATS Implementation Plan.
- (ii) Cabinet is asked to agree the revised NDR cost profile.
- (iii) Cabinet is asked to confirm it is content for the Development Consent Order for the finalised NDR scheme to be submitted.

Background Papers

County Council Cabinet reports dated 6 April 2010, 2 April 2012, 3 December 2012 and 2 September 2013.

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Appendix C

Project Delivery - Financial profile for Dual Carriageway NDR including Postwick Hub

	Financial Year							Total
	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	Future years	
Capital Spend Profile with identified funding sources shown below								
DfT			5.00	19.00	43.50			67.50
Postwick Hub CIF Funding		4.00	15.00					19.00
Growth Point Funding	1.36	0.35						1.71
NCC (LA Contribution) – Supported by GNDP funding up to £40m	1.81	3.55 (Note 1)	7.55	9.50	20.00	17.28	0.65* (Note 2)	60.34
TOTAL	3.17	7.90	27.55	28.50	63.50	17.28	0.65	148.55

Note 1 – The current year (13/14) profile has been amended from previous profile (£2m) and this has correspondingly reduced funding required in 14/15. This is taking into account the change of planning approach to the NSIP process, which requires earlier activities in its delivery compared with the Local Planning route, which was previously being considered when the previous profile was developed.

Note 2 – Remainder of airport radar funding costs to be spread over years from 18/19 to 22/23.

5 Glossary

DCLG	Department for Communities and Local Government
DfT	Department for Transport
DMRB	Design manual for Roads and Bridges
EA	Environment Agency
GNDP	Greater Norwich Development Partnership
HA	Highways Agency
JCS	Joint Core Strategy
LTP	Local Transport Plan
NATS	Norwich Area Transportation Strategy
NCC	Norfolk County Council
NIP	National Infrastructure Plan
NDR	Norwich Northern Distributor Road
NPPF	National Planning Policy Framework
NPS	National Policy Statement
TEN-T Routes	Trans-European Network of transport routes
WebTAG	Web-based Transport Appraisal Guidance produced by the Department for Transport

The Norfolk County Council (Norwich Northern Distributor Road (A1067 to A47(T))) Order

5.1 Pre-application Consultation Report

Planning Act 2008

Infrastructure Planning

The Infrastructure Planning (Applications: Prescribed Forms and Procedure)
Regulations 2009

PINS Reference Number: TR010015

Document Reference: 5.1

Regulation Number: 5(2)(q)/Section 37 Planning Act 2008

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1 Key Summary

1.1 Introduction

- 1.1.1 Norfolk County Council proposes to construct the Norwich Northern Distributor Road (NDR). The NDR is a project of national significance which requires a Development Consent Order (DCO) under the Planning Act 2008.
- 1.1.2 The planning process for dealing with infrastructure projects which require a DCO was established by the Planning Act 2008, later amended by the Localism Act 2011. As a project which requires a DCO, pre-application consultations for the NDR have been undertaken in accordance with the Planning Act 2008.
- 1.1.3 This report details the pre-application consultations undertaken, the responses received during the consultations, the regard Norfolk County Council (in its capacity as promoter of the NDR) has given to these responses and the resulting changes that have been made to the NDR proposals. For the purposes of this report, Norfolk County Council, as promoter of the NDR, is referred to as "the applicant."
- 1.1.4 A reference guide summarising the pre-application consultation activity in chronological order is listed in Appendix C of this report. However the following tables provide the key activities undertaken and key dates for this consultation activity:

Date	Activity
19 April 2013	Commencement of Consultation with local authorities on draft SOCC.
18 May 2013	Deadline for responses to local authority consultation on SOCC.
21 June 2013	Notice of the SOCC published in the Eastern Daily Press and the Norwich Advertiser (both local newspapers) for a first time in accordance with Section

	47(6)(a).
28 June 2013	Notice of the SOCC published in the Eastern Daily Press and the Norwich Advertiser (both local newspapers) for a second time.
8 July 2013	Commencement of formal consultations under Section 47 of the 2008 Planning Act.
8 July to 12 August 2013	17 public exhibitions undertaken at various locations.
12 July 2013	Commencement of formal consultations under Section 48 of the 2008 Planning Act.
12 July 2013	Section 48 Notice placed in the Eastern Daily Press and the Norwich Advertiser (both local newspapers), the Times (a national newspaper) and the London Gazette in accordance with Regulation 4(2) of the Infrastructure Planning (Applications: Prescribed Forms and Procedure Regulations 2009).
12 July 2013	Notice placed in the Eastern Daily Press and the Norwich Advertiser (both local newspapers) advising of the release of the PEIR and where it could be viewed.
19 July 2013	Section 48 Notice placed in the Eastern Daily Press and the Norwich Advertiser (both local newspapers), the Times (a national newspaper) and the London Gazette in accordance with Regulation 4(2) of the Infrastructure Planning (Applications: Prescribed Forms and Procedure Regulations 2009).
19 July 2013	Notice placed in the Eastern Daily Press and the Norwich Advertiser (both local newspapers) advising of the release of the PEIR and where it could be viewed.
30 July 2013	Commencement of formal consultations under Section 42 of the Planning Act 2008.
30 July 2013	Section 42 consultation documents issued to local authorities, prescribed consultees and those with an interest in land.
20 September 2013	Consultation deadline for responses to Section 42,

	Section 47 and Section 48 consultations.
11 October 2013	Extended consultation deadline for additional Section 42 consultees.
11 October 2013	Commencement of further consultations with certain Section 42 consultees on refinements made to proposals.
13 November 2013	Consultation deadline for responses to the further consultation on refinements made to proposals.
18 November 2013	Extended consultation deadline for responses to consultation on refinements to the proposals and for additional consultees.

Table 1/1: Key Dates for Consultation Activity

Consultation	Key Activity
Section 47	<ul style="list-style-type: none"> • 17 public exhibitions held on varying dates between 8 July and 12 August 2013, and at various venues; • over 57,000 invitations and scheme information letters sent out to: <ul style="list-style-type: none"> ⇒ county/city/district councillors/MPs and MEPs whose constituencies were located within the area defined by the SOCC, ⇒ residential and business addresses located within the area defined by the SOCC, ⇒ stakeholders and interest groups; • details of exhibition boards placed on the applicant's web site; • scheme information documents (including the PEIR) placed on deposit at 17 local authority main offices and libraries; • publicity on radio and in newspapers of the exhibitions; • opportunity to provide comments by letter, e-mail, telephone, paper questionnaire and on-line

	questionnaire.
Section 48	<ul style="list-style-type: none"> • notices placed in 2 local newspapers, the Times and the London Gazette on 2 separate occasions; • notification of consultation and copy of notice sent to local authorities and prescribed consultees; • scheme information documents (including the PEIR) placed on the applicant's web site and deposited at 17 local authority main offices and libraries; • opportunity to provide comments by letter and e-mail.
Section 42	<ul style="list-style-type: none"> • information packages issued to 12 local authorities, 128 prescribed consultees and 1067 parties with an interest in land; • scheme information documents (including the PEIR) placed on the applicant's web site and deposited at 17 local authority main offices and libraries; • opportunity to provide comments by letter and e-mail.

Table 1/2: Key Consultation Activities

1.2 Section 47 and Section 48 Consultation Outcomes

1.2.1 The Section 47 and 48 consultations received 1492 responses, which is considered a good response rate and has allowed the local communities' main issues and views on the NDR to be identified. The key issues identified were as follows:

- (a) questions regarding the need for the NDR;
- (b) concern about the volume of development associated with the NDR;
- (c) suggestions on alternatives to the NDR such as improved public transport and cycle facilities;
- (d) suggestions on need for the NDR to provide a link between the A1067 and A47 to the west of Norwich;

- (e) suggestions on alternative routes for the NDR, including that it should be closer to the city;
- (f) support for the NDR being dual carriageway, rather than single carriageway, between Fir Covert Road and Fakenham Road;
- (g) comment that the Postwick Hub Junction is over complicated;
- (h) comment regarding the number of local road closures, including those on Holt Road, Church Street and Green Lane East/Broad Lane;
- (i) comment regarding the provision of the Middle Road Bridge, and the resulting affects to Middle Road;
- (j) comment regarding the number of roundabouts on the NDR;
- (k) comment regarding the new Drayton Lane link, and the closure of Drayton Lane at its junction with Reepham Road;
- (l) suggestions that the North Walsham Road/Crostwick Lane junction proposals are not appropriate and a roundabout/traffic signals are required;
- (m) suggestions for more NMU facilities and that the NDR may be a barrier to these users;
- (n) comment regarding the affects of the NDR on landscape, wildlife and agricultural land and also regarding the emissions/noise that it will be generated;
- (o) suggestions for specific routes that may experience increased traffic as a result of the NDR.

1.3 Section 42 Consultation Outcomes

1.3.1 A total of 103 responses were received from local authorities, prescribed statutory consultees and those with an interest in land as a result of the consultations.

1.3.2 The Section 42 consultations generally identified the key issues as being similar to those identified by the Section 47 and Section 48 consultations. However, the Section 42 consultations also identified the following key issues relating to the proposals:

- (a) the impact of the drainage proposals, and in particular the shape/position of drainage lagoons and concern the contaminants will leak into the ground water;
- (b) comment about the effects of the proposals on specific land interests.

1.4 Scheme Refinements Following Consultation

1.4.1 The applicant has given regard to the responses received from the Section 42, Section 47 and Section 48 consultations and has made a number of minor refinements to the scheme proposals. It has undertaken further localised consultations on these refinements (those persons that may be affected by the refinements) and given regard to the responses received before finalising the application proposals.

1.5 Conclusions

- 1.5.1 The applicant considers that the DCO pre-application consultation has been carried out in accordance with the requirements of the Planning Act 2008. This consultation process has ensured that the key issues associated with the proposals have been identified.
- 1.5.2 The applicant does not consider that the pre-application consultation is the end of public engagement, and will continue to engage with local authorities, statutory organisations, those with land interests and the local community during the remainder of the scheme development and construction.

2 Background

2.1 Introduction

2.1.1 This Section 37 Consultation Report has been prepared by the applicant. It has been prepared to accompany the application for a Development Consent Order (DCO) to be submitted to the Secretary of State for Transport. The application for a DCO is to authorise the development and operation of a dual carriageway all-purpose strategic distributor road known as the Northern Distributor Road (NDR).

2.1.2 This report has been developed in accordance with Part 5, Chapter 1, Section 37(3)(c) of the Planning Act 2008. As such, this report provides:

- (a) an account of the statutory consultation, publicity and community consultation activities undertaken by the applicant at the pre-application stage and details of deadlines set for consultation responses in accordance with Section 42, Section 47 and Section 48 of the Planning Act 2008;
- (b) a summary of the relevant responses to the separate strands of consultation;
- (c) the account taken of responses in developing the application for the NDR from proposed to final form, as required by Section 49(2) of the Planning Act 2008.

2.1.3 This chapter provides a brief summary of the NDR proposals presented for pre-application consultation. It also sets out Norfolk County Council's role as the applicant, highway authority and prescribed consultee under the Planning Act 2008, and its location relative to neighbouring authorities (who are relevant to the proposals). The applicant has to consult with certain authorities under the Planning Act 2008.

2.2 Structure of this Report

2.2.1 The following table details the structure of this report and provides a brief outline of the contents of each chapter.

Chapter	Description
1 Key Summary	This chapter provides an overview of this report and summarises the key issues identified as a result of the pre-application consultations.
2 Background	This chapter provides a brief summary of the NDR proposals presented for pre-application consultation and its location relative to the local authorities.
3 Previous Consultations Prior to Planning Act 2008 Pre-Application Consultations	This chapter details the consultations undertaken prior to the Planning Act 2008 pre-application consultations and how they have influenced the scheme proposals.
4 Pre-Application Consultation Strategy	This chapter details the statutory pre-application consultations undertaken and how these have met the requirements of the Planning Act 2008.
5 Section 47 and Section 48 Consultation Responses	This chapter details the results of the consultations undertaken under Section 47 and Section 48 of the Planning Act 2008.
6 Section 42 Consultation Responses	This chapter details the results of the consultations undertaken with local authorities, prescribed consultees and those with interest in land (as defined by Section 44 of the Planning Act 2008) under Section 42 of the Planning Act 2008.
7 Further Consultations	This chapter details the results of further consultation on refinements to the proposals.
8 Conclusion and Summary	This chapter details conclusions from the consultations, identifying the key issues, and summarising the refinements made as a result of the pre-application consultations.

Table 2/1: Structure of this Report

2.3 Background to NATS and the NDR

- 2.3.1 The Norwich Area Transportation Strategy (NATS) was originally developed in the 1970's and has been revised in 1991, 1998 and 2004. The original strategy recognised that car use could not continue unrestrained, and that public transport needed priority to be effective. At this time Norfolk County Council had reservations about the strategy and did not sign up to it.
- 2.3.2 Following extensive assessment work by consultants the revised NATS was published in 1991 and included Park and Ride and a number of road schemes. However, the NDR (as put forward by the consultants) was not included in the adopted strategy, with Norfolk County Council requesting that more work be undertaken on its viability.
- 2.3.3 In 1994 public consultation on the initial NDR options was carried out as part of the Norwich Area Review of the Norfolk Structure Plan. At this stage no commitment was made to pursue the NDR until the feasibility of alternatives had been assessed, including resolving issues at the eastern and western ends of the route.
- 2.3.4 During 1996 and 1997, NATS came under revision again. This was in light of changes to government policy and the funding situation since the previous strategy. During the 1990s 'green' issues had come much more to the fore and money was not being made available for large schemes. This review led to the adoption of the new strategy, which was published in 1998. The adopted strategy had many themes and strategies including a Park and Ride network, bus priorities and public transport improvements, traffic management schemes, parking restraint and pedestrian/cycle facilities. At this stage, and considering the then government policy guidance and lack of government funding for transport schemes, the NATS did not include an NDR.
- 2.3.5 NATS was reviewed again in 2002. The reasons for the review were the changes in government policy, but the revised NATS was also informed by:
- (a) housing and economic growth;

- (b) developments along the inner and outer ring roads;
- (c) growth at Norwich International Airport;
- (d) delivery of some of the Park and Ride sites;
- (e) traffic congestion and public criticism of local transport policies being anti-car.

- 2.3.6 Consultations on the revised NATS were undertaken in 2003 and asked whether the public supported the NDR. The consultation indicated strong local support for the NDR with 78% of respondents being in favour. It should be noted that this response was to a full NDR between the A47 at Postwick and the A47 to the west of Norwich.
- 2.3.7 The overall strategy for the revised NATS was agreed in 2004. It recognised the Norwich area as a centre where growth would be focussed and therefore the strategy looked to provide the essential infrastructure needed to accommodate this growth, including a Northern Distribution Road.
- 2.3.8 However, further work needed to be carried out on the proposals for an NDR, including an appraisal of the alternative routes suggested during the 2003 public consultations. Subsequent consultations in 2004 sought specific views on route options for the NDR to the east and west of the A140 Cromer Road. These included additional options further west of Norwich not included in the 2003 consultations. Regard was given to the consultation responses and also the response of statutory environmental bodies (at that time these were Environment Agency, English Nature and the Countryside Agency) regarding the impact of routes on the River Wensum Special Area of Conservation (SAC).
- 2.3.9 Further local consultations were undertaken in 2005 on the western most route options in the Western Longville area. Assessments were also undertaken on mitigation measures for all eastern and western route options and the impacts on the River Wensum SAC.

- 2.3.10 At its meeting on 19 September 2005 the applicant's Cabinet considered the responses to the consultations described and the assessment of the mitigation measures for the River Wensum and agreed an adopted route for the NDR. This route was between the A47 at Postwick and the A1067 near Attlebridge (i.e. no link between the A1067 and A47).
- 2.3.11 Between 2005 and 2008 the proposals for the adopted route were developed further and in July 2008 a Major Scheme Business Case submission was made for the NDR to the Department for Transport (DfT).
- 2.3.12 During 2008 work, including consultations, was undertaken on an Implementation Plan for NATS – it was adopted in November 2009. This work aimed to show what the strategy meant on the ground and was linked closely to the Joint Core Strategy (JCS) for the Greater Norwich Area that was being prepared at the time.
- 2.3.13 In September 2011 the applicant had to re-submit its business case for the NDR following the government's comprehensive spending review. The final bid was approved by the DfT with reconfirmation of Programme Entry in December 2011 for the NDR between the A47 at Postwick (including the Postwick Hub junction) and the A140 Cromer Road. At its meeting on 2 April 2012 the applicant's Cabinet agreed to underwrite the cost of providing the NDR to the A1067 Fakenham Road near Attlebridge
- 2.3.14 Subsequent consultations in April/May/June 2012 and February/March 2013 helped to refine the proposals prior to commencement of the statutory pre-application consultations detailed in this report.

2.4 The Scheme

- 2.4.1 The proposed development, the Norwich Northern Distributor Road (NDR), is a predominantly dual carriageway all-purpose strategic distributor road, which would link the A1067 Fakenham Road, near Attlebridge to the A47(T) at Postwick. This would be over a length of approximately 20.4km. Appendix A of this report contains a plan showing an outline of the route.

2.4.2 The detailed description of the scheme is contained in Volume 1 Chapter 2 of the Environmental Statement (Document Reference 6.1).

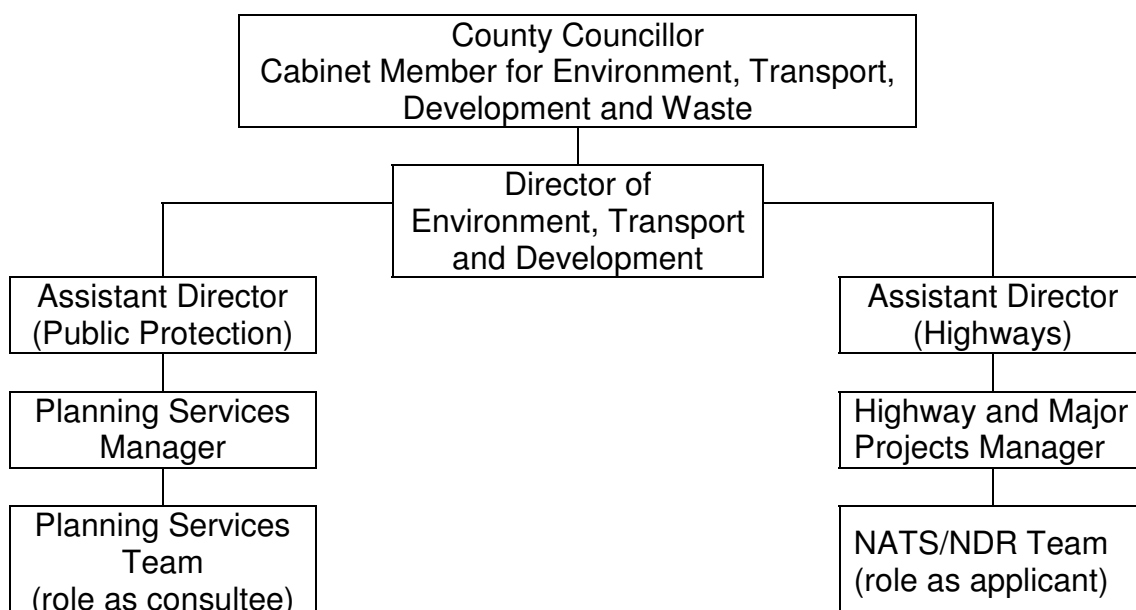
2.5 Development Consent Order Application and the Applicant

2.5.1 The DCO application is submitted by Norfolk County Council, in its capacity as highway authority.

2.5.2 If made, the DCO would authorise the construction, operation and maintenance of the NDR and the work associated with connecting it to the existing highway network. It would also authorise the compulsory acquisition of all the land and/or rights required to do this.

2.5.3 In addition to being the DCO applicant, Norfolk County Council is also a prescribed consultee as defined by Schedule 1 of the Infrastructure Planning (Applications: Prescribed Forms and Procedures) Regulations 2009.

2.5.4 During the pre-application process, clear boundaries have been maintained between these two roles, which were helped by the establishment of internal structures defining two separate teams, one fulfilling the role of applicant and the other the role of consultee. The internal structure, within part of the Department of Environment, Transport and Development, is summarised by the following chart.



2.5.5 In order to distinguish between the two roles of Norfolk County Council, references in this report to "the applicant" means Norfolk County Council in its capacity as the local highway authority and promoter of the NDR.

2.6 Other Local Authorities

2.6.1 In summary, Section 43 of the Planning Act 2008 defines local authorities as being:

- (a) a category "B" authority is one in whose administrative area the application land is situated and the authority is a unitary or a lower-tier authority;
- (b) a category "A" authority is one where any part of the boundary of A's area is also a part of the boundary of B's area;
- (c) a category "C" authority is one in whose administrative area the application land is situated and the authority is an upper-tier authority;
- (d) a category "D" authority is an authority that is not a lower-tier authority and where any part of the boundary of D's area is also a part of the boundary of C's area.

2.6.2 There are further detailed criteria to be considered in relation to the status of the authority which determines whether it needs to be consulted by the applicant under the Planning Act 2008. Applying these criteria, the relevant local authorities for the NDR are detailed in the table below.

Category "B"	Local Authority
Category "B" authority is where the application land is in the authority's area and the authority is a unitary or a lower-tier authority.	<ul style="list-style-type: none"> • Broadland District • Norwich City Council
Category "A"	Local Authority
Category "A" authority is where any part of the boundary of A's area is	<ul style="list-style-type: none"> • Breckland District Council • North Norfolk District Council

also a part of the boundary of B's area.	<ul style="list-style-type: none"> • South Norfolk Council • Great Yarmouth Borough
Category "C"	Local Authority
Category "C" authority is where the land is in the area of an upper-tier county council.	<ul style="list-style-type: none"> • Norfolk County Council
Category "D"	Local Authority
Category "D" authority is an authority that is not a lower-tier authority and where any part of the boundary of D's area is also a part of the boundary of C's area.	<ul style="list-style-type: none"> • Cambridgeshire County Council • Lincolnshire County Council • Suffolk County Council
Category other than A-D	Local Authority
An authority which is not defined in Section 43(3) as a "lower-tier district council", a "unitary council" and an "upper-tier county council" and where the land is in the area of that authority.	Local Authority <ul style="list-style-type: none"> • Broads Authority

Table 2/2: Details of Neighbouring Local Authorities

2.6.3 In addition, the applicant also consulted Waveney District Council pursuant to Section 42. Although consultation with Waveney was not required (because whilst Waveney shares a boundary with both Norfolk County Council and with the Broads Authority, Waveney is not a Category "D" local authority for the purposes of Section 43(2A) of the Planning Act 2008 and the Broads Authority is not a "lower-tier district council" for the purposes of Section 43(2)(a) of the Planning Act 2008 the applicant decided to consult Waveney for completeness.

2.6.4 Although the relevant legislation only requires the applicant to consult parish councils in whose area the scheme will be located, the applicant has adopted similar principles as for local authorities and also consulted 'neighbouring' parish councils. The table below details these parish councils.

Category “B” parish council is where the application land is in the authority’s area.	Category “A” parish council is where any part of the boundary of A’s area is also a part of the boundary of B’s area.		
<ul style="list-style-type: none"> • Attlebridge • Taverham • Drayton • Horsford • Horsham and Newton St Faith • Spixworth • Beeston St Andrew • Sprowston • Rackheath • Gt and Lt Plumstead • Postwick with Witton • Crostwick • Norwich 	<ul style="list-style-type: none"> • Surlingham • Keswick and Intwood • Caistor St Edmund • Bawburgh • Colney • Cringleford • Bixley • Trowse with Newton • Kirby Bedon • Bramerton • Costessey • Felthorpe • Frettenham 	<ul style="list-style-type: none"> • Stratton Strawless • Salhouse • Blofield • Woodbastwick • Brundall • Ringland • Morton on the Hill • Hellesdon • Spixworth • Swannington with Alderford and Lt • Witchingham • Hainford 	<ul style="list-style-type: none"> • Sprowston • Wroxham • Horstead with Stanninghall • Old Catton • Norton Subcourse • Langley with Hardley • Cantley • Strumpshaw • Carleton St Peter • Claxton • Rockland St Mary

Table 2/3: Details of Parish Councils Consulted

2.6.5 The plans in Appendix G of this report show the locations of these authorities and how they fit into the above categories.

2.7 Compliance with Legislative Requirements

2.7.1 As explained in the Introduction to the Application (Document Reference 1.1), the NDR is an infrastructure project for which a DCO is required. On 9 August 2013, the Secretary of State for Transport made a Direction (the Direction) pursuant to the powers in Section 35 of the Planning Act 2008, which directed that the NDR is "to be treated as development for which development consent is required."

2.7.2 The Direction was made during the applicant's formal pre-application consultation under the Planning Act 2008. The Planning Inspectorate has requested that the applicant explain how the pre-application consultation complies with the Planning Act 2008 requirements and specifically the

relevance of the Direction and any impact on the lawfulness of the pre-application consultation carried out.

2.7.3 The applicant considers that the pre-application consultation was validly carried out and that it complied with the requirements of Part 2 of Chapter 5 of the Planning Act 2008. Attached as Appendix D to this report is a Legal Opinion from the applicant's Counsel, explaining why there are no issues in relation to the validity of the pre-application consultation that has been undertaken by the applicant simply because some of it preceded the making of the Direction.

2.7.4 A brief summary of this reasoning is set out below.

Brief chronology of events

2.7.5 In December 2012, the applicant decided to promote the NDR as a Nationally Significant Infrastructure Project (NSIP). At that time the NDR fell within the definition of a NSIP set out in Section 22(2) of the Planning Act 2008 (as it then was) because it included works to the Postwick junction of the A47(T) and was to be constructed for a purpose connected with the A47(T).

2.7.6 Publication of the notice stating where and when the SOCC could be inspected took place on 21 June 2013 and on 28 June 2013, with the first publication exhibition held on 8 July 2013. The Section 48 Notices were published on 12 July 2013 and 19 July 2013. The programme of public exhibitions ran until 12 August 2013. Section 42 consultation letters were issued on 30 July 2013 and representations under all three strands of consultation were invited until 20 September 2013. Further information on the consultation is set out in the rest of this Consultation Report.

2.7.7 On 24 July 2013 the Highway and Railway (Nationally Significant Infrastructure Project) Order 2013 (S.I. 2013/1883) (the Highways Order) was made and the Order came into force on 25 July 2013. This was some weeks after the start of the statutory consultation process referred to above. The Order amended Section 22 of the Planning Act 2008 so that a project such as

the NDR would not (from 25 July 2013 onwards) fall within the definition of a NSIP.

2.7.8 On 25 July 2013, the applicant submitted a qualifying request to the Secretary of State for a direction under Section 35(1) of the Planning Act 2008 that the NDR was a project of national significance and so should be treated as development for which development consent was required.

2.7.9 As noted above, on 9 August 2013 the Secretary of State made the Direction under Section 35 Planning Act 2008 that the NDR was a project of national significance and was to be treated as development for which development consent was required. In addition the Secretary of State directed that “any proposed application in relation to the NDR is to be treated as a proposed application for which development consent is required”.

Validity of pre-application consultation

2.7.10 It is undoubtedly the case that the effect of the Direction is to make the NDR a development project for which a DCO is required if it is to be authorised.

2.7.11 There are no issues in relation to the validity of the pre-application consultation that has been undertaken by the applicant under the Planning Act 2008 for the following reasons:

- (a) there is no practical distinction between a NSIP and a project that is the subject of a direction under Section 35(1) of the Planning Act 2008. The means by which development consent is granted is the same in both cases and is via a DCO: Section 37(1) of the Planning Act 2008;
- (b) a NSIP and a project that is the subject of a direction under Section 35(1) of the Planning Act 2008 have to progress by following the procedures in Part 5 (pre-application) and Part 6 (post-application) of the Planning Act 2008. The pre-application procedure in Part 5 of the Planning Act 2008 applies to both without distinction;
- (c) the Direction made in respect of the NDR includes a further direction under Section 35ZA(3)(b) of the Planning Act 2008, namely that “any

proposed application in relation to the [NDR] is to be treated as a proposed application for which development consent is required”;

- (d) the only “proposed application” that this further direction can relate to is the proposed application for a DCO that the applicant has been progressing since December 2012. That proposed application would only fall within Section 35ZA(3)(b) of the Planning Act 2008 if the Secretary of State was of the view that it was an application for a consent “mentioned” in Section 33(1) or Section 33(2) of the Planning Act 2008. Of the consents “mentioned” in those provisions, the only one that is applicable is a “development consent” itself;
- (e) the effect of this further direction is that the applicant’s proposed application for a DCO, which has been at the pre-application stage since early 2013, is “to be treated as a proposed application for development consent” for all of the purposes of the Planning Act 2008. This includes the provisions of the Planning Act 2008 which deal with pre-application consultation. Thus, all of the actions that have been taken by the applicant as part of its preparation of its “proposed application” (including, therefore, all of its pre-application consultation under Section 42, 47 and 48 of the Planning Act 2008) are to be treated as actions that relate to the proposed application that must now be made for development consent as a result of the Direction.

2.7.12 For these reasons, there are no issues in relation to the validity of the pre-application consultation that has been undertaken by the applicant simply because some of it preceded the making of the Direction. Furthermore, given the further direction that has been made under Section 35ZA(3) of the Planning Act 2008, there are no reasons why the applicant cannot rely on its pre-application consultation in support of the DCO application in respect of the NDR.

- 2.7.13 The applicant notes that the Direction makes reference to the NDR improving connections to/from the Norwich International Airport, Gt Yarmouth Enterprise Zone and the strategic road network. Whilst these are locations beyond the area of consultation defined by its SOCC, the applicant considers that the rationale for consultation was and is still appropriate. This rationale was that the consultation should be aimed at the NDR proposals that are to be the subject of the DCO and so should be kept to a manageable size, and should engage those most affected whilst ensuring that the main issues are embraced.
- 2.7.14 Whilst the NDR is expected to benefit wider areas, including improved connections between Norwich and the Great Yarmouth Enterprise Zone and between Norwich and the Strategic Road Network, no material impacts have been identified on either the Enterprise Zone or on the parts of the Strategic Road Network beyond the consultation area.
- 2.7.15 It is also worth noting that Broadland District Council has confirmed that the consultation carried out has been adequate for the proposed application. In addition, Norfolk County Council, Norwich City Council, the Broads Authority, Great Yarmouth Borough Council, Waveney District Council, and the New Anglia Local Enterprise Partnership (which is responsible for the Enterprise Zone) were also consulted. Great Yarmouth Borough Council did not submit any response. Norfolk County Council, Norwich City Council, and Waveney District Council (which includes Lowestoft where parts of the Enterprise Zone are situated) confirmed that they had no objections to the NDR. The Broads Authority welcomed the route of the proposed NDR and the New Anglia LEP responded that it supported the NDR. The details of the responses are set out in Appendix T of this report.
- 2.7.16 The planning process for dealing with infrastructure projects which require Development Consent Orders (DCO) was established by the Planning Act 2008, later amended by the Localism Act 2011.

2.7.17 As a project which requires a DCO, pre-application consultations for the NDR have been undertaken in accordance with the Planning Act 2008, the requirements of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2009 and the Infrastructure Planning (Applications: Prescribed Forms and Procedures) Regulations 2009, together with guidance issued by the Planning Inspectorate and the Department for Communities and Local Government.

2.7.18 The Planning Inspectorate's "Advice Note 14: Compiling the consultation report" provides advice on how the applicant's pre-application consultation is reported. The table below summarises the key advice given in the note and where this advice has been incorporated into this report.

Explanatory Text	
Planning Inspectorate Advice Note 14	Location in this Report
Explanatory text should set the scene and provide an overview and narrative of the whole pre-application stage as it relates to the particular project.	Explanatory text is contained in Sections 2.3, 2.7, 3 and 4.1.2 of this report.
It would assist if a quick reference guide in bullet form, summarising the consultation activity in chronological order, is included near the start of the report.	This list of full consultation activity is contained in Appendix C of this report. A quick reference guide is contained in Section 1.4 of this report.
Consultation with the Prescribed Consultees (Section 42, Planning Act 2008)	
Planning Inspectorate Advice Note 14	Location in this Report
This includes prescribed statutory bodies, local authorities consulted under Section 43 of the Planning Act 2008 and those with an interest in the land consulted under Section 44 of the Planning Act 2008. Three separate strands of	Consultation with these bodies is described in Section 4.2-4.8, 4.9 and 4.12-4.13 of this report.

prescribed consultees should be clearly identified.	
The applicant should provide a full list of Section 42 (Planning Act 2008) prescribed consultees as part of the consultation report.	Appendix F-2 of this report contains a list of Section 42 prescribed consultees.
A short description of how Section 43 of the Planning Act 2008 has been applied should be provided in order to identify the relevant local authorities included in the consultation. This should be supported by a map.	Section 2.6 of this report describes how local authorities have been identified. Maps showing the administrative boundaries are contained in Appendix G of this report.
It is important that those with an interest in land consulted under Section 44 of the Planning Act 2008 are identified as a distinct element of the Section 42 consultation.	Appendix H-2 of this report contains a list of the Section 44 consultees.
Statement of Community Consultation Process (Section 47 of the Planning Act 2008)	
Planning Inspectorate Advice Note 14	Location in this Report
It would be helpful to provide a summary of the rationale behind the SOCC methodology.	Section 4.4 of this report details the rationale behind the SOCC.
Evidence should be submitted which shows the local authorities consulted on the SOCC, what the local authority comments were, confirmation that they were given 28 days to provide their comments and a description about how the applicant had regard given to the comments received.	Appendix I-1 of this report details the local authorities consulted on the SOCC. Appendix I-2 of this report details the responses received. Section 4.3.4 of this report details the local authority comments on the draft SOCC and the regard given to them.

<p>Copies of the published SOCC as it appeared in the press should be provided along with which local newspapers it was published in and when.</p>	<p>Section 4.3.5 of this report details the dates and newspapers that notice of the SOCC was published in.</p> <p>Appendix L of this report contains copies of the notices as they appeared in the newspapers and on-line.</p>
<p>Where there are any inconsistencies with the SOCC, then these should be clearly explained and justified.</p>	<p>Section 4.6 of this report details the inconsistencies with the SOCC.</p>
<p>Statutory Publicity (Section 48 of the Planning Act 2008)</p>	
<p>Planning Inspectorate Advice Note 14</p>	<p>Location in this Report</p>
<p>A copy of the Section 48 Notice as it appeared in the local newspapers, together with a description of when and where it was published and confirmation of the time period given for responses should be included in the report.</p>	<p>Section 4.9 of this report details the dates and newspapers that the Section 48 Notice was published in.</p> <p>Appendix M of this report contains copies of the notices as they appeared in the newspapers and on-line.</p>
<p>Applicants should provide confirmation that the Section 48 Notice was sent to the prescribed consultees at the same time that the notice was published.</p>	<p>Appendix N of this report details the notification of the Section 48 Notice.</p>
<p>Non Statutory 'informal consultation'</p>	
<p>Planning Inspectorate Advice Note 14</p>	<p>Location in this Report</p>
<p>Any consultation not carried out under the provisions of the Planning Act 2008 should be indicated and identified separately in the report</p>	<p>Section 3.0 of this report details the non statutory consultations undertaken prior to the consultations carried out under the provisions of the Planning Act 2008. Section 4.10 also</p>

	outlines other non statutory consultations undertaken.
EIA Regulations Consultation	
Planning Inspectorate Advice Note 14	Location in this Report
Applicants may wish to draw attention to the consultation responses received under the EIA process.	Details of consultations and discussions under the EIA process are contained in each of the relevant chapters of the Environmental Statement (Document Ref 6.1).
Issues led approach	
Planning Inspectorate Advice Note 14	Location in this Report
If the level of response is significant it may be appropriate to group responses under headline issues.	This approach has been adopted for the presentation of responses. Section 5.2.3 of this report details how responses have been grouped.
Summary of Responses	
Planning Inspectorate Advice Note 14	Location in this report
A list of individual responses received should be provided and categorised in an appropriate way.	Given the volume of Section 47 and 48 responses received, they have been grouped into categories of similar issues and detailed in Appendix S of this report. Individual comments to the Section 42 consultations are contained in Appendix T and Appendix U of this report.

Table 2/4: Compliance with PINS advice

2.7.19 The Department for Communities and Local Government Guidance “Planning Act 2008 – Guidance on the pre-application consultation process” also

includes guidance on the consultation report. The table below summarises the key advice given and where this advice has been incorporated into this report.

Explanatory Text	
DCLG Guidance	Location in this Report
The consultation report should provide a general description of the consultation process undertaken.	Tables 1/1 and 1/2 in Section 1.1.4 contain a summary of the consultation activity.
Compliance with Planning Act 2008	
DCLG Guidance	Location in this Report
The consultation report should set out specifically what the applicant has done in compliance with the requirements of the Planning Act, relevant secondary legislation, this guidance, and any relevant policies, guidance or advice published by Government or the Inspectorate.	Sections 2.7 and 4 detail the compliance with the requirements of the Planning Act 2008.
SOCC Consultation	
DCLG Guidance	Location in this Report
The consultation report should set out how the applicant has taken account of any response to consultation with local authorities on what should be in the applicant's statement of community consultation.	Section 4.3 details the local authority responses to consultation on the SOCC and the regard given to them by the applicant. Copies of the actual responses received are contained in Appendix I-2 of this report.
Summary of Responses	
DCLG Guidance	Location in this Report
The consultation report should set out a summary of relevant responses to	Summaries of the relevant responses are contained in

consultation (but not a complete list of responses).	Appendix S, T, U and X of this report. Sections 5 and 6 identify the key issues raised.
Regard Given to Responses	
DCLG Guidance	Location in this Report
The consultation report should provide a description of how the application was influenced by those responses, outlining any changes made as a result and showing how significant relevant responses will be addressed.	The regard given the responses received are contained in Appendices S, T, U and X of this report.
The consultation report should provide an explanation as to why responses advising on major changes to a project were not followed, including advice from statutory consultees on impacts which the applicant has not followed	The regard given the responses received are contained in Appendices S, T, U and X of this report and explain why suggested changes to the project have not been followed.
Allowing Secretary to State to Understand Consultation Process	
DCLG Guidance	Location in this Report
The consultation report should be expressed in terms sufficient to enable the Secretary of State to fully understand how the consultation process has been undertaken and significant effects addressed. However, it need not include full technical explanations of these matters.	The overall consultation activity is described, in chronological order, in Appendix C of this report. The separate consultation activity under Sections 42, 47 and 48 of the Planning Act 2008 are described separately in Section 4 of this report.

Table 2/4: Compliance with DCLG Guidance

3 Previous Consultations Prior to Planning Act 2008 Pre-Application Consultations

3.1 Introduction

3.1.1 Extensive consultations on the Norwich Area Transportation Strategy (NATS), including the NDR, have been undertaken since 2003. The most recent rounds of consultation were in April/May/June 2012 and February/March 2013. During these consultations the applicant has listened to what local residents and other interested parties had to say, and changed the emerging NDR proposals as a result of responses received. This chapter outlines the consultations on the NDR, and how these have resulted in changes to the proposals. A summary of this activity is contained in Appendix B of this report.

3.1.2 All consultations detailed in this chapter (i.e. described in Sections 3.2, 3.3 and 3.4) were non-statutory consultations but were used to develop the final scheme proposals that were presented for the Section 42, 47 and 48 statutory consultations.

3.2 Consultations Prior to 2012

3.2.1 An outline of the consultations prior to 2012 and the main decisions taken as a result of the responses is given below:

Year	Description	Main Action in relation to Issue
2003	Consultations within the Norwich area (which included parts of the consultation area outlined in the SOCC) on the Norwich Area Transportation Strategy (NATS) and route options for the NDR between the A47 to the east of Norwich and the A47 to the west of Norwich. This included	Over 21,000 responses were received to this consultation. It helped to identify the concerns of environmental organisations about the potential impact of an NDR on the Tud and Wensum Valleys (i.e. the link to the A47 west of Norwich). The applicant concluded that route options should be subject

	<p>leaflets to over 130,000 households/businesses, consultation materials sent to stakeholders/interest groups and exhibitions in locations across the Norwich area.</p>	<p>to further consultation.</p>
2004	<p>Further consultations within the Norwich area (which included parts of the consultation area outlined in the SOCC) on route options for the NDR between the A47 to the east of Norwich and the A47 to the west of Norwich. This included the circulation of a brochure/questionnaire to over 130,000 households/businesses in the Greater Norwich Area as well as Norfolk parish/town councils, statutory bodies, utility companies and stakeholder groups. 6 staffed public exhibitions were held in areas around Norwich.</p>	<p>A total of 10,092 responses were received to this consultation. Following consideration of the responses received the applicant concluded to undertake further work to examine mitigation measures for all eastern and western route options and the impact on the River Wensum Special Area of Conservation (i.e. the link to the A47 west of Norwich). The applicant also concluded to undertake further local consultations on the westernmost route options.</p>
2005	<p>Consultations in the area of Weston Longville on the two western most route options. Over 400 residents in the Hockering/Weston Longville/Attlebridge area and were consulted together with local parish councils. It included a single public exhibition.</p>	<p>198 responses to this consultation were received of which the main comments were objecting to the routes or commenting that the routes were too far west.</p> <p>The responses received during this and previous consultations, together with other route assessment work were considered when the applicant decided that the route for the NDR should be from the A47 at</p>

		Postwick to the A1067 Fakenham Road (i.e. with no NDR link between the A47 to the west of Norwich and the A1067). The decision not to include an A1067 to A47(w) link was due to the potential ecological impacts of crossing the River Wensum Special Area of Conservation.
2006 – 2008	On going meetings with parish councils along the corridor of the proposed NDR route to give an opportunity to raise issues or concerns.	None.
2007 - 2008	Further exhibitions in parishes along the corridor of the proposed NDR route giving information on the project's development, including an exhibition in Postwick regarding the plans for the Broadland Gate Development (a new business park on land to the east of the existing Broadland Business Park).	None.
2009	Consultations between October and November 2009 in the Norwich area (which included parts of the consultations area outlined in the SOCC) on the Implementation Plan for NATS. This set out the interventions (including the NDR) to improve access within the Norwich area and to encourage a modal shift onto more sustainable transport	The consultation received over 11,500 responses with over 1,000 people attending the exhibitions.

	<p>systems. The consultations included over 160,000 booklets to households/businesses and 17 exhibitions.</p>	
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Table 3/1: Summary of Consultation Prior to 2012

3.3 Public Consultations – April/May/June 2012

- 3.3.1 A Major Scheme Business Case submission for the NDR to the Department for Transport (DfT) was submitted in July 2008. In December 2009 the part of the NDR between the A47 east of Norwich and the A140 Cromer Road was formally granted Programme Entry and thereby included in the DfT's programme for future funding.
- 3.3.2 However, the government's comprehensive spending review resulted in an examination of funding commitments by the DfT, which resulted in the NDR being placed within a pool of schemes requiring a new funding bid.
- 3.3.3 In September 2011 the applicant resubmitted a bid for funding from the DfT's Development Pool bid. The final bid was approved by the DfT with reconfirmation of Programme Entry in December 2011 for the NDR between the A47 at Postwick (including the Postwick Hub junction) and the A140 Cromer Road. At its meeting of 2 April 2012, the applicant's Cabinet agreed to underwrite the cost of providing the NDR to the A1067 Fakenham Road near Attlebridge.
- 3.3.4 Following this reconfirmation a series of 14 public exhibitions were held in parishes along the corridor of the NDR to enable people living close to the NDR to see the latest proposals and give feedback. In order to publicise the public exhibitions a flyer was sent out to all individuals and stakeholders listed on the existing NDR consultation list, (comprising of over 1,400 consultees). It was also sent to all Norfolk parish councils. Meetings were held with parish councils and various stakeholders.

3.3.5 Over 1228 people attended the exhibitions and a total of 510 responses to the consultation were received. The key findings from these consultations and how they influenced the ongoing development of the NDR proposals (at that time) is detailed in the table below:

Key Issue Raised	Applicant's Action in Relation to Issue
150 responses indicated that the NDR should link all the way to the A47 to the west of Norwich.	This had been considered during the earlier consultations. The applicant had decided not to include a link between the A1067 and A47 due to the potential for ecological impacts of crossing the River Wensum Special Area of Conservation.
52 responses commented that there was not enough provision for walkers, cyclists and horse riders.	As a result of the consultations, further examination of the provision made for non motorised users (NMUs) was undertaken. This resulted in additional facilities such as new sections of bridleway adjacent to the route of the NDR being added to the proposals.
44 responses expressed concern over the closure of the A1067 Fakenham Road where it joined the NDR and the resulting effects on Reepham Road through Hellesdon (the proposals presented for consultation in 2012 did not include the now proposed A1067 Fakenham Road Roundabout but had Fakenham Road leading directly onto the NDR). 2 responses were in favour of the closure.	Following further consideration the NDR proposals were amended at this stage through the provision of a roundabout where the NDR meets the A1067 Fakenham Road, and the removal of the proposed roundabout providing a connection between the NDR and Fir Covert Road.
24 responses provided suggestions to discourage traffic from using Reepham Road as a result of the	Following further consideration the NDR proposals were amended at this stage through the provision of a roundabout where the NDR meets

<p>NDR, particularly through Hellesdon.</p>	<p>the A1067 Fakenham Road, and the removal of the proposed roundabout providing a connection between the NDR and Fir Covert Road.</p>
<p>10 responses did not support the closure to general traffic of Middle Road, Low Road and Smee Lane (the proposals presented for this consultation in 2012 included closures of Smee Lane and Middle Road where they meet the NDR, and a NMU and agricultural vehicle bridge over the NDR at Low Road). 9 responses were in favour of the closure.</p>	<p>As a result of the consultations the proposals were amended to provide closures to Smee Lane and Low Road, with an all user bridge being provided over the NDR at Middle Road. Middle Road was identified as the most appropriate road out of these three roads for an all user bridge because it was a better standard than Low Road and Smee Lane.</p>
<p>16 responses expressed concern over the closure of Church Street between Horsford and Horsham St Faith (the proposals presented for this consultation in 2012 included the closure of Church Street at its junction with the A140 Cromer Road). 2 responses were in favour of the closure.</p>	<p>As a result of the comments received, the applicant decided to remove this closure and monitor the road after implementation of the NDR with consideration to implementing the closure if appropriate.</p>
<p>13 responses made comments regarding the volume of traffic using the A1067 Fakenham Road/Beech Avenue/Fir Covert Road junction.</p>	<p>These concerns generally related to the closure of the A1067 Fakenham Road where it meets the NDR with the result that vehicles wishing to access Fakenham Road through Taverham/Drayton would have to do so via the NDR and Fir Covert Road. The provision of the roundabout at Fakenham Road, where it joins the NDR, addressed these concerns.</p>
<p>10 responses expressed concern regarding the effect to businesses of the closure of Fir Covert Road at its junction with Reepham Road. 2</p>	<p>The removal of the Fir Covert Road Roundabout and its replacement with the roundabout where the NDR meets Fakenham Road removed</p>

responses were in favour of the closure.	this closure. This change effectively relocated the position of this closure from the junction with Reepham Road to a point where the NDR crossed Fir Covert Road.
12 responses expressed concern regarding the lack of a pedestrian footbridge over the NDR linking Bullock Hill and the Petans Training facility.	These requests were a result of visitors to Petans tending to stay over night in Horsham St Faiths and then walking to the training facility via Bullock Hill. Having considered the volume of visitors to Petans and the cost of a new pedestrian footbridge, this proposal was not taken forward.
10 responses expressed concern over the volume of traffic using the B1150 North Walsham Road and the effects on its junction with Crostwick Lane/Rackheath Lane.	The applicant agreed to undertake an assessment of the junction and investigate any junction improvements as appropriate.
9 responses expressed concern regarding the new east bound merge and diverge slip roads with the A47 at the Postwick Junction, commenting that these would make the junction over complicated.	Given the constraints at the junction and having previously assessed a number of options the applicant concluded that the option proposed was the most appropriate.
There were 2 comments in favour of the removal of the Plumstead Road junction with the NDR, and 4 comments against the removal. There was concern about the increase in traffic along Plumstead Road through Thorpe End.	Having tested the removal of this junction using the traffic model it was found that vehicles would be diverted onto less suitable routes. The applicant decided to investigate alternative improvements that could be provided on Plumstead Road through Thorpe End.
6 responses expressed concern over the volume of traffic using the A1151 Wroxham Road and the effects on its	The applicant agreed to undertake an assessment of the junction and investigate any junction

junction with Green Lane West.	improvements as appropriate.
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Table 3/2: Summary of Main Responses from March/April/May 2012 Consultations

3.4 Public Consultations – February/March 2013

- 3.4.1 A further series of 14 exhibitions were held in February/March 2013 at similar venues to the previous 2012 exhibitions. They were also publicised in a similar manner to the previous 2012 consultations. The purpose of these exhibitions was to provide feedback on the results of the 2012 consultations and show how the NDR proposals had changed as a result of these comments.
- 3.4.2 The exhibitions were attended by over 550 people and 291 responses to this consultation were received.
- 3.4.3 Consultees were able to comment on any aspect of the NDR but they were also asked specifically to respond to the key changes to the NDR resulting from the April/May/June 2012 consultations, namely:
- (a) the provision of a roundabout junction where the A1067 Fakenham Road meets the NDR, and the removal of the previously proposed Fir Covert Road Roundabout resulting in a closure of this road where it crossed the NDR;
 - (b) removal of the Church Street closure at its junction with the A140 Cromer Road;
 - (c) relocation of the closure on Green Lane East/Broad Lane from the Norwich to Sheringham railway line to the junction with the Plumstead Road;
 - (d) provision of an all user bridge over the NDR at Middle Road and closure of Low Road and Smee Lane where they meet the NDR.
- 3.4.4 The responses received were similar to those outlined in Section 3.3.5 with 62 responses relating to the NDR not linking to the A47 to the west of Norwich.

3.4.5 Responses tended to be split when considering the main changes made since the previous consultations, as detailed below:

Key Issue Raised	Applicant's Action in Relation to Issue
129 responses were in favour of the relocation of the Fir Covert Roundabout to Fakenham Road with 60 responses not in favour. Those not in favour generally cited the resulting closure of Fir Covert Road as a concern.	As a result of the comments received and following further investigation, the NDR proposal was further amended so that it included an additional roundabout at the NDR junction with Fir Covert Road. This was in addition to the roundabout at the NDR junction with the A1067 Fakenham Road.
63 responses were in favour of the bridge at Middle Road. 52 responses did not support this bridge.	Whilst overall there was a majority in favour of the Middle Road Bridge, responses from just Gt and Lt Plumstead parish identified 18 responses in favour of the bridge and 22 responses not in favour. Having considered the consultation response and also the parish council support for this, the applicant decided not to amend the proposal.
47 responses were in favour of removing the Church Street closure and monitoring the road after the implementation of the NDR. 57 responses were not in favour of the proposal.	Having considered the consultation results the applicant decided to retain the proposal – i.e. to not close Church Street but monitor it after implementation of the NDR with a view to providing the closure if considered appropriate.
60 responses were in favour of the relocation of the Green Lane East/Broad Lane closure to the junction with Plumstead Road. 50 responses were not in favour of the proposal.	In view of the consultation results the applicant decided not to amend the proposal and retain the closure of Green Lane East/Broad Lane at its junction with Plumstead Road.

Table 3/3: Summary of Main Responses to Design Changes shown in February/March 2013 Consultations

4 Pre-Application Consultation Strategy

4.1 Introduction

- 4.1.1 This chapter describes the requirements for pre-application consultation as set out in the Planning Act 2008, and confirms how the applicant has met these requirements. Section 4.2 of this report provides a summary of how the requirements have been met. The subsequent sections describe this in more detail. The NDR scheme is linear in nature, and Section 4.4 of this report details how this influenced the consultations undertaken.
- 4.1.2 Section 2.3 of this report provides a narrative of how the proposals for an NDR were developed. Consultations in 2003, 2004 and 2005 (outlined in Section 3.2 of this report) helped to inform decisions on the preferred route for an NDR. At its meeting on 19 September 2005, the applicant's Cabinet adopted a route for the NDR between the A47 at Postwick and the A1067 near Attlebridge (i.e. with no link between the A1067 and A47). This proposed route alignment has not significantly changed up to the statutory pre-application consultations described in this chapter.
- 4.1.3 Subsequent consultations in April/May/June 2012 and February/March 2013 (described in Sections 3.3 and 3.4 of this report) helped to refine the proposals to a point where the applicant considered the proposals sufficiently developed to commence the statutory pre-application consultations detailed in this chapter.
- 4.1.4 The applicant's strategy for consultation with the local community (under Section 47 of the Planning Act 2008) was to:
- (a) advise people of the intention to submit a DCO application for the NDR;
 - (b) provide information on the latest proposals for the NDR;
 - (c) give an opportunity to give an opinion on the overall proposals;

- (d) give an opportunity to comment on any aspect of the design of the proposals;
 - (e) use the feedback to develop the proposals.
- 4.1.5 The February/March 2013 consultations had shown a change that relocated the Fir Covert Road Roundabout to the Fakenham Road junction with the NDR. Comments had been received during this consultation for the Fir Covert Road Roundabout to be re-introduced. These comments included suggestions that, to mitigate the cost of the additional roundabout, the NDR could be single carriageway between Fir Covert Road and Fakenham Road. The applicant was interested in views on this suggestion and therefore it was included as an alternative option in the statutory pre-application consultations.
- 4.1.6 There were some parameters associated with the proposals that were fixed, although the applicant still wanted to receive opinions/comments on these and any aspects of the proposals.
- 4.1.7 For example the route of the NDR was a fixed parameter for the statutory pre-application consultations as it had been agreed by the applicant's Cabinet in September 2005 following assessment and consultation work. However, the applicant was still interested to hear views on the route.
- 4.1.8 The design of the NDR has been undertaken to comply with the Design Manual for Roads and Bridges (DMRB) with the exception of those issues outlined in the Design and Departures Report (Document Ref 10.2). Other guidance and advice notes have also been considered. When giving regard to consultation comments on the design of the NDR the applicant has had to give consideration to compliance with DMRB and other guidance and this has affected the applicant's ability to make suggested changes.
- 4.1.9 The applicant has been holding on-going meetings and discussions since 2008 with directly affected landowners and their representatives, the purpose of which has been to advise them of the developing proposals and identify issues. The consultation with directly affected landowners, under Section 42

of the Planning Act 2008, allowed an opportunity for them to see the detailed proposals and formally comment upon them. Through out consultations the discussions with landowners have continued.

4.2 Section 47 - Consultation with the Local Community

4.2.1 The following tables outline the main consultation requirements of the Planning Act 2008 with regard to the consultation with people living in the vicinity of the land for the NDR, and how the applicant has met these requirements.

Section 47(1) Requirement
The applicant must prepare a statement setting out how the applicant proposes to consult, about the proposed application, with people living in the vicinity of the land.
What the Applicant Did
A Statement of Community Consultation (SOCC) was produced for the Section 47 consultations. A supporting document to the SOCC was also developed which outlined the rationale for the proposed consultation processes detailed in the SOCC. Appendix J of this report contains a copy of the final SOCC and its supporting document.

Table 4/1: Section 47(1) Requirements and What the Applicant Did

Section 47(2)and (3) Requirement
Before preparing the statement, the applicant must consult each local authority that is within Section 43(1) about what is to be in the statement. The deadline for the receipt by the applicant of a local authority's response to the consultation is the end of the period of 28 days that begins with the day after the day on which the local authority receives the consultation documents.
What the Applicant Did
Local authorities were consulted on the draft SOCC and supporting document – the documents were delivered to them on 19 April 2013. The deadline for responses was set as 18 May 2013. The local authorities

consulted were:

- Norfolk County Council (Category "C" authority);
- Broadland District Council (Category "B" authority);
- Norwich City Council (Category "B" authority);
- Broads Authority (Category Other than "A-D");
- South Norfolk Council (Category "A" authority).

A category "B" authority is one where the application land is in the authority's area and the authority is either a unitary authority or a lower-tier district council.

A category "C" authority is one where the application land is in the authority's area and the authority is an upper-tier county council.

The Broads Authority is not a "B" or "C" authority but the NDR does fall partly within the Broads Authority's area. Accordingly, the applicant consulted the Broads Authority on its draft SOCC.

South Norfolk Council is a category "A" authority. A category "A" authority is one that shares its boundary with a category "B" authority. South Norfolk Council was invited to comment on the SOCC because previous consultations had highlighted significant comments regarding the effects of the NDR on routes between the A1067 and A47 to the west of Norwich. Part of this area is within the authority of South Norfolk Council and the SOCC proposed public exhibitions here.

Appendix I-1 of this report contains copies of the letters sent to the above named authorities enclosing the draft SOCC for comment under Sections 47(2) and (3) of the Planning Act 2008.

Table 4/2: Section 47(2) and (3) Requirements and What the Applicant Did

Section 47(5) Requirement
In preparing the statement, the applicant must have regard to any response to consultation that is received by the applicant before the deadline imposed.
What the Applicant Did
Responses were received from all local authorities, with the exception of South Norfolk Council. A summary showing the regard given to the responses is detailed in Section 4.3.4.
Appendix I-2 of this report contains copies of the responses received

from the local authorities consulted on the draft SOCC.

Table 4/3: Section 47(5) Requirements and What the Applicant Did

Section 47(6) Requirement
<p>The applicant must:</p> <ul style="list-style-type: none"> • make the SOCC available to the public in a way that is reasonably convenient for people living in the vicinity, • publish a notice in a newspaper circulating in the vicinity of the land stating where and when the SOCC can be viewed, • publish the SOCC in such other manner as may be prescribed.
What the Applicant Did
<p>Notice of the SOCC and where it could be viewed was published in the Eastern Daily Press and the Norwich Advertiser (both local newspapers) on 21 June 2013 and 28 June 2013.</p> <p>Appendix L of this report contains copies of the Section 47 Notices.</p>

Table 4/4: Section 47(6) Requirements and What the Applicant Did

Section 47(7) Requirement
<p>The applicant must carry out consultation in accordance with the proposals set out in the statement.</p>
What the Applicant Did
<p>Section 4.5 of this report details what the SOCC stated the applicant would do, and how the applicant complied with this.</p>

Table 4/5: Section 47(7) Requirements and What the Applicant Did

4.3 Section 47 - Statement of Community Consultation

- 4.3.1 In accordance with Section 47 of the Planning Act 2008, the applicant produced a Statement of Community Consultation which defined how the applicant would undertake consultation with the local community.
- 4.3.2 Consultation on the content of the SOCC with local authorities was begun on 19 April 2013 and the deadline for their response was 18 May 2013. When consulting on the draft SOCC, the applicant also provided the local authorities with a supporting document to help inform their response. The supporting

document contained background information on the NDR and the methodology behind the proposed consultation. It also contained the preliminary environmental information that was available at the time of this consultation (in accordance with advice from the Planning Inspectorate).

4.3.3 A further letter dated 7 May 2013 was sent to local authorities and is contained in Appendix I-1 of this report. This explained that whilst the SOCC clearly identified the project as including the Postwick Hub Junction, this may not have been made as clear as possible in the Scoping Report that was sent with the draft SOCC. Therefore the letter was sent to ensure that they clearly understood that the project included the Postwick Hub Junction.

4.3.4 The responses from the local authorities on the draft SOCC and how the applicant had regard to the comments made are summarised in the following tables. Full copies of the responses from local authorities are contained in Appendix I-2 of this report.

Summary of Comments from Norfolk County Council
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<p><u>Text from response received, 9 May 2013.</u></p>
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<p>I refer to your formal consultation, on the draft Norwich Northern Distributor Road Statement of Community Consultation (SOCC), as outlined in your letter of 19 April 2013. I can confirm that the consultation is in accordance with S47 of the Planning Act 2008, as amended.</p>

<p>In our previous discussion we suggested that consideration should be given on how to involve the 'difficult to reach groups'. Having perused the list of Identified Stakeholder and Local Interest Groups in Appendix E, I cannot see evidence of the 'difficult to reach groups' being considered, for example:</p>

- | |
|--|
| <ul style="list-style-type: none"> • Education and Youth Groups • Faith Groups • Minority Ethnic Groups • Equal Opportunity Groups |
|--|

<p>I have therefore obtained information from the Greater Norwich Development Partnership regarding the organisations they consulted when preparing the Joint Core Strategy and this information is attached to the email copy of this letter. You will also need to ensure that your list is</p>

up to date, for example Age Concern Norfolk joined Help the Aged to form Age UK Norfolk in April 2010.

The rationale of who will be consulted is understandably area based, however there are groups based outside the defined consultation area, but regularly pass through it (major retailers' national and local distribution vehicles for example). Has sufficient effort been taken to identify these groups?

Turning to the SOCC leaflet; this explains that the proposal is EIA development, and that an Environmental Impact Assessment will be carried out and where the environmental information will be available. I would suggest that there is further scope to make reference to the reasoned justification for the proposal and the positive benefits that it will bring to the local community; this could also include the mitigation measures.

To avoid confusing the public you should also be mindful of other major consultation exercises that are being undertaken in the area at the same time:

- Norfolk Mineral Site Specific Allocations Development Plan Document and Norfolk Waste Site Specific Allocations. The County Council will commence consultation on the main modifications to these documents on 15 May 2013 and the consultation period will end 26 June 2013,
- hearing on 21 May into the Joint Core Strategy for Broadland, Norwich and South Norfolk: Submission Content addressing the Judgement of Mr Justice Ouseley in *Heard v Broadland District Council*, South Norfolk District Council and Norwich City Council,
- Postwick Hub Public Inquiry which is due to start on 3 July 2013,
- consultation by Norfolk County Council on the future use of the former RAF Coltishall site.

In addition you will need to consider consultations being undertaken by other Councils on major planning applications in the area and particularly those that may be along or adjacent to the proposed route of the NDR. I therefore suggest that you contact Norwich City Council, Broadland District Council and South Norfolk District Council for such information.

Finally, it is important that the public are made aware that the SOCC is part of the pre-application process and that there will also be opportunities for the public to make their views known once the application has been accepted by the Secretary of State. The Planning Inspectorate Advice Note 8.1 provides further information on how the process works and you

<p>should make reference to this within the SOCC.</p>
<p>What the Applicant Did</p>
<p>List provided was cross referenced with the Identified Stakeholder and Local Interest Groups and the Supporting Document. This resulted in additional stakeholders being added to the list of those to be consulted.</p> <p>SOCC text was amended from 'Media – Press release will be issued</p> <p>to 'Media – Press release and relevant advertising will be issued</p> <p>This would allow the use of additional promotion and advertising of the exhibitions to be undertaken outside of the main consultation area.</p> <p>The comments regarding the provision of further justification for the NDR were noted. The applicant considered that the SOCC did already identify the key benefits of the NDR; namely:</p> <ul style="list-style-type: none"> • it will free road space for transport improvements in Norwich; • it will provide improved access from north Norfolk to the national trunk network; • it will bring traffic relief for communities to the north and east of Norwich; • it is a piece of transport infrastructure that is required to implement NATS, deliver growth and support the economy. <p>In this instance the applicant did not amend the SOCC.</p> <p>The original consultation letter of 19 April 2013 did ask the local authorities to provide information on any other consultations that they were aware of. The only consultations identified were those noted above. The applicant noted the dates of these other consultations.</p> <p>The actual date for the start of the Section 47 consultations and for the first public exhibition was moved from the 18 June 2013 (as outlined in the draft SOCC for consultation) to the 8 July 2013 to allow more time to prepare the consultation materials. This also resulted in it not conflicting with some of the consultations identified above.</p> <p>The SOCC text was amended to make reference to the Planning Inspectorate's Advice Note 8.1.</p>

Table 4/6: Norfolk County Council's Response to SOCC Consultation and What the Applicant Did

Summary of Comments from Broadland District Council

Text from response received, 20 May 2013.

(This was received after the consultation deadline of 18 May 2013 but the applicant had regard to the consultation response in preparing the final SOCC).

The draft Statement of Community Consultation prepared by Norfolk County Council, in relation to the Norwich Northern Distributor Road proposal is a relatively clear and concise document that gives a good summary of the proposals and provides useful information on who will be consulted, what they will be consulted on, how they will be consulted, and what will happen following the exercise. The process outlined in the SOCC generally follows the key principles of effective community involvement that are outlined in Broadland District Council's Community Involvement Protocol for Significant Development, these being:

Adopt an inclusive approach to community and stakeholder involvement ensuring that anyone who has interest is given the opportunity to contribute ideas from an early stage.

The combination of different forms of engagement and publicity outlined in the SOCC e.g. via exhibitions, meetings, documents at libraries, websites, posters, media etc will enable a wide variety of interested individuals to take part in the consultation.

Demonstrate, by reporting back on results of community and stakeholder involvement, that all views are listened to and considered.

The SOCC includes a statement on consultation feedback (which Broadland District Council has previously recommended), stating that a consultation report will be published alongside the planning application, setting out the account that has been taken of the relevant responses received. This is in keeping with the above principle. The Council recommends that this report is made available to those that have taken part in prior consultations.

Provide sufficient time for stakeholders and communities to contribute their views on proposals.

The consultation period lasts for 10 weeks, which should provide ample

time for individuals and stakeholder groups to formulate their responses.

Provide accessible, clear and relevant information relating to proposals and community involvement opportunities.

The SOCC is generally a very clear and concise document that should allow any reader to understand how they can get involved in the consultation and make a response.

However, there are one or two terms in the 'Summary of Proposals' which could perhaps be clearer. In particular, the reference in this section to 'at grade junctions', 'radial routes' and 'grade separated interchanges' may serve to confuse members of the public. In addition, technical terms such as 'earthwork bunds' and 'Bus Rapid Transit' may need explaining.

Subject to the amendments referred to above, Broadland District Council considers the draft SOCC as being a document that is fit for purpose.

What the Applicant Did

Text in SOCC was amended to explain terms such as 'radial routes', 'grade separated junctions', 'earthwork bunds' and 'Bus Rapid Transit'.

Table 4/7: Broadland District Council's Response to SOCC Consultation and What the Applicant Did

Summary of Comments from Norwich City

Text from response received, 17 May 2013.

I refer to your letters of 19 April 2013 and 07 May 2013 in relation to the above. The consultation area boundary now proposed is considered to be reasonable and now includes those areas of Norwich which are likely to be most affected by the proposals.

The content of the consultation also appears reasonable and I assume the proposed leaflet will be equality tested. Other than this I have no further comments to add at this stage on behalf of the City Council.

What the Applicant Did

The applicant wrote to residents/businesses, the letter was compliant with the applicant's equality guidelines.

Table 4/8: Norwich City Council's Response to SOCC Consultation and What the Applicant Did

Summary of Comments from Broads Authority

Text from response received, 25 April 2013

Many thanks for consulting the Broads Authority on the SOCC for the NDR. The approach seems a logical one and the timings of the consultation as a whole as well as the exhibitions give the community ample opportunity to get involved.

I would suggest considering adding the consultation to the Norwich City Council and Norfolk County Council newsletters, if the timing allows it. This could give more coverage. Unfortunately, there is no Broads Authority publication set for that time period, but if you provide us with relevant information we can add it to our website. Please let me know if you wish for us to do that.

I note in the SOCC there is nothing that refers to the format of response accepted or the questions that are intended to be asked.

To conclude, if this SOCC is followed (notwithstanding the comments above), the community will have ample opportunity to have their say.

What the Applicant Did

Text for Norfolk County Council’s “Your Norfolk” magazine June edition had already been arranged at the time of the SOCC consultation with local authorities. On 14 May 2013 the editors of known parish magazines/newsletters in the consultation area were e-mailed text advising of the proposed exhibitions together with a request that they place this text in their next publication.

With regard to the Broads Authority comment that the SOCC did not contain any reference to the format of providing comments - the draft SOCC did include this. Under the section entitled “How to find out More and Provide Comments” the draft SOCC outlined how to provide comments by e-mail, letter, telephone and on-line survey form. As a result no amendments were proposed to the SOCC as a result of this comment.

Table 4/9: Broads Authority Response to SOCC Consultation and What the Applicant Did

4.3.5 Notice of the SOCC and where it could be viewed was published in The Eastern Daily Press and the Norwich Advertiser (both local newspapers) on

21 June 2013 and 28 June 2013. Between 24 June 2013 and 20 September the SOCC was available to view at the following locations:

- Norfolk County Council's main office at County Hall, Martineau Lane, Norwich, NR1 2DH;
- Broadland District Council's main office at Thorpe Lodge, 1 Yarmouth Road, Norwich, NR7 0DU;
- South Norfolk District Council's main office at South Norfolk House, Swan Lane, Long Stratton, NR15 2XE;
- Norwich City Council's main office at City Hall, St Peters Street, Norwich, NR2 1NH;
- Broads Authority main office at Yare House, 62-64 Thorpe Road, Norwich, NR1 1RY;
- Norwich Millennium Library, The Forum, Millennium Plain, Norwich, NR2 1AW;
- Norwich Plumstead Road Library, Plumstead Road, Norwich, NR1 4JS;
- Norwich St Williams Way Library, Williams Loke, St Williams Way, Norwich, NR7 0AJ;
- Blofield Library, The Reading Room, Blofield, NR13 4RQ;
- Brundall Library, 90 The Street, Brundall, NR13 5LH;
- Costessey Library, Breckland Road, Costessey, Norwich, NR5 0RW;
- Earlham Library, Colman Road, Norwich, NR4 7HG;
- Hellesdon Library, Woodview Road, Hellesdon, Norwich, NR6 5SR;
- Mile Cross Library, Aylsham Road, Norwich, NR3 2RJ;
- Sprowston Library, Recreation Ground Road, Sprowston, Norwich, NR7 8EW;
- Taverham Library, Sandy Lane, Taverham, Norwich, NR8 6JR;
- West Earlham Library, 17/18 Earlham West Centre, Norwich, NR5 8AD.

4.3.6 Copies of the SOCC publication notices are contained in Appendix L of this report.

4.4 Section 47 - Rationale for the SOCC

4.4.1 The NDR scheme is linear in nature and this needed to be taken into consideration when determining the form of consultation with the local community.

4.4.2 The use of exhibitions was considered a good means of consulting because they allowed the opportunity to consult a larger number of residents and

stakeholders, without posting large paper documents to each consultee.

Unlike meetings, consultees could visit exhibitions at a day and time convenient for themselves. As the exhibitions would be staffed, they would also allow the opportunity to have face-to-face discussions and questioning.

4.4.3 At the time of developing the SOCC it was considered that those areas and roads most affected by the proposals would be:

- (a) parishes through which the NDR passed;
- (b) sections of main the radial routes close to the NDR, as traffic may be drawn to these sections in order to use the NDR;
- (c) existing roads around the north of Norwich;
- (d) the Norwich Outer Ring Road as the NDR would represent an alternative to this;
- (e) routes between the A1067 and A47 in the Taverham/Drayton and Costessey/Easton area.

4.4.4 As a result, the consultation area identified within the SOCC was defined on the following basis:

- (a) it included all parishes through which the NDR passes (including the proposed off line improvements);
- (b) its northern and eastern boundary was defined so that it includes the parishes that are adjacent to those through which the NDR passed;
- (c) the western boundary was defined so that it included the 3 parishes where concerns had been raised regarding the effects of the NDR on existing routes between the A1067 at Taverham/Drayton and the A47 at Easton/Costessey (i.e. Costessey, Easton and Ringland);

- (d) its southern boundary was defined by a line being a 200m offset south of the A1074 Dereham Road, A140/A1042 Outer Ring Road and A1042 Yarmouth Road.
- 4.4.5 This area was where the main letter drop to individual residents and business addresses, informing them of the proposed exhibitions was undertaken. A copy of the letter and information sent is contained in Appendix K-2 of this report.
- 4.4.6 The applicant could have extended the consultation area further so that it covered the whole of Norwich, the whole of the Broadland and North Norfolk District Councils and even the whole of Norfolk (as has been suggested in some of the consultation responses). In particular the areas further north of Norwich are areas likely to benefit from the improved accessibility provided by the NDR. Similarly, Norwich residents are those likely to benefit from the NATS proposals.
- 4.4.7 However, this was not a consultation on NATS, it was a consultation on the NDR proposals and the applicant wanted to keep the consultation manageable, cost effective and to engage those persons most affected by the proposals.
- 4.4.8 Further publicity and promotion of the consultation and exhibitions, was undertaken both within in the consultation area defined by the SOCC and areas beyond this. This supplementary promotion and advertising is detailed in Section 4.7.
- 4.4.9 The rationale for selecting the exhibition venues was as follows:
- (a) an exhibition venue was proposed in the majority of parishes through which the mainline of the NDR passes, the exceptions to this being Attlebridge and Beeston St Andrew. No exhibitions were proposed in Attlebridge and Beeston St Andrew as they are much smaller communities having less than 100 property addresses. However,

residents of any parish were able to attend any of the proposed exhibitions;

- (b) an exhibition was proposed in each parish located between the NDR and the boundary of Norwich City Council;
- (c) previous consultations had highlighted concerns regarding the effects of the NDR on existing routes between the A1067 at Taverham/Drayton and the A47 at Easton/Costessey. As a result exhibitions were proposed within the parishes of Easton and Costessey;
- (d) two exhibitions were proposed within Norwich. These were located at The Forum in the centre of the city and at the Norman Centre in the north of the city.

4.4.10 Village halls and community centres were used for the exhibitions as they were usually centrally located within a community and generally had the most suitable access for those walking, cycling and travelling by public transport or motor vehicle.

4.5 Section 47 - Compliance with the SOCC

4.5.1 The table below summarises what the SOCC stated regarding **how** the applicant would consult and what it did to achieve this.

What the SOCC Stated on How the Applicant Would Consult
The applicant would arrange and attend public exhibitions at the dates and venues detailed in the SOCC.
What the Applicant Did
The public exhibitions were arranged as detailed by the SOCC. The format of the exhibitions is outlined further in Section 4.8 of this report.

Table 4/10: SOCC Statement on Public Exhibitions and What the Applicant Did

What the SOCC Stated on How the Applicant Would Consult
The applicant would provide on its website the latest information on the

scheme including that displayed at the exhibitions.

What the Applicant Did

Electronic copies of the exhibition boards were posted on the applicant's website on 8 July 2013. The scheme information document was placed on deposit at the local authority offices and public libraries detailed in the SOCC on 8 July 2013. They were maintained there until 20 September 2013. Copies of the exhibition boards are contained in Appendix R-1 to R-4 of this report.

Table 4/11: SOCC Statement on Displaying Public Exhibition Information and What the Applicant Did

What the SOCC Stated on How the Applicant Would Consult

The applicant's website would also provide opportunity for comments to be submitted.

What the Applicant Did

An on-line survey form was available for responses to be provided electronically from 8 July 2013 until 20 September 2013.

Table 4/12: SOCC Statement on Providing Comments via Website and What the Applicant Did

What the SOCC Stated on How the Applicant Would Consult

Press releases and relevant advertising would be issued to include details of the consultation process and the public exhibitions.

What the Applicant Did

Other relevant advertising of the consultation was undertaken. Details of this are provided in Section 4.7.

Table 4/13: SOCC Statement on Relevant Advertising and What the Applicant Did

What the SOCC Stated on How the Applicant Would Consult

The SOCC would be made available for inspection, and the locations it can be viewed would be published in a local newspaper.

What the Applicant Did

Copies of the SOCC and its supporting document were placed on deposit

at the local authority offices and public libraries detailed in the SOCC on 24 June 2013. They were maintained there until 20 September 2013.

Table 4/14: SOCC Statement on Advertising SOCC and What the Applicant Did

What the SOCC Stated on How the Applicant Would Consult
The applicant would endeavour to continue holding meetings when requested before, during and after the consultation period.
What the Applicant Did
Section 4.10 of this report details the meetings that were held.

Table 4/15: SOCC Statement on Meetings and What the Applicant Did

What the SOCC Stated on How the Applicant Would Consult
Briefing meetings would be provided for local politicians (district/county/city councillors and MPs).
What the Applicant Did
District/county/city councillors were invited to a drop-in briefing session at County Hall between 3pm and 8pm on 3 July 2013. One city councillor attended this session.

Table 4/16: SOCC Statement on Briefing Local Politicians and What the Applicant Did

What the SOCC Stated on How the Applicant Would Consult
For those unable to attend an exhibition between 8 July and 20 September 2013, a project information document containing details of the proposals will be available at the venues detailed in the SOCC.
What the Applicant Did
The scheme information document was placed on deposit at the local authority offices and public libraries detailed in the SOCC on 8 July 2013. They were maintained there until 20 September 2013.

Table 4/17: SOCC Statement on Providing Information Other than Exhibitions and What the Applicant Did

4.5.2 The table below summarises what the SOCC stated regarding **who** the applicant would consult and what it did to achieve this.

What the SOCC Stated on Who the Applicant Would Consult
The applicant would send details of the exhibitions and consultation document locations to residential/business addresses within the consultation area using its latest available address information.
What the Applicant Did
Letters detailing the proposed exhibitions and deposit locations for the scheme information documents (including a short description of the scheme) were sent to 57,000 property/business addresses within the consultation area defined by the SOCC during the week beginning 1 July 2013. A copy of this letter is contained in Appendix K-2 of this report.

Table 4/18: SOCC Statement on Advising Residents of Exhibitions and What the Applicant Did

What the SOCC Stated on Who the Applicant Would Consult
The applicant would send details of the exhibitions and consultation document locations to county/city/district councillors and MPs/MEPs whose constituencies are either wholly or partly within the consultation area.
What the Applicant Did
Details of these were e-mailed to county/city/district councillors on 28 June 2013. Letters to MPs/MEPs were sent on 26 June 2013. Copies of these letters are contained in Appendix K-1 and K-4 of this report.

Table 4/19: SOCC Statement on Advising Local Politicians of the Public Exhibitions and What the Applicant Did

What the SOCC Stated on Who the Applicant Would Consult
The applicant would send details of the exhibitions and consultation document locations to parish councils within the consultation area.
What the Applicant Did
Letters to parish councils, advising of these details, were sent on 24 June 2013. A copy of this letter is contained in Appendix K-3 of this report.

Table 4/20: SOCC Statement on Advising Parish Councils of the Public Exhibitions and What the Applicant Did

What the SOCC Stated on Who the Applicant Would Consult
The applicant would send details of the exhibitions and consultation document locations to stakeholder and local interest groups.
What the Applicant Did
Letters to the stakeholders listed in the supporting document to the SOCC were issued during the week beginning 1 July 2013. A copy of this letter is contained in Appendix K-2 of this report.

Table 4/21: SOCC Statement on Advising Stakeholders and Local Interest Groups of the Public Exhibitions and What the Applicant Did

What the SOCC Stated on Who the Applicant Would Consult
The applicant would erect posters and advertising banners detailing the exhibitions in public libraries and other key venues within the consultation area and within Norwich City.
What the Applicant Did
The erection of posters and banners was undertaken as detailed in Section 4.7.

Table 4/22: SOCC Statement on Other Advertising of the Public Exhibitions and What the Applicant Did

What the SOCC Stated on Who the Applicant Would Consult
The applicant would ask parish councils within the consultation area to advertise the exhibitions in their newsletters and on their notice boards.
What the Applicant Did
On 14 May 2013 the editors of known parish magazines/newsletters in the consultation area were e-mailed text advising of the proposed exhibitions with a request that they place this text in their next publication. A copy of this e-mail is contained in Appendix K-3 of this report.

Table 4/23: SOCC Statement on Using Parish Councils to Advertise the Public Exhibitions and What the Applicant Did

4.5.3 The table below summarises what the SOCC stated the applicant would do regarding consultations on the Preliminary Environmental Information Report (PEIR) and what the applicant did to achieve this.

What the SOCC Stated the Applicant Would do Regarding Consultations on the PEIR
Preliminary environmental information would be available to view on the applicant's website and in hard copy at the library locations listed in the SOCC.
What the Applicant Did
<p>The PEIR was placed on the applicant's website on 13 July 2013. It was also deposited in the locations listed in the SOCC on 16 July 2013.</p> <p>It was originally intended that copies would remain in the deposit locations until 20 September. However, because a deadline extension to 18 October 2013 was provided to certain Section 42 consultees, the documents remained in these locations until this date.</p>

Table 4/24: SOCC Statement on Where the PEIR Would be Available and What the Applicant Did

What the SOCC Stated the Applicant Would do Regarding Consultations on the PEIR
Release of the preliminary environmental information would coincide with the start of consultation under Section 42 and Section 48 of the Planning Act 2008 as set out in this SOCC.
What the Applicant Did
The PEIR formed part of the Section 42 consultation packages. Section 48 Notices were placed in two local newspapers (the Eastern Daily Press and the Norwich Advertiser), the Times and the London Gazette on 12 and 19 July 2013. On the same days, a separate notice was placed in the Eastern Daily Press and the Norwich Advertiser advising where the PEIR was available to view. Copies of these notices are contained in Appendix M and Appendix O of this report.

Table 4/25: SOCC Statement on When the PEIR Would be Available and What the Applicant Did

What the SOCC Stated the Applicant Would do Regarding Consultations on the PEIR
Release of the preliminary environmental information may be after some of the public exhibitions referred to below. Its release will be advertised in

local newspapers and on the applicant’s website.
What the Applicant Did
A draft copy of the PEIR was available for the first exhibition on 8 July 2013. Notices advising of the final PEIR's release and where it could be viewed were placed in two local newspapers (the Eastern Daily Press and the Norwich Advertiser) on 12 and 19 July 2013. Copies of these notices are contained in Appendix O of this report.

Table 4/26: SOCC Statement on Advertising PEIR Availability and What the Applicant Did

4.6 Section 47 - Inconsistencies with the SOCC

4.6.1 The following tables list the inconsistencies from the SOCC.

What the SOCC Stated on Who the Applicant Would Consult
The applicant would send details of the exhibitions and consultation document locations to residential/business addresses within the consultation area using its latest available address information.
Inconsistency
<p>The consultation letters were sent to over 57,000 resident/business addresses, including a number of parishes that were not specifically hosting an exhibition. The letters invited them to attend any of the events listed. Comments received at the start of the exhibition highlighted that some residents had received letters on the day of or just after the first exhibition in Rackheath. Comments mainly came from residents of Rackheath who had missed the exhibition in their village.</p> <p>Whilst Rackheath residents were able to attend any of the other exhibitions, in light of the comments received the applicant decided to schedule an additional exhibition on 12 August 2013 (between 13:00 to 20:00) at the Holy Trinity Church in Rackheath. Letters notifying people of this new exhibition were sent to addresses within Rackheath Parish (see Appendix K-5 of this report).</p>

Table 4/27: Derivation from SOCC – Additional Rackheath Exhibition

What the SOCC Stated on How the Applicant Would Consult
Briefing meetings would be provided for local politicians

(district/county/city councillors and MPs/MEPs).
Inconsistency
Whilst district/county/city councillors were invited to a drop-in briefing session at County Hall between 3pm and 8pm on 3 July 2013, the invitation to this session for MPs/ MEPs was omitted. However, on 9 August 2013 the applicant wrote to MPs/MEPs offering to meet them individually should they wish to do so. One MP accepted this offer.

Table 4/28: Derivation from SOCC – MPs/MEPs Briefing Meeting

4.7 Section 47 - Other Promotion and Advertising of the Public Exhibitions

4.7.1 The SOCC stated that ‘press releases and relevant advertising would be issued to include details of the consultation process and the public exhibitions.’ The table below outlines the additional promotion/advertising of the consultations that was undertaken.

Activity	When
10 second advertisement slots on a local radio station (Heart FM).	6 slots per day between Monday 8 July 2013 and Friday 12 July 2013.
Advertisement poster on plasma screens in library screens within Norfolk.	Between Friday 28 June 2013 and Friday 9 August 2013.
A4 paper copy of poster placed in 11 libraries within the consultation area.	Between Monday 1 July 2013 and Friday 9 August 2013.
Advertisement poster on plasma screens at bus stops and park and ride sites.	Between Friday 28 June 2013 and Friday 9 August 2013.
Single ¼ page advert in the Eastern Daily Press (local newspaper).	Saturday 6 July 2013.
3 No front page strip ads in the Norwich Advertiser (local	Friday 5, 12 and 19 July 2013.

newspaper).	
Advertisement poster on plasma screens in The Forum in Norwich.	Between Friday 28 June 2013 and Friday 9 August 2013.
Advert in the June 2013 edition of "Norfolk Matters" Magazine and e-bulletin that is issued to all parish councils in Norfolk.	Between Friday 5 July 2013 and Friday 9 August.
3 advertisement banners erected in the receptions of Norfolk County Council, Norwich City Council and Broadland District Council.	Between Friday 5 July 2013 and Friday 9 August.

Table 4/29: Summary of Supplementary Promotion/Advertising

4.7.2 Examples of the additional publicity produced are contained in Appendix P of this report.

4.8 Section 47 - Public Exhibitions

4.8.1 In accordance with the SOCC, public exhibitions were provided as detailed below:

Public Exhibitions Outlined in the SOCC	
Date	Venue
Mon 8 July 1pm to 8pm	Rackheath Holy Trinity Church, Salhouse Road, Rackheath, NR13 6PD.
Fri 12 July 1pm to 8pm	The Dussindale Community Centre, Pound Lane, Thorpe St Andrew, Norwich, NR7 0SR.
Sat 13 July 1pm to 8pm	Old Catton Village Hall, Church Street, Hall Drive, Old Catton, NR6 7DW.
Mon 15 July 1pm to 8pm	Postwick Village Hall, Ferry Lane, Postwick, NR13 5HL.
Tue 16 July 1pm to 8pm	Spixworth Village Hall, Crostwick Lane, Spixworth, NR10 3NQ.
Thu 18 July 1pm to 8pm	Easton Village Hall, Marlingford Road, Easton, NR9 5AD.
Sat 20 July 1pm to 8pm	Drayton Village Hall, Pond Lane, Drayton, NR8 6PP.

Mon 22 July 1pm to 8pm	Hellesdon Community Centre, Middletons Lane, Norwich NR6 5SR.
Wed 24 July 1pm to 8pm	Sprowston Diamond Centre, School Lane, Sprowston, NR7 8TR.
Thu 25 July 1pm to 8pm	Horsford Village Hall, Holt Road, Horsford, NR10 3DN.
Sat 27 July 1pm to 8pm	Breckland Hall, Breckland Road, New Costessey NR5 0RW.
Tue 30 July 1pm to 8pm	St Faiths Centre, Manor Road, Horsham, Norwich, NR10 3LF.
Fri 2 August 1pm to 8pm	Taverham Village Hall, Sandy Lane, Norwich, NR8 6JR.
Sat 3 August 1pm to 8pm	Gt Plumstead Village Hall, Church Road, Gt Plumstead, NR13 5AB.
Tue 6 August 9am to 4pm	The Forum, Millennium Plain, Norwich, NR2 1TF.
Fri 9 August 1pm to 8pm	Norman Centre, Bignold Road, Norwich, NR3 2QZ.
Additional Public Exhibition not Outlined in the SOCC	
Date	Venue
Mon 12 August 1pm to 8pm	Rackheath Holy Trinity Church Hall, Salhouse Road, Rackheath, NR13 6PD.

Table 4/30: Public Exhibition Dates and Venues

4.9 Section 48 - Statutory Publicity

4.9.1 The following sections outline the main consultation requirements of the Planning Act 2008 with regard to the statutory publicity, and how the applicant has met these requirements.

Section 48 Requirement
The applicant must publicise the proposed application in the prescribed manner. Publicity should include a deadline for receipt of responses, as well as the matters set out in Regulation 4(3) of the Infrastructure Planning (Applications: Prescribed Forms and Procedures) Regulations 2009.
What the Applicant Did
Notices publicising the proposed DCO application were placed (on 12 and 19 July 2013) in the following publications: <ul style="list-style-type: none"> • Eastern Daily Press (local newspaper),

- Norwich Advertiser (local newspaper),
- The Times (national newspaper),
- London Gazette.

The notices complied with the requirements of Section 48 and Regulation 4(3), and confirmed that responses should be received by 20 September 2013. Appendix M of this report contains copies of the Section 48 Notices.

Table 4/31: Section 48 Requirements and What the Applicant Did

- 4.9.2 The local authorities and prescribed consultees were notified of the commencement of this consultation via correspondence dated 11 July 2013 (see Appendix Q of this report). This correspondence included a copy of the Section 48 Notice as it would appear in the newspapers for the first time the following day. Where available, copies of the notices as displayed on the newspapers' websites have also been included in Appendix M of this report.
- 4.9.3 At the time of the Section 48 consultation the applicant's records showed that there was no clerk for Crostwick Parish Meeting and an oversight meant that it was not included in the notification. However, at the commencement of the Section 42 consultations the parish chairman had been identified and included in the subsequent formal Section 42 consultations
- 4.9.4 The Section 48 Notice identified the consultation material used in the consultation, being documents, plans and maps showing the nature and location of the NDR, including the Preliminary Environmental Information Report.
- 4.9.5 The notice also identified the times and locations where the materials could be inspected and these are detailed below.

Library Details	Mon	Tue	Wed	Thu	Fri	Sat	Sun
Norwich Millennium Library - The Forum, Millennium Plain, Norwich, NR2 1AW	9am - 8pm	9am - 8pm	9am - 8pm	9am - 8pm	9am - 8pm	9am - 5pm	Closed
Norwich Plumstead Road Library - Plumstead Road, Norwich, NR1 4JS	Closed	1pm - 7pm	10am - 1pm 2pm - 5pm	1pm - 7pm	10am - 1pm 2pm - 5pm	10am - 3:30pm	Closed
Norwich St Williams Way	10am - 1pm	2pm - 8pm	Closed	10am - 1pm	10am - 1pm	10am -	Closed

Library - Williams Loke, St Williams Way, Norwich, NR7 0AJ	2pm - 5pm			2pm - 5pm	2pm - 5pm	1pm	
Blofield Library - The Reading Room, Blofield, NR13 4RQ	2pm - 5pm	Closed	9am - 1pm 2pm - 5pm	Closed	9am - 1pm	9am - 1pm	Closed
Brundall Library - 90 The Street, Brundall, NR13 5LH	10am - 1pm	2pm - 7pm	Closed	10am - 1pm	2pm - 5pm	10am - 1pm	Closed
Costessey Library - Breckland Road, Costessey, Norwich, NR5 0RW	9am - 1pm 2pm - 5pm	2pm - 7:30pm	9am - 1pm 2pm - 5pm	Closed	9am - 1pm 2pm - 5pm	9am - 1pm	Closed
Earlham Library - Colman Road, Norwich, NR4 7HG	1pm - 5pm	10am - 5pm	10am - 5pm	10am - 7pm	10am - 5pm	10am - 5pm	Closed
Hellesdon Library - Woodview Road, Hellesdon, Norwich, NR6 5SR	10am - 1pm	10am - 1pm 2pm - 5pm	10am - 1pm 2pm - 5pm	10am - 1pm 2pm - 8pm	10am - 1pm 2pm - 5pm	10am - 1pm	Closed
Mile Cross Library - Aylsham Road, Norwich, NR3 2RJ	Closed	2pm - 7:30pm	10am - 5:30pm	10am - 5:30pm	10am - 5:30pm	10am - 1pm	Closed
Sprowston Library - Recreation Ground Road, Sprowston, Norwich, NR7 8EW	Closed	9am - 1pm 2pm - 8pm	9am - 1pm 2pm - 5pm	9am - 1pm 2pm - 5pm	9am - 1pm 2pm - 5pm	10am - 4pm	Closed
Taverham Library - Sandy Lane, Taverham, Norwich, NR8 6JR	9am - 1pm 2pm - 5pm	9am - 1pm	2pm - 5pm	2pm - 8pm	9am - 1pm 2pm - 5pm	9am - 1pm	Closed
West Earlham Library - 17/18 Earlham West Centre, Norwich, NR5 8AD	Closed	9am - 1pm 2pm - 6pm	Closed	9am - 1pm 2pm - 6pm	Closed	9am - 1pm	Closed
Local Authority Offices	Mon	Tue	Wed	Thu	Fri	Sat	Sun
Norfolk County Council - County Hall, Martineau Lane, Norwich, NR1 2DH	8:45am - 5:30pm	8:45am - 5:30pm	8:45am - 5:30pm	8:45am - 5:30pm	8:45am - 5pm	Closed	Closed
Broadland District Council - Thorpe Lodge, 1 Yarmouth Road, Norwich, NR7 0DU	8:30am - 5pm	8:30am - 5pm	8:30am - 5pm	8:30am - 5pm	8:30am - 5pm	Closed	Closed
Broads Authority - Yare House, 62-64 Thorpe Road, Norwich, NR1 1RY	9am - 5pm	9am - 5pm	9am - 5pm	9am - 5pm	9am - 5pm	Closed	Closed
Norwich City Council - City Hall, St Peters Street, Norwich, NR2 1NH	8:45am - 5pm	8:45am - 5pm	1pm - 5pm	8:45am - 5pm	8:45am - 5pm	Closed	Closed

Table 4/32: Consultation Document Deposit Location

4.10 Non-Statutory Consultations

4.10.1 The SOCC stated that the applicant would endeavour to continue holding meetings when requested before, during and after the consultation period. During the period from commencement of consultations on 8 July to 18 November (the last deadline for responses to the design change consultations outlined in Section 7.0 of this report) the following meetings were attended by the applicant's representatives (all meetings that were requested were attended):

Date	Consultee	Venue	Issues Discussed
5 August 2013	Taverham Parish Councils Traffic and Transportation Sub Committee	Taverham Village Hall	Volume of vehicles using routes between the A1067 at Taverham and the A47
21 August 2013 4 October 2013 7 November 2013	Resident representatives of Hall Lane, Drayton	Site meeting Drayton Hall Lane, Drayton	Proposal to close Drayton Lane south and resulting effects on Reepham Road and Hall Lane
24 Sept 2013	Chloe Smith MP	Norfolk County Council's main offices, Norwich	General update from the applicant on progress of the project
24 Sept 2013	Resident representatives of, Middle Road, Gt Plumstead	On site Middle Road Gt Plumstead	Proposal to provide Middle Road Bridge, the resulting effects on Middle Road and the current standard of Middle Road
25 Sept 2013	District Councillor, County Councillor and representative for Horstead Parish Council	Norfolk County Council's main offices, Norwich	Effects of NDR on B1150 through Horstead
30 Sept 2013	Horsham and St Faiths St Faiths Parish Council	St Faiths Centre, Manor Road	Impact of smoke from airfield on NDR and proposal not to provide bridge/underpass

			between Bullock Hill and Petans training facility
15 November 2013	Resident of Green Lane West, Rackheath	On site at Green Lane West junction with Wroxham Road	Effects of proposals on nearby property regarding noise, emissions and visual intrusion

Table 4/33: Additional Meetings Dates and Venues

4.10.2 The meetings were arranged to allow informal discussion on the proposals.

For each meeting the applicant encouraged the consultee(s) to submit a consultation response so that the points raised could be formally logged.

4.10.3 The applicant was also invited to give a presentation on the project at a number of business events during the consultation, which gave an opportunity to raise questions.

4.11 EIA Regulations Consultations

4.11.1 The NDR is a scheme that requires an Environmental Impact Assessment (EIA). The results of the EIA have been reported in an Environmental Statement that forms part of the application documents. A notification under Regulation 6 of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2009 was issued to the Secretary of State (sent to the Planning Inspectorate) on 23 January 2013 confirming that the applicant would provide an environmental statement in respect of the NDR Scheme. The notification was provided prior to the consultation under section 42 commencing, as is required by Regulation 6(1). A copy of the notification is provided as Appendix Y to this report.

4.11.2 A Preliminary Environmental Information Report (PEIR) was produced as part of the pre-application consultations. This gave a preliminary understanding of the potential environmental effects of the scheme and of the measures proposed to reduce these effects.

4.11.3 The PIER formed part of the scheme information sent to Section 42 consultees. As described in the SOCC, the PEIR was also available to view at the following locations:

- (a) the applicant’s website;
- (b) at the public exhibitions outlined in the SOCC;
- (c) at the main local authority receptions and public libraries outlined in the SOCC.

4.11.4 Notices advertising the release of the PEIR and how it could be viewed were placed in the Eastern Daily Press and Norwich Advertiser (both local newspapers) on 12 and 19 July 2013. Copies of these notices are contained in Appendix O of this report.

4.12 Section 42 - Consultation with Local Authorities, Prescribed Consultees and Those with Interest in Land

4.12.1 The following sections outline the main consultation requirements of the Planning Act 2008 with regard to the consultation with local authorities and prescribed consultees and those with in interest in land, and how the applicant has met these requirements.

Section 42 Requirement
<p>The applicant must consult the following about the proposed DCO application:</p> <ul style="list-style-type: none"> • such persons as may be prescribed; • the Marine Management Organisation if certain marine areas may be affected (not relevant in this case); • each local authority that is within Section 43; • the Greater London Authority if the land is in Greater London (not relevant in this case); • each person who is within one or more of the categories set out in Section 44.
What the Applicant Did - prescribed consultees and local authorities
<p>Prescribed consultees and local authorities were sent, by Royal Mail</p>

Recorded Delivery, a consultation package consisting of:

- a covering letter;
- the scheme information document;
- the Preliminary Environmental Information Report (PEIR);
- the Non Technical Summary of the PEIR;
- the Non Technical Note on Transport Modelling;
- a CD containing electronic copies of all the above documents plus the appendices to the scheme information document (which included scheme drawings and provisional modelled traffic flow predictions).

A copy of the letter sent to prescribed consultees and local authorities is contained in Appendix F-1 of this report. Appendix F-2 of this report contains a schedule of the local authorities and prescribed consultees that were consulted, including the dates they received the documents and the deadline stated for a response.

Section 2.6 describes how a local authority was identified for the purposes of Section 43 of the Planning Act 2008.

What the Applicant Did – those with interest in land

Those with an interest in land (as defined under Section 44 of the Planning Act 2008) were sent a consultation package consisting of:

- a covering letter;
- the scheme information document;
- the Non Technical Summary of the PEIR;
- the Non Technical Note on Transport Modelling;
- a CD containing electronic copies of all the above documents plus the appendices to the scheme information document (which included scheme drawings and provisional modelled traffic flow predictions) and the Preliminary Environmental Information Report (PEIR).

Consultation packages to addresses in the local area (i.e. parishes through which the NDR passes or adjacent to the NDR) were generally hand delivered through property letter boxes between 10 August and 14 August 2013. The other addresses were sent by courier on 12 August 2013.

As additional information came to light regarding land ownership and interests, further consultation packages were issued and these new consultees were advised of an extended deadline to the consultation in

order that they were allowed the minimum 28 day period to respond.

A copy of the letter sent to those consultees with an interest in land is contained in Appendix H-1 of this report. Appendix H-2 of this report contains a full schedule of those consulted, when they received the documents and the stated deadline for a response.

Table 4/34: Section 42 Requirements and What the Applicant Did

Section 45 Requirement

The applicant must, when consulting a person under Section 42 of the Planning Act 2008, notify the person of the deadline for the receipt by the applicant of the person's response to the consultation. The deadline for receipt of responses must not be earlier than the end of the period of 28 days that begins with the day after the day on which the person receives the consultation documents.

What the Applicant Did

The deadline for receipt of responses was set as 20 September 2013. This was detailed in the covering letter set to all consultees, and was more than 28 days after the day of receipt in all cases.

As additional information came to light regarding land ownership and interests, further consultation packages were issued and these new consultees were advised of an extended deadline to the consultation in order that they were allowed the minimum 28 day period to respond. Appendix H-2 of this report contains a full schedule of those consulted, when they received the documents and the stated deadline for a response.

Table 4/35: Section 45 Requirements and What the Applicant Did

Section 46 Requirement

The applicant must supply the Secretary of State with such information in relation to the proposed application as the applicant would supply to comply with Section 42 of the Planning Act 2008. This must be done before commencing the consultation under Section 42.

What the Applicant Did

The applicant's letter dated 26 July 2013, notified PINS (on behalf of the Secretary of State) of its intention to submit a DCO for the scheme and included copies of the Section 42 consultation documents. This is

contained in Appendix N of this report. The letter was sent prior to the commencement of the Section 42 consultation and the applicant can confirm that the documents issued with this letter were the same as those issued to the Section 42 consultees.

Table 4/36: Section 46 Requirements and What the Applicant Did

4.13 Section 42 - Additional Consultees/Extended Consultation Deadlines

4.13.1 During the process of undertaking the Section 42 consultations, there was occasionally a need to re-send the consultation packages. The reasons for this included:

- (a) a change in parish clerk, requiring new consultation documents being sent to the new clerk;
- (b) no delivery confirmation being received and resending new consultation documents to the consultee again;
- (c) requests from consultees to include other organisations/bodies to be included in the consultation;
- (d) new information regarding land interests becoming available.

4.13.2 Where documents had to be resent, the consultees were given an extended deadline to ensure that they had the minimum statutory period of 28 days to provide a response. They were advised of the new deadline for responses on the documents they received.

4.13.3 The list of consultees in Appendix F-2 and H-2 of this report details the deadline given to the consultees and details the reasons for needing to resend the consultation documents.

4.14 Section 42 - On-Going Diligent Inquiry

4.14.1 Throughout the pre-application process, the applicant has continually carried out diligent inquiry to identify those within the three categories defined in Section 44 of the Planning Act 2008 (effectively owners, tenants, occupiers,

other persons with interests in land, and persons whose land might be injuriously affected). That included research through the Land Registry, information requests issued to relevant addresses, appropriate use of the applicant's prior knowledge of owners and occupiers (including the most appropriate address to which letters should be issued, which could be different to addresses identified at the Land Registry), use of publicly available information lists (such as directories), and consideration of the potential effects of the Scheme (in particular having regard to persons potentially within 'Category 3' as defined in section 44(4) of the Planning Act 2008).

- 4.14.2 The applicant used the results of that diligent inquiry in order to carry out the pre-application consultations pursuant to Section 42 of the Planning Act 2008 that are described in this report.
- 4.14.3 Where land was in unknown ownership at the time of the consultation, the applicant used consultation letters addressed to "The owner/occupier" or site notices (as appropriate considering the land in question), in order to seek to ensure that the relevant persons would be provided with notice of the proposed application.
- 4.14.4 As a separate exercise to the consultations undertaken under Section 42 of the Planning Act 2008 the applicant has been carrying out land referencing for the compilation of the Book of Reference. In a limited number of cases this exercise has produced some discrepancies with the information used to identify the Section 42 consultees. These discrepancies are identified in Appendix Z of this report together with the applicant's comments. Having regard to those comments the applicant remains satisfied that after making diligent inquiries it has notified all those persons with a relevant interest known to it. In addition, the applicant is satisfied that the discrepancies are minor and that no person who should have been consulted under Section 42 has been deprived of the opportunity to make representations.

4.14.5 If the applicant's continuing diligent inquiry reveals that land has been sold in between the pre-application consultations, submission of the application and the issue of the notification pursuant to Section 56 of the Planning Act 2008, then it will issue the latter notification to the 'new' owner. In addition, if the continuing diligent inquiry results in an 'additional' person being noted as relevant (such as a spouse who is not recorded on a registered title), then they will also be included in the Section 56 notification process. Measures such as these will ensure that, to the extent that the new owner is not aware of the scheme from the extensive local consultation and publicity generally, that they will be aware of the application and will have an opportunity to make representations to the Secretary of State.

4.15 Traffic Modelling Presented for Consultation

4.15.1 To help inform responses the consultation information included modelled traffic flow information for the 2012 base year and for the years 2017 and 2032, for situations with and without the NDR. In addition to the information being available on the internet, it was also available as follows:

- (a) for the Section 47 consultations this information was presented on the displays at the public exhibitions;
- (b) for the Section 48 consultations this information was contained in the documents deposited at the locations detailed in the Section 48 Notice;
- (c) for the Section 42 consultations this information was contained in the information documents sent to consultees.

4.15.2 The modelled traffic flows presented were based upon the NATS transport model that was originally developed in 2002 and which has been updated a number of times since then. In 2013 the model was refined using fresh data collected in 2012 and this latter model was used to develop the traffic forecasts presented at consultation. However, at the time of the consultation the refinement process was still underway and hence the flows presented at

consultation were preliminary data based upon a partially calibrated and validated model.

- 4.15.3 Since consultation the calibration/validation has been completed and the model has been refined further. The refinements have included minor changes to the NDR scheme design, and updates to the model to take on board new information in relation to the internalisation of trips within developments, new developer links and travel plans associated with developments. The data now presented therefore takes on board all of the aforementioned changes.
- 4.15.4 Notwithstanding this, analysis has been undertaken to understand the impact of the changes made and this has concluded that the majority of flow differences between the consultation data and the data now presented is slight. In no case was a material traffic impact identified in the final modelling in a location where the preliminary data had suggested that there would be no traffic impacts arising from the NDR. In addition the analysis indicates that, whilst absolute flows have changed, the forecast impact and trends associated with the provision of the NDR remain similar.
- 4.15.5 The adoption of the JCS was subject to a legal challenge in May 2011, which resulted in part of the JCS being remitted to the pre-submission stage (i.e. this part should be consulted upon again before examination by an independent inspector). The remitted part of the JCS had not yet been adopted at the time of the statutory pre-application consultations on the NDR.
- 4.15.6 The applicant therefore presented traffic data for two scenarios detailed below:
- (a) traffic modelling data with JCS growth allocation – which showed forecast traffic flows assuming the level of development detailed in the JCS and allocated in the locations identified by the JCS;

- (b) traffic modelling data with dispersed growth – which showed forecast traffic flows assuming the level of development detailed in the JCS but dispersed equally across the highway network.

4.15.7 Since consultation, the remitted JCS has been found sound and is in the process of being adopted. Accordingly, the more realistic scenario is the traffic modelling data with JCS growth allocated. It is this scenario that is therefore carried forward in all of the assessment material presented in the DCO application. However, because data for both scenarios were provided the applicant considers that a robust consultation was carried out that presented the potential scenarios as they stood at the time consultation was carried out.

5 Section 47 and Section 48 Consultation Responses

5.1 Section 47 and 48 Consultations - Introduction

- 5.1.1 This chapter explains the applicant's analysis of responses from the consultations undertaken under Sections 47 and 48 of the Planning Act 2008. Publication of the notice stating where and when the SOCC could be inspected took place on 21 June 2013 and on 28 June 2013, with the first exhibition held on 8 July 2013. The Section 48 Notices were published on 12 July 2013 and 19 July 2013, resulting in the Section 47 consultation and the Section 48 consultation running concurrently.
- 5.1.2 With both these consultations being undertaken at the same time it has not been possible to distinguish between responses from the two different consultations. Since the applicant gave equal consideration to all of the responses, the applicant does not consider it is necessary to distinguish between those from persons responding to the Section 47 consultation and those from persons responding to the Section 48 consultation. Responses to the consultations could be made by a number of methods as outlined below:
- (a) on-line questionnaire;
 - (b) paper copy questionnaire (handed in at an exhibition or posted to Norwich Northern Distributor Road, Norfolk County Council, Department of Environment, Transport and Development, County Hall, Martineau Lane, Norwich, NR1 2DH);
 - (c) telephone call to the applicant's call centre;
 - (d) e-mailing norwich.transport@norfolk.gov.uk;
 - (e) letter posted to Norwich Northern Distributor Road, Norfolk County Council, Department of Environment, Transport and Development, County Hall, Martineau Lane, Norwich, NR1 2DH.

5.1.3 Irrespective of the method of response, each comment was logged and analysed using the same process. Analysis has been undertaken on the basis of issues raised. Responses have been initially divided into the following main topics, which the applicant devised using knowledge gained from the extensive previous consultation on NATS and the NDR:

- comments regarding the need for the NDR;
- comments regarding alternatives to the NDR;
- comments regarding the route of the NDR;
- comments regarding the on-line proposals;
- comments regarding the off-line proposals;
- comments regarding walking/cycling/horse rider issues;
- comments regarding landscaping/planting issues;
- comments regarding wildlife issues;
- comments regarding noise/emission issues;
- comments regarding effects to specific roads;
- comments regarding land/property issues;
- comments regarding suggested changes;
- comments on the quality of consultation/exhibitions;
- other comments.

5.1.4 Within each of the main categories above the responses were then divided into subcategories, which are detailed in Appendix S of this report.

5.2 Section 47 and 48 Consultations - Summary of Responses

5.2.1 At each exhibition visitors were asked to sign-in (a record was also taken of the number of visitors unwilling to sign-in) so that the number of visitors at each venue could be documented. The number of recorded visitors to the exhibitions was as follows:

Date	Venue	Number of Visitors
Mon 8 July 1pm to 8pm	Rackheath Holy Trinity Church Hall, Salhouse Road, Rackheath, NR13 6PD.	166

Fri 12 July 1pm to 8pm	The Dussindale Community Centre, Pound Lane, Thorpe St Andrew, Norwich, NR7 0SR.	125
Sat 13 July 1pm to 8pm	Old Catton Village Hall, Church Street, Hall Drive, Old Catton, NR6 7DW.	146
Mon 15 July 1pm to 8pm	Postwick Village Hall, Ferry Lane, Postwick, NR13 5HL.	74
Tue 16 July 1pm to 8pm	Spixworth Village Hall, Crostwick Lane, Spixworth, NR10 3NQ.	216
Thu 18 July 1pm to 8pm	Easton Village Hall, Marlingford Road, Easton, NR9 5AD.	37
Sat 20 July 1pm to 8pm	Drayton Village Hall, Pond Lane, Drayton, NR8 6PP.	121
Mon 22 July 1pm to 8pm	Hellesdon Community Centre, Middletons Lane, Norwich NR6 5SR.	163
Wed 24 July 1pm to 8pm	Sprowston Diamond Centre, School Lane, Sprowston, NR7 8TR.	78
Thu 25 July 1pm to 8pm	Horsford Village Hall, Holt Road, Horsford, NR10 3DN.	149
Sat 27 July 1pm to 8pm	Breckland Hall, Breckland Road, New Costessey NR5 0RW.	40
Tue 30 July 1pm to 8pm	St Faiths Centre, Manor Road, Horsham, Norwich, NR10 3LF.	88
Fri 2 August 1pm to 8pm	Taverham Village Hall, Sandy Lane, Norwich, NR8 6JR.	225
Sat 3 August 1pm to 8pm	Gt Plumstead Village Hall, Church Road, Gt Plumstead, NR13 5AB.	125
Tue 6 August 9am to 4pm*	The Forum, Millennium Plain, Norwich, NR2 1TF.	285
Fri 9 August 1pm	Norman Centre, Bignold Road,	32

to 8pm	Norwich, NR3 2QZ.	
Mon 12 August 1pm to 8pm	Rackheath Holy Trinity Church Hall, Salhouse Road, Rackheath, NR13 6PD.	62

Table 5/1: Recorded Visitor Numbers at Public Exhibitions

* Note the open plan style of The Forum exhibition meant that it was not feasible to ask visitors to 'sign-in' on arrival. However, an approximate tally of those examining the display boards was recorded and is the figure detailed in this table.

5.2.2 Consultees were able to provide comments on the NDR via a number of methods. A total of 1492 responses to the Section 47 consultations were received as outlined below:

Method of Response	Number of Responses
On-line Questionnaire	497
Paper Copy Questionnaire	563
Telephone Call/PEM Enquiry	28
E-mail	328
Letter	76
Total	1492

Table 5/2: Summary of Section 47 Responses

5.2.3 Appendix S of this report contains details of all the responses received as part of the Section 47 consultation. These have been divided into a number of main categories. The number of comments for each category is outlined below.

Category	Number of Comments
Need for NDR	801
Alternatives to NDR	25

Route of NDR	423
On-Line Proposals	265
Off Line Proposals	98
Walking/Cycling/Horse Rider Issues	67
Landscaping/Planting Issues	206
Wildlife Issues	25
Emission/Noise Issues	178
Specific Road Effects	163
Land/Property Issues	36
Suggested Changes	23
Consultation/Exhibitions	96
Other Comments (of which 105 responses were provided that did not include any comment)	168
Requests for information	40

Table 5/3: Main Category of Section 47 Responses

5.3 Section 47 and 48 Consultations – Key Issues

5.3.1 Given the volume of comments received, the main categories above have been further sub-divided into groups of similar comment. Appendix S of this report details the groups of comments and the regard the applicant has given to these comments. The main issues identified from the Section 47 and Section 48 consultation responses are identified in the following sections.

Issue	Consultation result
<u>Need for NDR</u> General support for the project and comments that the NDR is needed	171 comments indicated that they thought the NDR was needed. They considered that the NDR would: <ul style="list-style-type: none"> • ease congestion; • provide access for growth of business and Norfolk's economy; • provide better access to the main road network; • help discourage rat running on inappropriate routes; • be an important part of NATS.
<p>Regard Given to Response: These responses have been considered by the applicant and regard has been given to them in putting together the need and alternatives case for the NDR, which is detailed in Volume 1 Chapter 3 of the Environmental Statement (Document Ref 6.1)</p> <p>Design Change: No</p>	
Issue	Consultation result
<u>Need for NDR</u> General comments not in favour of the project and that the NDR is not needed	460 comments were made that commented they did not support the NDR or that it was not needed. The reasons that they thought the NDR was not needed included: <ul style="list-style-type: none"> • the money could be spent elsewhere. Suggested examples were the A47 single carriageway sections, the Long Stratton bypass, the Norwich Outer Ring Road, the existing road network, public transport sustainable transport measures, other local authority services and other infrastructure to support development; • the NDR will generate more traffic that will increase congestion; • the NDR will not achieve anything; • there is no existing problem; • the A47 is adequate; • the NDR will create more rat runs on inappropriate roads; • the NDR will increase accidents;

	<ul style="list-style-type: none"> Norfolk County Council cannot afford maintenance of the NDR.
<p>Regard Given to Response: These responses have been considered by the applicant and regard has been given to them in putting together the need and alternatives case for the NDR, which is detailed in Volume 1 Chapter 3 of the Environmental Statement (Document Ref 6.1)</p>	
<p>Design Change: No</p>	
Issue	Consultation result
<p><u>Need for NDR</u> NDR will create associated development which is not supported</p>	<p>170 comments were made on the association of the NDR with development outlined in the Joint Core Strategy. There were general comments not in favour of the proposed development. In addition comments also considered that:</p> <ul style="list-style-type: none"> there will be insufficient other infrastructure/employment opportunities to support development; the NDR will only benefit developers; the development will have an adverse effect on the environment; mass development is more suitable elsewhere; the NDR will mean that nearby villages will become urbanised; the developments are not dependant on the NDR.

Regard Given to Response: The NDR was developed to resolve existing problems of congestion and rat-running to the north and east of Norwich and to improve access to business, the strategic road network, Norwich Airport and the wider area of North Norfolk. It has been a key element of NATS before the development of the JCS. However, the NDR would also provide supporting infrastructure for the housing growth identified in the JCS. The Transport Assessment for the NDR (Document Ref 5.5) demonstrates that without the NDR the planned growth would have unacceptable impacts on movements across a wide area of Norwich and the associated rural area. The relationship between the NDR and planned growth in the JCS is detailed in Volume 1 Chapters 2 and 3 of the Environmental Statement (Document Ref 6.1).

Development serves people's needs for homes, jobs and services. Infrastructure capacity for growth, and the requirement and deliverability of enhanced infrastructure has been tested through the development plan process, in this case the JCS for Broadland, Norwich and South Norfolk. Similarly the JCS is supported by a range of economic evidence demonstrating the job growth potential of the area. The Greater Norwich partners continue to work together to facilitate the timely delivery of infrastructure and jobs.

The JCS is supported by evidence and has been the subject of statutory consultation and public examination by the independent Planning Inspectorate. Individual applications for development in villages as elsewhere will be determined by the district councils in accordance with the plan unless there are material considerations that indicate otherwise.

Design Change: No

Table 5/4: Section 47 and 48 Consultations - Need for NDR Comments

Issue	Consultation result
<p><u>Alternatives to NDR</u> Suggested alternatives to the NDR</p>	<p>25 comments identified a number of different alternatives (not including alternative routes which are described in Table 5/6 below). These included:</p> <ul style="list-style-type: none"> • invest in sustainable transport measures such as public transport and walking/cycling; • improve the A47 (particularly single carriageway sections) and/or the A17; • improve existing roads (usually not specified); • introduce a congestion charge in Norwich; • improve the radial routes into and out of Norwich; • improve the Norwich Outer Ring Road; • invest in rail transport as well as roads.
<p>Regard Given to Response: These responses have been considered by the applicant and regard has been given to them in putting together the assessment of alternatives, which is detailed in Volume 1 Chapter 3 of the Environmental Statement (Document Ref 6.1).</p> <p>Individual regard to the suggestions is contained in Appendix S of this report.</p> <p>Design Change: No</p>	

Table 5/5: Section 47 and 48 Consultations - Alternatives to NDR Comments

Issue	Consultation result
<p><u>Route of NDR</u> A link is needed between the A1067 and A47 to the west of Norwich</p>	<p>349 comments were made on the need for a link between the A1067 and A47 to the west of Norwich. The main reasons for having this view were:</p> <ul style="list-style-type: none"> • having no link will increase traffic on the minor roads between Drayton/Taverham and Costessey/Easton; • concern that no access to the A47(w) or A11 will be provided from the A140 to the north side of Norwich; • the environmental issues associated with the Wensum Valley Special Area of Conservation could be overcome; • without the link traffic will increase on the A1067 Fakenham Road; • without the link traffic will increase in the Hockering to Lenwade area, and that the existing routes here are unsuitable; • without the link traffic will not reduce on the Norwich Outer Ring Road; • without the link traffic will increase through the Postwick Hub Junction; • a route without the A1067 to A47(w) link was never consulted upon. <p>11 comments were made that the A1067 to A47(w) link was not needed or expressed concern regarding the adverse affect a new link road would have on the Wensum Valley.</p> <p>6 comments suggested alternative route options to provide the A1067 to A47(w) link. Although each suggestion varied slightly they all suggested routes further west utilising the existing crossing of the River Wensum on the A1067 near Attlebridge.</p>
<p>Regard Given to Response: A road linking the A1067 and the A47(w) would have to cross the Wensum Valley, which is designated a Special Area of Conservation (SAC) under the European Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora - often referred to as the Habitats Directive. An assessment of options across the Wensum Valley concluded, in 2005, that significant impacts on the SAC would be likely, and there was doubt as to whether, under the terms of the Habitats Directive, it would be possible to design an acceptable scheme. This in turn raised the prospect that consent for a</p>	

wider scheme including such a link might not be granted. On 19 September 2005, the applicant’s Cabinet resolved to have no NDR link between the A47(w) and the A1067. It therefore did not form part of the adopted route.

At its meeting of 16 September 2013 the meeting of the Norfolk County Council resolved to recommend to Cabinet that they submit an application for a DCO in respect of the NDR as proposed (i.e. between the A47 at Postwick and the A1067 near Attlebridge) and to also commission a report on a feasibility study of providing a link across the Wensum Valley from the A1067 to the A47(w). Whilst at its meeting of 7 October 2013 the applicant’s Cabinet resolved that a “scoping report on the feasibility of providing a link across the Wensum Valley from the A1067 – A47 be written once consultation work was completed”, this study has not been carried out and there is therefore currently no proposal establishing the form any link between the A1067 and A47(w) would take, or indeed whether any such link is feasible. The Transport Assessment for the NDR (Document Ref 5.5.) shows that the NDR can provide substantial benefits without a further link between the A1067 and A47(w) and that the NDR will reduce daily traffic on existing routes between the A1067 and the A47(w) between Drayton/Taverham and Costessey. The feasibility and environmental acceptability of a link to the A47(w) have not been established and the previous assessment in 2005 discarded this option. Accordingly, it is the position of the applicant that the NDR can and should be considered on its own merits without such a link.

Design Change: No

Issue	Consultation result
<p><u>Route of NDR</u> Suggested alternative routes for the NDR</p>	<p>28 comments suggested alternative routes for the NDR, of which the most frequent was for an inner orbital link road using routes linking proposed developments (mainly between Postwick and Norwich Airport). Other suggestions included:</p> <ul style="list-style-type: none"> • the Pink Route identified in previous consultations; • a route closer to the city; • the Green Route identified in previous consultations; • the route of the NDR should be to the north of Spixworth;

	<ul style="list-style-type: none"> • the route of the NDR should be to the north of Horsford; • the NDR should not cut through Thorpe Woodlands; • the route of the NDR should cut straight across the airport rather than being aligned around it. <p>The Pink Route and suggestions for a route closer to the city are similar alternatives to the suggestions for an inner orbital link road.</p>
<p>Regard Given to Response: The Pink Route is similar to an inner orbital road closer to the city, and therefore has been considered as Alternative No 5 in the need and alternatives case (Volume 1 Chapter 3 of the Environmental Statement (Document Ref 6.1)).</p> <p>The proposed NDR route passes around the airport boundary, because of the long term plans for the airport. This alignment has not changed since the preferred route was adopted by the applicant in 2005. Whilst the northeast runway is closed, the applicant understands that the long term plans for the area is for aviation related activities. These plans, which would involve moving aircraft into and out of this area, would be jeopardised by a route across the airport. This would inevitably lead to a substantial claim for compensation against the applicant.</p> <p>Regard given to the individual responses suggesting that the NDR passes too close to specific areas is given in Appendix S of this report.</p> <p>Design Change: No</p>	

Table 5/6: Section 47 and 48 Consultations - Route of NDR Comments

Issue	Consultation result
<p><u>On-Line Proposals</u> Dual carriageway section of the NDR between Fir Covert Road and Fakenham Road</p>	<p>The consultation proposals included a dual carriageway section for the NDR between Fir Covert Road and Fakenham Road but also included an alternative option for a single carriageway. Views were sought on both options.</p> <p>Of the responses that commented on the options there was a clear majority of 49 comments in favour of a dual carriageway, against 8 comments in favour of a single carriageway. The reasons provided for this were:</p> <ul style="list-style-type: none"> • that sometime in the future a dual carriageway section will be needed anyway; • a dual carriageway section reduces the likelihood of accidents; • in the future this will provide for a better link should the NDR ever extend through to the A47 to the west of Norwich; • without a dual carriageway section there will be bottlenecks and congestion; • a dual carriageway will reduce the likelihood of rat running on other routes; • a dual carriageway will remove traffic from the A1067 Fakenham Road. <p>Of those in favour of a single carriageway, the reasons provided for this were:</p> <ul style="list-style-type: none"> • the NDR will link to a single carriageway when it meets the A1067 Fakenham Road; • a single carriageway is more cost effective and has less environmental impacts; • a dual carriageway section will just cause a bottleneck at its junction with the A1067 Fakenham Road.
<p>Regard Given to Response: Having had regard to these comments the proposals submitted for a DCO include a dual carriageway section of carriageway between Fir Covert Road and Fakenham Road.</p> <p>Design Change: No</p>	
Issue	Consultation result
<p><u>On-Line Proposals</u></p>	<p>46 comments were made relating to the Postwick Hub Junction and suggesting that it was too complicated</p>

<p>Postwick Hub Junction</p>	<p>and that this will result in:</p> <ul style="list-style-type: none"> • increased journey times and distances travelled through the junction; • drivers avoiding the junction; • increased queuing; • impacts on local residents. <p>These comments included suggestions to change the junction, such as:</p> <ul style="list-style-type: none"> • keep the eastbound diverge slip road open; • keep both the eastbound the merge and diverge slip roads open; • do not expand the park and ride; • provide a separate path on New Postwick Bridge for walkers and cyclists.
<p>Regard Given to Response: During design development a number of significant engineering constraints have influenced the scheme design. These include the River Yare/Railway Bridge, the existing Postwick Bridge, a high pressure gas main and the nearby property settlements at Heath Farm and Postwick village. Given the constraints and having assessed a number of options it was concluded that, if the existing capacity problems are to be addressed and the committed development at Broadland Gate Business Park is to be accommodated, then removal of the existing eastbound diverge slip road and the provision of a new diverge slip road running parallel with the existing A47, is the only feasible solution.</p> <p>Due to the configuration requirements to accommodate a new eastbound diverge slip road, a new separate Postwick bridge crossing the A47 provides a connection between the Postwick North East Roundabout and the Park and Ride Junction.</p> <p>Design Change: No</p>	
<p>Issue</p>	<p>Consultation result</p>
<p><u>On-Line Proposals</u> Fir Covert Road Roundabout</p>	<p>There was a slight majority of 12 responses expressing support for the re-introduction of the Fir Covert Road Roundabout with the NDR, against 10 responses not in favour of this proposal. Those in favour of the proposal suggested that a roundabout here would be beneficial to:</p> <ul style="list-style-type: none"> • businesses on Fir Covert Road; • residents of Thorpe Marriott by reducing traffic here.

	<p>Those not in favour suggested that there were already too many roundabouts on the NDR or that a roundabout here would:</p> <ul style="list-style-type: none"> • encourage rat running on the minor roads between the A1067 at Drayton/Taverham and the A47 at Costessey/Easton; • be difficult to access due to the volume of traffic on the NDR; • cause increased traffic through the Fakenham Road/Beech Avenue/Fir Covert Road junction, <p>There was also a suggestion that Fir Covert Road should be bridged over the NDR and not have direct access to it.</p>
<p>Regard Given to Response: There has been extensive consideration regarding the provision of the roundabout at the Fir Covert Road junction with the NDR. After the April/May/June 2012 consultations the roundabout was relocated to the junction with Fakenham Road. The February/March 2013 consultations identified support for the roundabout at the Fakenham Road/NDR junction. However, it also identified concerns regarding the closure of Fir Covert Road, particularly by businesses there. Having given regard to these concerns, the NDR proposal was further amended so that it included an additional roundabout at the NDR junction with Fir Covert Road. This was in addition to the roundabout at the Fakenham Road/NDR junction.</p> <p>The applicant considers the provision of a 4 arm roundabout here as the most appropriate solution, particularly as traffic flow on Fir Covert Road is predicted to be similar or lower with the NDR. See Appendix I to the Traffic Forecasting Report (Document Ref 5.6) for forecast traffic flows.</p> <p>Design Change: No</p>	
Issue	Consultation result
<p><u>On-Line Proposals</u> Holt Road Closure at A140 Cromer Road Junction</p>	<p>14 comments suggested that Holt Road should not be closed at its junction with the Cromer Road Junction. The reasons provided for this were:</p> <ul style="list-style-type: none"> • the re-aligned Drayton Lane and its roundabout junction with the NDR and the major/minor priority junction with Reepham Road would not be required; • it will result in increased traffic through Drayton/Hellesdon; • it will create more complicated and longer journeys between the B1149 and A140.

Regard Given to Response: Prior to 2009 the applicant intended to bring the Holt Road and Cromer Road together at the existing junction, modified to pass over the NDR. However, work at the time showed that the most effective solution would be to link the Holt Road directly to the NDR at Drayton Lane instead of at Cromer Road.

Design Change: No

Issue	Consultation result
<u>On-Line Proposals</u> Middle Road Bridge	46 comments were not in favour of the proposed bridge over the NDR at Middle Road. The main reasons for this view were: <ul style="list-style-type: none"> • the bridge will encourage more traffic to use Middle Road as a through route; • Middle Road is unsuitable for through traffic, including farm vehicles; • the additional cost of the Middle Road Bridge is not warranted. 2 responses suggested that Middle Road Bridge will improve access for the village of Gt Plumstead and avoids severance of the local community.

Regard Given to Response: There has been extensive consideration of Middle Road Bridge and whilst the concerns of residents of Middle Road are acknowledged the wider view of the highway network (including the alternative routes to Middle Road) need to be considered. There has also been extensive discussion with the parish council on this issue and they have expressed a similar view. On this basis the bridge is to be retained as part of the proposal, so there is no change to the scheme.

Design Change: No

Issue	Consultation result
<u>On-Line Proposals</u> Number of roundabouts on NDR	30 comments suggested that there are too many roundabouts on the NDR which will cause: <ul style="list-style-type: none"> • delays on the NDR; • safety issues at the junctions; • delays on the radial routes. 5 further comments identified the main junctions of concern being: <ul style="list-style-type: none"> • Cromer Road Junction;

	<ul style="list-style-type: none"> • Wroxham Road Roundabout; • Airport Roundabout, including concern about the noise of vehicles accelerating/decelerating here; • Plumstead Road Roundabout. <p>The comments suggested that the junctions should be grade separated like those on the Norwich Southern Bypass.</p>
<p>Regard Given to Response: The NDR is a distributor road and not a bypass and so not many users are expected to drive from one end to the other. In view of this the delay at the roundabouts is not expected to be a deterrent to the use of the route. Grade separated junctions would have a much greater environmental impact and be more difficult to justify.</p> <p>The Airport Roundabout is required to accommodate the 90° change in direction of the NDR around the north of the airfield, and to provide access to the Petans training facilities and secure access to Norwich International Airport.</p> <p>Design Change: No</p>	
Issue	Consultation result
<p><u>On-Line Proposals</u> Drayton Lane link between NDR and Reepham Road</p>	<p>8 comments on the Drayton Lane link tended to express concern about the closure of Drayton Lane, which would increase traffic using Hall Lane. The comments suggested that Hall Lane is a poorer standard than Drayton Lane. Other comments suggested that the link was not adequate enough for the volumes of traffic, it would increase journey times/distances or that it passed through the area know as Bugg’s Grave.</p> <p>9 further responses suggested alternatives, which included:</p> <ul style="list-style-type: none"> • do not close Drayton Lane south of its junction with Reepham Road; • that Drayton Lane should be bridged over the NDR and not have direct access to it; • provide a roundabout at the Holly Lane/Hall Lane junction with Reepham Road; • provide a roundabout at the Drayton Lane junction with Reepham Road.
<p>Regard Given to Response: Further tests have been undertaken in the model to look into the option of a roundabout at the Drayton Lane/Reepham Road junction and also a more conventional priority (‘T’) junction. The findings for all options tested, some of which also included traffic calming on the section of Hall Lane between Drayton Lane South and Drayton village, showed that the use of Drayton Lane South, either instead of, or as well as Hall Lane, was less effective at reducing traffic flows into</p>	

Drayton than the NDR scheme as proposed. In view of this, and the fact that the NDR scheme as proposed showed a benefit of reducing the amount of traffic on Hall Lane when compared to a non-NDR scenario, there was no evidence to support changing the NDR scheme as proposed.

One of the purposes of the NDR is to provide maximum connectivity for communities to distribute traffic movements. Holt Road, as a B road, is considered a key radial route and therefore the connectivity provide by Drayton Lane from the NDR is important.

The applicant anticipates that the existing situation at the Reepham Road junction with Holly Lane/Hall Lane junction will improve as Holly Lane is proposed to be stopped up for through traffic. Therefore one arm of the staggered junction will become an 'access only' road.

Design Change: No

Table 5/7: Section 47 and 48 Consultations - On-Line Proposals Comments

Issue	Consultation result
<u>Off-Line Proposals</u> Number of road closures	22 comments were made that there were too many closures within the proposed scheme. Some commented that the closures were unnecessary and will result in: <ul style="list-style-type: none"> • increased journey times and distances; • increased traffic on other roads.
<p>Regard Given to Response: The applicant has tried to keep the number of road closures to a minimum and they are generally only provided for reasons of highway safety where minor roads are severed by the NDR or to encourage traffic to use more appropriate routes.</p> <p>Design Change: No</p>	
Issue	Consultation result
<u>Off-Line Proposals</u> North Walsham Road/Crostwick Lane proposals	30 comments relating to the North Walsham Road/Crostwick Lane junction proposals tended to suggest alternative proposals here. The main suggestions were: <ul style="list-style-type: none"> • provide a roundabout junction; • do not close Rackheath Lane; • provide traffic signals; • keep Rackheath Lane open to NMUs. 2 responses supported the proposals suggesting that this would prevent rat running via Crostwick Lane and Rackheath Lane and that a roundabout/traffic signals was not needed.
<p>Regard Given to Response: Whilst the comments are noted, the reasons for the closure are primarily to improve highway safety at the junction. Closure of Rackheath Lane will simplify turning movements allowing drivers waiting at the Crostwick Lane arm to concentrate on the vehicle movements on the main road.</p>	

Design Change: No	
Issue	Consultation result
<u>Off-Line Proposals</u> Closure of Church Street	<p>6 comments were in favour of the proposal not to close Church Street. Of the 14 comments suggesting that the road should be closed, the reasons for this view tended to be because:</p> <ul style="list-style-type: none"> • it is a poor standard road; • otherwise it will be used as a rat run; • of its poor junctions with the B1149 and A140; • it would protect residents from the effects of through traffic. <p>Comments against a closure were concerned that this would increase journey times/distances.</p>
<p>Regard Given to Response: The applicant reconsidered the closure following the public consultations in April/May/June 2012 and decided not to close Church Street. The purpose of the NDR is to remove traffic from some of the less suitable roads, such as Church Street, around north Norwich. This is reflected in the traffic modelling results which show that with Church Street left open; only very localised traffic would use it. Whilst it has been decided not to close Church Street, the applicant will monitor traffic flows post introduction of the NDR and consider re-introducing the closure if flows are not found to reduce. This was the proposal presented for the pre-application consultations and the applicant's position regarding this closure remains unchanged.</p>	
Design Change: No	
Issue	Consultation result
<u>Off-Line Proposals</u> Closure of Green Lane East/Broad Lane at its junction with Plumstead	<p>Of the comments relating to the closure of Green Lane East/Broad Lane at its junction with Plumstead Road, 7 suggested that the road should be closed because:</p> <ul style="list-style-type: none"> • it is already a dangerous junction; • it will discourage rat running. <p>Of the 12 comments against a closure there was concern that this will increase journey times/distances, particularly between Rackheath and Gt Plumstead.</p>

Road	Suggested alternatives to the proposals for this junction were a mini roundabout or the creation of a slip road diverging from Broad Lane and joining Plumstead Road to the west of the existing junction.
<p>Regard Given to Response: The closure of Green Lane East/Broad Lane at its junction with Plumstead Road will remove the existing crossroads junction making it a more conventional and safer T-junction. This element of the scheme together with the provision of an all purpose road bridge over the NDR at Middle Road was developed in consultation with the parish council as the preferred access solution for the local communities.</p> <p>Design Change: No</p>	

Table 5/8: Section 47 and 48 Consultations - Off-Line Proposals

Issue	Consultation result
<p><u>Walking/Cycling/Horse Riding Issues</u> Need more NMU facilities</p>	<p>There were 16 comments that provided general suggestions that more NMU facilities should be proposed.</p> <p>A further 17 comments suggested more NMU facilities at specific locations. The most frequently suggested improvements were:</p> <ul style="list-style-type: none"> • along the A140 between Horsham and the city centre; • along the entire route of the NDR; • along the main radial routes into and out of Norwich; • along Reepham Road between Thorpe Marriott and Hellesdon; • between Horsford and the city centre; • between Postwick and Whitlingham Park; • along Plumstead Road between Thorpe End and the city centre; • facilities in the Drayton area; • in the Rackheath area; • linking to the Marriotts Way.
<p>Regard Given to Response: During the April/May/June 2012 public consultations the applicant had various requests for improved walking and cycling facilities. As a result a strategy was developed to consider and prioritise these consultation requests. The strategy published as part of the February/March 2013 public consultations identified a network of routes to link areas that generate NMUs (such as villages, employment areas, future development) with each other, the Norwich Cycle Network and the Marriotts Way. Part of these routes utilised narrow country lanes, roads closed to motor vehicles and existing public rights of way. The applicant has prioritised NMU improvements on this network, and these improvements have included new NMU facilities as part of the proposals.</p> <p>The regard given to suggestions for improvements at specific locations is detailed in Appendix S to this report.</p> <p>Design Change: No</p>	

Issue	Consultation result
<p><u>Walking/Cycling/Horse Riding Issues</u> The NDR represents a barrier to NMUs</p>	<p>In addition to the requests for extra NMU facilities there were 22 comments that suggested the NDR represented a barrier to NMUs. Specific comments highlighted:</p> <ul style="list-style-type: none"> • severance by the NDR at Smee Lane; • severance by the NDR at St Faiths Road/Quaker Lane; • concern regarding the ability of NMUs to cross at the roundabout junctions with the NDR; • severance of the NDR between Bullock Hill and the Petans training facility, including requests for a bridge or underpass at this location; • severance by the NDR at Holly Lane; • concern regarding the ability of NMUs to cross the NDR when accessing Norwich from Spixworth.
<p>Regard Given to Response: The work described above identified key routes for NMUs. Where these key routes crossed the NDR, the applicant has provided segregated crossing facilities. These include NMU facilities on the Bell Farm Bridge, Buxton Road Bridge, Newman Road Bridge, Middle Road Bridge, New Postwick Bridge and under the Norwich to Sheringham railway line bridge.</p> <p>The regard given to concern about severance at specific locations is detailed in Appendix S to this report.</p> <p>Design Change: No</p>	

Table 5/9: Section 47 and 48 Consultations - Walking/Cycling Horse Riding

Issue	Consultation result
<p><u>Landscaping/Planting Issues</u> Effects of NDR on landscape and type of planting</p>	<p>190 comments were made regarding the effects of the NDR on the landscape and wildlife habitats or requested more planting.</p> <p>Additional comments suggested specific locations where additional landscaping and planting is required. These were:</p> <ul style="list-style-type: none"> • between the NDR and Rackheath; • to the area of Beeston Park; • to the north of Thorpe Marriott; • to the top of the embankments at the Plumstead Road/Norwich to Sheringham railway line bridge, • between the NDR and Spixworth. <p>6 further comments made suggestions on the types of planting to be used, and these included:</p> <ul style="list-style-type: none"> • mature trees rather than saplings to provide better early screening; • evergreen species to provide winter screening; • wild flower meadows in the landscaping areas and in the verges of roads where closures are proposed.
<p>Regard Given to Response: It is acknowledged that the proposed scheme will result in the loss of some 6,000 trees. However, the landscaping proposals propose a replacement ratio of, as a minimum, 2:1. An Environmental Impact Assessment (EIA) has been undertaken and the details of the planting can be found in the Volume 1 Chapter 7 of the Environmental Statement (Document Ref 6.1).</p> <p>Design Change: Yes – additional landscaping has been added to the proposals, particularly in the area around Beeston Park, Rackheath Park and The Springs. See Design Change Ref: 8.5, 9.2 and 9.6 in Appendix V to this report.</p>	

Table 5/10: Section 47 and 48 Consultations - Landscaping/Planting Comments

Issue	Consultation result
<p><u>Wildlife Issues</u> Effects of NDR on wildlife</p>	<p>11 comments were made on the general effect of the NDR on wildlife and 6 comments suggested the NDR would be a barrier to wildlife. These comments included:</p> <ul style="list-style-type: none"> • the proposals will not compensate for wildlife loss; • the impact on wildlife has not been provided and further studies are needed. <p>Further comments that identified specific locations noted that:</p> <ul style="list-style-type: none"> • the woodlands around Newman Road Rackheath would be adversely affected; • the NDR would be a barrier to wildlife in the area of Newman Road woodlands and between The Springs and the east side of the NDR. <p>The specific comments regarding the proposed mitigation measures included:</p> <ul style="list-style-type: none"> • the bat gantries will not work; • support for the proposed bat gantries; • need to consider species other than bats; • the proposed planting will aid wildlife.
<p>Regard Given to Response: Wildlife protection has been a crucial part of the NDR from a very early stage. As such, an extensive landscaping scheme has been prepared, that will tie up closely with the need to preserve ecological corridors throughout the wider landscape. It will comprise of native, locally present species of woodland, scrub and grassland habitats, hedgerows, and wetland areas. It will tie in with landscaping schemes of adjacent developments. Extensive mitigation to reduce the loss of habitats has been incorporated into the scheme. Where habitats are to be directly affected by the NDR, clearance will be undertaken outside of the breeding season and new habitats of equal or greater value will be put in their place and green bridges built into the scheme will preserve foraging in the area of disturbance.</p> <p>Adverse effects to the woodland at Newman Road, Rackheath, as with all habitats, have been minimised as far as possible. The Newman Road Bridge includes non-standard aspects to allow bats to cross the NDR. Some very basic bat gantries have been</p>	

proven not to be effective. However, the applicant has taken advice from the bat specialists, and would install a bat gantry design that it is confident will work. They would be installed early in the construction process and tie into the landscaping scheme to provide effective crossing points.

A number of surveys have been carried out for a variety of species to inform the Environmental Statement (Document Ref 6.1), these include, but are not limited too; badgers, bats, great crested newts, birds, invertebrates, reptiles, otters and water voles, brown hares and deer. This is in addition to surveys looking at habitats, trees and hedgerows.

Design Change: No

Table 5/11: Section 47 and 48 Consultations - Wildlife Comments

Issue	Consultation result
<p><u>Emission/Noise Issues</u> Effects of noise and emissions generate by the NDR</p>	<p>There were 123 comments on the effects of potential noise and emissions generated by the NDR. These included:</p> <ul style="list-style-type: none"> • the NDR will increase CO2 emissions and that this was contrary to government emission reduction targets; • emissions will be a health risk to those living close to the NDR; • the loss of vegetation resulting from the proposals will reduce air quality; • at the time of the consultations there was no information available regarding predicted noise/emissions generated by the NDR. <p>A further 55 responses identified specific areas of concern, which included:</p> <ul style="list-style-type: none"> • Thorpe End; • Rackheath; • Plumstead Road; • Spixworth; • Thorpe Marriott; • Reepham Road; • Horsford; • Drayton; • Buxton Road Bridge; • Taverham; • Postwick; • Old Catton; • Gt and Lt Plumstead; • Witton; • Hellesdon. <p>Suggestions to mitigate against the noise and pollution included:</p> <ul style="list-style-type: none"> • the NDR carriageway should utilise a low noise surface; • sound proof hoarding should be provided on top of verges/embankments.
<p>Regard Given to Response: Noise and Air Quality assessments are included within Volume 1 Chapters 4 and 11 of the Environmental Statement (Document Reference 6.1) and these consultation responses assisted in the assessment of both these topics.</p> <p>Climate change is one of the topics considered in the Environmental Impact Assessment (EIA) process. The assessments</p>	

included in the EIA give consideration to:

- changes in carbon emissions as a result of the scheme;
- impacts relevant to climate change adaptation including the potential influence of climate change on the project and the contribution of the project to wider resilience to changes in climate.

These assessments are included in the Environmental Statement (Document Ref 6.1).

The exact specification for surfacing will be considered at the detailed design stage, although at this current time the intention is to use a low noise carriageway surface.

Design Change: No

Table 5/12: Section 47 and 48 Consultations - Emissions/Noise Comments

Issue	Consultation result
<u>Specific Road Effects</u> NDR affects on Fakenham Road	22 comments expressed concern that the NDR will increase traffic on Fakenham Road and included a suggestion for traffic signals where it meets the NDR.
<u>Specific Road Effects</u> NDR affects on routes between Taverham/Drayton and Costessey/Easton	33 comments expressed concern that the proposals will increase traffic/rat running on routes between Taverham/Drayton and Costessey/Easton. The particular areas of concern were: <ul style="list-style-type: none"> • through Ringland Hills and affecting the environment here. There were requests for speed limits here; • Beech Avenue, Taverham which is a residential road containing a school. There were suggestions to make Beech Avenue access only; • on West End, The Street, Folgate Lane and Longwater Lane through Costessey. Comments include suggestion for more traffic calming to discourage this; • on the Fakenham Road/Beech Avenue/Fir Covert Road junction. There were suggestions for improvements here, such as a roundabout or traffic signals. <p>A further 8 responses expressed concern about the affects on the Fakenham Road/Beech Avenue/Fir Covert Road junction. There were suggestions for improvements here, such as a roundabout or traffic signals.</p>
<u>Specific Road Effects</u> NDR affects on Plumstead Road through Thorpe End	16 comments expressed concern that the proposals will increase traffic on Plumstead Road through Thorpe End. They included suggestions for: <ul style="list-style-type: none"> • traffic calming on Plumstead Road; • more pedestrian crossings on Plumstead Road.

<p><u>Specific Road Effects</u> NDR affects on Holt Road through Horsford</p>	<p>13 comments expressed concern that the proposals will increase traffic on Holt Road through Horsford. They included suggestions for:</p> <ul style="list-style-type: none"> • traffic calming on Holt Road through Horsford; • a weight restriction on Holt Road through Horsford.
<p><u>Specific Road Effects</u> NDR affects on Reepham Road through Hellesdon</p>	<p>11 comments expressed concern that the proposals will increase traffic on Reepham Road. They included suggestions for:</p> <ul style="list-style-type: none"> • traffic calming on Reepham Road through Hellesdon; • a pelican crossing across Reepham Road between Woodview Road and Gowing Road.
<p><u>Specific Road Effects</u> NDR affects on Wroxham Road</p>	<p>14 comments expressed concern that the proposals will increase traffic on Wroxham Road. This included concern on the effects to Wroxham/Hoveton and comment that it would discourage visitors to these villages. They included suggestions for:</p> <ul style="list-style-type: none"> • improving the Wroxham Road/Beeston Lane junction; • providing more footways on Wroxham Road between the park and ride site and Sprowston.
<p><u>Specific Road Effects</u> NDR affects on other radial routes</p>	<p>8 comments expressed concern that the proposals will increase traffic on radial routes and identified Cromer Road, North Walsham Road and Salhouse Road in particular.</p>
<p><u>Specific Road Effects</u> NDR affects on Drayton Wood Road and Middletons Road</p>	<p>13 responses expressed concern that the proposals will increase traffic on Drayton Wood Road and Middletons Road in Hellesdon. They included suggestions for:</p> <ul style="list-style-type: none"> • improvements to the Middletons Lane/A1067 Drayton High Road junction; • more pedestrian crossings on Middletons Lane.

in Hellesdon	
<p><u>Specific Road</u></p> <p><u>Effects</u></p> <p>Comments on the affect of the NDR on other roads</p>	<p>25 comments expressed concern about the affects of the NDR on other roads. These were:</p> <ul style="list-style-type: none"> • on routes through Thorpe Marriott; • on Green Lane West through Rackheath by HGVs; • through the Fifers Lane/St Faiths Road junction (including a suggestion that a separate access to the airport is needed from the NDR); • on the B1108 Watton Road through Colney; • on Brands Lane/Bilney Lane in the parish of Felthorpe (including a suggestion that this road be made access only); • on Broad Lane (between Hare Road and Water Lane) in the parish of Gt and Lt Plumstead, (including a suggestion that this road be made access only); • on Crostwick Lane through Spixworth; • on Fakenham Road through Lenwade and Morton on the Hill (including a suggestion for better enforcement of speed limits); • on The Street through Felthorpe; • on Felthorpe Road through Attlebridge; • through the Reepham Road/Fir Covert Road junction (including a suggestion for this to be improved); • on the route between the A47 at Hockering and the A1067 at Lenwade (including a suggestion that the route is unsuitable for HGVs).
<p>Regard Given to Response: The regard given to individual responses regarding the above roads is contained in Appendix S to this report.</p> <p>Design Change: No</p>	

Table 5/13: Section 47 and 48 Consultations - Effects on Specific Roads Comments

Issue	Consultation result
<u>Land/Property Issues</u> Loss of agricultural land and affects to property	Of the comments directly relating to the effects on land, 22 commented on the area of agricultural land lost to the scheme. 14 also commented: <ul style="list-style-type: none"> • that the prospect of the NDR has/will devalue their properties; • that the prospect of the NDR has meant that they have been unable to sell their properties; • that they want to/will be seeking compensation for the effects of the NDR.
<p>Regard Given to Response:</p> <p>The loss of productive agricultural land and commitments regarding the minimisation of impacts to soils are detailed in Volume 1 Chapter 13 and Volume 1 Chapter 9 of the Environmental Statement (Document Ref 6.1). Assessments of Noise and Air Quality are contained in Volume 1 Chapter 4 and 11 of the Environmental Statement (Document Ref 6.1).</p> <p>Under Part 1 of the Land Compensation Act 1973, at the appropriate time, compensation can be sought by people who own and also occupy certain property that has been reduced in value by physical factors caused by the use of a new or altered road but have not had any land acquired for the scheme itself.</p> <p>Design Change: No</p>	

Table 5/14: Section 47 and 48 Consultations - Land/Property Comments

Issue	Consultation result
<u>Consultation/Exhibitions</u> Area of consultation	25 comments were made that the consultation area was inadequate and should have been wider, including comments that it should have included the whole of Norwich, north Norfolk or the whole of Norfolk. 1 comment noted that the consultation area was satisfactory.
<u>Consultation/Exhibitions</u> Other Consultation Comments	<p>16 responses suggested that the consultation was inadequate. These included comments that:</p> <ul style="list-style-type: none"> • the NDR is not an NSIP project and no consultation was undertaken on whether it should be an NSIP; • the status of the NDR as an NSIP project changed during the consultation; • there was no publicity of the exhibitions; • there was no consultation on alternative routes; • the PEIR missed important areas of environmental impact. <p>24 comments were made that the exhibitions were good, whilst 8 comments noted that the exhibitions were not satisfactory.</p>
<u>Consultation/Exhibitions</u> Postal information	13 comments related to the fact that some residents of Rackheath had received the consultation letter on the day of the first exhibition.
<p>Regard Given to Response: Section 4.4 of this report defines the applicant's rationale for choosing the consultation area and the subsequent consultations undertaken.</p> <p>When the applicant commenced the statutory pre-application process, the NDR fell within the criteria for a NSIP under the Planning Act 2008. In order to obtain consent for the NDR, therefore, the applicant had to follow the Planning Act 2008 process. On 24 July 2013, the Highway and Railway (Nationally Significant Infrastructure Project) Order 2013 (S.I. 2013/1883) (the Highways Order) was made, coming into force on 25 July 2013. The Order amended Section 22 of the Planning Act 2008, so that a project such as the NDR would not (from 25 July 2013 onwards) fall within the definition of a NSIP.</p> <p>The applicant considered that the NDR was, nonetheless, of national significance. Accordingly, on 25 July 2013 the applicant</p>	

submitted a qualifying request to the Secretary of State for a direction under Section 35(1) of the Planning Act 2008 that the NDR was a project of national significance and so should be treated as development for which development consent was required. A Section 35 direction was made on 9 August 2013.

The issue of some residents of Rackheath receiving a consultation letter on the day of the first exhibition is discussed in Section 4.6 of this report (the applicant's response was to provide for an additional exhibition on 12 August 2013 (between 13:00 to 20:00) at the Holy Trinity Church on Salhouse Road. Letters notifying people of this new exhibition were sent to addresses within Rackheath Parish (Appendix K-5 to this report).

Design Change: No

Table 5/15: Section 47 and 48 Consultations - Consultations/Exhibition Comments

5.4 Section 47 and 48 Consultations - Conclusions

- 5.4.1 The Section 47 and Section 48 consultations have generated 1492 responses. This is considered a good response rate and has allowed the local communities' main issues and views on the NDR to be identified. In view of the volume of comments received, these were grouped into similar category subjects and detailed in Appendix S of this report. The key issues relating to the scheme proposals are summarised below:
- 5.4.2 Need for the NDR - Of the responses received the most frequent comment was associated with the need for the NDR. Of those that suggested the NDR was not needed (460 comments) the main reason for this view was that the money could be better spent elsewhere. Of those that thought the NDR was needed (171 comments), the majority did not give a reason for this view or suggested that the NDR would ease congestion.
- 5.4.3 NDR will create associated development – 170 comments were made regarding the development that has been associated with the NDR. Comments suggested that the NDR only benefited developers. They expressed concern about the impact development would have on the existing infrastructure, village environment and rural environment.
- 5.4.4 Alternatives to the NDR – 25 comments identified a number of suggested alternatives to the NDR. The main alternative identified was the investment in sustainable transport or improvements to the A47/A17.
- 5.4.5 Need A1067 to A47 link – 349 comments were made regarding the NDR not having a link between the A1067 and the A47 to the west of Norwich. Of these comments most did not give a reason for this view or considered that it would result in vehicles using less suitable routes between Taverham/Drayton and Costessey/Easton. 11 comments were not in favour of providing this link and 6 suggested routes for this link. The most frequently suggested alternative was a link between the A1067 and A47(w) that was further west

and utilised the existing crossing of the River Wensum via the A1067 near Attlebridge.

- 5.4.6 Suggested alternative routes – 28 comments suggested alternative routes for the NDR. The most frequently suggested alternative route was an inner orbital link which would be closer to Norwich. This would link with or utilise routes through proposed developments.
- 5.4.7 Dual carriageway between Fir Covert Road and Fakenham Road - Whilst the consultation proposals showed a dual carriageway section between the Fir Covert Road Roundabout and the Fakenham Road Roundabout, the applicant also consulted on an alternative option of a single carriageway. Of those that commented on these options there was a majority in favour of dual carriageway (49 comments) when compared to those in favour of the single carriageway option (8 comments).
- 5.4.8 Postwick Hub Junction – Comments on the Postwick Hub Junction tended to express concern that it is over complicated (46 comments) and will result in increased journey times and queuing. The most frequently suggested change was to keep open the eastbound diverge slip road from the A47 or keep both the eastbound diverge and eastbound merge slip roads open.
- 5.4.9 Fir Covert Road Roundabout – Of those that commented on this junction there was a slight majority in favour of this roundabout being re-introduced (12 comments) when compared to those against it being re-introduced (10 comments).
- 5.4.10 Holt Road closure – There were 14 comments suggesting that Holt Road should not be closed at its junction with the A140 Cromer Road Junction.
- 5.4.11 Middle Road Bridge – Of the 48 comments about the provision of a bridge over the NDR at Middle Road, the majority (46 comments) did not support the proposal. A number of these responses came from residents of Middle Road, and they expressed concern that the road would experience increased through traffic and not be able to accommodate this. The most frequent suggestion was the removal of this bridge.

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- 5.4.12 Roundabout junctions on the NDR – 30 comments considered that there were too many roundabout junctions on the NDR. They suggested that these would cause delays and more safety risks. Grade separated junctions, similar to those on the A47 Southern Bypass, was the most frequent alternative suggestion. A further 5 comments identified specific roundabouts as a concern.
- 5.4.13 Drayton Lane link – The 17 comments directly relating to the Drayton Lane link tended to express concern that the closure of Drayton Lane would increase traffic using Hall Lane, which they considered it to be the poorer standard road. Suggestions were made that a roundabout should be provided at the Reepham Road/Drayton Lane junction.
- 5.4.14 Number of road closures – 22 comments expressed concern regarding the number of local road closures, suggesting that these will increase journey times and distances.
- 5.4.15 North Walsham Road/Crostwick Lane junction – Of the 32 comments regarding this junction the majority expressed concern about the proposals and there were requests not to close Rackheath Lane. The most frequent alternative suggestion was traffic signals or a roundabout at this junction.
- 5.4.16 Church Street closure – Of those making comment on the closure there was a slight majority in favour of providing a closure (14 comments) when compared to the proposal for it to remain open but to monitor its usage (6 comments).
- 5.4.17 Green Lane East/Broad Lane closure – Of those making comment on the closure there was a slight majority in favour of keeping this road open (12 comments) when compared to the proposal for a closure (7 comments).
- 5.4.18 Need more NMU facilities – 33 comments were made that more NMU facilities should be provided as part of the NDR proposals, with some suggesting specific locations where facilities could be provided.
- 5.4.19 NDR represents a barrier to NMUs – 22 comments expressed concern that the NDR would present a barrier to NMU movements. Between St Faiths

Lane/Quaker Lane, Bullock Hill/Petans and at Smee Lane were the main areas of concern. Requests for bridges or underpasses here were made.

5.4.20 NDR will affect the landscape – Of the comments regarding landscaping there was a general concern regarding the effects of the NDR (190 comments) on the landscape and a request for more planting. Specific areas of concern were at Rackheath, including the embankment areas where the NDR rises to cross Plumstead Road and the Norwich to Sheringham railway line. 6 further responses suggested changes to the types of planting.

5.4.21 NDR will affect wildlife – There was general comment expressing concern that the NDR would affect wildlife and its habitats (11 comments) or would create a barrier to wildlife (6 comments).

5.4.22 Concern about noise and pollution – Of the comments regarding noise and pollution was a general concern regarding the affects of the NDR (178 comments), including the suggested increase in CO2 that could occur. Specific areas of concern were at Thorpe, Rackheath, Spixworth and Thorpe Marriott.

5.4.23 NDR affects specific roads – There were 155 comments on the effects of the NDR on specific roads. The routes between the A1067 at Taverham/Drayton and the A47 at Costessey/Easton were the most frequently identified areas where concern was expressed. Secondary areas were Plumstead Road through Thorpe End, Holt Road through Horsford and radial routes such as Reepham Road and Wroxham Road.

5.4.24 Loss of agricultural Land - There was comment (22 comments) expressing concern that the NDR would result in the loss of agricultural land and also concern about the effects to specific property (14 comments).

5.5 Section 47 and 48 Consultations - Refinements Made to Proposals

5.5.1 The majority of the Section 47 and Section 48 comments are similar to those received during previous consultations. A number of these have been

previously considered and the proposals amended prior to the pre-application consultations.

- 5.5.2 Having given regard to the responses resulting from the Section 47 and Section 48 consultations the applicant's refinements to the proposals are detailed in Appendix V of this report. Locations of these can be seen on the General Arrangement Drawing Sheets 1 to 12, Drawing No's R1C093-R1-5015 to 5026 (Application Document No 2.6).

Change Ref	Chainage	General Arrangement Sheet No.	Location	Change	Reason for change
4.11	Off Line	No 4	Holt Road/Drayton Lane Roundabout.	The roundabout was moved within the DCO boundary limits to avoid impact on residual property.	As a result of verbal comments received at exhibition (Section 47 and Section 48 consultations).
8.5	12500 to 13700	No 8	South side of NDR	Additional landscaping and woodland creation added.	As a result of Section 47 and Section 48 consultations. Also see: <ul style="list-style-type: none"> • Response Ref LA005 and LA009 in Appendix T of this report; • Response Ref IT001 in Appendix U of this report.
9.2	13800 to 14200	No 9	North of NDR - bunding south of The Springs Lake	New woodland added instead of grass planting.	As a result of Section 47 and Section 48 consultations. Also see: <ul style="list-style-type: none"> • Ref LA005 and LA009 in Appendix T of this report; • Ref IT023 and IT030 in Appendix U of this report.
9.6	14500 to 14950	No 9	North side of NDR - area around Lagoon 18 and 18B.	New hedgerow added north side of grassland creation to provide greater	As a result of Section 47 and Section 48 consultations.

				screening for properties in Rackheath. Note – this change shown on detailed landscape plans.	
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Table 5/16: Summary of Refinements to Proposals as a Result of Section 47 and Section 48 Consultations

6 Section 42 Consultation Responses

6.1 Section 42 Consultations - Introduction

6.1.1 This chapter explains the analysis of the responses received from the consultations undertaken under Section 42 of the Planning Act 2008. Summaries of each response to this consultation are contained in Appendix T and U of this report.

6.1.2 Responses to the consultation could be made by:

- (a) e-mailing norwich.transport@norfolk.gov.uk;
- (b) letter posted to Norwich Northern Distributor Road, Norfolk County Council, Department of Environment, Transport and Development, County Hall, Martineau Lane, Norwich, NR1 2DH.

6.1.3 Irrespective of the method of response, each comment was logged and analysed using the same process. Responses have been initially divided into the following main response topics:

- (a) responses from local authorities;
- (b) responses from prescribed consultees;
- (c) responses from those with interest in land (as defined under Section 44 of the Planning Act 2008).

6.2 Section 42 Consultations - Summary of Responses

6.2.1 The table below summaries the number of Section 42 consultation responses received.

Consultee	Documents Issued	Number of responses
Local Authorities	12	9
Prescribed Statutory Consultees	124	38
Those with Interest in Land (as defined under Section 44 of the Planning Act 2008)	1164	56

Total	1210	103
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Table 6/1: Summary of Section 42 Responses

6.3 Section 42 Consultations – Key Issues from Local Authorities

6.3.1 Responses were received from the following local authorities:

- Norfolk County Council (Ref LA001);
- Cambridgeshire County Council (Ref LA002);
- Suffolk County Council (Ref LA003);
- Breckland District Council (Ref LA004);
- Broadland District Council (Ref LA005);
- Norwich City Council (Ref LA006);
- South Norfolk Council (Ref LA007)
- Waveney District Council (Ref LA008);
- Broads Authority (Ref LA009).

6.3.2 Details of the responses received from local authorities are contained in Appendix T of this report. The following tables provide a summary of their response grouped by the type of comments made and issues raised.

Issue	Consultation result
<u>Need for NDR</u>	<ul style="list-style-type: none"> • Norfolk County Council stated that it had no objections to raise to the NDR but requested that the Preliminary Environmental Information Report (PEIR) needs to reflect the comments received from the internal consultees within the Environment, Transport and Development Directorate. • Cambridgeshire County Council commented that the proposed project should greatly benefit the distribution of traffic around Norwich and bring environmental benefits within Norwich, although it will be too remote to have a material impact on Cambridgeshire interest. • Broadland District Council indicated strong support for the NDR as it is a pre-requisite for development of housing and employment to the north east of Norwich (as identified in the Joint Core Strategy (JCS)), and will enable significantly enhanced public transport, cycling and walking networks. • Norwich City Council stated it had no objections to the proposals subject to the delivery of a programme of measures identified within the Norwich Area Transportation Strategy. • South Norfolk Council commented that the NDR is an important piece of infrastructure to enable the scale of growth envisaged in the Joint Core Strategy to be delivered, and as such it is supported in principle. • The Broads Authority welcomed the route of the proposed Northern Distributor Road as improving access to the Broads and thereby benefitting the tourist economy of the Broads. • Suffolk County Council, Breckland District Council and Waveney District Council commented that they had no objection to the proposal or no comment to make.
<p>Regard Given to Response: These responses have been considered by the applicant and regard has been given to them in putting together the need case for the NDR, which is detailed in Volume 1 Chapter 3 of the Environmental Statement (Document Reference 6.1).</p> <p>Design Change: No</p>	

Table 6/2: Section 42 Consultations - Local Authority Need for NDR Responses

Issue	Consultation result
<p><u>Route of NDR</u> Link between the A1067 and A47 to the west of Norwich</p>	<ul style="list-style-type: none"> • South Norfolk Council encouraged the applicant to consider the benefits of completing the final ‘missing’ section of the NDR between the A1067 and A47(w) across the River Wensum at the earliest possible date.
<p>Regard Given to Response: A road linking the A1067 and the A47(w) would have to cross the Wensum Valley, which is designated a Special Area of Conservation (SAC) under the European Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora - often referred to as the Habitats Directive. An assessment of options across the Wensum Valley concluded, in 2005, that significant impacts on the SAC would be likely, and there was doubt as to whether, under the terms of the Habitats Directive, it would be possible to design an acceptable scheme. This in turn raised the prospect that consent for a wider scheme including such a link might not be granted. On 19 September 2005, the applicant’s Cabinet resolved to have no NDR link between the A47(w) and the A1067. It therefore did not form part of the adopted route.</p> <p>At its meeting of 16 September 2013 the meeting of the Norfolk County Council resolved to recommend to Cabinet that they submit an application for a DCO in respect of the NDR as proposed (i.e. between the A47 at Postwick and the A1067 near Attlebridge) and to also commission a report on a feasibility study of providing a link across the Wensum Valley from the A1067 to the A47(w). Whilst at its meeting of 7 October 2013 the applicant’s Cabinet resolved that a “scoping report on the feasibility of providing a link across the Wensum Valley from the A1067 – A47 be written once consultation work was completed”, this study has not been carried out and there is therefore currently no proposal establishing the form any link between the A1067 and A47(w) would take, or indeed whether any such link is feasible. The Transport Assessment for the NDR (Document Ref 5.5.) shows that the NDR can provide substantial benefits without a further link between the A1067 and A47(w) and that the NDR will reduce daily traffic on existing routes between the A1067 and the A47(w) between Drayton/Taverham and Costessey. The feasibility and environmental acceptability of a link to the A47(w) have not been established and the previous assessment in 2005 discarded this option. Accordingly, it is the position of the applicant that the NDR can and should be considered on its own merits without such a link.</p> <p>Design Change: No</p>	

Table 6/3: Section 42 Consultations - Local Authority Route of NDR Responses

Issue	Consultation result
<u>On-Line Proposals</u> Fir Covert Road Roundabout	<ul style="list-style-type: none"> Broadland District Council welcomed the reinstatement of the Fir Covert Road Roundabout as this will ensure the continued access to the successful business community along it.
Regard Given to Response: Comment noted. Design Change: No	

Table 6/4: Section 42 Consultations - Local Authority On-Line Proposals Responses

Issue	Consultation result
<p><u>Walking/Cycling/Horse Riding Proposals</u> The NDR represents a barrier to NMUs</p>	<ul style="list-style-type: none"> Norwich City Council requested that the proposals ensure that the NDR enhances the potential for walking, cycling and public transport use between the expanding communities to the north and east of the city to ensure that any potential severance effects are fully mitigated.
<p>Regard Given to Response: During the April/May/June 2012 public consultations the applicant had various requests for improved walking and cycling facilities. As a result a strategy was developed to consider and prioritise these consultation requests. The strategy, published as part of the February/March 2013 public consultations, identified a network of routes to link areas that generate NMUs (such as villages, employment areas, future development) with each other, the Norwich Cycle Network and the Marriotts Way. Part of these routes utilised narrow country lanes, roads closed to motor vehicles and existing public rights of way. The applicant has prioritised NMU improvements on this network, and these improvements have included new NMU facilities as part of the proposals.</p> <p>Design Change: No</p>	

Table 6/5: Section 42 Consultations - Local Authority Walking/Cycling Horse Riding Responses

Issue	Consultation result
<p><u>Landscaping/Planting Issues</u> Landscaping proposals in area of Beeston St Andrew/Rackheath Park and further afield</p>	<ul style="list-style-type: none"> • Broadland District Council requested effective landscaping along the southern edge of the NDR in the area of Beeston St Andrew and Rackheath Park which maintains a sense of definition to these parkland areas. • The Broads Authority noted the potential for significant indirect impact on the Broads and requested that the green infrastructure and landscaping be strengthened and enhanced biodiversity measures incorporated.
<p>Regard Given to Response: Landscaping has been carefully designed, particularly in sensitive areas such as Beeston Park and Rackheath Park. There has been a degree of collaboration with ecologists representing the Beyond Green development, to ensure a coherent, functioning landscape-wide mitigation plan. However it is recognised that there is a need to provide further landscaping and biodiversity features in and around Beeston Park and Rackheath. As such, further planting and landscaping to screen the NDR and promote further diversification of biodiversity has been incorporated into the landscaping proposals.</p> <p>Design Change: Yes – additional landscaping has been added to the proposals in the area around Beeston Park, Rackheath Park and The Springs. See Design Change Refs: 8.5 and 9.2 in Appendix V to this report.</p>	

Table 6/6: Section 42 Consultations - Local Authority Landscaping/Planting Issues Responses

Issue	Consultation result
<u>Specific Road Effects</u> NDR affects on routes between the A1067 and A47(W)	<ul style="list-style-type: none"> South Norfolk Council urged the applicant to include adequate and appropriate mitigation measures to address the impacts the NDR will have on the roads connecting the A1067 to the A47 at Longwater/Easton (roads such as West End and Longwater Lane, for example). It would be happy to discuss any proposal, in particular, the imposition of average speed cameras along West End and Longwater Lane.
<p>Regard Given to Response: Traffic flows are generally predicted to decrease on these roads with an NDR. Refer to the Traffic Forecasting Report, Appendix I (Document Ref 5.6) for forecast traffic flows.</p> <p>Design Change: No</p>	

Table 6/7: Section 42 Consultations - Local Authority Effects on Specific Roads Responses

Issue	Consultation result
<u>Consultation/Exhibitions</u> Adequacy of Consultation	<ul style="list-style-type: none"> • Broadland District Council noted the consultation work that has been done to date, considering it to have been appropriate and well run in accordance with the Statement of Community Consultation. • South Norfolk Council noted that the information in the supporting documentation appeared generally adequate in enabling an accurate assessment of the likely environmental impacts of the NDR to be made.
<p>Response: Comments noted.</p> <p>Design Change: No</p>	

Table 6/8: Section 42 Consultations - Local Authority Consultations/Exhibition Responses

Issue	Consultation result
<u>Other Comments</u> NDR and NATS	<ul style="list-style-type: none"> • Norwich City Council requested that the applicant supports the application for the NDR by demonstrating its place within the overall NATS Strategy and giving a commitment to deliver the whole of the NATS implementation Programme by 2026.
<p>Response: The NDR is a key element of NATS. The applicant has an implementation plan for NATS, developed following consultations in 2009, which outlines the programme of proposed measures.</p> <p>Design Change: No</p>	

Table 6/9: Section 42 Consultations - Local Authority Other Responses

6.4 Section 42 Consultations – Key Issues from Prescribed Consultees

6.4.1 Responses were received from the following prescribed statutory consultees:

- Anglian Water (Ref: PC001);
- Canal Trust (Ref: PC002);
- Civil Aviation Authority (Ref: PC003);
- Energetics Electricity Limited (Ref: PC004);
- English Heritage (Ref PC005);
- Environment Agency (Ref PC PC006);
- Fisher German Pipelines (Ref PC007);
- Health and Safety Executive (Ref PC008);
- Highways Agency (Ref PC009);
- KLM Engineering (Ref PC 010);
- MOD - Defence Infrastructure Organisation (Ref PC011);
- Natural England (Ref PC012);
- New Anglia Local Enterprise Partnership (Ref PC013);
- Norfolk Constabulary (Ref PC014);
- Norfolk NHS Primary Care Trust (Ref PC015);
- North Norfolk Clinical Commissioning Group (Ref PC016);
- Norwich International Airport (Ref PC017);
- Police and Crime Commissioner (Ref PC 018);
- Public Health England (Ref PC019);
- Bawburgh Parish Council (Ref PC020);
- Blofield Parish Council (Ref PC021);
- Caister St Edmund Parish Council (Ref PC022);
- Colney Parish Council (Ref PC023);
- Felthorpe Parish Council (Ref PC024);
- Gt and Lt Plumstead Parish Council (Ref PC025);
- Hainford Parish Council (Ref PC026);
- Hellesdon Parish Council (Ref PC027);
- Horsford Parish Council (Ref PC028);
- Horsham and Newton St Faiths Parish Council (Ref PC029);
- Norton Sub Course Parish Council (Ref PC030);
- Rackheath Parish Council (Ref PC031);
- Salhouse Parish Council (Ref PC032);
- Spixworth Parish Council (Ref PC033);
- Sprowston Town Council (Ref PC034);
- Swannington Parish Council (Ref PC035);
- Wroxham Parish Council (Ref PC036)
- Greater Anglia (Ref PC036)
- Fulcrum Pipelines (Ref PC037)
- NATS En-Route (NERL) Safeguarding (Ref PC038)

6.4.2 Details of the responses received from prescribed statutory consultees are contained in Appendix T of this report. The following tables provide a summary of their responses grouped by the type of comments made and the issues raised.

Issue	Consultation result
<p><u>Need for NDR</u> Need for NDR</p>	<ul style="list-style-type: none"> • Highways Agency, New Anglia Local Enterprise Partnership, North Norfolk Clinical Commissioning Group, the Police and Crime Commissioner and Spixworth Parish Council expressed support for the scheme or noted benefits it would bring. The reasons given included: <ul style="list-style-type: none"> ⇒ it will assist in bringing forward anticipated growth in both housing and jobs in areas both in and around Norwich; ⇒ a successful economy requires an efficient transport system; ⇒ it will address the existing transport problems in northern Norwich; ⇒ the existing links to the airport and tourist areas to the north are inadequate. • Colney Parish Council, Gt and Lt Plumstead Parish Council, Rackheath Parish Council, Salhouse Parish Council, Swannington Parish Council and Wroxham Parish Council questioned the need for the NDR. The reasons given included: <ul style="list-style-type: none"> ⇒ the cost of the road, when local councils already face a shortfall in their budgets and the money could be better spent on other services; ⇒ the evidence does not support the case that the NDR is needed to create space for sustainable transport measures in Norwich; ⇒ the NDR will have little benefit in reducing traffic in the city and the Outer Ring Road; ⇒ it is wrong that the NDR has been inextricably linked to planned development; ⇒ the alleged generation of CO2 emissions per year by the NDR and the adverse effects to landscape/wildlife.
<p>Regard Given to Response: These responses have been considered by the applicant and regard has been given to them in putting together the need case for the NDR, which is detailed in Volume 1 Chapter 3 of the Environmental Statement (Document Reference 6.1).</p>	

Design Change: No

Table 6/10: Section 42 Consultations - Prescribed Consultee Need for NDR Responses

Issue	Consultation result
<p><u>Alternatives to NDR</u> Other alternatives not tested</p>	<ul style="list-style-type: none"> • Gt and Lt Plumstead Parish Council and Rackheath Parish Council commented that the NDR has not been tested against alternative routes and alternative transport strategies such as improved public transport, including light railway. Gt and Lt Plumstead Parish Council considered that the plan for the three quarter NDR route has never been properly tested against alternatives. • Rackheath Parish Council suggested that the money would be better spent on improving public transport and introducing free transport for children.
<p>Regard Given to Response: These responses have been considered by the applicant and regard has been given to them in putting together the assessment of alternatives, which is detailed in Volume 1 Chapter 3 of the Environmental Statement (Document Reference 6.1).</p> <p>Design Change: No</p>	

Table 6/11: Section 42 Consultations - Prescribed Consultee Alternatives to NDR Responses

Issue	Consultation result
<p><u>Route of NDR</u> Link between the A1067 and A47(w) of Norwich</p>	<ul style="list-style-type: none"> • North Norfolk Clinical Commissioning Group, Police and Crime Commissioner, Bawburgh Parish Council, Hellesdon Parish Council, Horsham and Newton St Faith Parish Council, Norton Subcourse Parish Council, Salhouse Parish Council and Swannington Parish Council commented that the NDR should link with the A47 to the west of Norwich, otherwise the benefits of the NDR are diminished. • The Environment Agency noted that Norfolk County Council had announced that it is commissioning a feasibility study for the section of the NDR, which would cross over the River Wensum SAC. It suggests that due consideration is given as to how this affects the current assessment of impacts that the Council is undertaking in relation to the present scheme.
<p>Regard Given to Response: A road linking the A1067 and the A47(w) would have to cross the Wensum Valley, which is designated a Special Area of Conservation (SAC) under the European Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora - often referred to as the Habitats Directive. An assessment of options across the Wensum Valley concluded, in 2005, that significant impacts on the SAC would be likely, and there was doubt as to whether, under the terms of the Habitats Directive, it would be possible to design an acceptable scheme. This in turn raised the prospect that consent for a wider scheme including such a link might not be granted. On 19 September 2005, the applicant’s Cabinet resolved to have no NDR link between the A47(w) and the A1067. It therefore did not form part of the adopted route.</p> <p>At its meeting of 16 September 2013 the meeting of the Norfolk County Council resolved to recommend to Cabinet that they submit an application for a DCO in respect of the NDR as proposed (i.e. between the A47 at Postwick and the A1067 near Attlebridge) and to also commission a report on a feasibility study of providing a link across the Wensum Valley from the A1067 to the A47(w). Whilst at its meeting of 7 October 2013 the applicant’s Cabinet resolved that a “scoping report on the feasibility of providing a link across the Wensum Valley from the A1067 – A47 be written once consultation work was completed”, this study has not been carried out and there is therefore currently no proposal establishing the form any link between the A1067 and A47(w) would take, or indeed whether any such link is feasible. The Transport Assessment for the NDR (Document Ref 5.5.) shows that the NDR can</p>	

provide substantial benefits without a further link between the A1067 and A47(w) and that the NDR will reduce daily traffic on existing routes between the A1067 and the A47(w) between Drayton/Taverham and Costessey. The feasibility and environmental acceptability of a link to the A47(w) have not been established and the previous assessment in 2005 discarded this option. Accordingly, it is the position of the applicant that the NDR can and should be considered on its own merits without such a link.

Design Change: No

Issue	Consultation result
<p><u>Route of NDR</u> Suggested alternative routes for the NDR</p>	<ul style="list-style-type: none"> • Gt and Lt Plumstead Parish Council, Rackheath Parish Council and Salhouse Parish Council suggested that the route of the NDR should be closer to the city, forming an inner orbital link road. The reasons for this include: <ul style="list-style-type: none"> ⇒ it would link the proposed development areas; ⇒ it could be delivered in a more cost effective and timely manner; ⇒ it is less environmentally damaging.

Regard Given to Response: The alternative of an inner orbital link road using routes through proposed development is considered as Alternative No 5 in the need and alternatives case. See Volume 1 Chapter 3 of the Environmental Statement (Document Reference 6.1).

Design Change: No

Table 6/12: Section 42 Consultations - Prescribed Consultee Route of NDR Responses

Issue	Consultation result
<u>On-Line Proposals</u> Dualling of the NDR between Fir Covert Road and Fakenham Road.	<ul style="list-style-type: none"> Felthorpe Parish Council and Hellesdon Parish Council supported dualling of the NDR between Fir Covert Road and Fakenham Road.
<p>Regard Given to Response: Comments noted. Design Change: No</p>	
Issue	Consultation result
<u>On-Line Proposals</u> Drainage proposals	<ul style="list-style-type: none"> The Environment Agency accepted in principle the drainage proposals for the majority of the scheme and that suitable drainage methods are proposed to prevent adverse impacts to the likely affected surface water bodies. It also provided other comments on drainage that included: <ul style="list-style-type: none"> ⇒ it should be ensured that the culverts are designed to contain the 1% chance (1 in 100) flow; ⇒ as ditches are going to be used to allow overland flows to infiltrate rather than pass underneath the road it should be ensured that they will also be sized to contain this 1% chance event. Norwich International Airport expressed concern that the planned drainage lagoons and temporary topsoil storage areas are potential bird attractants. It requested that the applicant, in consultation with Norwich International Airport develop a Bird Control Management Plan (BCMP) the aim of which would be to deter birds from flying in the vicinity of the airport.
<p>Regard Given to Response: Through continued correspondence the Environment Agency previously advised that in accordance with BRE365 a minimum infiltration rate in the area of the lagoons was used rather than an average. It also advised that lagoons with longer drain down times exceeding 7 days should be able to accommodate a 1 in 100 follow on storm.</p>	

<p>Design Change: Yes – changes to lagoon size and position have been made as a result of on-going discussions with the Environment Agency. See Appendix V of this report.</p> <p>The assessment of the bird strike hazard was undertaken for the scheme. Following the risk assessment and recommendations of specialists, the NDR was developed to eliminate any source of bird attracting features and activity on or in the vicinity (13km) of the airport.</p> <p>The landscaping has been designed to minimise nesting activity near the airport.</p> <p>Design Change: Yes – an additional area of grassland creation has been incorporated into the proposals to prevent issues arising from bird and wildlife management concerns. See Design Change Ref: 6.6 in Appendix V of this report.</p>	
<p><u>On-Line Proposals</u> Postwick Hub Junction</p>	<ul style="list-style-type: none"> Salhouse Parish Council commented that the Postwick Hub Junction is over complicated and the extra mileage will actually deter traffic from using the NDR with drivers seeking alternative routes through Gt Plumstead and Salhouse.
<p>Regard Given to Response: During design development a number of significant engineering constraints have influenced the scheme design. These include the River Yare/Railway Bridge, the existing Postwick Bridge, a high pressure gas main and the nearby property settlements at Heath Farm and Postwick village. Given the constraints and having assessed a number of options it was concluded that, if the existing capacity problems are to be addressed and the committed development at Broadland Gate Business Park is to be accommodated, then removal of the existing eastbound diverge slip road and the provision of a new diverge slip road running parallel with the existing A47, is the only feasible solution.</p> <p>Due to the configuration requirements to accommodate a new eastbound diverge slip road, a new separate Postwick bridge crossing the A47 provides a connection between the Postwick North East Roundabout and the Park and Ride Junction.</p> <p>Design Change: No</p>	
Issue	Consultation result
<p><u>On-Line Proposals</u> Fir Covert Road</p>	Felthorpe Parish Council and Hellesdon Parish Council supported the re-introduction of the Fir Covert Road

Roundabout	roundabout at its junction with the NDR.
<p>Regard Given to Response: Comments noted. Design Change: No</p>	
Issue	Consultation result
<p><u>On-Line Proposals</u> Plumstead Road and the Norwich to Sheringham Railway Line Bridge</p>	<ul style="list-style-type: none"> Salhouse Parish Council expressed concern regarding the elevated section of the NDR as it crosses Plumstead Road and the Norwich to Sheringham railway line, which will cause significant visual intrusion. It was suggested that the NDR should pass underneath Plumstead Road and the railway line.
<p>Regard Given to Response: The applicant has previously examined routeing the NDR below Plumstead Road and the railway line and it is technically difficult due to groundwater conditions. There would be a high risk of flooding of any tunnel and a need for a permanent pumping system. This would have resulted in high maintenance costs. Design Change: No</p>	
Issue	Consultation result
<p><u>On-Line Proposals</u> Number of roundabouts on NDR</p>	<ul style="list-style-type: none"> Wroxham Parish Council commented on the number of roundabouts proposed over the length of the NDR, which it considers will create a slow moving traffic jam during busy periods. Of particular concern is the A1151 junction with the NDR, and it suggested that a grade separated junction should be provided here.
<p>Regard Given to Response: The NDR is a distributor road and not a bypass and so not many users are expected to drive from one end to the other. In view of this the delay at the roundabouts is not expected to be a deterrent to the use of the route. Grade separated junctions would have a much greater environmental impact and be more difficult to justify. The A1151 Wroxham Road</p>	

junction operates below its theoretical capacity for the predicted traffic levels. Whilst it exceeds its desirable capacity in 2032 the delay is considered reasonable and the queues can be accommodated safely. See Chapter 8 of the Transport Assessment (Document Ref 5.5).

Design Change: No

Table 6/13: Section 42 Consultations - Prescribed Consultee On-Line Proposals Responses

The Issue	Consultation result
<u>Off-Line Proposals</u> Number of roads closures	<ul style="list-style-type: none"> • Rackheath Parish Council commented that the road closures will create problems in many parishes leading to longer journeys and increased congestion. • Salhouse Parish Council does not support local arguments in favour of the closure of local roads. It considered that these roads should remain open to allow use by slow moving agricultural vehicles as an alternative to the NDR.
<p>Regard Given to Response: The applicant has tried to keep the number of road closures to a minimum and they are generally only provided for reasons of highway safety where minor roads are severed by the NDR or to encourage traffic to use more appropriate routes.</p> <p>Design Change: No</p>	
Issue	Consultation result
<u>Off-Line Proposals</u> North Walsham Road/Crostwick Lane proposals	<ul style="list-style-type: none"> • Spixworth Parish Council, by a narrow majority, voted to support the proposals at this junction. However, another junction layout was put forward which the councillors felt had some merit.
<p>Regard Given to Response: The alternative suggested involves diverting the Rackheath Lane arm of the junction so that it joins North Walsham Road to the south of Crostwick Lane (thereby reversing the stagger of the side road arms of this junction) and restricting traffic exiting Rackheath Lane to left turn only.</p> <p>This alternative has been considered and is not appropriate for the following reasons:</p> <ul style="list-style-type: none"> • it is unlikely that physical measures alone could prevent the right turn out of Rackheath Lane making the restriction difficult to enforce; • the additional distance to travel to the North Walsham Road Roundabout and back could encourage vehicles to turn right out of 	

<p>Rackheath Lane thereby introducing an illegal movement and additional vehicles at the junction;</p> <ul style="list-style-type: none"> vehicles from Crostwick Lane wishing to access Rackheath Lane would have a difficult manoeuvre to make unless the left turn into Rackheath Lane from North Walsham Road was also restricted; it does not fulfil the objective to simplify the junction. <p>Design Change: No</p>	
Issue	Consultation result
<p><u>Off-Line Proposals</u> Closure of Green Lane East/Broad Lane at its junction with Plumstead Road</p>	<ul style="list-style-type: none"> Rackheath Parish Council commented that the proposals will cut the parish off from the Plumstead area, resulting in vehicles having to take a detour via the NDR. As a result they do not support the closing off of roads to through traffic, particularly the closure of Green Lane East/Broad Lane at its junction with Plumstead Road.
<p>Regard Given to Response: Whilst the comments are noted, the reasons for closure of Green Lane East/Broad Lane at its junction with Plumstead Road are primarily to improve highway safety at this junction. The closure of Green Lane East/Broad Lane at its junction with Plumstead Road will remove the existing crossroads junction making it a more conventional and safer T-junction.</p> <p>Design Change: No</p>	

Table 6/14: Section 42 Consultations - Prescribed Consultee Off-Line Proposals Responses

Issue	Consultation result
<p><u>Walking/Cycling/Horse Riding Issues</u> The NDR represents a barrier to NMUs</p>	<ul style="list-style-type: none"> • Horsham and Newton St Faiths Parish Council objected to the plans for an at-grade informal crossing of the NDR between Bullock Hill and Petans. It commented that having a crossing with no traffic lights would be highly dangerous and completely inappropriate. It suggested an underpass at this location. • Salhouse Parish Council expressed concern that the roundabouts on Salhouse Road and other radial routes will be impossible to cross by walkers, cyclists and horse riders. It requested better provision is made to cross the NDR.
<p>Regard Given to Response: During the April/May/June 2012 public consultations the applicant had various requests for improved walking and cycling facilities. As a result a strategy was developed to consider and prioritise these consultation requests. The strategy published as part of the February/March 2013 public consultations identified a network of routes to link areas that generate NMUs (such as villages, employment areas, future development) with each other, the Norwich Cycle Network and the Marriotts Way. Part of these routes utilised narrow country lanes, roads closed to motor vehicles and existing public rights of way. The applicant has prioritised NMU improvements on this network, and these improvements have included new NMU facilities as part of the proposals</p> <p>It is proposed to maintain connectivity between Bullock Hill and Petans with the provision of a segregated shared use footway/cycleway around the perimeter of the junction with uncontrolled crossing points. This is considered appropriate provision to cater for the anticipated level of usage.</p> <p>Design Change: No</p>	

Table 6/15: Section 42 Consultations - Prescribed Consultee Walking/Cycling Horse Riding Responses

Issue	Consultation result
<p><u>Landscaping/Planting Issues</u> Effects of NDR on landscape and type of planting</p>	<ul style="list-style-type: none"> Horsham and Newton St Faiths Parish Council objected to the proposed plans due to the loss of areas of countryside and that the NDR will lead the way for increased development that will encroach on the village.
<p>Regard Given to Response: The strategy for the scale and location of development is determined through the development plan process, in this case the Joint Core Strategy for Broadland, Norwich and South Norfolk. Individual sites for growth are set out in more detailed local plan documents that are currently in production and have been subject to consultation. The JCS is supported by evidence and has been the subject of statutory consultation and public examination by the independent Planning Inspectorate. Individual applications for development in villages as elsewhere will be determined by the district councils in accordance with the plan unless there are material considerations that indicate otherwise.</p> <p>Design Change: No</p>	

Table 6/16: Section 42 Consultations - Prescribed Consultee Landscaping/Planting Responses

Issue	Consultation result
<p><u>Wildlife Effects</u> Rackheath Park and The Springs</p>	<ul style="list-style-type: none"> • The Environment Agency commented that it will be essential to ensure that deterioration in water quality and habitat does not occur as a result of the proposed scheme, in particular the tributaries of the Bure (Spixworth and Dobbs Beck) and the Wensum are particularly sensitive to deterioration in water quality. In addition the quality of water discharged to The Springs should be at least as good as the known existing water quality. • Salhouse Parish Council expressed concern regarding effects to the historic Rackheath Park, the wet land habitat of Dobb's Beck, The Springs to the north west of the A1151, and the area around Beeston St Andrew. It commented on concerns that the NDR will cause increased surface drainage runoff into local water courses and that it will contain pollutants from the road.
<p>Regard Given to Response: The Environment Agency and Natural England have been consulted on the habitat and water quality of these areas. Measures have been incorporated into the scheme design to mitigate for any impacts. A Habitats Regulations Assessment has been undertaken to ensure there are no impacts on the Wensum. There are no anticipated impacts on Spixworth and Dobbs Beck.</p> <p>Design Change: No</p>	

Table 6/17: Section 42 Consultations - Prescribed Consultee Wildlife Responses

Issue	Consultation result
<p><u>Emission/Noise Issues</u> Concern over noise/emissions</p>	<ul style="list-style-type: none"> • Natural England commented that the proposals for the road need to clearly demonstrate how climate change over the longer term has been taken into account, including flood risk, increased runoff and changes to biodiversity and landscape. • Public Health England noted that the NDR is likely to cause a deterioration of air quality at certain locations, and requests the applicant clearly identifies the locations and number of households affected. • Horsham and Newton St Faiths Parish Council commented on concerns regarding the impact of the increased noise and pollution on the village. • Gt and Lt Plumstead Parish Council commented that the road would generate 25,000 extra tonnes of CO2 emissions per year, which is not consistent with national government policies.
<p>Regard Given to Response: Noise and Air Quality assessments are included within Volume 1 Chapters 4 and 11 of the Environmental Statement (Document Reference 6.1).</p> <p>Carbon emissions is one of the topics considered in the Environmental Impact Assessment (EIA) process. These assessments are included in Volume 1 Chapter 5 of the Environmental Statement (Document Ref 6.1). The assessment shows a slight increase in carbon emissions with the NDR, but this needs to be considered within the wider context of NATS which will enable other sustainable travel modes to be introduced.</p> <p>These responses have informed the assessments of these environmental topics.</p> <p>Design Change: No</p>	

Table 6/18: Section 42 Consultations - Prescribed Consultee Emission/Noise Responses

Issue	Consultation result
<u>Specific Road Effects</u> NDR affects on Plumstead Road	<ul style="list-style-type: none"> Gt and Lt Plumstead Parish Council commented that the route cuts the parish in two and has proposed closures of Smee Lane and Low Road. It considered that this and the proposed increase in housing in the North East Triangle will funnel traffic along Plumstead Road and cause a projected traffic increase of 100% on a very busy C class road.
<p>Regard Given to Response: One of the reasons for introducing a bridge over the NDR at Middle Road was to improve access options to Gt and Lt Plumstead and help mitigate concerns that the NDR cut the parish in two. The bridge was located here, rather than at Low Road or Smee Lane, because Middle Road was considered the better standard road.</p> <p>Design Change: No</p>	
<u>Specific Road Effects</u> NDR affects on routes between the A1067 and A47(w)	<ul style="list-style-type: none"> Swannington Parish Council commented that the proposed NDR will cause huge congestion and rat runs through small parishes and villages, particularly Swannington, Attlebridge, Taverham, Ringland and Costessey.
<p>Regard Given to Response: From the traffic modelling work that has been carried out, over time traffic levels are likely to increase over River Wensum. However, the traffic modelling shows that these flows are about the same or slightly less with the NDR in place compared to the scenario without the NDR, that is to say, the NDR doesn't encourage additional trips between Taverham and Costessey on these routes. Refer to the Traffic Forecasting Report, Appendix I (Document Ref 5.6) for forecast traffic flows.</p> <p>Design Change: No</p>	

<p><u>Specific Road Effects</u> NDR affects A1151 and B1140</p>	<ul style="list-style-type: none"> Salhouse Parish Council and Wroxham Parish Council commented on the predicted increase in traffic along the A1151 which would result in further tailbacks and delays on an already popular and crowded tourist route. Salhouse Parish Council suggested that this would increase traffic on the B1140 through the village. Wroxham Parish Council commented that a steady flow of traffic on the A1151 cannot be maintained when crossed by the two lane dual carriageway (NDR). It suggested a bridge arrangement for the A1151 to pass either over or under the NDR.
<p>Regard Given to Response: Traffic flows are predicted to increase on Wroxham Road close to the NDR and this is to be expected as it reflects traffic using Wroxham Road to access the NDR. See Appendix I to the Forecasting Report (Document Reference 5.6) for actual traffic flows.</p> <p>Traffic flows are predicted to increase on Salhouse Road north and south of the NDR and this is to be expected as it reflects traffic using it to access the NDR. However, on Salhouse Road in the built up area traffic flows are predicted to decrease. This reflects traffic wishing to access external destinations changing behaviour by travelling out to the NDR rather than travelling through the built up area. Refer to the Traffic Forecasting Report, Appendix I (Document Ref 5.6) for forecast traffic flows.</p> <p>Design Change: No</p>	

Table 6/19: Section 42 Consultations - Prescribed Consultee Effects on Specific Roads Responses

Issue	Consultation result
<u>Land/ Property issues</u> Airport issues	<ul style="list-style-type: none"> KLM Engineering commented that it is inappropriate that part of the current airfield will be removed from the airport to use for part of an alternative infrastructure project. It believes it is short term thinking to reduce the size of the airfield.
<p>Regard Given to Response: The future development proposals of the airport are not a matter for this application. In any event, the applicant has held discussions with Norwich International Airport, who are content with the NDR alignment around the north of airport.</p> <p>Design Change: No</p>	
<u>Land/ Property Issues</u> Loss of agricultural land and	<ul style="list-style-type: none"> Colney Parish Council expressed concern at the loss of productive agricultural land that will be permanently lost and the adverse affect to the landscape as a result of the NDR.
<p>Regard Given to Response: The loss of productive agricultural land and commitments regarding the minimisation of impacts to soils are detailed in Volume 1 Chapter 13 and Volume 1 Chapter 9 of the Environmental Statement (Document Reference 6.1).</p> <p>Design Change: No</p>	

Table 6/20: Section 42 Consultations - Prescribed Consultee Land/Property Responses

Issue	Consultation result
<u>Suggested Changes</u> Remove HGVs from Salhouse	<ul style="list-style-type: none"> • Salhouse Parish Council commented that the B1140 through Salhouse is a designated sugar beet route and requested that with the NDR in place, HGV traffic should be taken away from the B1140 through enforceable restrictions and signing. It also requested that the designated HGV route to Rackheath Industrial Estate and its associated restrictions be removed.
<p>Regard Given to Response: Norfolk County Council has a Route Hierarchy network which classifies roads according to their function and level of use. This was developed following assessments of roads and public consultations during the 1990s and early 2000s. Within this Route Hierarchy roads designated as a Main Distributor Route and classified a B road are identified as being a distributor of local through traffic. The applicant would not normally provide a weight restriction on such routes.</p> <p>Design Change: No</p>	

Table 6/21: Section 42 Consultations - Prescribed Consultee Suggested Changes Responses

Issue	Consultation result
<u>Consultation/Exhibitions</u> Previous route consultations	<ul style="list-style-type: none"> • Gt and Lt Plumstead Parish Council and Rackheath Parish Council commented that the NDR proposed in the 2003 consultations was for a full route between the A47 at Postwick and the A47 to west of Norwich and did not include the Postwick Hub Junction. It was suggested support for the NDR can only be based on the full route and there should be a consultation on the support for a road between the A47 and A1067. Suggestion was made that the originally proposed route options should be re-examined.
<p>Regard Given to Response: All consultations on the NDR since 2005 showed the NDR being proposed between the A47 at Postwick and the A1067 near Attlebridge including the more recent consultations in April/May/June 2012 (described in Section 3.3) and in February/March 2013 (described in Section 3.4). During these consultations there was the opportunity to comment on the route. In addition there has been opportunity to comment on the route as part of the statutory pre-application consultations.</p> <p>Design Change: No</p>	
<u>Consultation/Exhibitions</u> Pre-application consultation	<ul style="list-style-type: none"> • Colney Parish Council commented that the NDR consultation was not effective and omitted the necessary information for the wider community to make an informed decision. • Salhouse Parish Council commented that there was no public exhibition at Salhouse. • Rackheath Parish Council commented that some letters to Rackheath residents were received on the day of the first exhibition, meaning that residents were unable to attend or had very little time to prepare for a consultation there.
<p>Regard Given to Response: The consultation pack consisted of a cover letter, scheme information document, non-technical summary to the PEIR, a full copy of the PEIR, non-technical note on transport modelling and a CD containing these documents and appendices. This is considered a full pack of information to enable the consultees to provide informed responses on the NDR. The rationale for selection of exhibition venues is outlined in Section 4.4 of this report. Whilst Rackheath residents were able to attend any of the other exhibitions, in light of the comments the applicant decided to</p>	

schedule an additional exhibition on 12 August 2013 (between 13:00 to 20:00) at the Holy Trinity Church in Rackheath. Letters notifying people of this new exhibition were sent to addresses within Rackheath Parish (Appendix K-5 of this report).

Design Change: No

Table 6/22: Section 42 Consultations - Prescribed Consultee Consultations/Exhibition Responses

Issue	Consultation result
<u>Other comments</u> NDR and NATS	<ul style="list-style-type: none"> • New Anglia Local Enterprise Partnership commented that it is critical that the NDR is part of a wider package of public transport measures including improved bus services and an increase in cycling routes. • Gt and Lt Plumstead Parish Council commented on the Norwich Area Transportation Strategy (NATS) and considered that an NDR centred transport policy leads to greater vehicle use, longer journeys and increased congestion.
<p>Regard Given to Response: The NDR is a key element of NATS. The applicant has an implementation plan for NATS, developed following consultations in 2009, which outlines the programme of proposed measures.</p> <p>Design Change: No</p>	

Table 6/23: Section 42 Consultations - Prescribed Consultee Other Comments Responses

6.5 Section 42 – Key Issues from Those with Interest in Land

- 6.5.1 The consultation with those with interest in land (as defined in Section 44 of the Planning Act 2008) received 54 responses. A summary of these are contained in Appendix U of this report.
- 6.5.2 A majority of comments received related to requests for amendments to accommodation works. These included gating arrangements, boundary fencing and hedgerow detail, which will be considered during the detailed design and in discussion with land owners/tenants. The regard given to these responses is detailed in Appendix U of this report.
- 6.5.3 There were also responses relating to the specific effects of the proposals on individual land plots, including requests for additional landscaping and planting to provide protection adjacent to specific areas. Rather than document these specific issues in this section of the report, these comments and the regard given to them are also contained in Appendix U of this report.
- 6.5.4 The following tables provide a summary of the key issues identified by the consultation with those affected by land.

Issue	Consultation result
<u>Need for NDR</u>	<p>4 responses (IT008, IT035, IT038, IT039) questioned the need for the NDR. These included:</p> <ul style="list-style-type: none"> • the NDR will give license to commercial and domestic building, both of which will result in the loss of agricultural land; • the money could be better spent on improving public transport and cycle facilities; • the NDR will generate additional traffic which will cause environmental damage; • question why the NDR has to be key to the delivery of NATS.
<p>Regard Given to Response: These responses have been considered by the applicant and regard has been given to them in putting together the need case for the NDR, which is detailed in Volume 1 Chapter 3 of the Environmental Statement (Document Reference 6.1).</p> <p>Design Change: No</p>	

Table 6/24: Section 42 Consultations – Those with Interest in Land Need for NDR Responses

Issue	Consultation result
<p><u>Route of NDR</u> A link is needed between the A1067 and A47(w)</p>	<p>5 responses (IT010, IT012, IT013, IT018, IT036) suggested that the NDR should link to the A47 to the west of Norwich. Comments included:</p> <ul style="list-style-type: none"> • maximum benefit can only be achieved with this link; • providing this link would greatly benefit Taverham and Drayton.
<p>Regard Given to Response: A road linking the A1067 and the A47(w) would have to cross the Wensum Valley, which is designated a Special Area of Conservation (SAC) under the European Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora - often referred to as the Habitats Directive. An assessment of options across the Wensum Valley concluded, in 2005, that significant impacts on the SAC would be likely, and there was doubt as to whether, under the terms of the Habitats Directive, it would be possible to design an acceptable scheme. This in turn raised the prospect that consent for a wider scheme including such a link might not be granted. On 19 September 2005, the applicant’s Cabinet resolved to have no NDR link between the A47(w) and the A1067. It therefore did not form part of the adopted route.</p> <p>At its meeting of 16 September 2013 the meeting of the Norfolk County Council resolved to recommend to Cabinet that they submit an application for a DCO in respect of the NDR as proposed (i.e. between the A47 at Postwick and the A1067 near Attlebridge) and to also commission a report on a feasibility study of providing a link across the Wensum Valley from the A1067 to the A47(w). Whilst at its meeting of 7 October 2013 the applicant’s Cabinet resolved that a “scoping report on the feasibility of providing a link across the Wensum Valley from the A1067 – A47 be written once consultation work was completed”, this study has not been carried out and there is therefore currently no proposal establishing the form any link between the A1067 and A47(w) would take, or indeed whether any such link is feasible. The Transport Assessment for the NDR (Document Ref 5.5.) shows that the NDR can provide substantial benefits without a further link between the A1067 and A47(w) and that the NDR will reduce daily traffic on existing routes between the A1067 and the A47(w) between Drayton/Taverham and Costessey. The feasibility and environmental acceptability of a link to the A47(w) have not been established and the previous assessment in 2005 discarded this option.</p>	

Accordingly, it is the position of the applicant that the NDR can and should be considered on its own merits without such a link.	
Design Change: No	
Issue	Consultation result
<u>Route of NDR</u> Alternative routes for the NDR	<p>3 responses (IT012, IT013, IT040) suggested that the NDR should stop at the A140 and/or beyond this to utilise existing roads. The reasons for this view included:</p> <ul style="list-style-type: none"> • areas of countryside should be protected; • the speed of traffic joining Fakenham Road would be excessive; • Reepham Road, between Hall Lane and Fir Covert Road, is a good quality road that could be used for an NDR; • the road would not go anywhere other than Fakenham Road and those wishing to access the A47 would use unsuitable routes between the A1067 and Taverham/Drayton and the A47 at Costessey/Easton.
<p>Regard Given to Response: The alternative of a dual carriageway NDR between the A47 at Postwick and the A140 Cromer Road is considered as Alternative No 2 in the needs and alternative case (Volume 1 Chapter 3 of the Environmental Statement (Document Ref 6.1)).</p> <p>The alternative of using Reepham Road, between Hall Lane and Fir Covert Road, as part of an NDR was one of the options considered in the Stage 1 Environmental Assessment undertaken prior to developing a manageable number of route alternatives to take forward to the 2003 public consultations. It was rejected at this stage as a result of this assessment.</p>	
Design Change: No	

Table 6/25: Section 42 Consultations – Those with Interest in Land Route of NDR Responses

Issue	Consultation result
<u>On-Line Proposals</u> Dual carriageway section of the NDR between Fir Covert Road and Fakenham Road	1 response (IT010) expressed support for the NDR to be dual carriageway between Fir Covert Road and Fakenham Road.
<p>Regard Given to Response: Having had regard to these comments the proposals submitted for a DCO include a dual carriageway section of carriageway between Fir Covert Road and Fakenham Road.</p> <p>Design Change: No</p>	
Issue	Consultation result
<u>On-Line Proposals</u> Fir Covert Road Roundabout	7 responses (IT003, IT003A, IT004, IT004A, IT009, IT010, IT011) expressed support for the re-introduction of the Fir Covert Road Roundabout. 1 response (IT037) suggested that traffic should be excluded from the southern half of Fir Covert Road by constructing a three-exit roundabout at this junction.
<p>Regard Given to Response: There has been extensive consideration regarding the provision of the roundabout at the Fir Covert Road junction with the NDR. After the April/May/June 2012 consultations the roundabout was relocated to the junction with Fakenham Road. The February/March 2013 consultations identified support for the roundabout at the Fakenham Road/NDR junction. However, it also identified concerns regarding the closure of Fir Covert Road, particularly by businesses here. Having given regard to these concerns, the NDR proposal was further amended so that it included an additional roundabout at the NDR junction with Fir Covert Road. This was in addition to the roundabout at the Fakenham Road/NDR junction.</p>	

<p>The applicant considers the provision of a 4 arm roundabout here as the most appropriate solution, particularly as traffic flow on Fir Covert Road is predicted to be similar or lower with the NDR. See Appendix I to the Forecasting Report (Document Reference 5.6) for actual traffic flows.</p> <p>Design Change: No</p>	
Issue	Consultation result
<p><u>On-Line Proposals</u> Drainage</p>	<p>9 responses (IT012, IT013, IT019, IT020, IT024, IT034, IT035, IT042, IT044) made comment on the drainage proposals and the effects to individual land interests. These generally requested the relocation or the resizing of the lagoons. There were also concerns expressed that the drainage mitigation proposals were not adequate enough to protect ground water resources.</p>
<p>Regard Given to Response: The NDR drainage was designed in accordance with SUDS techniques to ensure that the water quality is appropriately managed. (See Volume 1 Chapter 14 of the Environmental Assessment (Document Ref 6.1)).</p> <p>Design Change: Yes – having given regard to the location of lagoons amendments have been made to the location of Lagoon No. 25. See Design Change Ref 12.5 in Appendix V to this report.</p>	
Issue	Consultation result
<p><u>On-Line Proposals</u> Middle Road Bridge</p>	<p>4 responses (IT036, IT041, IT042, IT045) objected to the proposal for a bridge over the NDR at Middle Road. The reasons for this view included:</p> <ul style="list-style-type: none"> • it will funnel Broadland Business Park and other nearby development traffic along Middle Road; • Middle Road cannot handle the additional traffic safely; • it adds additional cost to the overall scheme; • Plumstead Road is a more suitable road to accommodate traffic than Middle Road; • it conflicts with land that has already planning permissions granted.
<p>Regard Given to Response: There has been extensive consideration of Middle Road Bridge and whilst the concerns of residents of Middle Road are acknowledged the wider view of the highway network (including the alternative routes to Middle Road) need to</p>	

be considered. There has also been extensive discussion with the parish council on this issue and they have expressed a similar view. On this basis the bridge is to be retained as part of the proposal, so there is no change to the scheme.

Design Change: No

Issue	Consultation result
<p><u>On-Line Proposals</u> Plumstead Road and the Norwich to Sheringham Railway Line Bridge</p>	<p>1 response (IT035) expressed concern regarding the elevated section of the NDR as it crosses Plumstead Road and the Norwich to Sheringham railway line, which will cause significant visual intrusion. It suggested that the NDR should pass underneath Plumstead Road and the railway line.</p>

Regard Given to Response: The applicant has previously examined routeing the NDR below Plumstead Road and the railway line and it is technically difficult due to groundwater conditions. There would be a high risk of flooding of any tunnel and a need for a permanent pumping system. This would have resulted in high maintenance costs.

Design Change: No

Issue	Consultation result
<p><u>On-Line Proposals</u> Drayton Lane link</p>	<p>2 responses (IT002, IT051) expressed concern regarding the closure of Drayton Lane, south of its junction with Reepham Road and the resulting affect of diverting traffic via Hall Lane. Issues identified included:</p> <ul style="list-style-type: none"> • Hall Lane has a dangerous bend and is not wide enough to allow large vehicles to pass each other; • Hall Lane is used by residents to walk to Drayton; • there would be negative effects to Reepham Road (between Drayton Lane and Hall Lane) and the junction of Reepham Road/Hall Lane; • Drayton Lane is the more suitable alternative to accommodate traffic; <p>Alternative suggestions included that a roundabout should be provided at the Reepham Road/Drayton Lane</p>

	<p>junction, the Drayton Lane closure should be removed and traffic calming should be provided on Hall Lane south of Drayton Lane.</p>
<p>Regard Given to Response: Further tests have been undertaken in the model to look into the option of a roundabout at the Drayton Lane/Reepham Road junction and also a more conventional priority ('T') junction. The findings for all options tested, some of which also included traffic calming on the section of Hall Lane between Drayton Lane South and Drayton village, showed that the use of Drayton Lane South, either instead of, or as well as Hall Lane, was less effective at reducing traffic flows into Drayton than the NDR scheme as proposed. In view of this, and the fact that the NDR scheme as proposed showed a benefit of reducing the amount of traffic on Hall Lane when compared to a non-NDR scenario, there was no evidence to support changing the NDR scheme as proposed.</p> <p>Design Change: No</p>	

Table 6/26: Section 42 Consultations – Those with Interest in Land On-Line Proposal Responses

Issue	Consultation result
<u>Off-Line Proposals</u> North Walsham Road/Crostwick Lane proposals	1 response (IT030) expressed concern that the closure of Rackheath Lane will result in increased journey distances for agricultural vehicles, making the farming of land either side of North Walsham Road untenable and potentially creating a rat run via Dow Lane. Suggestion was made that if a closure was needed it should be re-aligned as a private access or relocated east of the cottages on Rackheath Lane.
<p>Regard Given to Response: Whilst the comments are noted, the reasons for the closure are primarily to improve highway safety at the junction. Closure of Rackheath Lane will simplify turning movements allowing drivers waiting at the Crostwick Lane arm to concentrate on the vehicle movements on the main road.</p> <p>Design Change: No</p>	
Issue	Consultation result
<u>Off-Line Proposals</u> Closure of Green Lane East/Broad Lane at its junction with Plumstead Road	1 response (IT005) expressed concern regarding the closure of Green Lane East/Broad Lane at Plumstead Road and that this will have a significant inconvenience to farming operations (with a suggestion that an agricultural access is needed to link with land to the west of the railway line). 1 response (IT018) was in favour of the closure.
<p>Regard Given to Response: Consultation proposals already included a private means of access from Plumstead Road to the land west of the railway line.</p> <p>Design Change: Yes –. See Design Change Ref: 10.2 in Appendix V to this report.</p>	
<u>Off-Line Proposals</u> Concern regarding other closures of	2 responses (IT012, IT013) expressed concern that the closure of Holly Lane will result in rat running on other roads.

local roads	
Regard Given to Response: This junction is closed for reasons of highway safety. Junctions are not permitted on slip roads. See Forecasting Report (Document Ref 5.6) for the traffic effects of the severance.	
Design Change: No	

Table 6/27: Section 42 Consultations – Those with Interest in Land Off-Line Proposal Responses

Issue	Consultation result
<p><u>Landscaping/Planting Issues</u> Effects of NDR on landscape and type of planting</p>	<p>10 responses (IT001, IT020, IT023, IT025, IT026, IT030, IT033, IT039, IT050, IT052) made comments regarding landscaping and planting issues, of which most generally requested additional landscaping to specific land interests. The areas around Beeston Park, Rackheath Park and The Springs were particular areas of concern.</p>
<p>Regard Given to Response: Extensive planting and landscaping is planned along the route of the NDR. Planting will comprise of native, locally present species of woodland, scrub and grassland habitats, hedgerows, and wetland areas. It will tie in with landscaping schemes of adjacent developments. Further planting and landscaping to screen the NDR and promote further diversification of biodiversity has been incorporated into the schemes landscaping proposals since the pre-application consultations.</p> <p>Design Change: Yes – additional landscaping has been added to the proposals, particularly in the area around Beeston Park, Rackheath Park and The Springs. See Design Change Refs: 8.5, 9.2 and 9.11 in Appendix V to this report.</p>	

Table 6/28: Section 42 Consultations – Those with Interest in Land Landscaping/Planting Issues Responses

Issue	Consultation result
<p><u>Emission/Noise Issues</u> Concern over noise/emissions</p>	<p>6 responses (IT020, IT030, IT033, IT035, IT050, IT052) commented on noise and emissions, which generally related to the effects on specific land interests and requested discussions to consider the best mitigation measures. Comments also included.</p> <ul style="list-style-type: none"> • requests for low noise surfacing; • the emissions generated by NDR would be inconsistent with national policy.
<p>Regard Given to Response: Assessments of Noise and Air Quality are contained in Volume 1 Chapter 4 and 11 of the Environmental Statement (Document Reference 6.1) and these comments have assisted in the assessment of noise and emissions.</p> <p>Exact specification of carriageway surfacing will be determined at the detailed design stage although a low noise surface is proposed.</p> <p>Design Change: No</p>	

Table 6/29: Section 42 Consultations – Those with Interest in Land Noise/Emission Issues Responses

Issue	Consultation result
<p><u>Specific Road Effects</u> Plumstead Road through Thorpe End and North Walsham Road/Beeston Lane Junction</p>	<p>1 response (IT035) expressed concern regarding the effects of the NDR on Plumstead Road through Thorpe End. This included comment that:</p> <ul style="list-style-type: none"> • the village is likely to experience increased noise and pollution impacts; • no accurate noise calculations were available during the consultations; • traffic increases will be experienced on Plumstead Road. <p>1 response (IT052) expressed concern regarding the safety of the North Walsham Road/Beeston Lane Junction, which included a suggestion that it should be re-aligned.</p>
<p>Regard Given to Response: Traffic modelling indicates that flows will reduce on Plumstead Road with an NDR. See Appendix I to the Traffic Forecasting Report (Document Reference 5.6) for forecast traffic flows.</p> <p>The registered planning application for development at North Sprowston and Old Catton by Beyond Green Developments Ltd includes proposals to re-align this junction.</p> <p>Design Change: No</p>	

Table 6/30: Section 42 Consultations – Those with Interest in Land Specific Road Effects Responses

Issue	Consultation result
<u>Land/Property Issues</u>	<p>34 responses made comments regarding the specific effect of the NDR on land interests. These included comments on:</p> <ul style="list-style-type: none"> • plot boundary and severance line treatments, such as fencing, hedgerow planting; • the locations of gates to individual plots; • the need for specific access to fields or amendments to proposed private means of access; • the proposed reinstatement of land to be handed back after the works; • the disruption to farming and loss of crop production as a result of the scheme.
<p>Regard Given to Response: The regard given to each issue is detailed in Appendix U of this report.</p> <p>Issues regarding fencing, hedgerow planting and gating will be considered as part of the detailed design and include discussions with land owners and tenants. Matters relating to the disruption to farming and loss of crop production will be addressed through compensation negotiations.</p> <p>Design Change: Yes – particular changes resulting from these comments are detailed in Appendix V to this report.</p>	

Table 6/31: Section 42 Consultations – Those with Interest in Land – Land/Property Issues Responses

6.6 Section 42 - Conclusions

6.6.1 Comments from those with an interest in land largely related to the impact of the scheme on specific land issues. The regard given to these is contained in Appendix U of this report and the applicant will continue on-going discussions regarding these issues.

6.6.2 The key issues relating to the proposals identified during the Section 42 consultations were as follows:

6.6.3 Need for NDR – There were a total of 24 responses commenting on the need for the NDR as follows:

- (a) 6 local authorities stated they had no objection to the proposals or had no comments to make. 3 local authorities expressed support for the proposals;
- (b) 5 prescribed consultees expressed support for the NDR, 6 questioned whether the NDR was needed;
- (c) 4 responses from those with an interest in land questioned the need for the NDR.

6.6.4 Alternatives to NDR – 2 responses suggested alternatives to the NDR as follows:

- (a) 2 prescribed consultees suggested that alternatives to the NDR, such as improving public transport, had not been tested.

6.6.5 Need A1067 to A47 link – 15 responses made comment on a link between the A1067 and A47 to the west of Norwich as follows:

- (a) 1 local authority wished the link be provided at the earliest opportunity;
- (b) 8 prescribed consultees commented that there should be a link between the A1067 and A47 to the west of Norwich, 1 commented on the potential feasibility study for such a link;
- (c) 5 responses from those with an interest in land commented that there should be a link between the A1067 and A47 to the west of Norwich.

- 6.6.6 Suggested alternative routes – 6 responses suggested alternative routes for the NDR as follows:
- (a) 3 prescribed consultees suggested the NDR should be closer to Norwich, forming an inner orbital route linking the proposed developments;
 - (b) 3 responses from those with an interest in land commented that the NDR should stop at the A140.
- 6.6.7 Dual carriageway between Fir Covert Road and Fakenham Road – 3 responses made comment on the dual carriageway section between Fir Covert Road and Fakenham Road as follows:
- (a) 2 prescribed consultees supported the dualling of the NDR at this location;
 - (b) 1 response from those with an interest in land supported the dualling of the NDR at this location.
- 6.6.8 Drainage proposals - 11 responses commented on the drainage proposals as follows:
- (a) 2 prescribed consultees made specific comment on the detail of the drainage proposals;
 - (b) 9 responses from those with an interest in land commented on the drainage proposals and how these affected specific land interests;
- 6.6.9 Postwick Hub Junction - 1 response commented on the Postwick Hub Junction as follows:
- (a) 1 prescribed consultee considered the junction was over complicated.
- 6.6.10 Fir Covert Road Roundabout – 11 responses commented on the Fir Covert Road Roundabout as follows:
- (a) 1 local authority supported the re-introduction of this roundabout;
 - (b) 2 prescribed consultees supported the re-introduction of this roundabout;
 - (c) 7 responses from those with an interest in land supported the re-introduction of this roundabout. 1 response did not support the roundabout and suggested that traffic be excluded from the southern half

of Fir Covert Road by constructing a three exit roundabout at this junction.

6.6.11 Middle Road Bridge – 4 responses regarding Middle Road Bridge were received as follows:

- (a) 4 responses from those with an interest in land were not in favour of the bridge because Middle Road would experience increased through traffic and is not suitable to accommodate this.

6.6.12 Plumstead Road and Norwich to Sheringham railway line bridge – 2 responses regarding this bridge were received as follows:

- (a) 1 prescribed consultee commented on the visual intrusion of the elevated NDR at this location and suggested that the NDR should pass underneath Plumstead Road and the Norwich to Sheringham railway line;
- (b) 1 response from those with an interest in land commented on the visual intrusion of the elevated NDR at this location and suggested that the NDR should pass underneath Plumstead Road and the Norwich to Sheringham railway line.

6.6.13 Drayton Lane link – 2 responses made comment on the Drayton Lane link as follows:

- (a) 2 responses from those with an interest in land expressed concern about the closure of Drayton Lane, south of its junction with Reepham Road and the resulting effect of diverting traffic via Hall Lane. Suggestions were made that a roundabout should be provided at the Reepham Road/Drayton Lane junction.

6.6.14 Number of roundabouts on NDR– 1 response regarding the number of roundabouts on the NDR was received as follows;

- (a) 1 prescribed consultee commented that the number of roundabouts will create slow moving traffic at busy periods.

6.6.15 Number of road closures – 4 responses regarding the number of road closures were received as follows:

- (a) 2 prescribed consultees commented that local roads should remain open;

- (b) 2 responses from those with an interest in land expressed concern regarding the closure of Holly Lane.

6.6.16 North Walsham Road/Crostwick Lane proposals – 2 responses commented on the proposals for this junction as follows:

- (a) 1 prescribed consultee supported the proposals for this junction;
- (b) 1 response from those with an interest in land expressed concern that the closure of Rackheath Lane would result in increased journey distances for agricultural vehicles and make farming certain fields unviable.

6.6.17 Closure of Green Lane East/Broad Lane – 3 responses regarding this closure were received as follows:

- (a) 1 prescribed consultee did not support the closure as it would cut the parish off from other parishes;
- (b) 1 response from those with an interest in land supported this closure, 1 expressed concern that it would have a significant inconvenience to farming operation.

6.6.18 NDR represents a barrier to NMUs – 3 responses commented on the effects of the NDR on NMUs as follows:

- (a) 1 local authority commented that the potential severance effects of the NDR on NMUs needed to be mitigated;
- (b) 2 prescribed consultees expressed concern at the crossing between Bullock Hill and Petans, and at the NDR roundabouts.

6.6.19 NDR will affect the landscape – 13 responses made comment on the landscaping proposals as follows:

- (a) 2 local authorities requested that the landscaping be strengthened;
- (b) 1 prescribed consultee made comment on the impact of the NDR on the landscape;
- (c) 10 responses from those with an interest in land commented on landscaping and planting, which generally related to requests for more protection for specific land interests.

6.6.20 NDR will affect wildlife – 2 responses made comment on the effects to wildlife of the proposals as follows:

- (a) 2 prescribed consultees identified the areas of Rackheath Park and The Springs as particular areas of concern.

6.6.21 Concern about noise and emissions - 10 responses made comment on the noise and emission effects of the NDR as follows:

- (a) 4 prescribed consultees commented on noise/emission issues, including the effect to villages and the overall CO2 emissions generated by the road;
- (b) 6 responses from those with an interest in land commented on noise and emissions, which generally related to the effects on specific land interests.

6.6.22 NDR will affect specific routes – 7 responses commented on the effects of the NDR on specific routes as follows:

- (a) 1 local authority requested adequate mitigation on routes connecting the A1067 and A47 to the west of Norwich;
- (b) 4 prescribed consultees commented on the effects to specific roads, including Plumstead Road, the A1151 Wroxham Road, the B1140 through Salhouse and routes connecting the A1067 and A47 to the west of Norwich;
- (c) 1 response from those with an interest in land expressed concern regarding the effects on Plumstead Road through Thorpe End. 1 response expressed concern regarding the safety of the North Walsham Road/Beeston Lane Junction.

6.6.23 Land Property Issues - 36 responses made comment on land/property issues as follows:

- (a) 1 prescribed consultee commented on the loss of airport land, 1 commented on the loss of agricultural land;
- (b) 34 responses from those with interest in land made comments relating to specific land interests.

6.7 Section 42 - Refinements Made to Proposals

- 6.7.1 In addition to the Section 42 consultations, discussions with landowners, occupiers and their agents have been on-going before and the during the Section 42 consultations. These discussions have resulted in changes to the proposals not necessarily documented in the formal Section 42 consultation response from consultees.
- 6.7.2 The changes resulting from the Section 42 consultations, together with those from ongoing discussion with land owners/tenants, are detailed in Appendix V to this report. Locations of these can be seen on the General Arrangement Drawing Sheets 1 to 12, Drawing No's R1C093-R1-5015 to 5026 (Application Document No 2.6). The refinements to the scheme as a result of the formal Section 42 consultations are also summarised the following table.

Change Ref	Chainage	General Arrangement Sheet No.	Location	Change	Reason for change
3.2	2400 to 2910	No 3	Private means of access between Breck Farm Lane and Reepham Road Roundabout – south side of NDR.	Width of private means of access widened to 4m with 2m verges either side.	As a result of consultations. See Response Ref IT020 in Appendix U of this report.
6.6	8000	No 6	South side of NDR.	Additional grassland creation.	To prevent issues arising from bird and wildlife management concerns. As a result of consultations. See Response Ref PC017 in Appendix T of this report.
8.3	12100	No 8	North east of North Walsham Road Roundabout.	Width of private means of access widened to 4m with 2m verges either side.	As a result of consultations. See Response Ref IT020 in Appendix U of this report.
8.5	12500 to 13700	No 8	South side of NDR	Additional landscaping and woodland creation added.	As a result of Section 47 consultations. Also see: <ul style="list-style-type: none"> • Response Ref LA005 and LA009 in Appendix T of this report; • Response Ref IT001 in Appendix U of this report.

9.2	13800 to 14200	No 9	North of NDR - bunding south of The Springs Lake	New woodland added instead of grass planting.	As a result of Section 47 consultations. Also see: <ul style="list-style-type: none"> Response Ref LA005 and LA009 in Appendix T of this report; Response Ref IT023 and IT030 in Appendix U of this report.
9.9	14240	No 9	Wroxham Road Roundabout – between western and southern arms.	Field access provided from Wroxham Road Roundabout rather than Wroxham Road.	To provide access to land. As a result of consultations see Response Ref IT042 in Appendix U of this report.
9.11	13450	No 9	North east side of NDR around Lagoon 17.	Additional landscaping and woodland creation added to area of top soiling.	As a result of consultations see Response Ref IT023 in Appendix U of this report.
10.2	17000 to 16750	No 10	Private means of access from Plumstead Road – to west of NDR.	Width of private means of access widened to 4m with 2m verges either side.	As a result of consultations see Response Ref IT005 in Appendix U of this report.
12.5	19200	No 12	Lagoon 25 – east side of NDR.	Lagoon moved from west side of the NDR to the east side.	As a result of consultation. See Response Ref IT019 and IT044 in Appendix U of this report.

12.9	Off Line	No 12	Broadland Gate Roundabout.	New field access added from roundabout.	As a result of consultations. See Response Ref IT019 in Appendix U of this report.
12.11	20050	No 12	East of Postwick North East Roundabout.	New field access added from private means of access.	Access omitted from consultation now added. As a result of consultations. See Response Ref IT019 and IT044 in Appendix U of this report.

Table 6/32: Summary of Refinements to Proposals as a Result of Section 42 Consultations

7 Further Consultations

7.1 Further Consultations - Introduction

- 7.1.1 Further consultation was undertaken regarding the design changes summarised in Appendix V of this report. These changes were considered minor in nature and would only affect the immediate surrounding area. As a result a small scale consultation with landowners and directly affected persons was undertaken.
- 7.1.2 Consultation letters (128 letters) were sent out between 11 October and 17 October. Appendix W-1 of this report contains copies of the consultation letter and lists of the consultees. It also includes details of the dates these were delivered/received by the consultees and deadline provided for their response.

7.2 Further Consultations – Summary of Responses

- 7.2.1 Details of the responses received to the further consultations are contained in Appendix W-2 of this report. The key responses relating to the design changes are as follows.

Issue	Consultation result
Design Change 2.8	2 responses (DC002, DC002A) objected to the new access proposed to a parcel of land that previously had no access because of increased security concerns, usage/maintenance of the access and the area of land is small and could be used for landscaping.
<p>Regard Given to Response: The applicant had not previously provided an access because it had assumed its purchase by a neighbouring landowner. Once it was noticed that the land had no access it considered it appropriate to provide one. Negotiations with the landowner over post scheme ownership of land and maintenance responsibility will continue as part of detailed design and compensation discussions.</p> <p>Boundary fencing to mitigate security risks will be considered as part of the detailed design and will include discussions with land owners.</p> <p>Further Design Change: No</p>	
Design Change 2.9	1 response (DC009) objected to the reinstatement of the Fir Covert Road Roundabout and the proposed relocation of the equestrian crossing further from the junction. Commented that Fir Covert Road was already very busy, exiting their premises is very difficult and the provision of the roundabout will make this situation worse.
<p>Regard Given to Response: There has been extensive consideration regarding the provision of the roundabout at the Fir Covert Road junction with the NDR. After the April/May/June 2012 consultations the roundabout was relocated to the junction with Fakenham Road. The February/March 2013 consultations identified support for the roundabout at the Fakenham Road/NDR junction. However, it also identified concerns regarding the closure of Fir Covert Road, particularly by businesses here. Having given regard to these concerns, the NDR proposal was further amended so that it included an additional roundabout at the NDR junction with Fir Covert Road. This was in addition to the roundabout at the Fakenham Road/NDR junction.</p> <p>The applicant considers the provision of a 4 arm roundabout here as the most appropriate solution, particularly as traffic flow on Fir</p>	

<p>Covert Road is predicted to be similar or lower with the NDR. See Appendix I to the Traffic Forecasting Report (Document Reference 5.6) for forecast traffic flows.</p> <p>Further Design Change: No</p>	
<p>Design Change Ref: 4.11</p>	<p>1 response (DC008) objected to the proposal for temporary widening of a 200m length of the existing highway on the north side of the Holt Road/ Drayton Lane Roundabout due to the effects on mature trees and the privacy/security of Horsford Hall.</p>
<p>Regard Given to Response: Having considered this consultation response with the applicant's contractor, it was determined that a tie-in could be completed by alternative means.</p> <p>Further Design Change: Yes - See design Change Ref: 4.12 in Appendix V to this report.</p>	
<p>Design Change Ref 5.4</p>	<p>1 response (DC005) objected the creation of the new drainage Lagoon (8A) to the west of the Cromer Road Junction and noted that this would result in the removal the farm's slurry pit, which is part of operations of a working farm.</p>
<p>Regard Given to Response: Lagoon 8A was positioned in the natural low spot to minimise the flood risk. Other options were explored, but proved not feasible due to topography of the site.</p> <p>Further Design Change: No</p>	
<p>Design Change Ref 6.6</p>	<p>1 response (DC006) objected to the use of land to create an additional grassland area and considered that this was an underhand way of obtaining industrial land for an agricultural price.</p>
<p>Regard Given to Response: The additional area of grassland creation has been incorporated into the proposals to prevent issues arising from bird strike hazards associated with Norwich Airport.</p> <p>Further Design Change: No</p>	

Design Change Ref 7.1	2 responses (DC001, DC004) expressed concern regarding the provision of a bridleway in front of the properties on Buxton Road.
<p>Regard Given to Response: Further details of the proposed bridleway will be considered as part of detailed design and will include discussions with land owner.</p> <p>Further Design Change: No</p>	
Design Change 9.9	1 response (DC003) suggested that the new field access off Wroxham Road Roundabout could be continued southwards to provide an alternative access to a property.
<p>Regard Given to Response: The property already has an access from Wroxham Road. However, this suggestion will be considered as part of detailed design and will include discussions with land owners.</p> <p>Further Design Change: No</p>	
Design Change 12.5 and 12.8	1 response (DC007) objected to the relocation of Lagoon 25 and the temporary top soil storage area to the east side of the NDR because of the effects to a nearby property. An alternative location further south was suggested. 1 response expressed support for the relocation of Lagoon 25 and the temporary top soil storage area.
<p>Regard Given to Response: The lagoon was relocated following discussions with the directly affected landowner, who owns the fields on either side of the NDR. The suggested location south of the Business Park Roundabout between the NDR and the Postwick Footpath No 2 cannot be utilised due to its distance from the proposed drainage system outfall.</p> <p>Further Design Change: No</p>	

Table 7/1: Design Change Consultation Responses

7.3 Further Consultations – Conclusions

7.3.1 Whilst 34 responses were received to the design change consultations, the majority of these re-iterated the comments made during the previous consultations. 11 responses, as summarised above made comment on the proposed design changes.

7.4 Further Consultations – Refinements Made to Proposals

7.4.1 One additional change resulting from the further consultations is detailed in Appendix V to this report. The location of this can be seen on the General Arrangement Drawing Sheets 1 to 12, Drawing No's R1C093-R1-5015 to 5026 (Application Document No 2.6). It is also summarised below.

Change Ref	Chainage	General Arrangement Sheet No.	Location	Change	Reason for change
4.12	Off Line	No 4	North east of Holt Road/Drayton Lane Roundabout.	Removal of area designed for temporary traffic management, which removes need to effect mature trees and stable block.	Contractor advice that tie-in could be completely by alternative means. As a result design change consultations – see Ref: DC008.

Table 7/2: Summary of Refinements to Proposals as a Result of Further Consultations

8 Conclusion and Summary

8.1 Introduction

- 8.1.1 This consultation report has outlined the non statutory and statutory consultations undertaken on the NDR proposals since 2003.
- 8.1.2 The Planning Act 2008 requires consultation on a scheme proposal before the submission of the application for a Development Consent Order, and these consultations have been undertaken in accordance with Section 42, Section 47 and Section 48 of the Planning Act 2008.
- 8.1.3 The preferred scheme presented for application has been developed by taking into account the feedback from all these consultations.
- 8.1.4 Section 2.7 of this report provides a summary of the compliance to the legislative requirements.

8.2 Conclusion from Section 47 Consultations

- 8.2.1 Section 47 of the Planning Act 2008 outlines the requirements for consultation with the local community and the following sections detail how these requirements have been fulfilled:
- (a) Section 4.2 of this report details how the applicant produced the SOCC, following consultations with local authorities and having given regard to their comments;
 - (b) Section 4.4. of this report details the rationale for developing the SOCC;
 - (c) Section 4.5 and 4.6 of this report details how the consultations the applicant undertook have complied with the SOCC.
- 8.2.2 The applicant received a total of 1492 responses to this consultation and regard has been given to these when considering whether to make the DCO application in the same form as it was consulted upon or whether to make refinements to the scheme.

8.3 Conclusion from Section 48 Consultations

8.3.1 Section 4.9 of this report outlines how the applicant fulfilled the requirements for consultation under Section 48 of the Planning Act 2008.

8.3.2 With both the Section 47 and Section 48 consultations being undertaken at the same time it has not been possible to distinguish between responses from the two different consultations. Therefore responses received from the Section 48 consultation have been addressed together with those received from the Section 47 consultation.

8.4 Conclusion from Section 42 Consultations

8.4.1 Section 42 of the Planning Act 2008 outlines the requirements to consult:

- (a) local authorities, which were identified in accordance with Section 43 of the Planning Act 2008;
- (b) prescribed consultees, which were identified in accordance with Schedule 1 of the Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009;
- (c) those with interest in land, which were identified in accordance with Section 44 of the Planning Act 2008.

8.4.2 Section 4.12 and 4.13 of this report details how the applicant has fulfilled the Section 42 requirements.

8.4.3 The applicant received a total of 103 responses to this consultation and regard has been given to these when considering whether to make the DCO application in the same form as it was consulted upon or whether to make refinements to the scheme.

8.5 Summary of Key Issues

8.5.1 The applicant, having given regard to the responses received from consultations under Section 47, Section 48 and Section 42 of the Planning Act 2008, has identified the key issues associated with the proposals.

8.5.2 The table below summaries the key issues, the number of comments received regarding those issues and the tables in this report where a greater explanation of them can be found.

Key Issue	Section 47 and 48	Section 42 Local Authorities	Section 42 Prescribed Consultees	Section 42 Those with Interest in land
Need for NDR (including development associated with NDR)	801 comments (Table 5/4)	9 responses (Table 6/2)	11 responses (Table 6/10)	4 responses (Table 6/24)
Suggested alternatives to the NDR	25 comments (Table 5/5)		2 responses (Table 6/11)	
Link between the A1067 and A47	366 comments (Table 5/6)	1 response (Table 6/3)	9 responses (Table 6/12)	5 responses (Table 6/25)
Alternative routes for the NDR	28 comments (Table 5/6)		3 responses (Table 6/12)	3 responses (Table 6/25)
Dual carriageway between Fir Covert Road and Fakenham Road	57 comments (Table 5/7)		2 responses (Table 6/13)	1 response (Table 6/26)
Drainage proposals			2 responses (Table 6/13)	9 responses (Table 6/26)
Postwick Hub Junction	46 comments (Table 5/7)		1 response (Table 6/13)	
Fir Covert Road Roundabout	22 comments (Table 5/7)	1 response (Table 6/4)	2 responses (Table 6/13)	8 responses (Table 6/26)
Holt Road Closure at A140 Cromer	14 comments (Table 5/7)			

Road Junction				
Middle Road Bridge	48 comments (Table 5/7)			4 responses (Table 6/26)
Plumstead Road and the Norwich to Sheringham Railway Line Bridge			1 response (Table 6/13)	1 response (Table 6/26)
Number of roundabouts on NDR	35 comments (Table 5/7)		1 response (Table 6/13)	
Drayton Lane link between NDR and Reepham Road (including Drayton lane Closure)	17 comments (Table 5/7)			2 responses (Table 6/26)
Number of roads closures	22 comments (Table 5/8)		2 responses (Table 6/14)	2 responses (Table 6/27)
North Walsham Road/Crostwick Lane proposals	32 comments (Table 5/8)		1 response (Table 6/14)	1 response (Table 6/27)
No closure of Church Street	20 comments (Table 5/8)			
Closure of Green Lane East/Broad Lane at its junction with Plumstead Road	19 comments (Table 5/8)		1 response (Table 6/14)	2 responses (Table 6/27)

Need more NMU facilities	33 comments (Table 5/9)			
The NDR represents a barrier to NMUs	22 comments (Table 5/9)	1 response (Table 6/5)	2 responses (Table 6/15)	
Effects of NDR on landscape and type of planting	196 comments (Table 5/10)	2 responses (Table 6/6)	1 response (Table 6/16)	10 responses (Table 6/28)
Effects of NDR on wildlife	17 comments (Table 5/11)		2 responses (Table 6/17)	
Effects of noise and emissions generate by the NDR	178 comments (Table 5/12)		4 responses (Table 6/18)	6 responses (Table 6/29)
Effects of NDR of specific routes	155 comments (Table 5/13)	1 response (Table 6/7)	4 responses (Table 6/19)	1 response (Table 6/30)
Loss of agricultural land and affects to property	36 comments (Table 5/14)		2 responses (Table 6/20)	34 responses (Table 6/31)

Table 8/1: Summary of Key Issues (note table references are for the tables shown in this report)

8.5.3 On completion of the statutory consultations, and having given regard to the responses received, the applicant made refinements to the scheme proposals. These refinements identified against the key issues in the table above are described in more detail in Appendix V of this report.

8.6 Further Consultations

- 8.6.1 These changes were considered minor in nature and would only affect the immediate surrounding area. As a result a small scale consultation with landowners and directly affected persons was undertaken.
- 8.6.2 11 responses made comment on the design changes, of which one resulted in a further change to the proposals.

8.7 Scheme Refinements and Conclusion

- 8.7.1 The applicant considers that it has fulfilled its requirements for consultation under the Planning Act 2008 and having given regard to the responses received has made changes to the scheme proposals that are outlined in Appendix V of this report. This appendix also details changes to the proposals that are not directly related to the proposals but are as a result of refinements to the scheme.
- 8.7.2 The applicant will continue consultation/discussions with prescribed consultees, affected land owners and the local community as the NDR scheme progresses.

Glossary

The Applicant	Norfolk County Council, as promoter of the NDR
DCO	Development Consent Order
DfT	Department for Transport
EIA	Environmental Impact Assessment
ES	Environmental Statement
GNDP	Greater Norwich Development Partnership
IRR	Inner Ring Road (for Norwich)
JCS	Joint Core Strategy
KSI	Killed or Seriously Injured (Accidents)
LEP	Local Enterprise Partnership
Marriotts Way	A long distance permissive path linking Taverham/Drayton area to the Norwich Inner Ring Road
MEP	Member of the European Parliament
MP	Member of Parliament
NATS	Norwich Area Transportation Strategy
NCC	Norfolk County Council
NDR	Norwich Northern Distributor Road
NMU	Non Motorised User
Norwich Cycle Network	A network of routes for cyclists developed as part of NATS
NSIP	Nationally Significant Infrastructure Project
Off-Line	Located away from the main corridor of the NDR
On-Line	Located on or adjacent to the main corridor of the NDR
ORR	Outer Ring Road (for Norwich)

PEIR	Preliminary Environmental Information Report
PINS	The Planning Inspectorate
PMA	Private Means of Access
SAC	Special Area of Conservation
SOCC	Statement of Community Consultation
SUDS	Sustainable Urban Drainage System
TR	Trunk Road
TRL	Transport Research Laboratory

The Norfolk County Council (Norwich Northern Distributor Road (A1067 to A47(T))) Order

5.1 Pre-application Consultation Report Appendix S to Z

Planning Act 2008

Infrastructure Planning

The Infrastructure Planning (Applications: Prescribed Forms and Procedure)
Regulations 2009

PINS Reference Number: TR010015

Document Reference: 5.1

Regulation Number: 5(2)(q)/Section 37 Planning Act 2008

Author: Norfolk County Council

Revision	Date	Description
0	8 January 2014	Revision for application

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Appendix S

Section 47 and 48 Consultations – Summary of Responses

Norwich Northern Distributor Road - Application for Development Consent Order - Document Reference: 5.1
 Summary of Section 47 and 48 Consultation Responses

Category of Response	Typical Comments	No of Comments	Regard Given to Response	Design Change
Comments Regarding the Need for the NDR				
<p><u>NDR is needed</u> Comments that the NDR is needed</p>	<p><u>General comment the NDR is needed</u> General comments that the NDR is needed</p>	104	<p>These responses have been considered by the applicant and regard has been given to them in putting together the need and alternatives case for the NDR, which is detailed in Volume 1 Chapter 3 of the Environmental Statement (Document Ref 6.1).</p>	No
	<p><u>NDR will ease congestion</u> Comments that the NDR is needed because it will ease traffic congestion</p>	30	<p>The NDR eases congestion and delay on the northern sections of the Norwich Outer Ring Road (ORR). It also provides relief to the radial routes into Norwich within the built up area. It reduces through and cross city traffic using the ring roads and city centre roads. It reduces traffic on inappropriate orbital urban and rural roads. It does this by providing additional orbital road capacity around Norwich.</p>	No
	<p><u>NDR will provide access for growth</u> Comments that the NDR will provide vital access for growth of business and Norfolk's economy</p>	20	<p>The NDR provides enhanced strategic access to existing businesses throughout the northern suburbs and to the new employment developments proposed at Broadland Business Park/Broadland Gate, Rackheath and Norwich</p>	No

Norwich Northern Distributor Road - Application for Development Consent Order - Document Reference: 5.1
 Summary of Section 47 and 48 Consultation Responses

Category of Response	Typical Comments	No of Comments	Regard Given to Response	Design Change
			International Airport. Together these sites will provide around 120 hectares of land for development.	
	<p><u>NDR will provide access to main road network</u> Comments that the NDR is needed because it will provide better access to the main road network</p>	11	At present trips from north and north east Norfolk have to travel through the built up area of Norwich to access the strategic road network and destinations beyond Norwich. The NDR will enable these trips, and trips from the north east growth area, to use a new purpose built route that circumvents the built up area of Norwich.	No
	<p><u>NDR will reduce journey times</u> Comments that the NDR is needed because it will reduce journey times/rat running</p>	3	Journey time savings on key routes across Norwich are set out in Sections 7.5 and 7.6 of the Traffic Forecasting Report (Document Ref 5.6).	No
	<p><u>NDR is an important part of NATS</u> Comments that the NDR is needed because it is an important part of NATS</p>	2	The NDR is a key element of NATS. The applicant has an implementation plan for NATS, developed following consultations in 2009, which outlines the programme of proposed measures.	No
	<p><u>Beneficial with NATS improvements made</u> Comments suggesting that the NDR will be beneficial if the other sustainable transport</p>	1	Comments noted.	No

Norwich Northern Distributor Road - Application for Development Consent Order - Document Reference: 5.1
 Summary of Section 47 and 48 Consultation Responses

Category of Response	Typical Comments	No of Comments	Regard Given to Response	Design Change
	improvements are made			
<u>The NDR is not needed</u> Comments that the NDR is not needed	<u>General comment the NDR is not needed</u> General comments that the NDR is not needed	122	These responses have been considered by the applicant and regard has been given to them in putting together the need and alternatives case for the NDR, which is detailed in Volume 1 Chapter 3 of the Environmental Statement (Document Ref 6.1).	No
	<u>Money could be spent elsewhere</u> Comments that the money for the NDR should be spent elsewhere. Examples given were: <ul style="list-style-type: none"> • the A47 single carriageway sections • the Long Stratton bypass • the Norwich Outer Ring Road • the existing road network • public transport • sustainable transport measures • on other local authority services • other infrastructure to support development 	223	These responses have been considered by the applicant and regard has been given to them in putting together the need and alternatives case for the NDR, which is detailed in Volume 1 Chapter 3 of the Environmental Statement (Document Ref 6.1).	No
	<u>NDR will increase congestion</u>	41	The NDR eases congestion and delay on the	No

Norwich Northern Distributor Road - Application for Development Consent Order - Document Reference: 5.1
 Summary of Section 47 and 48 Consultation Responses

Category of Response	Typical Comments	No of Comments	Regard Given to Response	Design Change
	Comments that the NDR will increase congestion		northern sections of the Norwich Outer Ring Road (ORR). It also provides relief to the radial routes into Norwich within the built up area. It reduces through and cross city traffic using the ring roads and city centre roads. It reduces traffic on inappropriate orbital urban and rural roads. It does this by providing additional orbital road capacity around Norwich.	
	<u>NDR will not achieve anything</u> Comments that the NDR will not achieve anything	27	These responses have been considered by the applicant and regard has been given to them in putting together the need and alternatives case for the NDR, which is detailed in Volume 1 Chapter 3 of the Environmental Statement (Document Ref 6.1).	No
	<u>NDR will increase car usage</u> Comments that the NDR will encourage more car usage/only benefits cars users	22	Analysis of the forecast traffic has indicated that the total number of trips made is expected to be largely unchanged as a result of the NDR. See the Traffic Forecasting Report (Document Ref 5.6) paragraph 6.5.3. The increase in vehicle trips is forecast to be around 0.2% with NDR.	No
	<u>There is no existing problem</u>	10	These responses have been considered by the applicant and regard has been given to them in	No

Norwich Northern Distributor Road - Application for Development Consent Order - Document Reference: 5.1
 Summary of Section 47 and 48 Consultation Responses

Category of Response	Typical Comments	No of Comments	Regard Given to Response	Design Change
	Comments that there is no existing problem		putting together the need and alternatives case for the NDR, which is detailed in Volume 1 Chapter 3 of the Environmental Statement (Document Ref 6.1).	
	<p><u>A47 is adequate</u></p> <p>Comments that the A47 is adequate</p>	6	The NDR is not proposed as a bypass around Norwich, the A47 Southern Bypass provides this function. Rather, a function of the NDR is to distribute traffic between radial routes around north Norwich providing better access to these routes as well as Norwich International Airport and proposed developments. The A47(T) does not meet the objectives of the NDR.	No
	<p><u>NDR will create rat runs</u></p> <p>Comments that the NDR will create rat runs</p>	6	A purpose of the NDR is to encourage vehicles away from inappropriate routes in the northern area of Norwich. The applicant's consultations have identified roads where concerns about roads becoming rat runs have been identified. The key routes identified are detailed later in this appendix.	No
	<p><u>NDR will increase accidents</u></p> <p>Comments that the NDR will increase</p>	2	An analysis of forecast accidents with the NDR has been carried out and is contained in the Economic Appraisal Report, Section 7	No

Norwich Northern Distributor Road - Application for Development Consent Order - Document Reference: 5.1
 Summary of Section 47 and 48 Consultation Responses

Category of Response	Typical Comments	No of Comments	Regard Given to Response	Design Change
	accidents		(Document Ref 5.7). In summary it shows that the NDR Scheme would reduce the numbers of accidents in the Norwich area.	
	<u>Cannot afford maintenance of NDR</u> Comments that the County Council cannot afford the maintenance cost of the NDR	1	The Local Highways Maintenance grant is calculated, for the A class road network, purely on length. Therefore the NDR, a future A class road, would attract extra funding through this formula.	No
<u>NDR will create associated development</u> Comments relating the NDR and development outlined in the Joint Core Strategy	<u>General comment not in favour of development</u> General comment against the development that has been associated with the NDR	77	The relationship between the NDR and planned growth in the Joint Core Strategy (JCS) is detailed in Volume 1 Chapters 2 and 3 of the Environmental Statement (Document Ref 6.1).	No
	<u>Insufficient infrastructure for development</u> Comments that there will be insufficient other infrastructure/employment opportunities to support development	37	Infrastructure capacity for growth, and the requirement and deliverability of enhanced infrastructure, has been tested through the development plan process, in this case the JCS for Broadland, Norwich and South Norfolk. Similarly the JCS is supported by a range of economic evidence demonstrating the job growth potential of the area. The Greater Norwich partners continue to work together to facilitate the timely delivery of infrastructure and	No

Norwich Northern Distributor Road - Application for Development Consent Order - Document Reference: 5.1
 Summary of Section 47 and 48 Consultation Responses

Category of Response	Typical Comments	No of Comments	Regard Given to Response	Design Change
	<p><u>NDR will only benefit developers</u> Comments that the NDR will only benefit developers</p>	36	<p>jobs. The NDR was developed to resolve existing problems of congestion and rat-running to the north and east of Norwich and to improve access to business, the strategic road network, Norwich International Airport and the wider area of North Norfolk. It has been a key element of NATS before the development of the JCS. However, the NDR would also provide supporting infrastructure for the housing growth identified in the JCS. Development serves people's needs for homes, jobs and services.</p>	No
	<p><u>Development will have adverse environmental impact</u> Comment that development will have an adverse effect on the environment</p>	10	<p>The JCS is supported by a wide range of environmental evidence including a sustainability appraisal (incorporating strategic environmental assessment). Where required, individual developments will be subject to further testing through environmental impact assessment as they come forward.</p>	No
	<p><u>Development should be elsewhere</u> Comments that mass development is more</p>	5	<p>The strategy for the scale and location of development is determined through the development plan process, in this case the JCS</p>	No

Norwich Northern Distributor Road - Application for Development Consent Order - Document Reference: 5.1
 Summary of Section 47 and 48 Consultation Responses

Category of Response	Typical Comments	No of Comments	Regard Given to Response	Design Change
	suitable elsewhere		for Broadland, Norwich and South Norfolk. The JCS is fully supported by evidence and has been the subject of statutory consultation and public examination by the independent Planning Inspectorate.	
	<p><u>NDR will urbanise villages</u></p> <p>Comments that the NDR will mean that nearby villages will become urbanised</p>	3	The strategy for the scale and location of development is determined through the development plan process, in this case the Joint Core Strategy for Broadland, Norwich and South Norfolk. Individual sites for growth are set out in more detailed local plan documents that are currently in production and have been subject to consultation. The JCS is supported by evidence and has been the subject of statutory consultation and public examination by the independent Planning Inspectorate. Individual applications for development in villages as elsewhere will be determined by the district councils in accordance with the plan unless there are material considerations that indicate otherwise.	No
	<u>NDR will not benefit city centre business</u>	1	One of the NDR's aims is to reduce the amount	No

Norwich Northern Distributor Road - Application for Development Consent Order - Document Reference: 5.1
 Summary of Section 47 and 48 Consultation Responses

Category of Response	Typical Comments	No of Comments	Regard Given to Response	Design Change
	<p>Comments suggesting that the NDR will not benefit businesses in the city centre</p>		<p>of cross city traffic using city centre roads. This enables both Norwich City Council and Norfolk County Council to continue to deliver sustainable transport measures and public realm improvements such as in Theatre Street and Westlegate which makes Norwich the attractive shopping destination it is.</p>	
	<p><u>Developments not dependant of NDR</u> Comments suggesting that the developments are not dependant on the NDR</p>	<p>1</p>	<p>The importance of the NDR in delivering the strategy for growth is set out in the JCS in particular Policy 9 and the “contingency” section (paragraphs 7.11 to 7.18) of the JCS. The implementation framework (Appendix 7) of the JCS identifies the NDR as Priority 1 infrastructure that is fundamental to the strategy or must happen to enable physical growth. The Transport Assessment for the NDR (Document Ref 5.5) demonstrates that without the NDR the planned growth would have unacceptable impacts on movements across a wide area of Norwich and the associated rural area.</p>	<p>No</p>

Norwich Northern Distributor Road - Application for Development Consent Order - Document Reference: 5.1
 Summary of Section 47 and 48 Consultation Responses

Category of Response	Typical Comments	No of Comments	Regard Given to Response	Design Change
Comments Regarding Alternatives to the NDR				
<u>Alternatives to NDR</u> Comments suggesting alternatives to the NDR.	<u>Invest in sustainable transport</u> Comments suggesting investment in sustainable transport measures such as public transport and walking/cycling	6	These responses have been considered by the applicant and regard has been given to them in putting together the need and alternatives case for the NDR, which is detailed in Volume 1 Chapter 3 of the Environmental Statement (Document Ref 6.1).	No
	<u>Improve A47/A17</u> Comments suggesting Improvements to the A47 (particularly single carriageway sections) and/or the A17	6	Norfolk County Council is responsible for all roads within Norfolk apart from the trunk roads (A47, A17, A11 and A12), which are the responsibility of government and improved/maintained on their behalf by the Highways Agency. Norfolk County Council has campaigned extensively for full dualling of the A11 and is pleased to see that this is now in the process of being completed. It is now turning its attention to the A47 to try to influence government to commit to improvements on this road.	No
	<u>Improve existing roads</u> Comments suggesting improvements to the	5	These responses have been considered by the applicant and regard has been given to them in putting together the need and alternatives case	No

Norwich Northern Distributor Road - Application for Development Consent Order - Document Reference: 5.1
 Summary of Section 47 and 48 Consultation Responses

Category of Response	Typical Comments	No of Comments	Regard Given to Response	Design Change
	existing roads (usually not specified)		for the NDR, which is detailed in Volume 1 Chapter 3 of the Environmental Statement (Document Ref 6.1).	
	<u>Introduce Norwich congestion charge</u> Comments suggesting the introduction of a congestion charge in Norwich	3	These responses have been considered by the applicant and regard has been given to them in putting together the need and alternatives case for the NDR, which is detailed in Volume 1 Chapter 3 of the Environmental Statement (Document Ref 6.1).	No
	<u>Improve Honingham to Lenwade route</u> Comments suggesting improvements to the existing route between A47 and A1067 in the area of Honingham to Lenwade	1	An existing route between the A1067 at Lenwade and the A47 near Honingham is being improved following public consultation in 2007. This was in response to existing issues regarding HGV through movements between the A47 and A1067.	No
	<u>Improve radial routes</u> Comments suggesting improvements to radial routes into and out of Norwich	1	These responses have been considered by the applicant and regard has been given to them in putting together the need and alternatives case for the NDR, which is detailed in Volume 1 Chapter 3 of the Environmental Statement (Document Ref 6.1).	No

Norwich Northern Distributor Road - Application for Development Consent Order - Document Reference: 5.1
 Summary of Section 47 and 48 Consultation Responses

Category of Response	Typical Comments	No of Comments	Regard Given to Response	Design Change
	<p><u>Improve Outer Ring Road</u> Comments suggesting improvements to the Norwich Outer Ring Road</p>	1	<p>These responses have been considered by the applicant and regard has been given to them in putting together the need and alternatives case for the NDR, which is detailed in Volume 1 Chapter 3 of the Environmental Statement (Document Ref 6.1).</p>	No
	<p><u>Invest in rail transport</u> Comments suggesting investment into rail transport as well as roads</p>	1	<p>These responses have been considered by the applicant and regard has been given to them in putting together the need and alternatives case for the NDR, which is detailed in Volume 1 Chapter 3 of the Environmental Statement (Document Ref 6.1).</p>	No
	<p><u>Alternative is needed</u> General comments stating that an alternative is needed</p>	1	<p>These responses have been considered by the applicant and regard has been given to them in putting together the need and alternatives case for the NDR, which is detailed in Volume 1 Chapter 3 of the Environmental Statement (Document Ref 6.1).</p>	No

Norwich Northern Distributor Road - Application for Development Consent Order - Document Reference: 5.1
 Summary of Section 47 and 48 Consultation Responses

Category of Response	Typical Comments	No of Comments	Regard Given to Response	Design Change
Comments on the Route of the NDR				
<p><u>Need A1067 to A47 link</u> Comments relating to the need for a link between the A1067 and the A47 to the west of Norwich</p>	<p><u>General comment on need for A1067 to A47 link</u> General comments that the link between the A1067 and the A47(w) is needed but not expressing a reason for this view</p>	205	<p>A road linking the A1067 and the A47(w) would have to cross the Wensum Valley, which is designated a Special Area of Conservation (SAC) under the European Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora - often referred to as the Habitats Directive. An assessment of options across the Wensum Valley concluded, in 2005, that significant impacts on the SAC would be likely, and there was doubt as to whether, under the terms of the Habitats Directive, it would be possible to design an acceptable scheme. This in turn raised the prospect that consent for a wider scheme including such a link might not be granted. On 19 September 2005, the applicant's Cabinet resolved to have no NDR link between the A47(w) and the A1067. It therefore did not form part of the adopted route.</p> <p>At its meeting of 16 September 2013 the meeting of the Norfolk County Council resolved to recommend to Cabinet that they submit an</p>	No

Norwich Northern Distributor Road - Application for Development Consent Order - Document Reference: 5.1
 Summary of Section 47 and 48 Consultation Responses

Category of Response	Typical Comments	No of Comments	Regard Given to Response	Design Change
			<p>application for a DCO in respect of the NDR as proposed (i.e. between the A47 at Postwick and the A1067 near Attlebridge) and to also commission a report on a feasibility study of providing a link across the Wensum Valley from the A1067 to the A47(w). Whilst at its meeting of 7 October 2013 the applicant's Cabinet resolved that a "scoping report on the feasibility of providing a link across the Wensum Valley from the A1067 – A47 be written once consultation work was completed", this study has not been carried out and there is therefore currently no proposal establishing the form any link between the A1067 and A47(w) would take, or indeed whether any such link is feasible. The Transport Assessment for the NDR (Document Ref 5.5.) shows that the NDR can provide substantial benefits without a further link between the A1067 and A47(w) and that the NDR will reduce daily traffic on existing routes between the A1067 and the A47(w) between Drayton/Taverham and Costessey. The feasibility and environmental acceptability of a</p>	

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Category of Response	Typical Comments	No of Comments	Regard Given to Response	Design Change
			link to the A47(w) have not been established and the previous assessment in 2005 discarded this option. Accordingly, it is the position of the applicant that the NDR can and should be considered on its own merits without such a link.	
	<p><u>Having no link will effect traffic on roads between Drayton/Taverham and Costessey</u> Comments raising concerns that having no link will this will increase traffic on the minor roads between Drayton/Taverham and Costessey</p>	88	See above comments regarding the A1067 to A47(w) link.	No
	<p><u>Having no link will reduce access to A47 west and A11</u> Comments expressing concern that no access to the A47(w) or A11 will be provided from the A140 to the north of Norwich</p>	18	See above comments regarding the A1067 to A47(w) link.	No
	<p><u>Link environmental issues can be overcome</u> Comments that the environmental issues associated with the Wensum Valley Special Area of Conservation could be overcome</p>	12	See above comments regarding the A1067 to A47(w) link.	No

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Category of Response	Typical Comments	No of Comments	Regard Given to Response	Design Change
	<p><u>Having no link will increase traffic on Fakenham Road</u> Comments expressing concern that without the link traffic will increase on Fakenham Road</p>	10	<p>Traffic is predicted to increase on Fakenham Road to the west of the termination of NDR, and some of this has switched from using the A47. See Section 7.1.5 of the Traffic Forecasting Report (Document Ref 5.6).</p>	No
	<p><u>Having no link will increase traffic in Hockering to Lenwade area</u> Comments expressing concern that without the link traffic will increase in the Hockering to Lenwade area, and that the existing route here is unsuitable</p>	7	<p>Traffic flows increase overall by 33% in 2017 and 42% in 2032 on the routes between the A1067 and the A47 in the Hockering and Lenwade area with an NDR, though traffic levels reduce on the link roads in the Taverham and Costessey area, refer to paragraphs 7.1.8 to 7.1.14 in the Traffic Forecasting Report (Document Ref 5.6). The demand for travel by HGV's in the Lenwade/Hockering area is acknowledged and a scheme is underway which improves a route to make it suitable for HGV's and this uses Wood Lane in the south.</p>	No
	<p><u>Having no link will increase traffic on the Outer Ring Road</u> Comments expressing concern that without</p>	6	<p>Despite not connecting to the A47 in the west, the NDR does reduce traffic on the Outer Ring Road. See Sections 7 of the Traffic Forecasting</p>	No

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	<p>the link traffic will not reduce on the Outer Ring Road</p>		<p>Report (Document Ref 5.6).</p>	
	<p><u>Having no link will increase traffic through Postwick Hub</u> Comments expressing concern that without the link traffic will increase through the Postwick Hub Junction</p>	<p>1</p>	<p>The Postwick Hub junction improvement has been designed to accommodate the traffic flows from the proposed NDR.</p>	<p>No</p>
	<p><u>Never consulted upon ¾ route</u> Comments that a route without the A1067 to A47(w) link was not consulted upon</p>	<p>1</p>	<p>All consultations on the NDR since 2005 showed the NDR being proposed between the A47 at Postwick and the A1067 near Attlebridge including the more recent consultations in April/May/June 2012 (described in Section 3.3) and in February/March 2013 (described in Section 3.4). During these consultations there was the opportunity to comment on the route. In addition there has been opportunity to comment on the routes as part of the statutory pre-application consultations.</p>	<p>No</p>
	<p><u>Improve routes between Taverham/Drayton/Costessey</u> Comments suggesting that without the link</p>	<p>1</p>	<p>Considering the three key routes between the A1067 at Taverham/Drayton and the A47 at Costessey, (i.e. Costessey Lane, Taverham Lane and Ringland Road) with an NDR traffic</p>	<p>No</p>

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	<p>routes between the A1067 at Taverham/Drayton and the A47 at Costessey would need to be improved</p>		<p>levels are predicted to decrease on these routes. Refer to paragraphs 7.1.8 to 7.1.14 in the Traffic Forecasting Report (Document Ref 5.6).</p>	
<p><u>Do not need A1067 to A47 link</u> Comments in favour of not providing a link between the A1067 and A47(w)</p>	<p><u>A1067 to A47 link would harm environment</u> Comments expressing concern regarding the adverse affect a new link road would have on the Wensum Valley</p>	<p>11</p>	<p>See above response regarding the environmental considerations associated with the River Wensum. An A1067 to A47(w) link is not being proposed as part of the scheme.</p>	<p>No</p>
<p><u>Suggested routes between A47 and A1067</u> Comments providing suggestions for alternative routes between the A1067 and</p>	<p><u>Between Attlebridge River Crossing and Honingham</u> Comments suggesting that a link should be provided from the A1067 west of Attlebridge river crossing through to the A47 at Honingham</p>	<p>2</p>	<p>This route formed one of the options consulted upon during the 2004 consultations on route options for the NDR between the A47 to the east of Norwich and the A47 to the west of Norwich. This route received low support with 33% of responses identifying it as their least favoured of the route options to the west of Norwich (the option with lowest support had 34% of responses identifying it as their least favoured</p>	<p>No</p>

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Category of Response	Typical Comments	No of Comments	Regard Given to Response	Design Change
A47(w)	<p><u>Between Attlebridge River Crossing and Hockering</u> Comments suggesting that a link should be provided from the A1067 west of Attlebridge river crossing through to the A47 at Hockering</p>	1	<p>option). It was generally not favoured because it was considered too far from the city.</p> <p>This is a similar route to the one described as “Between Attlebridge River Crossing and Honingham” above. See regard given to this response.</p>	No
	<p><u>West of Ringland to A47</u> Comments suggesting that a link should be provided from the A1067 to the A47(w) to Ringland</p>	1	<p>This route formed one of the options consulted upon during the 2004 consultations on route options for the NDR between the A47 to the east of Norwich and the A47 to the west of Norwich. A route west of Ringland would still require a crossing of the River Wensum SAC.</p>	No
	<p><u>Lenwade to A47</u> Comments suggesting that a link should be provided from the A1067 at Lenwade and the A47</p>	1	<p>During the 2003 and 2004 consultations on routes, the options between the A1067 and A47 between Attlebridge and Honingham were not favoured as they were considered to be too far from the city. This option is further west and would place the NDR even further from the city than the consultation options that were not favoured. Norfolk County Council has a programme of on-going improvements to a route</p>	No

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Category of Response	Typical Comments	No of Comments	Regard Given to Response	Design Change
			between the A1067 and A47 in this area, to address an existing issue of HGV through movements.	
	<u>Link to A47 at Wood Lane</u> Comments suggesting that a link should be provided from the A1067 to the A47 at Wood Lane.	1	This is a similar route to the one described as "Lenwade to A47" above. See regard given to this response.	No
<u>NDR is too close to villages</u> Comments relating to the proximity of the NDR to villages	<u>General comment the NDR is close to villages</u> General comments that the NDR is too close to villages, but not identifying specific villages	4	Between 2003 and 2005 the applicant undertook assessment work into a number of route options, including consultations in 2003 and 2004 (detailed in Section 3.2 of this report). As a result of this work the preferred route from the A1067 Fakenham Road at Attlebridge to the A47 at Postwick was adopted in September 2005.	No
	<u>NDR is too close to Thorpe Marriott</u> Comments that the NDR is too close to Thorpe Marriott and should be built more to the north	3	Routing the NDR further north would further impact Drayton Drewray Woodland and potentially impact the common land associated with this area.	No
	<u>NDR is too close to Rackheath</u>	2	Routing the NDR to the north and east of Rackheath places the road to far from the city	No

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	Comments that the NDR is too close to Rackheath and should be built more to the north and east		centre and closer to the south edge of Salhouse and the north edge of Rackheath. It would require a much longer length of raised embankment to cross the NDR over Plumstead Road and the Norwich to Sheringham railway line.	
	<u>NDR is too close to Thorpe End</u> Comments that the NDR is too close to Thorpe End and should be built more to the east	1	Routing the NDR further from Thorpe End would place it closer to Rackheath. Routing the NDR to the north and east of Rackheath places the road to far from the city centre and closer to the south edge of Salhouse and the north edge of Rackheath. It would require a much longer length of raised embankment to cross the NDR over Plumstead Road and the Norwich to Sheringham railway line.	No
	<u>NDR is too close to Spixworth</u> Comments that the NDR is too close to Spixworth	1	Routing the NDR southwards would result in Buxton Road Bridge further impacting residents of properties on the road.	No
<u>NDR is too close to specific areas</u>	<u>NDR passes through Drayton Drewray</u> Comments expressing concern that the NDR passes through an area of woodland known	3	The woodland lost at Drayton Drewray is of coniferous plantation and is not part of the common land, which lies further to the north and is a more interesting area with a higher	No

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<p>Comments relating to the proximity of the NDR to specific landscape areas and areas of interest</p>	<p>as Drayton Drewray</p>		<p>deciduous component interspersed with grassland and scrub areas. The impact is therefore considered to be only slightly adverse in landscape terms. However, a combined ecological and landscape mitigation area is proposed to link some of the existing woodland areas, which would comprise a mixture of woodland, scrub and grassland. Additional planting by agreement with adjacent landowners is also proposed to augment the roadside planting. This design theme continues through to the woodland at Drayton Drewray, where additional planting and mounding are provided as compensation for woodland lost and to strengthen the screen from Thorpe Marriot.</p>	

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Category of Response	Typical Comments	No of Comments	Regard Given to Response	Design Change
	<p><u>NDR passes through Buggs Grave</u> Comments expressing concern that the NDR passes through an area known as Buggs Grave</p>	1	<p>Investigations by the applicant's environmental consultants have identified that there is nothing on the Historic Environment Record and no details from journals or articles about archaeology at the Buggs Grave site. The name of the crossroads may indicate that someone was buried there, but there is no physical evidence of this to date. Any burials affected by the NDR will be picked up as part of the archaeological investigations/mitigation in the Environmental Statement (Document Ref 6.1).</p>	No
	<p><u>Don't touch Crostwick Common</u> Comments requesting that the NDR does not go through Crostwick Common</p>	1	<p>The proposed route of the NDR does not go through Crostwick Common.</p>	No
<p><u>NDR should stop at Cromer Road</u> Comments that the NDR should stop at</p>	<p><u>General comment the NDR should stop at A140</u> Comments suggesting that the NDR should stop at the A140 Cromer Road but not expressing a reason for this view.</p>	2	<p>The alternative of a dual carriageway NDR between the A47 at Postwick and the A140 Cromer Road is considered as Alternative No 2 in the needs and alternative case (Volume 1 Chapter 3 of the Environmental Statement (Document Ref 6.1)).</p>	No

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Category of Response	Typical Comments	No of Comments	Regard Given to Response	Design Change
Cromer Road	<p><u>Additional traffic between A140 and A1067 is not wanted</u></p> <p>Comments that the additional traffic between the A140 and A1067 is not wanted</p> <p><u>A140 to A1067 section not value for money</u></p> <p>Comments that this section is does not present value for money</p> <p><u>Stopping at A140 would reduce construction time and costs</u></p> <p>Comments that this would reduce the scheme cost and time for construction</p>	1	See above comments regarding the alternative of a dual carriageway NDR between the A47 at Postwick and the A140 Cromer Road.	No
	<p><u>Stop at A140 if no link to A47</u></p> <p>Comments that unless the link to the A47 west of Norwich is provided then the section between A140 and A1067 is not required</p>	1	See above comments regarding the alternative of a dual carriageway NDR between the A47 at Postwick and the A140 Cromer Road.	No
<u>NDR should stop at Reepham Road</u> Comments that the NDR	<p><u>Stopping at Reepham Road would avoid Marriotts Way</u></p> <p>Comments suggesting that the NDR should be stopped at Reepham Road in order to avoid the need to provide a bridge for</p>	1	This option is similar to the alternative of a dual carriageway NDR between the A47 at Postwick and the A140 Cromer Road, which is considered as Alternative No 2 in the needs and alternative case (Volume 1 Chapter 3 of the Environmental	No

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should stop at Reepham Road	Marriotts Way to pass over it		Statement (Document Ref 6.1)).	
NDR too close to <u>airport</u> Comments that the NDR is too close to	NDR will <u>constrain airport expansion</u> Comments expressing concern that the current route of the NDR will constrain future expansion of the airport	4	The route of the NDR has been taken round the north of the Airport so as to minimise any possible impact on both the operational Airport land and its current aeropark development proposals.	No
Norwich Airport	NDR will <u>affect airport radar</u> Comments expressing concern that the NDR will affect the airport radar and the applicant should not be paying for its upgrade	2	The current airport radar system was installed in 1991 and is a relatively old generation of radar but meets the current operational requirements of the airport. The airport would have had to replace the radar within 10 years from now even if the NDR was not built. The current radar has issues with separating out aircraft movements from other movements (including traffic). Currently it is located far enough away from traffic routes (e.g. A140) that these can be adequately distinguished. However the NDR is located close enough that it cannot safely filter out vehicle movements. Without this filtering, there is a risk to the radar operation that would in effect close the airport as aeroplanes	No

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			<p>would not be able to safely take off or land.</p> <p>Norwich International Airport are in the process of relocating (and upgrading) the radar system so that there are no NDR related issues. The cost of these works is being shared by the applicant (as mitigation due to the NDR impact) and Norwich International Airport (to reflect the bringing forward of the future planned replacement and it getting a new system).</p>	
<p><u>Suggested alternative routes</u> Comments suggesting alternative routes for the NDR</p>	<p><u>Route should be inner orbital link</u> Comments suggesting the provision of an inner orbital link road using routes linking proposed developments (mainly between Postwick and Norwich Airport)</p> <p><u>Route should be Pink Route</u> Comments suggesting that the route of the NDR should be the Pink Route identified in previous consultations</p>	<p>17</p> <p>3</p>	<p>The alternative of an inner orbital link road using routes through proposed development considered as Alternative No 5 in the need and alternatives case (Volume 1 Chapter 3 of the Environmental Statement (Document Ref 6.1)).</p> <p>The Pink Route is similar to an inner orbital route suggested above, which is considered as Alternative No 5 in the needs and alternative case (Volume 1 Chapter 3 of the Environmental Statement (Document Ref 6.1)).</p>	<p>No</p> <p>No</p>
	<p><u>Route should be closer to the city</u> Comments suggesting that the route of the</p>	<p>2</p>	<p>A route closer to the city is similar to an inner orbital route suggested above, which is</p>	<p>No</p>

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	NDR should be closer to Norwich		considered as Alternative No 5 in the needs and alternative case (Volume 1 Chapter 3 of the Environmental Statement (Document Ref 6.1)).	
	<u>Re-align route in area around airport</u> Comments suggesting an alternative route that takes a more sweeping arc north of the airport taking it over Quaker Lane instead of the northern end of St Faiths Road to a roundabout junction on the Buxton Road	1	Such a route places the NDR closer to Spixworth (i.e. between Quaker Lane and Atherton Road). It would also result in the embankments associated with the provision of the Buxton Road Bridge directly impacting on properties in Spixworth.	No
	<u>Route should be Green Route</u> Comments suggesting that the route of the NDR should be the Green Route identified in previous consultations, running close to the city and connecting to the Sprowston Park & Ride	1	The Green Route was one of route options considered during the 2003-2005 assessments consultations. Whilst crossing the River Wensum further east it still impacts on the SAC.	No
	<u>Re-align route to north of Spixworth</u> Comments that the route of the NDR should be to the north of Spixworth	1	Between 2003 and 2005 the applicant undertook extensive feasibility work including a Stage 1 Environmental Assessment on various route options in order to develop a manageable number of route alternatives for consultation in 2003 and 2004. A route north of Spixworth	No

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			<p>formed one of the options included in this assessment but not taken forward to the consultations as other options were deemed to have less environmental impact.</p>	
	<p><u>Re-align route to north of Horsford</u> Comments that the route of the NDR should be to the north of Horsford</p>	1	<p>A route north of Horsford would place the NDR approximately 7km from the Norwich Outer Ring Road and makes the connection to Norwich Airport less direct. It would also impact the Horsford Woods County Wildlife Site.</p>	No
	<p><u>Route should avoid Thorpe Woodlands</u> Comments suggesting that the route of the NDR should not cut through Thorpe Woodlands</p>	1	<p>The route of the NDR avoids Thorpe Woodlands, which are located to the west of Thorpe End.</p>	No
	<p><u>Route should go across airport</u> Comments suggesting that the route of the NDR should cut straight across the airport rather than being aligned around it</p>	1	<p>The proposed route passes around the airport boundary, because of the long term plans for the airport. This alignment has not changed since the preferred route was adopted by the applicant in 2005. Whilst the northeast runway is closed, the applicant understands that the long term plans for the area is for aviation related activities. These plans, which would involve moving aircraft into and out of this area, would</p>	No

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			be jeopardised by a route across the airport. This would inevitably lead to a substantial claim for compensation against the applicant.	

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Comments on On-Line Proposals to the NDR				
In favour of <u>dual carriageway section</u> Comments in favour of a dual carriageway section of the NDR between Fir Covert Road and Fakenham Road	<u>General comment in favour of dual carriageway</u> General comments in favour of a dual carriageway section but not expressing a reason for this view <u>Dual carriageway will be needed in future</u> Comments suggesting that sometime in the future a dual carriageway section will be needed anyway <u>Dual carriageway will reduce accidents</u> Comments that a dual carriageway section reduces the likelihood of accidents <u>Better if NDR joins the A47 in the future</u> Comments that in the future this will provide for a better link should the NDR ever extend through to the A47 to the west of Norwich <u>Otherwise there will be bottlenecks</u> Comments that without a dual carriageway	27 8 3 3 3	Comments noted. Comments noted. Comments noted. Comments noted. Comments noted.	No No No No No

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	section there will be bottlenecks and congestion			
	<u>Otherwise there will be rat running</u> Comments that a dual carriageway will reduce the likelihood of rat running on other routes	3	Comments noted.	No
	<u>Dual carriageway will remove traffic from Fakenham Road</u> Comments that a dual carriageway will remove traffic from Fakenham Road	1	Comments noted.	No
	<u>Dual carriageway better in the long term</u> Comments that a dual carriageway has longer term benefits	1	Comments noted.	No
<u>In favour of single carriageway section</u> Comments in favour of a single	<u>General comments in favour of single carriageway</u> General comments in favour of a single carriageway section but not expressing a reason for this view	5	Comments noted.	No
	<u>Already links to a single carriageway</u>	1	This alternative is considered as Alternative No 4 in Volume 1 Chapter 3 of the Environmental	No

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<p>carriageway section of the NDR between Fir Covert Road and Fakenham Road</p>	<p>Comments in favour of single carriageway because the NDR will link to a single carriageway when it meets the A1067</p> <p><u>Single carriageway less cost and less environmental impact</u></p> <p>Comments that a single carriageway is more cost effective and has less environmental impacts</p>	<p>1</p>	<p>Statement (Document Ref 6.1).</p> <p>See Alternative No 4 in Volume 1 Chapter 3 of the Environmental Statement (Document Ref 6.1).I</p>	<p>No</p>
<p><u>Unclear Opinion on dual carriageway</u> Comments where it is not clear whether a dual or single carriageway section between Fir Covert Road and Fakenham Road is favoured</p>	<p><u>Otherwise there will be bottlenecks at the A1067 junction</u></p> <p>Comments that a dual carriageway section will just cause a bottleneck at its junction with the A1067</p>	<p>1</p>	<p>See Alternative No 4 in Volume 1 Chapter 3 of the Environmental Statement (Document Ref 6.1).</p>	<p>No</p>
<p><u>Unclear Opinion on dual carriageway</u> Comments where it is not clear whether a dual or single carriageway section between Fir Covert Road and Fakenham Road is favoured</p>	<p><u>Unclear opinion on dual carriageway</u></p> <p>Comments where it is not clear whether a dual or single carriageway section between Fir Covert Road and Fakenham Road is favoured</p>	<p>2</p>	<p>Comments noted.</p>	<p>No</p>

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<p>section between Fir Covert Road and Fakenham Road is favoured</p>				
<p><u>Comments on Postwick Hub</u> Comments on the Postwick Hub Junction</p>	<p><u>Postwick Hub Junction overcomplicated</u> Comments suggesting that the Postwick Hub Junction is over complicated</p>	<p>13</p>	<p>During design development a number of significant engineering constraints influenced the scheme design. These include the River Yare/Railway Bridge, the existing Postwick Bridge, a high pressure gas main and the nearby property settlements at Heath Farm and Postwick village.</p> <p>Given the constraints at the site and having assessed a number of options the proposed design is considered the most practicable solution to address the capacity issues and accommodate the committed development at Broadland Gate Business Park.</p>	<p>No</p>
	<p><u>Postwick Hub Junction will increase journey times</u> Comment suggesting that the Postwick Hub</p>	<p>7</p>	<p>In designing the proposed junction layout every effort has been made to avoid or minimise the impact on existing users of the junction, however</p>	<p>No</p>

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	Junction will increase journey times and the distance travelled through the junction		it is acknowledged that some movements through the junction will be longer. The new layout will cater for all movements and all local roads will remain open.	
	<p><u>General concern about Postwick Hub Junction</u></p> <p>General comments expressing concern regarding the Postwick Hub Junction</p>	3	Comments noted.	No
	<p><u>Postwick Hub Junction will be avoided</u></p> <p>Comments suggesting that the Postwick Hub Junction will cause problems and drivers will avoid it</p>	3	In designing the proposed junction layout every effort has been made to avoid or minimise the impact on existing users of the junction, however it is acknowledged that some movements through the junction will be longer.	No
	<p><u>Postwick Hub junction will not reduce queuing</u></p> <p>Comments suggesting that the Postwick Hub Junction will not reduce queuing</p>	2	The junction has been designed for the predicted traffic levels. See Chapter 8 of the Transport Assessment (Document Ref 5.5).	No
	<p><u>Postwick Hub Junction will impact residents</u></p> <p>Comments expressing concern that the Postwick Hub Junction will impact on the</p>	1	Whilst it is acknowledged that some movements through the junction will be longer the new road layout will mean that all local roads will remain open.	No

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	quality of life of local residents			
<p><u>Suggested changes to Postwick Hub Junction</u></p> <p>Comments suggesting changes to the format of the Postwick Hub Junction</p>	<p><u>Keep eastbound diverge slip road open</u></p> <p>Comments suggesting the existing eastbound diverge slip road should be kept open</p>	9	<p>Given the site constraints and having assessed a number of options it was concluded that if the existing capacity problems are to be addressed and the committed development at Broadland Gate Business Park is to be accommodated then removal of the existing eastbound diverge slip road and the provision of a new diverge slip road running parallel with the existing A47, is the only feasible solution.</p>	No
	<p><u>Keep both eastbound slip roads open</u></p> <p>Comments suggesting the existing eastbound diverge and eastbound merge slip roads should be kept open</p>	4	<p>Due to the configuration requirements to accommodate a new eastbound diverge slip road, a new separate Postwick bridge crossing the A47 is required to provide a connection between the Postwick North East roundabout and the Park and Ride junction. This in turn results in a new east bound merge slip road being required.</p>	No
	<p><u>Do not expand park and ride</u></p> <p>Comments suggesting that the Postwick Park and Ride site should not be expanded</p>	1	<p>The park and ride expansion was the subject of a separate and independent planning application, which was granted permission in 2010. The transport analysis for the proposals</p>	No

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			to upgrade the junction allows for the expansion of the park and ride facilities to ensure that the junction could accommodate this.	
	<p><u>Separate path for New Postwick Bridge</u> Comments suggesting that the shared use cycle track on New Postwick Bridge needs to be segregated from the carriageway</p>	1	The proposals provide for a shared use footway/cycleway on the south east side of New Postwick Bridge. This would be separate from the main carriageway.	No
	<p><u>Request for flyover instead of roundabout/signalled junction</u></p>	1	The Postwick Hub junction does provide for a grade separated junction, with bridges over the A47.	No
	<p><u>Suggest Option 4</u> Comments suggesting Option 4 as an alternative</p>	1	Alternative Route No 4 was suggested during the Public Inquiry for the Slip and Side Road Orders for the stand alone Postwick Hub Scheme. It proposed to maintain the existing junction layout with: <ul style="list-style-type: none"> • the closure of existing westbound A47 merge slip road, • provision of a new westbound merge slip road from the A1042 Yarmouth Road (West) on the eastern approach to the Oaks Lane junction initially in an eastbound direction but then passing through 180 degrees before joining the main A47 westbound, 	No

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			<ul style="list-style-type: none"> • modification to the existing bridge to provide one northbound lane and two southbound lanes over the A47 utilising the existing bridge deck, • provision of part time signalisation of Postwick North West roundabout. <p>It could not be considered a viable option due:</p> <ul style="list-style-type: none"> • to unacceptable risk on the safe operation of the A47 due to predicted queuing onto the mainline, • insufficient capacity at the Postwick P&R roundabout in the PM peak in 2020 and 2030 with significant predicted queuing, • it not enabling the Broadland Gate Business Park development to proceed, and the development benefits could not be realised. 	
<p><u>Not in favour of Fir Covert Road Roundabout</u> Comments suggesting that the Fir Covert Road</p>	<p><u>Roundabout will increase traffic between Drayton/Taverham and Costessey</u> Comments suggesting that a roundabout on Fir Covert Road will encourage rat running on the minor roads between the A1067 at Drayton/Taverham and the A47 at Costessey</p>	4	<p>With regard to rat running on the 3 routes crossing the River Wensum between the A1067 at Drayton/Taverham and the A47 at Costessey, the traffic modelling work the applicant has carried out indicates that over time traffic levels are likely to increase. However the traffic modelling shows that these flows are about the same or slightly less with the NDR in place</p>	No

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Roundabout with the NDR should be removed	<p><u>Already too many roundabouts</u> Comments suggesting that the NDR already has too many roundabouts</p>	2	<p>compared to the scenario without the NDR, that is to say, the NDR doesn't encourage additional trips between Taverham and Costessey on these routes. Refer to paragraphs 7.1.8 to 7.1.14 in the Traffic Forecasting Report (Document Ref 5.6).</p>	
			<p>There has been extensive consideration regarding the provision of the roundabout at the Fir Covert Road junction with the NDR. After the April/May/June 2012 consultations the roundabout was relocated to the junction with Fakenham Road. The February/March 2013 consultations identified support for the roundabout at the Fakenham Road/NDR junction. However, it also identified concerns regarding the closure of Fir Covert Road, particularly by businesses there. Having given regard to these concerns, the NDR proposal was further amended so that it included an additional roundabout at the NDR junction with Fir Covert Road. This was in addition to the roundabout at the Fakenham Road/NDR junction.</p>	No

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			The applicant considers the provision of a 4 arm roundabout here as the most appropriate solution, particularly as traffic flow on Fir Covert Road is predicted to be similar or lower with the NDR. See Appendix I to the Traffic Forecasting Report (Document Ref 5.6) for forecast traffic flows.	
	<p><u>Roundabout will be difficult to access</u></p> <p>Comments suggesting that a roundabout on Fir Covert Road will be difficult to access due to the volume of traffic on the NDR</p>	2	The junction has been designed for the predicted traffic levels. See Chapter 8 of the Transport Assessment (Document Ref 5.5).	No
	<p><u>Roundabout will increase traffic through Fakenham Road/Beech Avenue/Fir Covert Road junction</u></p> <p>Comments suggesting that a roundabout on Fir Covert Road will cause issues at the Fakenham Road/Beech Avenue/Fir Covert Road junction</p>	1	Traffic flows on Fir Covert Road are less in 2017, or similar in 2032, with an NDR compared to no NDR. Also, traffic flows on the A1067 will be much less with an NDR. See Appendix I to the Traffic Forecasting Report (Document Ref 5.6) for forecast traffic flows.	No
	<p><u>General comment not in favour of Fir Covert Road Roundabout</u></p> <p>General comment not in favour of the Fir</p>	1	Comments noted.	No

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	Covert Road Roundabout but not specifying a reason for this view			
In favour of <u>Fir Covert Road Roundabout</u> Comments in favour of retaining the Fir Covert Road Roundabout with the NDR	<u>General comment in favour of Fir Covert Road Roundabout</u> General comment in favour of the Fir Covert Road Roundabout but not specifying a reason for this view	9	Comments noted.	No
	<u>Fir Covert Road Roundabout will be beneficial to businesses</u> Comments suggesting that having a roundabout is beneficial to businesses on Fir Covert Road	2	Comments noted.	No
	<u>Fir Covert Road Roundabout will be beneficial to Thorpe Marriott</u> Comments suggesting that having a roundabout here is beneficial to residents of Thorpe Marriott by reducing traffic here	1	A roundabout at Fir Covert Road on the NDR provides better connectivity within the highway network which will reduce the propensity for longer distance trips to use Thorpe Marriott as a cut through. Traffic modelling shows that traffic on Pendlesham Rise decreases with an NDR. See Appendix I to the Traffic Forecasting Report (Document Ref 5.6) for forecast traffic flows.	No

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<u>Suggested changes of Fir Covert Road Roundabout</u>	<u>Bridge instead of Fir Covert Roundabout</u> Comments suggesting that Fir Covert Road should be bridged over the NDR and not have direct access to it	1	This option was considered and rejected due to higher cost and maintenance. The bridge was also rejected as it would not provide interconnectivity between Fir Covert Road and the NDR.	No
<u>Comments on Buxton Road Bridge</u> Comments on Buxton Road Bridge	<u>Need access to Buxton Road from NDR</u> Comment suggesting that access should be provided to/from Buxton Road and the NDR by providing slip roads at the bridge	4	Whilst one of the purposes of the NDR is to provide maximum connectivity between routes to distribute traffic movements, Buxton Road is not considered one of the main radial routes into and out of the city – the adjacent B1150 North Walsham Road performs this function. Therefore no connection to the NDR is proposed.	No
	<u>Buxton Road Bridge will split community</u> Comments suggesting that the NDR bridge will segregate the properties on Buxton Road south of the NDR from the rest of Spixworth	1	The applicant has provided a bridge at Buxton Road in order to maintain local connectivity between the main village of Spixworth and properties to the south of the NDR. This bridge includes shared use footway/cycleway facilities to maintain connectivity with the existing facilities on Buxton Road.	No
	<u>General comments not in favour of Buxton Road Bridge</u> General comments not in favour of Buxton	1	Comments noted.	No

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	Road Bridge but not expressing a reason for this view			
<u>Comments on the proposed drainage</u> Comments on the proposed drainage provision	<u>Drainage provision needs to be adequate</u> Comments suggesting that the drainage provision needs to be adequate to accommodate future increased rainfall.	1	The NDR is proposed to be drained by a comprehensive and sustainable drainage system. The capacity of the system makes allowance for climate change.	No
<u>Comments on Holt Road closure</u> Comments not in favour of the Holt Road closure and that Holt Road should link to the Cromer Road Junction	<u>Don't close B1149 Holt Road</u> General comments suggesting that Holt Road should not be closed but link to the Cromer Road Junction	9	Prior to 2009 the applicant intended to bring the Holt Road and Cromer Road together at the existing junction, modified to pass over the NDR. However, work at the time showed that the most effective solution would be to link the Holt Road directly to the NDR at Drayton Lane instead of at Cromer Road.	No
that Holt Road should link to the Cromer Road Junction	<u>Without Holt Road closure Drayton Lane re-alignment would not be required</u> Comments suggesting that the re-aligned Drayton Lane and its roundabout junction with NDR and major/minor priority junction	2	Holt Road is classified a B road and considered an important radial route that requires connectivity to the NDR. Given the difficulties with connecting Holt Road to the NDR at the Cromer Road Junction, the proposals are	No

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	with Reepham Road would not be required if Holt Road was linked to the Cromer Road Junction		considered appropriate.	
	<u>Holt Road closure will increase traffic through Drayton/Hellesdon</u> Comments expressing concern that the lack of a link to the Cromer Road Junction will result in increased traffic through Drayton/Hellesdon.	2	Traffic flows are predicted to increase on Reepham Road through Hellesdon with an NDR. Connecting Holt Road to the Cromer Road Junction was looked at previously when this issue arose and the parish council preferred the option of providing a Fakenham Road/NDR roundabout even though this was likely to be less effective. See Appendix I to the Traffic Forecasting Report (Document Ref 5.6) for forecast traffic flows.	No
	<u>Holt Road closure will create longer journeys</u> Comments that the lack of a link to the Cromer Road Junction will create a more complicated junction and longer journeys between the B1149 and A140	1	The applicant accepts that the closure of Holt Road will increase the distance of certain journeys. However, the reason for proposing this closure is given above.	No
<u>Comments on Marriotts Way Bridge</u>	<u>Peaceful nature of Marriotts Way will be affected</u> Comments expressing concern that the	1	Mitigation measures at the Marriotts Way Bridge crossing over the NDR are described in Volume 1 Chapter 8 of the Environmental Statement	No

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Comments expressing concern about the Marriotts Way Bridge	bridge over the NDR will effect the quiet and peaceful nature of Marriotts Way		(Document Ref 6.1).	
Not in favour of <u>Middle Road Bridge</u> Comments not in favour of the <u>Middle Road Bridge</u> over the NDR	<u>General comment not in favour of Middle Road Bridge</u> General comments not in favour of the <u>Middle Road Bridge</u> but not expressing a reason for this view	21	There has been extensive consideration of <u>Middle Road Bridge</u> and whilst the concerns of residents of <u>Middle Road</u> are acknowledged the wider view of the highway network (including the alternative routes to <u>Middle Road</u>) need to be considered. There has also been extensive discussion with the parish council on this issue and they have expressed a similar view. On this basis the bridge is to be retained as part of the proposal, so there is no change to the scheme.	No
	<u>Middle Road</u> is unsuitable for through traffic Comments suggesting that <u>Middle Road</u> is unsuitable for through traffic, including farm vehicles	12	See response regarding <u>Middle Road Bridge</u> above.	No
	<u>Increased traffic/rat running on Middle Road</u> Comments suggesting that the bridge will	11	See response regarding <u>Middle Road Bridge</u> above.	No

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	encourage more traffic to use Middle Road as a through route			
	<u>Middle Road Bridge cost not warranted</u> Comments suggesting that the additional cost of the Middle Road Bridge is not warranted	2	See response regarding Middle Road Bridge above.	No
<u>In favour of Middle Road Bridge</u> Comments in favour of Middle Road Bridge over the NDR	<u>Middle Road Bridge provides better access to village</u> Comments suggesting that Middle Road Bridge will improve access for the village of Gt Plumstead and avoids severance of the local community	2	Comments noted.	No
<u>Comments regarding Plumstead Road Over Bridge</u> Comments regarding the	<u>NDR should go under Plumstead Road/railway line</u> Comments suggesting that the NDR should go under the Norwich to Sheringham Railway Line and Plumstead Road rather than over it on a bridge	4	The applicant has previously examined routeing the NDR below Plumstead Road and the railway line and it is technically difficult due to groundwater conditions. There would be a high risk of flooding of any tunnel and a need for a permanent pumping system. This would have resulted in high maintenance costs.	No

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Plumstead Road Over Bridge	<p><u>Plumstead Road Bridge should be single span</u></p> <p>Comments suggesting that a single bridge should span both Plumstead Road and the Norwich to Sheringham Railway Line</p>	1	<p>The railway line and Plumstead Road run at an angle of 43° to one another and the NDR is proposed to cross skew to the railway and square to Plumstead Road. A single span structure crossing both the road and the railway would be in excess of 100m long and require a large imposing box girder or truss bridge, which would not prove to be an economic or visually acceptable solution in this location. This arrangement would also have high future maintenance costs associated with painting the steel girders. The solution taken forward comprises a much simpler structure with the NDR between two bridges supported on reinforced earthwork.</p>	No
<p><u>Comments not in favour of Roundabouts</u></p> <p>General comments not in favour of the roundabout junctions on the</p>	<p><u>Roundabouts will cause delays on NDR</u></p> <p>Comments suggesting that the roundabouts will cause delays on the NDR, and junctions should be grade separated like those on the Norwich Southern Bypass</p>	18	<p>The junctions have been designed for the predicted traffic levels. See Chapter 8 of the Transport Assessment (Document Ref 5.5). The NDR is a distributor road and not a bypass and so not many users are expected to drive from one end to the other. In view of this the delay at the roundabouts is not expected to be a deterrent to the use of the route. Grade</p>	No

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NDR			separated junctions would have a much greater environmental impact and be more difficult to justify.	
	<p><u>Too many roundabouts</u> General comments that there are too many roundabouts on the NDR</p>	5	One of the purposes of the NDR is to provide maximum connectivity for communities to distribute traffic movements. Therefore junctions with the main radial routes are required to do this.	No
	<p><u>General comments not in favour of roundabouts</u> General comments not in favour of roundabouts but not expressing a specific reason for this view</p>	4	Comments noted.	No
	<p><u>Safety concerns about roundabouts</u> Comments expressing concerns regarding the general safety of roundabouts</p>	2	Roundabouts are generally, on average, considered to be one of the safest forms of junction type.	No
	<p><u>Roundabouts will cause delays on radial routes</u> Comments suggesting that the roundabouts will cause delays on the radial routes into</p>	1	The new NDR roundabouts have been designed to accommodate the predicted traffic levels. See Chapter 8 of the Transport Assessment (Document Ref 5.5). They are an essential part of the scheme to enable it to function as a	No

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	and out of Norwich		distributor road.	
<u>Comments in favour of Roundabouts</u> General comments in favour of the roundabout junctions on the NDR	<u>General comments in favour of roundabouts</u> Comments in favour of roundabout junctions or expressing a preference for roundabouts rather than traffic signals	2	Comments noted.	No
<u>Comments on Fakenham Road Roundabout</u> Comments on the Fakenham Road Roundabout	<u>General comment in favour of Fakenham Road Roundabout</u> General comment in favour of Fakenham Road Roundabout but not giving a reason for this view	1	Comments noted.	No
	<u>Fakenham Road Roundabout will benefit Reepham Road</u> Comments suggesting that the Fakenham Road Roundabout will reduce traffic on Reepham Road	1	Comments noted.	No

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<u>Comments on Cromer Road Junction</u> Comments on the Cromer Road Junction	<u>Cromer Road Junction is inadequate</u> Comments suggesting that the Cromer Road junction with the NDR will be inadequate for the volume of traffic using it	1	The junction has been designed for the predicted traffic levels. See Chapter 8 of the Transport Assessment (Document Ref 5.5).	No
<u>Comments on Wroxham Road Roundabout</u> Comments on the Wroxham Road Roundabout	<u>Wroxham Road roundabout is inadequate</u> Comments suggestion that Wroxham Road roundabout with the NDR will be inadequate for the volume of traffic using it	1	Wroxham Road junction operates below its theoretical capacity for the predicted traffic levels. Whilst it exceeds its desirable capacity in 2032 the delay is considered reasonable and the queues can be accommodated safely. See Chapter 8 of the Transport Assessment (Document Ref 5.5).	No
<u>Comments on the Airport Roundabout</u> Comments on the Airport Roundabout	<u>General comment not in favour of the Airport Roundabout</u> General comment not in favour of the Airport Roundabout but not giving a reason for this view	1	The Airport Roundabout is required to accommodate the 90° change in direction of the NDR around the north of the airfield, and to provide access to the Petans training facilities and secure access to Norwich International Airport.	No
	<u>Airport Roundabout will create noise</u> Comments expressing concern the	1	Reasons for the provision of the Airport Roundabout are detailed above. Predicted	No

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	acceleration/deceleration of vehicles at this junction will create noise for nearby residents		noise and, where appropriate, mitigation measures are outlined in Volume 1 Chapter 11 of the Environmental Statement (Document Ref 6.1).	
<u>Comments on Plumstead Road Roundabout</u> Comments on the Plumstead Road Roundabout	<u>Plumstead Road roundabout is inadequate</u> Suggestion that Plumstead Road roundabout with the NDR will be inadequate for the volume of traffic using it	1	Plumstead Road South junction operates below its theoretical capacity for the predicted traffic levels. Whilst it exceeds its desirable capacity in 2032 the delay is considered reasonable and the queues can be accommodated safely. See Chapter 8 of the Transport Assessment (Document Ref 5.5).	No
<u>Comments regarding the Drayton Lane Link</u> Comments regarding the Drayton lane Link	<u>Drayton Lane link is inadequate</u> Suggestion that Drayton Lane link is inadequate for the volume of HGV traffic using it <u>Drayton Lane junction proposals effect Buggs Grave</u> Comment highlighting that the junction proposals here impact on Buggs Grave site	1	The new link has been designed to accommodate the predicted traffic levels.	No
		1	Investigations by the applicant's environmental consultants have identified that there is nothing on the Historic Environment Record and no details from journals or articles about archaeology at the Buggs Grave site.	No

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			<p>The name of the crossroads may indicate that someone was buried there, but there is no physical evidence of this to date. Any burials affect by the NDR will be picked up as part of the archaeological investigations/mitigation in the Environmental Statement (Document Ref 6.1).</p>	
	<p><u>Drayton Lane junction proposals will re-direct traffic via Hall Lane</u> Comments suggesting the junction proposals, and in particular the closure south of Reepham Road, will re direct traffic through Hall Lane. Comments suggested that Hall Lane is a poorer standard than Drayton Lane</p>	5	<p>Some vehicles currently using Drayton Lane may be diverted to Hall Lane. However, the NDR scheme as proposed shows a benefit of reducing the amount of traffic in Hall Lane when compared to a non NDR scenario.</p>	No
	<p><u>Drayton Lane junction proposals will increase journey times</u> Comments suggesting the junction proposals will increase journey times and distances for those accessing Drayton.</p>	1	<p>The applicant accepts that certain journey distances/times will increase as a result of Holt Road no longer linking directly to Cromer Road as it does presently. The journey between Horsford and the Norwich Outer Ring Road would increase by approximately 0.6km as a result. The reasons for not providing the link to</p>	No

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<p><u>Suggested changes to the Drayton Lane link</u> Comments suggesting changes or alternative proposals to the Drayton Lane link</p>	<p><u>Don't close Drayton Lane South</u> Comments suggesting that there should be no closure of Drayton Lane immediately south of its junction with Reepham Road</p>	6	<p>Cromer Road are described previously.</p> <p>Further tests have been undertaken in the model to look into the option of a roundabout at the Drayton Lane/Reepham Road junction and also a more conventional priority ('T') junction. The findings for all options tested, some of which also included traffic calming on the section of Hall Lane between Drayton Lane South and Drayton village, showed that the use of Drayton Lane South, either instead of, or as well as Hall Lane, was less effective at reducing traffic flows into Drayton than the NDR scheme as proposed. In view of this, and the fact that the NDR scheme as proposed showed a benefit of reducing the amount of traffic on Hall Lane when compared to a non-NDR scenario, there was no evidence to support changing the NDR scheme as proposed.</p>	No
	<p><u>Bridge instead of Drayton Lane Roundabout</u> Comments suggesting that Drayton Lane should be bridged over the NDR and not have direct access to it</p>	1	<p>One of the purposes of the NDR is to provide maximum connectivity for communities to distribute traffic movements. Holt Road, as a B road, is considered a key radial route and therefore the connectivity provided by Drayton</p>	No

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			Lane from the NDR is important.	
	<u>Roundabout at Reepham Road and Holly Lane/Hall Lane junction</u> Comments suggesting the provision of a roundabout at this junction.	1	The applicant anticipates that the existing situation at this junction will improve as Holly Lane is proposed to be stopped up for through traffic. Therefore one arm of the staggered junction will become an 'access only' road.	No
	<u>Roundabout at Drayton Lane / Reepham Road crossroads</u> Comments suggesting the provision of a roundabout at this junction.	1	See response above to "Don't close Drayton Lane South"	No
<u>Other comments on the design</u> Other general comments on the design proposals for the NDR	<u>General positive comments on design</u> Other positive comments on the design proposals including comments in favour of low noise asphalt, the NDR vertical alignment being in cutting and the limited lighting provision.	4	Comments noted.	No
<u>Comments regarding lay-</u>	<u>Comments regarding the lack of lay-bys on the NDR</u>	2	The provision of lay-bys has been considered in accordance with the highway standard. The spacing of junctions on the scheme (on average	No

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<p><u>bys</u> Comments regarding the provision of lay-bys on the NDR</p>	<p>Comments expressing concern regarding the lack of lay-bys on the NDR and that this could be a problem when vehicles break down</p>		<p>1 per 2km) is more frequent than the recommended frequency of lay-bys (1 per 2.5km) and therefore generally obviates the need for lay-bys. However two lay-bys on either side of the NDR north of Business Park roundabout are proposed due to their proximity to the strategic road network where journeys could involve longer distance routes and so their provision is considered appropriate at this location.</p>	

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Comments Regarding the Off-line Proposals				
<p><u>Too many road closures</u> General comments that the scheme has too many road closures</p>	<p><u>Closures will increase journey times</u> Comments suggesting that the closures will increase journey times and distances</p>	14	<p>The applicant has tried to keep the number of road closures to a minimum and they are generally only provided for reasons of highway safety where minor roads are severed by the NDR or to encourage traffic to use more appropriate routes.</p>	No
	<p><u>Closures will increase traffic on other roads</u> Comments suggesting that the closures will increase traffic on other roads and create rat runs</p>	2	<p>See above response regarding the number of road closures.</p>	No
	<p><u>Closures are unnecessary</u> General comments not in favour of the closures or suggesting that they are unnecessary</p>	2	<p>See above response regarding the number of road closures.</p>	No
	<p><u>Keep all roads open</u> Comments suggesting that there should be no closures and all roads should be kept</p>	2	<p>See above response regarding the number of road closures.</p>	No

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	open			
	<u>Closures will increase traffic on Fakenham Road</u> Comments suggesting that the closures will increase traffic on Fakenham Road	1	See above response regarding the number of road closures.	No
	<u>Closures will create problems if NDR closed</u> Comments suggesting that problems will occur on other local roads if the NDR is closed for any reason	1	See above response regarding the number of road closures.	No
<u>Not in favour of North Walsham Road/Crostwick Lane proposals</u> Comments not in favour of the proposals for the North Walsham Road/Crostwick Lane/Rackheath Lane	<u>Need roundabout at North Walsham Road/Crostwick Lane</u> Comments suggesting that the best proposal for the junction is a roundabout	13	Whilst the comments are noted, the reasons for the closure are primarily to improve highway safety at the junction. Closure of Rackheath Lane will simplify turning movements allowing drivers waiting at the Crostwick Lane arm to concentrate on the vehicle movements on the main road.	No
	<u>Do not close Rackheath Lane</u> Comments not in favour of the closure of Rackheath Lane at this junction	11	See above comments regarding junction.	No
	<u>Need roundabout or traffic signals at North</u>	3	See above comments regarding junction.	No

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Junction	<u>Walsham Road/Crostock Lane</u> Comments suggesting that the best proposal for the junction is a roundabout or traffic signals			
	<u>Keep Rackheath Lane open to NIMUs</u> Comments suggesting that the Rackheath Lane closure should remain open to NIMUs	2	See above comments regarding junction.	No
	<u>Need traffic signals at North Walsham Road/Crostock Lane</u> Comments suggesting that the best proposal for the junction is traffic signals	1	See above comments regarding junction.	No
	<u>North Walsham Road/Crostock Lane proposal will stop rat running</u> Comments suggesting that the proposal will stop rat running via Crostock Lane and Rackheath Lane and improve the junction	1	Comments noted.	No
	<u>Do not need roundabout/traffic lights at North Walsham Road/Crostock Lane</u> Comments suggesting that roundabout/traffic	1	Comments noted.	No

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Category of Response	Typical Comments	No of Comments	Regard Given to Response	Design Change
<p><u>Not in favour of Church Street proposals</u> Comments not in favour of the proposals not to close Church Street and monitor post NDR</p>	<p>lights are not needed at this junction</p> <p><u>Church Street is poor standard</u> Comments suggesting that Church Street should be closed because it is a poor standard road</p>	<p>6</p>	<p>The applicant reconsidered the closure following the public consultations in April/May/June 2012 and decided not to close Church Street. The purpose of the NDR is to remove traffic from some of the less suitable roads, such as Church Street, around north Norwich. This is reflected in the traffic modelling results which show that with Church Street left open; only very localised traffic would use it. Whilst it has been decided not to close Church Street, the applicant will monitor traffic flows post introduction of the NDR and consider re-introducing the closure if flows are not found to reduce. This was the proposal presented for the pre-application consultations and the applicant's position regarding this closure remains unchanged.</p>	<p>No</p>
	<p><u>Church Street will become a rat run</u> Comments suggesting that Church Street should be closed otherwise it will be used as a rat run</p>	<p>5</p>	<p>See above reponse regarding the closure of Church Street.</p>	<p>No</p>

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Category of Response	Typical Comments	No of Comments	Regard Given to Response	Design Change
	<p><u>General comment not in favour of closing Church Street</u></p> <p>General comments in favour of closing Church Street but not expressing a reason for this view</p>	1	See above repose regarding the closure of Church Street.	No
	<p><u>Church Street has poor junctions</u></p> <p>Comments suggesting that Church Street should be closed because of its poor junctions with the B1149 and A140</p>	1	See above repose regarding the closure of Church Street.	No
	<p><u>Need to protect Church Street residents</u></p> <p>Comments suggesting that Church Street should be closed to protect residents from the effects of through traffic</p>	1	See above repose regarding the closure of Church Street.	No
<p><u>In favour of Church Street proposal</u></p> <p>Comments in favour of the proposals not to close Church Street and</p>	<p><u>Church Street closure will increase journey times</u></p> <p>Comments suggesting that Church Street should remain open otherwise journey times will be increased</p> <p><u>General comment in favour of not closing Church Street</u></p>	4	Comments noted.	No
		2	Comments noted.	No

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Category of Response	Typical Comments	No of Comments	Regard Given to Response	Design Change
monitor post NDR	General comments in favour of keeping Church Street open but not expressing a reason for this view			
<u>Not in favour of Green Lane East/Broad Lane closure</u> Comments not in favour of the Green Lane East/Broad Lane closure at the junction with Plumstead Road	<u>Green Lane East/Broad Lane closure will increase journey times</u> Comments suggesting that the proposed closure will increase journey times and distances, particularly between Rackheath and Gt Plumstead	7	Whilst the comments are noted, the reasons for this closure are primarily to improve highway safety at this junction.	No
	<u>General comment not in favour of Green Lane East/Broad Lane closure</u> General comments in favour of keeping Green Lane East/Broad Lane open but not expressing a reason for this view	3	Whilst the comments are noted, the reasons for this closure are primarily to improve highway safety at this junction.	No
	<u>Bus routes will need to be changed</u> Comments highlighting that bus routes would need to be changed as a result of the proposed closure	1	Closure of Green Lane East/Broad Lane at Plumstead Road will affect the bus route. This will be reviewed as part of the detailed design in consultation with relevant bus operators.	No
	<u>Green Lane East/Broad Lane needs mini roundabout</u>	1	The closure of Green Lane East/Broad Lane at its junction with Plumstead Road will remove the	No

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	Comments suggesting that a mini roundabout is needed at this junction		existing crossroads junction making it a more conventional and safer T-junction. This element of the scheme together with the provision of an all purpose road bridge over the NDR at Middle Road was developed in consultation with the parish council as the preferred access solution for the local communities.	
<u>In favour of Green Lane East/Broad Lane closure</u>	<u>Green Lane East/Broad Lane junction is dangerous</u> Comments in favour of the proposed closure because this is already a dangerous junction	3	Comments noted.	No
Comments in favour of Green Lane East/Broad closure at the junction with Plumstead Road	<u>Support Green Lane East/Broad Lane closure</u> General comments in favour of closure but not expressing a reason for this view	2	Comments noted.	No
	<u>Green Lane East/Broad Lane closure will reduce rat running</u> Comments suggesting that the proposed closure will discourage rat running	2	Comments noted.	No
<u>Suggested</u>	<u>Create slip from Broad Lane</u>	2	The closure of Broad Lane at its junction with	No

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Category of Response	Typical Comments	No of Comments	Regard Given to Response	Design Change
<p><u>changes to Green Lane East/Broad Lane Junction</u> Comments suggesting alternative proposals for the Green Lane East/Broad Junction</p>	<p>Comments suggesting the creation of a slip road diverging from Broad Lane and joining Plumstead Road to the west of the existing junction.</p>		<p>Plumstead Road will remove the existing crossroads junction making it a more conventional and safer T-junction. This element of the scheme together with the provision of an all purpose road bridge over the NDR at Middle Road was developed in consultation with the Parish Council as the preferred access solution for the local communities.</p>	
<p><u>Not in favour of Wroxham Road/Green Lane West Junction proposals</u> Comments not in favour of the proposals for the Wroxham Road/Green</p>	<p><u>Wroxham Road/Green Lane West proposal will be dangerous</u> Comments suggesting that the proposals for the junction will be dangerous.</p>	1	<p>The proposed changes to this junction were considered following comments from the previous April/May/June 2012 consultations that identified the existing junction as an issue. By diverting Green Lane West further south west it will join Wroxham Road at a location where visibility is improved.</p>	No
<p>Comments not in favour of the proposals for the Wroxham Road/Green</p>	<p><u>Need roundabout at Wroxham Road/Green Lane West</u> Comments suggesting that the best proposal</p>	1	<p>The provision of a roundabout at this location was considered when assessing options at the junction, the main issue identified being the present poor visibility from Green Lane West.</p>	No

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Category of Response	Typical Comments	No of Comments	Regard Given to Response	Design Change
Lane West Junction	for the junction is a roundabout.		The proposals shown are considered the most appropriate solution to resolve this problem.	
In favour of <u>Wroxham Road/Green Lane West junction proposals</u> Comments in favour of the proposals for the Wroxham Road/Green Lane West Junction	<u>Wroxham Road/Green Lane West proposals will improve safety</u> Comments suggesting that the proposals for this junction will improve safety	1	Comments noted. One of the reasons for relocation of this junction is because of poor visibility from Green Lane West. The vertical alignment of Wroxham Road immediately north east of the existing junction location restricts visibility when looking right from the side road.	No
<u>Suggested changes to Wroxham Road/Green Lane West junction proposals</u>	<u>Create two lanes on exit from Green Lane West</u> Comments suggesting that a left turn and right turn lane should be provide on the re-aligned exit from Green Lane West onto Wroxham Road	2	The junction has been designed for the predicted traffic levels. The proposals shown are considered the most appropriate solution to resolve the problems associated with the existing junction.	No

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Category of Response	Typical Comments	No of Comments	Regard Given to Response	Design Change
Comments suggesting alternative proposals for the Wroxham Road/Green Lane West Junction				

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Category of Response	Typical Comments	No of Comments	Regard Given to Response	Design Change
Comments Regarding the Walking/Cycling Horse Riding Proposals				
<p><u>Need more NMU facilities</u> Comments on the need for more NMU facilities as part of the proposals</p>	<p><u>General comment on need for more NMU facilities</u> General comments on the need for more NMU facilities but not identifying any specific locations</p>	14	<p>During the April/May/June 2012 public consultations the applicant had various requests for improved walking and cycling facilities. As a result a strategy was developed to consider and prioritise these consultation requests. The strategy published as part of the February/March 2013 public consultations identified a network of routes to link areas that generate NMUs (such as villages, employment areas, future development) with each other, the Norwich Cycle Network and the Marriotts Way. Part of these routes utilised narrow country lanes, roads closed to motor vehicles and existing public rights of way. The applicant has prioritised NMU improvements on this network, and these improvements have included new NMU facilities as part of the proposals.</p>	No
	<p><u>Need more NMU facilities on busy roads</u> Comment suggesting that more footways are needed on roads with heavy traffic</p>	1		No
	<p><u>Cycle routes do not go anywhere</u> Comments suggesting that the proposed cycle routes do not go anywhere or link to any other facility</p>	1		No
<p><u>NDR represents barrier to NMUs</u> General comments that the NDR presents a barrier to NMUs but without identifying any</p>	<p><u>General comment NDR represents barrier to NMUs</u> General comments that the NDR presents a barrier to NMUs but without identifying any</p>	7	<p>The work described above identified key routes for NMUs. Where these key routes crossed the NDR, the applicant has provided segregated crossing facilities. These include NMU facilities</p>	No

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Category of Response	Typical Comments	No of Comments	Regard Given to Response	Design Change
Comments that the NDR represents a barrier to NMUs	<p>specific location</p> <p><u>NDR severs Smees Lane</u> Comments identifying severance by the NDR at Smees Lane as a concern</p>	4	<p>on the Bell Farm Bridge, Buxton Road Bridge, Newman Road Bridge, Middle Road Bridge, New Postwick Bridge and under the Norwich to Sheringham railway line bridge.</p> <p>Whilst no NMU crossing facility has been provided that directly links Smees Lane on either side of the NDR, the applicant has provided brideways adjacent to the NDR allowing access to the footway/cycleway facilities that cross the NDR via Middle Road Bridge.</p>	No
	<p><u>NDR severs at St Faiths Road/Quaker Lane route</u> Comments identifying severance by the NDR at St Faiths Road/Quaker Lane as a concern</p>	3	<p>Whilst no NMU crossing facility has been provided that directly links Quaker Lane with St Faiths Road, the applicant has provided a brideway adjacent to the south side of the NDR which then allows the use of the footway/cycleway facilities on Buxton Road Bridge. This provides a link, segregated from the main carriageway, from the northern end of St Faiths Road to Spixworth and also linking to the eastern end of Quaker Lane.</p>	No
	<p><u>Concern about crossing roundabouts</u> Comments expressing concern regarding the</p>	2	<p>It is proposed to maintain connectivity with the provision of a segregated shared use</p>	No

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Category of Response	Typical Comments	No of Comments	Regard Given to Response	Design Change
	ability of NMUs to cross at the roundabout junctions with the NDR		footway/cycleway around the perimeter of the junction with uncontrolled crossing points. This is considered appropriate provision to cater for the level of usage anticipated.	
	<p><u>NDR severs Bullock Hill from Petans</u></p> <p>Comments identifying severance of the NDR between Bullock Hill and the Petans training facility, including requests for a bridge or underpass at this location</p>	3	It is proposed to maintain connectivity with the provision of a segregated shared use footway/cycleway around the perimeter of the junction with uncontrolled crossing points. This is considered appropriate provision to cater for the anticipated level of usage.	No
	<p><u>NDR severs Holly Lane</u></p> <p>Comments identifying severance by the NDR at Holly Lane as a concern</p>	1	Whilst the NDR severs Holly Lane at its junction with Holt Road, the applicant has provided footway/cycleway facilities adjacent to the west bound merge slip road providing access to the at grade facilities on the Cromer Road Junction. These facilities provide links to Cromer Road and Holt Road.	No
	<p><u>NDR severs Spixworth</u></p> <p>Comments expressing concern regarding the ability of NMUs to cross the NDR when accessing Norwich from Spixworth</p>	1	There are existing shared use footway/cycleway facilities on Buxton Road linking Spixworth to the northern edge of Norwich. This route will be retained as part of the NDR proposals, with the provision of shared use footway/cycleway	No

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Category of Response	Typical Comments	No of Comments	Regard Given to Response	Design Change
	<p><u>NDR impacts public rights of way</u></p> <p>Comments expressing concern regarding the NDR severing public rights of way and having an adverse impact on them</p>	1	<p>facilities on Buxton Road Bridge over the NDR.</p> <p>In the majority of instances where a public right of way has been severed an alternative diversion route has been provided (e.g. Attlebridge Restricted Byway No 3, Drayton Restricted Byway No 6, Horsford Restricted Byway No 7 and Postwick Footpath No 2) or a bridge has been provided (e.g. Marriotts Way and Bell Farm Horsford RB No 5)</p> <p>Two public rights of way (Spixworth Bridleway No 1 and Gt/Lt Plumstead Footpath No 5) are substantially removed but similarly new alternative bridleways have been provided in their place.</p>	No
<p><u>Need NIMU facilities at specific locations</u></p> <p>Comments suggesting more or improved NIMU</p>	<p><u>Need NIMU facilities between Horsham and city centre</u></p> <p>Comments suggesting more NIMU facilities along the A140 between Horsham and the city centre</p>	4	<p>There is an existing off road facility (via New Home Lane) linking Horsham with the new Cromer Road Junction with the NDR where at grade cycle facilities are being provided as part of the NDR proposals. Norfolk County Council has previously undertaken a feasibility study into cycle facilities between the existing Cromer Road Roundabout South and the Norwich Cycle</p>	No

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Category of Response	Typical Comments	No of Comments	Regard Given to Response	Design Change
facilities at specific locations			Network at Fifers Lane. Whilst the provision of these facilities would be useful, they would need to be considered and prioritised by the County Council alongside other requests for highway improvements.	
	<p><u>Need NMU facilities along whole route of NDR</u></p> <p>Comments suggesting NMU facilities along the entire route of the NDR</p>	3	Whilst NMU facilities have not been provided along the whole length of the route, the facilities that have been provided, together with existing facilities and roads deemed suitable for NMUs, help to provide such a route.	No
	<p><u>Need more NMU facilities between Thorpe Marriott and Hellesdon</u></p> <p>Comments suggesting NMU facilities along Reepham Road between Thorpe Marriott and Hellesdon</p>	2	The Norwich Cycle Network already identifies a route between Thorpe Marriott and Hellesdon via the Marriotts Way and Hellesdon Road/Low Road and Hospital Lane.	No
	<p><u>Need more NMU facilities between Horsford and the city centre</u></p> <p>Comments suggesting NMU facilities between Horsford and the city centre</p>	2	The closure of Holt Road at the Cromer Road Junction will reduce vehicle flow on a large proportion of the route between Horsford and the Cromer Road Junction with the NDR where at grade cycle facilities are being provided as part of the NDR proposals. Norfolk County Council has previously undertaken a feasibility	No

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Category of Response	Typical Comments	No of Comments	Regard Given to Response	Design Change
			<p>study into cycle facilities between the existing Cromer Road Roundabout South and the Norwich Cycle Network at Fifers Lane. Whilst the provision of these facilities would be useful they would need to be considered and prioritised by the County Council alongside other requests for highway improvements.</p> <p>The proposals also provide an improved cycle route between Horsford and Marriotts Way via Dog Lane, Bell Farm Track (Horsford Restricted Byway No 5) and routes through Thorpe Marriott.</p>	
	<p><u>Need NMU facilities on main radial routes</u> Comments suggesting NMU facilities along the main radial routes into and out of Norwich</p>	1	<p>The Norwich Cycle Network identifies routes between the city centre and the edge of its urban area, although these are not necessarily via the main radial routes but more appropriate, less trafficked routes. It is these routes where improvements will be prioritised. Further bus lanes introduced on radial routes as part of the NATS bus rapid transport proposals could also be used by cyclists.</p>	No
	<p><u>Need more NMU facilities between Postwick</u></p>	1	<p>The eastbound diverge slip road at Postwick, to</p>	No

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	<p><u>and Whitlingham Park</u> Comments suggesting NMU facilities between Postwick and Whitlingham Park</p>		<p>be stopped up is currently being used informally by pedestrians and cyclists to access the service path over the A47 viaduct and bridge over the Norwich to Great Yarmouth railway line to gain access to National Cycle Network Route 1 and Whitlingham Park.</p> <p>The current service path used by cyclists and pedestrians over the A47 viaduct and bridge is 1.5m wide and does not comply with current design standards for a NMU facility.</p> <p>To ensure that cyclists are not disadvantaged by the proposed stopping up of the eastbound diverge slip road, a shared use facility for pedestrians and cyclists will be incorporated into the scheme along the line of the existing slip road.</p>	
	<p><u>Need more NMU facilities between Thorpe End and the city centre</u> Comments suggesting NMU facilities along Plumstead Road between Thorpe End and the city centre</p>	1	<p>The Norwich Cycle Network does not identify Plumstead Road as being part of the Norwich Cycle Network. Whilst the provision of such facilities on Plumstead Road would be useful, they would need to be considered and prioritised by Norfolk County Council alongside other</p>	No

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Category of Response	Typical Comments	No of Comments	Regard Given to Response	Design Change
	<p><u>Need more NEMU facilities in the Drayton area</u> Comments suggesting more NEMU facilities in the Drayton area</p>	1	<p>requests for highway improvements.</p> <p>During the April/May/June 2012 public consultations the applicant had various requests for improved walking and cycling facilities. As a result a strategy was developed to consider and prioritise these consultation requests. The strategy published as part of the February/March 2013 public consultations identified a network of routes to link areas that generate NEMUs (such as villages, employment areas, future development) with each other, the Norwich Cycle Network and the Marriotts Way. Part of these routes utilised narrow country lanes, roads closed to motor vehicles and existing public rights of way. The applicant has prioritised NEMU improvements on this network, and these improvements have included new NEMU facilities as part of the proposals.</p>	No
	<p><u>Need more NEMU facilities in the Rackheath area</u> Comments suggesting more NEMU facilities in the Rackheath area</p>	1	<p>The NDR proposals provided for new bridleways adjacent to the NDR in the area of Rackheath, including 2 grade separated crossings of the NDR (i.e. Newman Road Bridge and beneath</p>	No

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Category of Response	Typical Comments	No of Comments	Regard Given to Response	Design Change
	<p>Need more NMU facilities linking to <u>Marriotts Way</u></p> <p>Comments suggesting more NMU facilities linking to the Marriotts Way</p>	1	<p>the Plumstead Road Overbridge).</p> <p>The proposals included a number of NMU links to the Marriotts Way including new bridleways adjacent to the NDR, together with an Overbridge at Bell Farm Track (Horsford Restricted Byway No 5).</p>	No
<p><u>Support NMU proposals</u></p> <p>General positive comments on the proposals for NMUs</p>	<p><u>General support for NMU proposals</u></p> <p>General positive comments on the NMU proposals but not identifying any specific proposals</p>	3	Comments noted.	No
	<p><u>Support extra bridleways</u></p> <p>Comments in favour of extra bridleways being proposed as part of the scheme</p>	3	Comments noted.	No
	<p><u>Support roads closures</u></p> <p>Comments in favour of road closures because they can be used by NMUs as reduced traffic routes</p>	1	Comments noted.	No
<p><u>Detailed design/construction comments</u></p>	<p><u>Construct NMU facilities at same time as NDR</u></p> <p>Comments suggesting that the NMU facilities</p>	2	The intention is to construct the NMU facilities at the same time as the main line carriageway.	No

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Category of Response	Typical Comments	No of Comments	Regard Given to Response	Design Change
Comments relating to the detailed design/construction of the NDR NMU facilities	<p>need to be constructed at the same time as the main line of the NDR</p> <p><u>NMUs need to be wide enough</u></p> <p>Comments suggesting the NMU facilities should be sufficiently wide enough</p>	1	<p>The NMU facilities are generally proposed as 3m wide bridleways/cycle tracks with 1m verges either side. This is in line with guidance from the Department of Transport's Design Manual for Roads and Bridges document "TA90/05 – Pedestrian, cycle and equestrian routes"</p>	No
	<p><u>Provide good NMU routes surface</u></p> <p>Comments suggesting the surface of both the on and off road NMU routes needs to be good quality</p>	1	<p>The preferred surface for use on the bridleways would be crushed road planings to depth of 150mm. In determining this preference the applicant has considered the Department for Transport's Design Manual for Roads and Bridges "TA91/05 Provision for Non-Motorised Users", which identifies this surface as a good compromise towards meeting the requirements of pedestrians, cyclists and equestrians.</p>	No
	<p><u>Improve Bell Farm Track</u></p> <p>Comment that the Bell Farm Track is difficult to use at present</p>	1	<p>The proposals include improvements to the surface of Bell Farm Track.</p>	No

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Category of Response	Typical Comments	No of Comments	Regard Given to Response	Design Change
Comments Regarding the Landscaping/Planting Proposals				
<p><u>NDR will affect the landscape</u> General comments on the effects of the NDR on the current landscape</p>	<p><u>NDR will destroy landscape habitats</u> Comments expressing concern that the NDR will destroy valuable landscape and wild life habitats</p>	187	<p>It is acknowledged that the proposed scheme will result in the loss of some 6,000 trees. However, the landscaping proposals propose a replacement ratio of, as a minimum, 2:1. An Environmental Impact Assessment (EIA) has been undertaken and the details of the planting can be found in the Volume 1 Chapter 7 of the Environmental Statement (Document Ref 6.1).</p>	No
	<p><u>Need more planting</u> General comment that more planting is required but not providing specific locations</p>	3	<p>Significant consideration has been given to the alignment of the NDR route to maintain current vegetation and existing screening. Biodiversity has also been a major consideration in deciding upon the route of the NDR to minimise the loss of existing habitats. Extensive planting and landscaping is planned along the route of the NDR. Planting will comprise of native, locally present species of woodland, scrub and grassland habitats, hedgerows, and wetland areas. The proposals for the scheme include the provision of deciduous and evergreen trees, both mature and sapling. It will tie in with</p>	No

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			landscaping schemes of adjacent developments. Details of the landscaping proposals for the route can be found in Volume 1 Chapter 7 of part one of the Environmental Statement (Document Ref 6.1).	
<u>Support landscaping proposals</u> General comments in support of the landscaping proposals	<u>General support for landscaping proposals</u> Positive comments on the landscaping proposals but not identifying any specific proposal	3	Comments noted.	No
<u>Landscaping proposals at specific locations</u> Comment on the landscaping proposals at specific	<u>Need more planting at Thorpe Marriott</u> Comments suggesting that more planting is needed to the north of Thorpe Marriott	1	Significant consideration has been given to the alignment of the NDR route to maintain current vegetation and existing screening. Biodiversity has also been a major consideration in deciding upon the route of the NDR to minimise the loss of existing habitats. Extensive planting and landscaping is planned along the route of the NDR. Planting will comprise of native, locally present species of woodland, scrub and	No
	<u>Need more planting on the Plumstead Road/railway line embankment</u> Comments suggesting that more planting is needed up to the top of the embankments leading to the Plumstead Road/Norwich to	1		No

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Category of Response	Typical Comments	No of Comments	Regard Given to Response	Design Change
Locations	<p>Sheringham railway line bridge</p> <p><u>Need more planting at Spixworth</u></p> <p>Comments suggesting that more planting between the NDR and Spixworth</p>	1	<p>grassland habitats, hedgerows, and wetland areas The proposals for the scheme include the provision of deciduous and evergreen trees, both mature and sapling. It will tie in with landscaping schemes of adjacent developments. Details of the landscaping proposals for the route can be found in Volume 1 Chapter 7 of part one of the Environmental Statement (Document Ref 6.1).</p>	No
	<p><u>Need more planting at Rackheath</u></p> <p>Comments suggesting that more planting is needed between the NDR and Rackheath</p>	3	<p>It is recognised that there is a need to provide further landscaping and biodiversity features in Rackheath. As such, further planting and landscaping to screen the NDR and promote further diversification of biodiversity has been incorporated into the schemes landscaping proposals.</p>	<p>Yes – Design Change Ref: 9.2 and 9.6 in Appendix V of this report.</p>
	<p><u>Need more planting to east of Beeston Park</u></p> <p>Comments suggesting that more planting is needed to the area east of Beeston Park</p>	1	<p>Landscaping proposals for the scheme now include further planning and landscaping at North Walsham Road and Wroxham Road, details of which can be found in Volume 1</p>	<p>Yes – Design Change Ref:</p>

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Category of Response	Typical Comments	No of Comments	Regard Given to Response	Design Change
			Chapter 7 of the Environmental Statement (Document Ref 6.1).	8.5 in Appendix V of this report.
<u>Types of planting</u> Comments on the proposed types of planting	<u>Need matures trees planted</u> Comments suggesting that mature trees need to be planted not saplings to provide better/earlier screening	3	Both mature and sapling trees will be planted along the route of the road.	No
	<u>Planting should include evergreens</u> Comments suggesting that the planting used should include evergreen species to provide winter screening	1	Landscaping proposals for the scheme include the provision of deciduous and evergreen trees.	No
	<u>Planting should include wild flowers</u> Comments suggesting that the planting used should include wild flower meadows	1	Landscape mitigation plans already incorporate the provision of wild flowers on suitable verges of the NDR, details of which can be found in Volume 1 Chapter 7 of the Environmental Statement (Document Ref 6.1).	No
	<u>Verges of closed roads should have wild flowers</u>	1	Landscape mitigation plans already incorporate the provision of wild flowers on suitable verges of the NDR, details of which can be found in	No

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	Comments suggesting that the verges of roads where closures are proposed should be planted with wild flowers		Volume 1 Chapter 7 of the Environmental Statement (Document Ref 6.1).	

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Category of Response	Typical Comments	No of Comments	Regard Given to Response	Design Change
Comments Regarding Wildlife Effects of the Proposals				
<p><u>NDR will affect the wildlife</u> General comment on the impact of the NDR on wildlife</p>	<p><u>General NDR will affect wildlife</u> Comments suggesting that the NDR will adversely affect wildlife <u>Proposals will not compensate for wildlife loss</u> Comments suggesting that the proposed landscaping will not compensate for the loss of wildlife habitats</p>	<p>7 2</p>	<p>Wildlife protection has been a crucial part of the NDR from a very early stage. As such, an extensive landscaping scheme has been prepared, that will tie up closely with the need to preserve ecological corridors throughout the wider landscape. It will comprise of native, locally present species of woodland, scrub and grassland habitats, hedgerows, and wetland areas. It will tie in with landscaping schemes of adjacent developments. Extensive mitigation to reduce the loss of habitats has been incorporated into the scheme. Where habitats are to be directly affected by the NDR, clearance will be undertaken outside of the breeding season and new habitats of equal or greater value will be put in their place and green bridges built into the scheme will preserve foraging in the area of disturbance.</p>	<p>No No</p>
<p><u>NDR will affect the wildlife at specific</u></p>	<p><u>NDR will affect Newman Road area</u> Comment suggesting that the woodlands around Newman Road at Rackheath will be</p>	<p>1</p>	<p>An extensive landscaping scheme is being prepared, that will tie up closely with the need to preserve ecological corridors throughout the</p>	<p>No</p>

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Category of Response	Typical Comments	No of Comments	Regard Given to Response	Design Change
<p><u>location</u> Comment on the impact of the NDR on wildlife at a specific location</p>	<p>destroyed</p>		<p>wider landscape. It will comprise of native, locally present species of woodland, scrub and grassland habitats, hedgerows, and wetland areas. It will tie in with landscaping schemes of adjacent developments. A number of green and dark corridors across the route have been provided within the scheme to encourage the continuation of current wildlife corridors.</p>	
<p><u>NDR will be a barrier to wildlife</u> Comments that the NDR will be a barrier to wildlife</p>	<p><u>General NDR will be a barrier to wildlife</u> Comments that the NDR will be a barrier to wildlife but identifying any specific location</p>	<p>4</p>	<p>Wildlife protection has been a crucial part of the NDR project from a very early stage. As such, an extensive landscaping scheme has been prepared, that will tie up closely with the need to preserve ecological corridors throughout the wider landscape. It will comprise of native, locally present species of woodland, scrub and grassland habitats, hedgerows, and wetland areas. It will tie in with landscaping schemes of adjacent developments. A number of green corridors and a dark corridor doubling as a drainage culvert in Rackheath will be provided within the scheme to encourage the continuation of current wildlife corridors.</p>	<p>No</p>

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Category of Response	Typical Comments	No of Comments	Regard Given to Response	Design Change
	<p><u>NDR will be barrier to wildlife near Rackheath</u> Comments suggesting that the NDR will be a barrier to wildlife in the area of Newman Road woodlands and between The Springs and the east side of the NDR</p>	2	<p>A number of green corridors and a dark corridor doubling as a drainage culvert in Rackheath will be provided within the scheme to encourage the continuation of current wildlife corridors.</p>	No
<p><u>Do not support for wildlife proposals</u> Comments in support for specific proposals to aid wildlife</p>	<p><u>Do not support bat gantries</u> Comments suggesting that bat gantries will not work</p>	1	<p>Some very basic bat gantries have been proven not to be effective. However, the applicant has taken advice from the bat specialists, and would install a bat gantry design that it is confident will work. They would be installed early in the construction process and tie into the landscaping scheme to provide effective crossing points.</p>	No
	<p><u>Need to consider other species</u> Comments suggesting that mitigation measures need to be considered for species other than bats</p>	1	<p>The NDR project as a whole has had regard to the Joint Core Strategy's Green Strategy. A number of surveys have been carried out for a variety of species to inform the Environmental Statement (Document Ref 6.1), these include, but are not limited too; badgers, bats, great crested newts, birds, invertebrates, reptiles, otters and water voles, brown hares and deer.</p>	No

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			This is in addition to surveys looking at habitats, trees and hedgerows.	
<u>In favour of wildlife proposals</u> Comments in support for specific proposals to aid wildlife	<u>Support bat gantries</u> Comments in favour of the proposed bat gantries <u>Support for planting to aid wildlife</u> Comments suggesting that the proposed planting will be good for wildlife	2	Comments noted.	No
<u>Other wildlife comments</u> Other wildlife comments not covered above	<u>Recently disappeared barn owl</u> Comments suggesting that a barn owl recently disappeared since land was taken over by Birse	2	Comments noted.	No
		1	Extensive mitigation is planned to protect Barn Owls during operation of the NDR. An extensive landscaping scheme is being prepared that intends to encourage Barn Owls to fly over the carriageway at a height of 3 metres and prevent collisions with vehicles. This will be achieved by planting continuous hedgerows and tightly spaced trees (less than 3 metres apart) up to the carriageway. The applicant is committed to replace all grassland, woodland and hedgerows that are to be removed to provide an equal amount of additional habitat.	No

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Category of Response	Typical Comments	No of Comments	Regard Given to Response	Design Change
Comments Regarding Emission/Noise Effects of the Proposals				
<u>Concern about noise and pollution</u> Comments expressing concern regarding the noise and pollution generated by the NDR	<u>General concern about noise/pollution</u> General comments expressing concern regarding the noise and pollution generated by the NDR but not identifying any specific location	85	Assessments of Noise and Air Quality are contained in Volume 1 Chapter 4 and 11 of the Environmental Statement (Document Ref 6.1).	No
Comments expressing concern regarding the noise and pollution generated by the NDR	<u>NDR will increase CO2 emissions</u> Comments expressing concern that the NDR will increase CO2 emissions and that this was contrary to government emission reduction targets	29	Climate change is one of the topics considered in the Environmental Impact Assessment (EIA) process. These assessments are included in Volume 1 Chapter 5 of the Environmental Statement (Document Ref 6.1). The assessment shows a slight increase in carbon emissions with the NDR, but this needs to be considered within the wider context of NATS which will enable other sustainable travel modes to be introduced.	No
	<u>Health risk to those near NDR</u> Comments expressing concern that traffic emissions will be a health risk to those living close to the NDR	4	Assessments of Noise and Air Quality are contained in Volume 1 Chapter 4 and 11 of the Environmental Statement (Document Ref 6.1).	No
	<u>Loss of vegetation will reduce air quality</u> Comment suggesting that the loss of	1	Assessments of Noise and Air Quality are contained in Volume 1 Chapter 4 and 11 of the	No

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	vegetation resulting from the proposals will reduce air quality		Environmental Statement (Document Ref 6.1).	
	<u>Need low noise surfacing</u> Comments suggesting that the NDR carriageway should utilise a low noise surface	1	The exact specification for surfacing will be considered at the detailed design stage, although at this current time the intention is to use a low noise carriageway surface.	No
	<u>Need sound proof hoarding on top of verges/embankments</u> Comments suggesting sound proof hoarding should be provided on top of verges/embankments	1	Assessments of Noise and Air Quality are contained in Volume 1 Chapter 4 and 11 of the Environmental Statement (Document Ref 6.1).	No
	<u>No noise/emission information available</u> Comments that at the time of the consultations there was no information available regarding predicted noise/emissions generated by the NDR	1	Assessments of Noise and Air Quality are contained in Volume 1 Chapter 4 and 11 of the Environmental Statement (Document Ref 6.1). Detailed information was not available at the time of consultation. However, the PEIR provided preliminary assessment information.	No
<u>Noise/pollution affects on specific</u>	<u>Concern about noise/pollution effects on Thorpe End</u>	9	Assessments of Noise and Air Quality are contained in Volume 1 Chapter 4 and 11 of the Environmental Statement (Document Ref 6.1).	No

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<p><u>Locations</u> Comments regarding the effects of noise/pollution on specific locations</p>	<p><u>Concern about noise/pollution effects on Rackheath</u></p>	9	<p>Assessments of Noise and Air Quality are contained in Volume 1 Chapter 4 and 11 of the Environmental Statement (Document Ref 6.1).</p>	No
	<p><u>Concern about noise/pollution effects on Plumstead Road</u></p>	6	<p>Assessments of Noise and Air Quality are contained in Volume 1 Chapter 4 and 11 of the Environmental Statement (Document Ref 6.1).</p>	No
	<p><u>Concern about noise/pollution effects on Spixworth</u></p>	6	<p>Assessments of Noise and Air Quality are contained in Volume 1 Chapter 4 and 11 of the Environmental Statement (Document Ref 6.1).</p>	No
	<p><u>Concern about noise/pollution effects on Thorpe Marriott</u></p>	4	<p>Assessments of Noise and Air Quality are contained in Volume 1 Chapter 4 and 11 of the Environmental Statement (Document Ref 6.1).</p>	No
	<p><u>Concern about noise/pollution effects on Reepham Road</u></p>	4	<p>Assessments of Noise and Air Quality are contained in Volume 1 Chapter 4 and 11 of the Environmental Statement (Document Ref 6.1).</p>	No
	<p><u>Concern about noise/pollution effects in Horsford</u></p>	3	<p>Assessments of Noise and Air Quality are contained in Volume 1 Chapter 4 and 11 of the Environmental Statement (Document Ref 6.1).</p>	No
	<p><u>Concern about noise/pollution effects on Drayton</u></p>	3	<p>Assessments of Noise and Air Quality are contained in Volume 1 Chapter 4 and 11 of the Environmental Statement (Document Ref 6.1).</p>	No

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	<u>Concern about noise/pollution effects on properties near Buxton Road Bridge</u>	2	Assessments of Noise and Air Quality are contained in Volume 1 Chapter 4 and 11 of the Environmental Statement (Document Ref 6.1).	No
	<u>Concern about noise/pollution effects in Drayton/Taverham</u>	2	Assessments of Noise and Air Quality are contained in Volume 1 Chapter 4 and 11 of the Environmental Statement (Document Ref 6.1).	No
	<u>Concern about noise/pollution effects on Postwick</u>	2	Assessments of Noise and Air Quality are contained in Volume 1 Chapter 4 and 11 of the Environmental Statement (Document Ref 6.1).	No
	<u>Concern about noise/pollution effects in Old Catton</u>	2	Assessments of Noise and Air Quality are contained in Volume 1 Chapter 4 and 11 of the Environmental Statement (Document Ref 6.1).	No
	<u>Concern about noise/pollution effects in Lt Plumstead</u>	1	Assessments of Noise and Air Quality are contained in Volume 1 Chapter 4 and 11 of the Environmental Statement (Document Ref 6.1).	No
	<u>Concern about noise/pollution effects in Witton</u>	1	Assessments of Noise and Air Quality are contained in Volume 1 Chapter 4 and 11 of the Environmental Statement (Document Ref 6.1).	No
	<u>Concern about noise/pollution effects in Hellesdon</u>	1	Assessments of Noise and Air Quality are contained in Volume 1 Chapter 4 and 11 of the Environmental Statement (Document Ref 6.1).	No

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			Environmental Statement (Document Ref 6.1).	

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Category of Response	Typical Comments	No of Comments	Regard Given to Response	Design Change
Comments Regarding Traffic Effects Issues on Specific Roads				
<u>NDR affects on Fakenham Road</u> Comments expressing concern about the effects on Fakenham Road	<u>Increased traffic on Fakenham Road</u> Comments expressing concern that the proposals will increase traffic flow on Fakenham Road through Taverham and Drayton	20	Traffic flows are predicted to decrease on Fakenham Road through Taverham and Drayton with an NDR, refer to Appendix I of the Traffic Forecasting Report (Document Ref 5.6).	No
Comments expressing concern about the effects on Fakenham Road	<u>Fakenham Road needs improving</u> Comments suggesting that Fakenham Road needs improving including a suggestion for traffic signals where it meets the NDR	2	As flows on Fakenham Road are predicted to reduce as a result of the NDR. There are no proposals for improvement to this road as part of the application.	No
<u>NDR affects on routes between Taverham/Drayton and Costessey/East on</u> Comments expressing concern about the effects on routes between the A1067 and	<u>Increased traffic through Ringland Hills</u> Comments expressing concern that the proposals will increase traffic/rat running on routes through Ringland Hills and affecting the environment here. Comments include requests for speed limits	19	Traffic flows are predicted to decrease on Ringland Road with an NDR, refer to Appendix I of the Traffic Forecasting Report (Document Ref 5.6).	No
Comments expressing concern about the effects on routes between the A1067 and	<u>Increased traffic on Beech Avenue</u> Comments expressing concern that the proposals will increase traffic flow/rat running on Beech Avenue which is a residential road containing a school. Comments include	8	Traffic flows are predicted to decrease on Beech Avenue with an NDR, refer to Appendix I of the Traffic Forecasting Report (Document Ref 5.6).	No

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A47	<p>suggestion to make Beech Avenue as access only</p> <p><u>Increased traffic through Costessey</u> Comments expressing concern that the proposals will increase traffic flow/rat running on West End, The Street, Folgate Lane and Longwater Lane through Costessey. Comments include suggestion for more traffic calming to discourage this</p>	6	<p>Traffic flows are generally predicted to decrease on these roads with an NDR, refer to Appendix I of the Traffic Forecasting Report (Document Ref 5.6).</p>	No
<p><u>NDR affects on Fakenham Road/Beech Avenue/For Covert Road Junction</u> Comments expressing concern about the effects on the Fakenham Road/Beech Avenue/For Covert Road</p>	<p><u>Increased traffic through Fakenham Road/Beech Avenue/Fir Covert Road Junction</u> Comments expressing concern that the proposals will increase traffic flow/rat running through this junction which is already dangerous. Comments also suggest improvements here, such as a roundabout or traffic signals</p>	8	<p>Traffic flow on the A1067 is predicted to decrease with an NDR and flows on Fir Covert Road remain similar or lower. See Appendix I to the Traffic Forecasting Report (Document Ref 5.6) for forecast traffic flows. There is a potential proposal for a superstore at this location which will improve the existing junction by signalling it and installing pedestrian and cycle facilities.</p>	No

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Category of Response	Typical Comments	No of Comments	Regard Given to Response	Design Change
Junction				
<u>NDR affects on Plumstead Road through Thorpe End</u> Comments expressing concern about the effects on Plumstead Road, particularly through Thorpe End	<u>Increased traffic through Thorpe End</u> Comments expressing concern that the proposals will increase traffic flow/rat running on Plumstead Road through Thorpe End <u>Plumstead Road will be difficult to cross</u> Comments expressing concern that Plumstead Road will be difficult to cross	13	Traffic modelling indicates that flows will reduce at this location with an NDR. See Appendix I to the Traffic Forecasting Report (Document Ref 5.6) for forecast traffic flows.	No
	<u>Need traffic calming in Thorpe End</u> Comments suggesting that traffic calming is needed on Plumstead Road through Thorpe End	1	Whilst the traffic modelling is showing a slight reduction in traffic flow on Plumstead Road through Thorpe End, the proposals include a new footway on the north side. This will allow pedestrians in this area to access the existing pedestrian crossing near the village shops.	No
	<u>Modelled predictions for Plumstead Road not accepted</u> Comments that the modelled traffic flow predictions for Plumstead Road are not accepted.	1	Traffic modelling indicates that flows will reduce slightly at this location with an NDR. See Appendix I to the Traffic Forecasting Report (Document Ref 5.6) for forecast traffic flows. Traffic calming is not proposed.	No
		1	The traffic model used to assess the impact of the NDR scheme has recently been updated using new origin/destination and traffic count data from autumn 2012. This base model has been calibrated and validated in accordance with Government guidelines.	No

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<p><u>NDR affects on Holt Road through Horsford</u> Comments expressing concern about the effects on Holt Road, particularly through Horsford</p>	<p><u>Increase traffic through Horsford</u> Comments expressing concern that the proposals will increase traffic flow/rat running on Holt Road through Horsford</p> <p><u>Need traffic calming through Horsford</u> Comments suggesting traffic calming on Holt Road through Horsford</p>	<p>10</p>	<p>Traffic flows are predicted to increase through Horsford with an NDR. See Appendix I to the Forecasting Report (Document Ref 5.6) for forecast traffic flows. This reflects traffic which is currently using rural orbital routes switching to the NDR and using routes such as the B1149 through Horsford to access the NDR.</p> <p>Traffic calming through Horsford does not form part of the application proposals. However, the applicant has given a commitment to monitor vehicles flows/speeds post NDR implementation with a view to considering such measures if appropriate.</p>	<p>No</p>
	<p><u>Need weight restriction through Horsford</u> Comments suggesting a weight restriction on Holt Road through Horsford</p>	<p>2</p>	<p>The County Council has a Route Hierarchy network which classifies roads according to their function and level of use. This was developed following assessments of roads and public consultations during the 1990's and early 2000's. Within this Route Hierarchy, Holt Road is designated a Main Distributor Route and classified a B road. Its function is therefore identified as being a distributor of local through traffic and the provision of a weight restriction would prevent the fulfilment of this. Therefore a</p>	<p>No</p>

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<u>NDR affects on Reepham Road</u> Comments expressing concern about the effects on Reepham Road	<u>Increased traffic on Reepham Road</u> Comments expressing concern that the proposals will increase traffic flow/rat running on Reepham Road, including through Hellesdon	8	weight restriction is not considered appropriate. Traffic flows are predicted to increase on Reepham Road through Hellesdon with an NDR. This was looked at previously and with support from the parish council a roundabout was provided for the Fakenham Road/NDR junction although this was not as effective in reducing flows on Reepham Road as some of the other measures that were considered which included traffic calming. See Appendix I to the Traffic Forecasting Report (Document Ref 5.6) for forecast traffic flows.	No
	<u>Need traffic calming through Hellesdon</u> Comments suggesting traffic calming on Reepham Road through Hellesdon	2	The possibility of traffic calming on Reepham Road through Hellesdon was suggested to the local community but the provision of the Fakenham Road/NDR roundabout was the more favoured option.	No
	<u>Need pedestrian crossing Hellesdon</u> Comments suggesting a pelican crossing across Reepham Road between Woodview Road and Gowing Road	1	The demand for pedestrians needing to cross, at this location, would need to be considered and prioritised by Norfolk County Council alongside other requests for highway improvements.	No
<u>NDR affects on</u>	<u>Increased traffic on Wroxham Road</u>	9	Traffic flows are predicted to increase on	No

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Category of Response	Typical Comments	No of Comments	Regard Given to Response	Design Change
<p><u>Wroxham Road</u> Comments expressing concern about the effects on Wroxham Road, including through Wroxham/Hove ton</p>	<p>Comments expressing concern that the proposals will increase traffic flow/rat running on Wroxham Road, including through Wroxham/Hoveton</p>		<p>Wroxham Road close to the NDR and this is to be expected as it reflects traffic using Wroxham Road to access the NDR. See Appendix I to the Traffic Forecasting Report (Document Ref 5.6) for forecast traffic flows.</p> <p>Traffic flows at the bridge in Wroxham/Hoveton are very similar with and without an NDR indicating that it is essentially beyond the influence of the scheme.</p>	
	<p><u>Need to improve Wroxham Road/Beeston Lane junction</u> Comments suggesting that the Wroxham Road/Beeston Lane junction needs to be improved</p>	2	<p>Beeston Lane is access only and so has very few traffic movements in and out. The NDR is unlikely to change this position.</p>	No
	<p><u>Need more footways on Wroxham Road</u> Comments suggesting that more footways are needed on Wroxham Road between the Park and Ride site and Sprowston</p>	1	<p>A shared use footway is already provided on the northwest side of Wroxham Road linking the built up area of Sprowston with the Park and Ride site.</p>	No
	<p><u>Increase flooding on Wroxham Road</u> Comments suggesting the increased development will result in flooding of</p>	1	<p>The NDR is proposed to be drained by a comprehensive and sustainable drainage system. The capacity of the systems makes allowance for the climate change.</p>	No

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	Wroxham Road			
	<u>No one will visit Wroxham</u> Comments suggesting that the development in Norwich and surrounding countryside no one will want to visit Wroxham	1	Wroxham is a key tourist destination and therefore it is unlikely that no one would want to visit Wroxham.	No
<u>NDR affects on other radial routes</u> Comments expressing concern about the effects on the radial routes into and out of Norwich	<u>Increase traffic on Cromer Road</u> Comments expressing concern that the proposals will increase traffic flow on Cromer Road	4	Traffic flows are predicted to decrease on Cromer Road, in the built up area near the Outer Ring Road, with an NDR. See Appendix I to the Traffic Forecasting Report (Document Ref 5.6) for forecast traffic flows. This reflects traffic wishing to access external destinations changing behaviour by travelling out to the NDR rather than travelling through the built up area.	No
	<u>Increase traffic on North Walsham Road</u> Comments expressing concern that the proposals will increase traffic flow on North Walsham Road	2	Traffic flows are predicted to increase on North Walsham Road north of the NDR and this is to be expected as it reflects traffic using North Walsham Road to access the NDR. However, south of the NDR traffic flows are predicted to decrease. See Appendix I to the Traffic Forecasting Report (Document Ref 5.6) for forecast traffic flows.	No
	<u>Increase traffic on Salhouse Road</u>	2	Traffic flows are predicted to increase on	No

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	Comments expressing concern that the proposals will increase traffic flow on Salhouse Road		Salhouse Road north and south of the NDR and this is to be expected as it reflects traffic using it to access the NDR. However, on Salhouse Road in the built up area traffic flows are predicted to decrease. This reflects traffic wishing to access external destinations changing behaviour by travelling out to the NDR rather than travelling through the built up area. See Appendix I to the Traffic Forecasting Report (Document Ref 5.6) for forecast traffic flows.	
<u>NDR affects on Drayton Wood Road</u> Comments expressing concern about the effects on Drayton Wood Road in Hellesdon	<u>Increase traffic on Drayton Wood Road</u> Comments expressing concern that the proposals will increase traffic flow/rat running on Drayton Wood Road, in Hellesdon	7	Drayton Wood Road is not represented in the traffic model. However, it is recognised that it is currently used as a rat-run between Reepham Road and Drayton High Road and so vehicle flows/speeds post NDR implementation would be monitored with a view to considering traffic management measures if deemed appropriate.	No
<u>NDR affects on Middletons Lane</u>	<u>Increase traffic on Middletons Lane</u> Comments expressing concern that the proposals will increase traffic flow on	3	Traffic flows on Middleton's Lane are predicted to decrease with an NDR. See Appendix I to the Traffic Forecasting Report (Document Ref 5.6)	No

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Comments expressing concern about the effects on Middletons Lane in Hellesdon	<p>Middletons Lane, in Hellesdon</p> <p><u>Improve the Middletons Lane/A1067 junction</u></p> <p>Comments suggesting that the Middletons Lane/A1067 Drayton High Road junction will need improving</p>	2	<p>for forecast traffic flows.</p> <p>As flows on Middletons Lane are predicted to reduce as a result of the NDR there are no proposals for improvements to this road as part of the application. However, the applicant will monitor the affects of the NDR on this road with a view to considering improvements if deemed appropriate.</p>	No
	<p><u>Need more crossings of Middletons Lane</u></p> <p>Comments suggesting more pedestrian crossings are needed on Middletons Lane</p>	1	<p>As flows on Middletons Lane are predicted to reduce as a result of the NDR there are no proposals for improvements to this road as part of the application. However, the applicant will monitor the affects of the NDR on this road with a view to considering improvements if deemed appropriate.</p>	No
<p><u>NDR affects on Thorpe Marriott</u></p> <p>Comments expressing concern about the effects on routes through</p>	<p><u>Increase traffic in Thorpe Marriott</u></p> <p>Comments expressing concern that the proposals will increase traffic flow on routes through Thorpe Marriott</p>	5	<p>Traffic flows on Pendlesham Rise in Thorpe Marriott are predicted to decrease with an NDR. See Appendix I to the Traffic Forecasting Report (Document Ref 5.6) for forecast traffic flows.</p>	No

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Thorpe Marriott				
<p><u>NDR affects on Green Lane West</u> Comments expressing concern about the effects on Green Lane West through Rackheath</p>	<p><u>Stop HGVs on Green Lane West</u> Comments expressing concern about the current use of Green Lane West through Rackheath by HGVs and that this needs to be prevented</p>	2	<p>Green Lane West, between its junction with Salhouse Road and Newman Road, already has a 7.5T weight restriction to protect this road from through HGV movements and ensure that HGVs access the industrial estate (located towards the north western end of this road) via Wroxham Road. However, comment has been made that the weight restriction is abused. The NDR will provide a high standard alternative to Green Lane West allowing HGVs to more easily access the industrial estate via Wroxham Road.</p>	No
<p><u>NDR affects on Fifers Lane/St Fairs Road junction</u> Comments expressing concern about the effects on the Fifers Lane/St Fairs Road junction</p>	<p><u>Increase traffic through the Fifers Lane/St Fairs Road junction</u> Comments expressing concern that the proposals will increase traffic flow on routes through the Fifers Lane/St Fairs Road junction <u>Need separate airport access</u> Comments suggesting that a separate access to the airport is needed from the NDR to reduce traffic on Fifers Lane</p>	1	<p>Traffic flows on Fifers Lane and St Fairs Road are predicted to decrease with an NDR. See Appendix I to the Traffic Forecasting Report (Document Ref 5.6) for forecast traffic flows.</p>	No
<p><u>NDR affects on Fifers Lane/St Fairs Road junction</u> Comments expressing concern about the effects on the Fifers Lane/St Fairs Road junction</p>	<p><u>Need separate airport access</u> Comments suggesting that a separate access to the airport is needed from the NDR to reduce traffic on Fifers Lane</p>	2	<p>Access to the airport is provided from the NDR but this will not be for passenger traffic. It is unlikely that the operator would reconfigure the airport to make this possible.</p>	No

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<p><u>Other roads identified</u> Comments expressing concern regarding the effects of the NDR on other roads</p>	<p><u>Increase traffic on B1108 Watton Road</u> Comments expressing concern that the proposals will increase traffic flow on the B1108 Watton Road through Colney</p>	1	<p>Traffic flows on the B1108 Watton Road (between Hethersett Lane and Colney Lane) are predicted to decrease slightly with an NDR.</p>	No
	<p><u>Increase traffic on Brands Lane/Bilney Lane</u> Comments expressing concern that the proposals will increase traffic flow on Brands Lane/Bilney Lane in the parish of Felthorpe, including a request that this road be made access only</p>	1	<p>Traffic flows on Brands Lane/Bilney Lane are predicted to decrease with an NDR</p>	No
	<p><u>Increase traffic on Broad Lane</u> Comments expressing concern that the proposals will increase traffic flow on Broad Lane (between Hare Road and Water Lane) in the parish of Gt and Lt Plumstead, including a request that this road be made access only</p>	2	<p>This section of Broad Lane is not in the traffic model. The applicant will monitor vehicles flows on this road post NDR implementation, with a view to considering an access only restriction if deemed appropriate.</p>	No
	<p><u>Increase traffic through Spixworth</u> Comments expressing concern that the proposals will increase traffic flow/rat running on Crostwick Lane through Spixworth</p>	1	<p>Crostwick Lane is a route that is currently being used for orbital journeys around Norwich and so traffic flows on it are predicted to decrease with an NDR. See Appendix I to the Traffic Forecasting Report (Document Ref 5.6) for</p>	No

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Category of Response	Typical Comments	No of Comments	Regard Given to Response	Design Change
			forecast traffic flows.	
	<p><u>Increase traffic on Fakenham Road through Lenwade and Morton on the Hill</u> Comments expressing concern that the proposals will increase traffic flow on Fakenham Road through Lenwade and Morton on the Hill, including concern with the safety of junction here and better enforcement of speed limits</p>	2	<p>Traffic flows on Fakenham Road through Lenwade and Morton on the Hill are predicted to increase with an NDR. This is partly as a result of some traffic choosing this route for destinations towards King's Lynn in preference to the A47.</p>	No
	<p><u>Increase traffic through Felthorpe</u> Comments expressing concern that the proposals will increase traffic flow on The Street through Felthorpe</p>	3	<p>Traffic flows on The Street through Felthorpe are predicted to decrease with an NDR. See Appendix I to the Traffic Forecasting Report (Document Ref 5.6) for forecast traffic flows.</p>	No
	<p><u>Increase traffic on Felthorpe Road</u> Comments expressing concern that the proposals will increase traffic flow on Felthorpe Road through Attlebridge</p>	2	<p>Felthorpe Road is not represented in the traffic model but the applicant would expect the impact of the NDR to be the same as for The Street in Felthorpe where decreases are predicted with an NDR.</p>	No
	<p><u>Increase traffic through the Reepham Road/Fir Covert Road junction</u> Comments expressing concern that the proposals will increase traffic flow through</p>	1	<p>Overall traffic flows through the Reepham Road/Fir Covert Road junction are predicted to decrease with an NDR in place.</p>	No

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Category of Response	Typical Comments	No of Comments	Regard Given to Response	Design Change
	<p>the Reepham Road/Fir Covert Road junction, including requests for this to be improved</p> <p><u>Increase traffic on route between Hockering and Lenwade</u></p> <p>Comments expressing concern that the proposals will increase traffic flow on the route between the A47 at Hockering and the A1067 at Lenwade, suggesting that the route is unsuitable for HGVs</p>	1	<p>Traffic flows increase overall by 33% in 2017 and 42% in 2032 on the routes between the A1067 and the A47 in the Hockering and Lenwade area with an NDR, though traffic levels reduce on the link roads in the Taverham and Costessey area, refer to paragraphs 7.1.8 to 7.1.14 in the Traffic Forecasting Report (Document Ref 5.6).</p> <p>The demand for travel by HGV's in the Lenwade / Hockering area is acknowledged and a scheme is underway which improves a route to make it suitable for HGV's and this uses Wood Lane in the south.</p>	No
	<p><u>Flooding on Low Road</u></p> <p>Concern that Low Road floods and the NDR crossing the road removes the alternatives exit route</p>	1	<p>This issue will be referred to Norfolk County Council's highway maintenance engineer for this area so that the adequacy of highway drainage in this area can be reviewed.</p>	No

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Category of Response	Typical Comments	No of Comments	Regard Given to Response	Design Change
Comments Regarding Land/ Property Effects of the Proposals				
<u>Loss of agricultural land</u> Comments expressing concern regarding the area of agricultural land lost to the scheme	<u>Loss of agricultural land</u> Comments expressing concern regarding the area of agricultural land lost to the scheme	22	The loss of productive agricultural land and commitments regarding the minimisation of impacts to soils are detailed in Volume 1 Chapter 13 and Volume 1 Chapter 9 of the Environmental Statement (Document Ref 6.1).	No
<u>Impact on property</u> Comments expressing concern regarding the impact on individual properties	<u>NDR will devalue properties</u> Comments suggesting that the prospect of the NDR has/will devalue properties	8	Under Part 1 of the Land Compensation Act 1973, at the appropriate time, compensation can be sought by people who own and also occupy certain property that has been reduced in value by physical factors caused by the use of a new or altered road but have not had any land acquired for the scheme itself.	No
	<u>Unable to sell property</u> Comments from individuals suggesting that the prospect of the NDR has meant that they	4	Under Part 1 of the Land Compensation Act 1973, at the appropriate time, compensation can be sought by people who own and also occupy	No

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	<p>have been unable to sell their properties</p>		<p>certain property that has been reduced in value by physical factors caused by the use of a new or altered road but have not had any land acquired for the scheme itself.</p>	
	<p><u>Request for compensation</u> Comments from individuals identifying that they want/will be seeking compensation for the effects of the NDR</p>	<p>2</p>	<p>Under Part 1 of the Land Compensation Act 1973, at the appropriate time, compensation can be sought by people who own and also occupy certain property that has been reduced in value by physical factors caused by the use of a new or altered road but have not had any land acquired for the scheme itself.</p>	<p>No</p>

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Category of Response	Typical Comments	No of Comments	Regard Given to Response	Design Change
Comments Regarding Suggested Changes (not detailed elsewhere in analysis)				
Other on-line changes Suggested changes to the proposals not detailed elsewhere in the analysis	<u>Lower Speed Limit on NDR</u> Suggestion that the speed limit on the NDR should be lower (i.e. 50mph or 60mph)	4	Lowering the speed limit would reduce the capacity of the NDR and not necessarily improve its safety. The NDR alignment is designed for national speed limit standard.	No
	<u>Lower speed limits on entering NDR</u> Comments suggesting that lower speed limits should be provided on the radial routes joining the NDR	2	The speed limits on the radial routes adjacent to the NDR have been revised and amended where considered appropriate.	No
	<u>Roundabout at Fakenham Road junction</u> Comments suggesting that a roundabout junction should be provided where the NDR joins the A1067 Fakenham Road	1	The proposals include the provision of a roundabout junction where the NDR joins the A1067 Fakenham Road.	No
Other off-line changes	<u>Need gravel run-offs on roundabouts</u> Comments suggesting gravel run-offs should be provided on the roundabouts to catch drivers travelling too fast	1	The applicant is not aware of these being provided at other roundabouts and does not consider them to be appropriate for the proposed NDR roundabouts. The proposals have been subject to a Stage 1 Safety Audit and this was not raised as an issue.	No
	<u>Close Church Road at A47</u> Comments suggesting that Church Road in	3	One of the reasons for introducing the Middle Road Bridge was as a result of the options	No

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Category of Response	Typical Comments	No of Comments	Regard Given to Response	Design Change
Suggested improvements to the highway/transport infrastructure away from the main NDR proposals	Gt Plumstead should be closed at its junction with the A47 to discourage through traffic		available for accessing Gt Plumstead. Providing such a closure would reduce these options.	
	<u>Closures on Fir Covert Road</u> Comments suggesting alternative locations for closure points on Fir Covert Road	2	The applicant considers the provision of a 4 arm roundabout here as the most appropriate solution, particularly as traffic flow on Fir Covert Road is predicted to be similar or lower with the NDR. See Appendix I to the Traffic Forecasting Report (Document Ref 5.6) for forecast traffic flows.	No
	<u>Make Marriotts Way a tramway</u> Comments suggesting that Marriotts Way could be made into a tram routes into the city centre	2	Comments not related to the NDR proposals.	No
	<u>Keep traffic on radial routes</u> Comments suggesting that traffic should be kept on the main radial routes into and out of Norwich	1	The radial routes form part of the main road network and accordingly are generally classified as A or B roads. As a result these are the routes where the applicant would seek to place the majority of through traffic.	No
	<u>Review Salhouse Road speed limits</u> Comments suggesting that the speed limits along Salhouse Road are inconsistent and should be reviewed	1	Comments not related to the NDR proposals.	No

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	<u>Improve Marriotts Way surface</u> Comments suggesting that the surface of Marriotts Way should be improved	1	Comments not related to the NDR proposals.	No
	<u>Mini roundabout at Brick Kilns junction</u> Comments suggesting that the junction of Norwich Road and Salhouse Road (by the Brick Kilns public house) in Little Plumstead should be a mini roundabout	1	Road safety improvements have previously been undertaken at this junction. These have included visibility splay improvements, provision of a vehicle activated flashing sign and introduction of a 30mph speed limit. Side road flows are predicted to reduce as a result of the NDR. Therefore the provision of a mini roundabout is not proposed.	No
	<u>Protect resident residential areas</u> Comments suggesting that residential areas should be protected by rising bollards	1	This comment does not directly relate to the NDR proposals.	No
	<u>Grade Separated junctions on A47</u> Comments suggesting the A47 junctions with Cucumber Lane (at Brundall) and Dereham Road (at Easton) should be improved to grade separated junctions	1	This comment does not directly relate to the NDR proposals.	No
	<u>Review HGV signing on A47</u> Comments suggesting that the HGV signing	1	It is intended to review direction signing, including the signing for HGVs on the A47. This	No

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	<p>on the A47 at the Easton Roundabout should be reviewed/improved</p>		<p>will be considered as part of the detailed design.</p>	
	<p><u>Reposition bus stop at Reeves Corner</u> Comments suggesting new locations for the bus stops at the Broad Lane/Plumstead Road junction at Gt Plumstead.</p>	<p>1</p>	<p>The applicant will consider the potential relocation of bus stops at the detailed design stage, in conjunction with relevant bus operators.</p>	<p>No</p>

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Category of Response	Typical Comments	No of Comments	Regard Given to Response	Design Change
Comments Regarding Quality of Consultation/Exhibitions				
<u>Positive comments on consultation</u> Comments expressing satisfaction with the consultations undertaken	<u>Consultation was satisfactory</u> Comments suggesting that the consultation was satisfactory	1	Comments noted.	No
<u>Negative comments on consultation</u> Comments expressing dissatisfaction with the consultations undertaken	<u>Consultation area was inadequate</u> Comments suggesting that the consultation area was inadequate and should have been wider, including comments that it should have included the whole of Norwich, north Norfolk or the whole of Norfolk	25	Section 4.4 of this Report defines the applicant's rationale for choosing the consultation area and the subsequent consultations undertaken.	No
	<u>Consultation was inadequate</u> General comments that the overall consultation itself was inadequate, including the status of the NDR as an NSIP project changed during the consultation period	5	When the applicant commenced the statutory pre-application process, the NDR fell within the criteria for a NSIP under the Planning Act 2008. In order to obtain consent for the NDR, therefore, the applicant had to follow the Planning Act 2008 process. On 24 July 2013, the Highway and Railway (Nationally Significant	No

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			<p>Infrastructure Project) Order 2013 (S.I. 2013/1883) (the Highways Order) was made, coming into force on 25 July 2013. The Order amended Section 22 of the Planning Act 2008, so that a project such as the NDR would not (from 25 July 2013 onwards) fall within the definition of a NSIP.</p> <p>The applicant considered that the NDR was, nonetheless, of national significance. Accordingly, on 25 July 2013 the applicant submitted a qualifying request to the Secretary of State for a direction under section 35(1) of the Planning Act 2008 that the NDR was a project of national significance and so should be treated as development for which development consent was required. A Section 35 direction was made on 9 August 2013.</p>	
	<p><u>No consultation on whether a NSIP</u> Comments that there was no consultation on whether the NDR was a NSIP project or not</p>	5	<p>When the applicant commenced the statutory pre-application process, the NDR fell within the criteria for a NSIP under the Planning Act 2008.</p>	No
	<p><u>Not a consultation</u> Comments suggesting that it was not a consultation, but just a presentation</p>	2	<p>The consultation process allowed for various methods for members of the public to make their comments known. These included a paper copy questionnaire, an on-line questionnaire, by e-</p>	No

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	<p><u>No publicity of exhibitions</u> Comments suggesting that there was insufficient or no publicity of the exhibitions</p>	1	<p>mail, and by letter. Section 4.7 of this report details the exhibition publicity that the applicant undertook.</p>	No
	<p><u>Comments on PEIR</u> Comments stating that the PEIR missed important areas of environmental impact</p>	1	<p>Preliminary information included in the PEIR, provided initial, high level information on all environmental disciplines. It was not appropriate to provide full details on any aspects of the baselines or assessments, because at the time of consultation the most recent rounds of baselines surveys were still in progress, and hence accurate, detailed assessments not possible.</p>	No
	<p><u>No consultation on alternative routes</u> Comments stating that the consultation did not include details on alternative routes for people to comment upon</p>	1	<p>The consultation identified (under the heading 'What we will consult on') that responses could include "alternatives ways of meeting the need", the "alignment" of the NDR and "the route of the NDR". It was open to consultees to include alternative routes if they so wished. Where alternatives have been suggested the applicant has considered them.</p>	No
	<p><u>Premature to consult on NDR</u></p>	1	<p>The relationship between the NDR and planned</p>	No

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	Comments that it was premature to consult on the NDR when the public inquiry of the JCS had not reached a verdict		growth in the Joint Core Strategy (JCS) is detailed in Volume 1 Chapters 2 and 3 of the Environmental Statement (Document Ref 6.1).	
<u>Positive comments on the exhibitions</u>	<u>Exhibitions were good</u> Comments that the exhibitions were good	20	Comments noted.	No
Comments expressing satisfaction with the public exhibitions	<u>Exhibition staff were helpful</u> Comments that those staffing the exhibitions were helpful	2	Comments noted. The exhibitions were generally staffed by between 5 and 8 representatives of the applicant, depending on the expected level of attendance.	No
	<u>Exhibition venues were good</u> Comments that the exhibition venues were good	1	Comments noted.	No
	<u>Exhibition content was good</u> Favourable comments on the maps and video presented at the exhibition	1	Comments noted.	No
<u>Negative comments on the exhibitions</u>	<u>Video missed western</u> Comments that the video presented at the exhibitions had the western end (between Fir Covert Road and Fakenham Road missing)	2	The applicant made a decision not to include the final section of the NDR video (between Fir Covert Road and Fakenham Road) presented at the exhibitions. This was because the applicant was consulting on an alternative option of a single carriageway here and did not want to be	No
Comments expressing dissatisfaction				

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Category of Response	Typical Comments	No of Comments	Regard Given to Response	Design Change
with the public exhibitions	<p><u>Video did not show houses</u> Comments that the video and cross sections presented at the exhibitions did not show individual properties and buildings</p> <p><u>No Thorpe End Exhibition</u> Comments asking why there was no exhibition in Thorpe End</p> <p><u>Forum exhibition should be longer</u> Comments that the exhibition in The Forum should have been for more than one day</p> <p><u>People won't attend exhibitions</u> Comments suggesting that people live busy lives and won't attend exhibitions, door to door surveys should have been undertaken</p>	<p></p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>	<p>influencing people's views on this by showing either a dual carriageway or a single carriageway.</p> <p>The movie visualisation was based upon aerial photographs draped over a Digital Terrain Model of the existing landscape. Building outlines were created by extruding the building footprints taken from Master Map data, only some buildings were modelled which were near to the proposals as there are limits to the amount of geometry within the model.</p> <p>The rationale for selection of public exhibitions is detailed in Section 4.4 of this report.</p> <p>The applicant recognised that The Forum in the centre of Norwich was an important venue and therefore wanted to hold an exhibition here. The availability of The Forum meant that it was not available to book for a longer period.</p> <p>The rationale for selection of public exhibitions is detailed in Section 4.4 of this report.</p>	<p></p> <p>No</p> <p>No</p> <p>No</p> <p>No</p>

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	instead			
	<u>Misled at exhibition</u> Comment that the person at the exhibition felt misled as he was told that the scheme would not go for clearance to build until 2015	1	The applicant cannot confirm the contents of the conversation at the exhibition. However, the exhibition display boards (shown in Appendix R-1 to R-4 of this report) gave a clear indication of the programmed timescales for the project.	No
	<u>No A47 to A1067 traffic flow data at exhibitions</u> Comments that there was no information available at the exhibitions regarding the modelled traffic flows between the A47 and A1067	1	Provisional modelled traffic flows were shown at the exhibitions for the future years of 2017 and 2032. Figures were shown at locations on Ringland Road, Taverham Lane and Costessey Lane, which are the roads forming the 3 main routes between the A47 and A1067 in this area. Further information is shown in Appendix I to the Traffic Forecasting Report (Document Ref 5.6).	No
<u>Comments on posted information</u> Comments on the quality of information posted to residents and	<u>Some letters delivered late</u> Comments that information letters advised of the exhibitions were received after the first exhibition	10	The issue of some residents of Rackheath receiving a consultation letter on the day of the first exhibition is discussed in Section 4.6 of this report. The applicant's response was to provide for an additional exhibition on 12 August 2013 (between 13:00 to 20:00) at the Holy Trinity Church in Rackheath. Letters notifying people of this new exhibition were sent to addresses within Rackheath Parish (Appendix K-5 of this	No

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stakeholders			report).	
	<u>Posted information was poor</u> Comments suggesting that the information sent to residents and stakeholders was poor	3	Copies of the information posted to Section 47 consultees are contained in Appendix K-2 of this report. The postal information was not intended to provide a full description of the proposals but summary of them, and encourage consultees to visit a public exhibition or view the information online.	No
<u>Consultation</u> <u>other</u> <u>comments</u> Other comments relating to the consultation process	<u>Already decided scheme would proceed</u> Comments that a decision has already been made to move forward with the NDR	3	The applicant's Cabinet decided on 3 December 2012 to move forward with the NDR as a NSIP. The NSIP process has a built-in requirement for pre-application consultation. The applicant has undertaken that consultation and has considered the results at a Cabinet meeting on 4 November 2013 before taking a decision to make this application.	No
	<u>Comments will be ignored</u> Comments suggesting that the responses received during the consultation will be ignored	3	Comments received to the consultation, together with the regard the applicant has given to them, are summarised in this consultation report.	No

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	<p><u>Decisions made before end of consultation</u> Comments suggesting that decisions on the NDR are being made before the end of the consultation</p>	1	<p>An update report on the NATS Implementation Plan and the NDR was considered by the applicant's Cabinet meeting of 4 November 2013, which outlined the results from the Section 47 consultations. This sought agreement for a DCO for the finalised NDR scheme to be submitted. The applicant is not aware of any other decision making process made before the end of consultation.</p>	No
	<p><u>Request to not be consulted in future</u> Comments requesting not to be consulted on the NDR proposals in future</p>	2	<p>Comments noted.</p>	No

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Category of Response	Typical Comments	No of Comments	Regard Given to Response	Design Change
Request for Information				
<u>Requests for Information</u>	<u>Requests for Information</u> Requests received for further information on the scheme following the exhibitions and consultations.	40	The applicant intends to continue contact with the local community, as the NDR scheme progresses.	No

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Category of Response	Typical Comments	No of Comments	Regard Given to Response	Design Change
Other Comments				
<u>A47 comments</u> Comments regarding the A47 not detailed elsewhere in analysis	<u>Acle Straight is dangerous</u> Comments suggesting that the A47 between Acle and Great Yarmouth is dangerous	1	Comments not related to the NDR proposals.	No
<u>General Development comments</u> Comments on general development in Norfolk and North Norwich	<u>Reinvestment in existing development is needed rather than new development</u> Comments suggesting that money should be spent on re-investment in existing development rather than on building new developments <u>Proposed scale of development is too large</u> Comments suggesting that development may be needed however not at the scale proposed north of Norwich	2	Comments not related to the NDR proposals.	No
		11	Comments not related to the NDR proposals.	No

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	<u>Do not need more business parks</u> Comments suggesting that Norwich already has enough business parks on its outskirts	1	Comments not related to the NDR proposals.	No
	<u>General development not needed</u> Comments stating that no development is needed in and around Norwich	9	Comments not related to the NDR proposals.	No
	<u>Developments at Beeston and White House Farm will increase traffic</u> Comments suggesting that developments north of Norwich will increase traffic in the area	1	These developments are part of the planned growth set out in existing planning permissions and the adopted Joint Core Strategy for the Norwich area. They are likely to increase traffic in the local area and this has been taken into account in the NDR modelling predictions.	No
	<u>Will make Norwich less attractive</u> Comments suggesting that development around Norwich will make it a less attractive place to live or visit.	1	An aim of NATS is to reduce the dominance of traffic in certain areas of Norwich city centre, where there is a conflict between pedestrians and vehicles. By doing this the experience for shopper/visitors can be improved and space created for them to enjoy.	No

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	<p><u>Will increase traffic in Hellesdon Hospital area</u> Comments suggesting that new development will increase traffic on the A1067 near Hellesdon Hospital</p>	1	<p>Traffic on the A1067 near Hellesdon Hospital will increase as development occurs but is predicted to decrease with an NDR in place. See Appendix I to the Traffic Forecasting Report (Document Ref 5.6) for forecast traffic flows.</p>	No
	<p><u>Development should take place on brown field sites instead</u> Comments suggesting that new development should take place on brown field sites rather than existing countryside</p>	2	<p>Comments not related to the NDR proposals.</p>	No
	<p><u>Other ways to development in a more ecologically friendly way</u> Comments suggesting there is generally other ways to introduce new development in a more ecologically friendly way</p>	1	<p>Comments not related to the NDR proposals.</p>	No
<p><u>Other Transport Comments</u> Comments regarding</p>	<p><u>Airport and Train station need better transport frameworks</u> Comments suggesting that the airport and train station in Norwich need better transport frameworks</p>	1	<p>Comments not related to the NDR proposals.</p>	No

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transport not detailed elsewhere in analysis	<p><u>Viability and financial strength of the Airport</u> Comments questioning Norwich Airport's viability and financial strength</p> <p><u>Salhouse Railway Station should be relocated further into the village</u> Comments suggesting that Salhouse Railway Station should be moved closer to the main part of the village</p> <p><u>Park and Ride site at Wroxham Road been ignored in the proposal for an orbital road</u> Comments stating that the park and ride site on Wroxham Road has not been considered in the proposal for an orbital road</p>	1	Comments not related to the NDR proposals.	No
<u>Other general NDR comments</u> Comments regarding the	<p><u>Residents access through to Felthorpe, Aylsham etc now more logical</u> Comments suggesting that the latest NDR proposals will improve residents access to Felthorpe and Aylsham</p>	1	<p>Comments not related to the NDR proposals.</p> <p>The alternative of an inner orbital link road using routes through proposed development considered as Alternative No 5 in the need and alternatives case (Volume 1 Chapter 3 of the Environmental Statement (Document Ref 6.1)).</p> <p>Comments noted.</p>	No

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NDR not detailed elsewhere in analysis	<p><u>Unhappy that NDR has been published in 2014 AA Atlas</u></p> <p>Comments stating that the NDR route should not be shown in the AA Atlas before planning permission is granted</p> <p><u>Meeting Request</u></p> <p>Comments requesting a meeting to discuss the NDR proposals</p>	1	This is an issue for the AA. The applicant has not instructed/requested for the NDR to be shown on this atlas.	No
	<p><u>Already bought land at Gazebo Farm before planning</u></p> <p>Comments stating that land at Gazebo Farm should not have been bought by the contractors before planning permission is granted</p>	2	The applicant has endeavoured to hold meetings with interested parties before, during and after the formal pre-application consultations when requested. Details of the meetings held since the start of the pre-application consultations are detailed in Section 4.10 of this report.	No
	<p><u>Already bought land at Gazebo Farm before planning</u></p> <p>Comments stating that land at Gazebo Farm should not have been bought by the contractors before planning permission is granted</p>	1	When the preferred route for the NDR was adopted directly affected land owners had the ability to serve a blight notice. Given that the route passed very close to Gazebo Farm Bungalow a decision was taken by Birse (the proposed contractor for the works) to purchase this property for use as a potential site office. This decision was taken with the knowledge that if blight had been served it would most likely have been successful.	No

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	<p><u>Won't be concerned by the time it is open</u> Comments stating that the NDR will not be of concern by the time the NDR is built and open to traffic</p>	1	<p>Comments noted. The applicant has a current proposed construction start date of spring 2015.</p>	No
	<p><u>Questioning data that states 70% of local people want NDR</u> Comments expressing doubt on the data which suggests 70% of local people want the NDR</p>	1	<p>The 2003 consultations into NATS (see Section 3.2), which included a Northern Distributor Road between the A47 to the east of Norwich and the A47 to the west of Norwich, identified 78% of responses in favour of the road.</p>	No
	<p><u>Does the scheme meet public policy</u> Comments questioning whether the NDR meets public policy</p>	1	<p>Section 2.3 of this report details how NATS, has given regard to government policies.</p>	No
	<p><u>Will have an adverse affect on Norwich during construction</u> Comments suggesting that there will be an adverse affect on Norwich while the NDR is being constructed</p>	1	<p>Whilst this is an issue of construction of the NDR, every effort would be made to keep the effects to a minimum.</p>	No

Norwich Northern Distributor Road - Application for Development Consent Order - Document Reference: 5.1
 Summary of Section 47 and 48 Consultation Responses

Category of Response	Typical Comments	No of Comments	Regard Given to Response	Design Change
	<p><u>New Rackheath rail link would be undermined by NDR</u></p> <p>Comments suggesting that a new rail link in Rackheath would be undermined by the construction of the NDR</p>	1	Any new rail link associated with development at Rackheath will provide an additional mode of transport for accessing Norwich from that area. The NDR primarily serves orbital trips around Norwich rather than trips to Norwich.	No
	<p><u>No suitable roads for it to link with at the Thorpe Marriott end</u></p> <p>Comments suggesting there are no suitable roads for the NDR to link to Thorpe Marriott end of the scheme</p>	1	Near Thorpe Marriott the NDR links with the main radial route of Fakenham Road, as well as Fir Covert Road and Reepham Road. The reasons for it not linking with the A47(w) are described elsewhere in this appendix.	No
	<p><u>Whether the road will improve traffic in Hellesdon/Aylsham is questionable</u></p> <p>Comments questioning whether the NDR will improve traffic congestion in Hellesdon and Aylsham</p>	1	The NDR is unlikely to have an impact on congestion in Aylsham. However, it will enable Aylsham residents to more easily access many destinations by car without needing to travel through Norwich.	No
<p><u>NSIP comments</u></p> <p>Comments regarding the NDR as a Nationally Significant</p>	<p><u>Not an NSIP</u></p> <p>Comments suggesting that the NDR should not be considered as a Nationally Significant Infrastructure Project</p>	2	This issue is detailed in Section 2.7 of this report.	No

Norwich Northern Distributor Road - Application for Development Consent Order - Document Reference: 5.1
 Summary of Section 47 and 48 Consultation Responses

Category of Response	Typical Comments	No of Comments	Regard Given to Response	Design Change
Infrastructure Project				
<u>Comments that are not understood</u> Comments received that are not understood	<u>Postwick Hub</u> Comments stating “Postwick Hub” but nothing else	1	Comments noted.	No
<u>Other Comments</u> Comments not detailed elsewhere in analysis	<u>Own small development proposal was refused planning permission</u> Comments questioning why a large project such as the NDR may get planning permission when their small development did not. <u>All future budget reviews and spending must consider the needs of the whole county and Eastern Region</u> Comments suggesting that funding should be allocated to the whole county and eastern region rather than just the NDR.	1	Comments not related to the NDR proposals.	No

Norwich Northern Distributor Road - Application for Development Consent Order - Document Reference: 5.1
 Summary of Section 47 and 48 Consultation Responses

Category of Response	Typical Comments	No of Comments	Regard Given to Response	Design Change
	<p><u>Little is gained from developments to sustain or improve the infrastructure, particularly the highways</u></p> <p>Comments suggesting that developments do little to improve existing infrastructure</p>	1	Comments not related to the NDR proposals.	No
	<p><u>Need to adapt to climate change and adopt new low-growth models of development</u></p> <p>Comments suggesting that low-growth developments need to be implemented to adapt to climate change</p>	1	Comments not related to the NDR proposals.	No
	<p><u>No commercial traffic coming from Gt. Yarmouth</u></p> <p>Comments suggesting no commercial traffic from Gt Yarmouth will make use of the NDR</p>	1	This response has been considered by the applicant and regard has been given to them in putting together the needs and alternative case for the NDR, which is detailed in Volume 1 Chapter 3 of the Environmental Statement (Document Ref 6.1).	No
	<p><u>Present ring road is too over crowded and difficult to cross</u></p> <p>Comments suggesting the Outer Ring Road of Norwich is overcrowded and difficult for pedestrians to cross</p>	1	The NDR eases congestion and delay on the northern sections of the Norwich Outer Ring Road (ORR). See Appendix I to the Traffic Forecasting Report (Document Ref 5.6) for forecast traffic flows.	No

Norwich Northern Distributor Road - Application for Development Consent Order - Document Reference: 5.1
 Summary of Section 47 and 48 Consultation Responses

Category of Response	Typical Comments	No of Comments	Regard Given to Response	Design Change
	<p><u>No comment given</u> Paper or on-line questionnaires were received but no comments were given on them</p>	105	Noted.	No
	<p><u>Request to be kept informed of progress and further opportunities to comment</u> Comments requesting to be kept informed of any future consultations</p>	1	Comments noted. The applicant intends to continue to have contact with local communities, as the NDR scheme progresses.	No
	<p><u>Beeston Park will not cope with extra traffic</u> Comments stating Beeston Park will not cope with extra traffic after construction of the NDR and new development</p>	1	The landscaping through Beeston Park has been designed with regard to the existing nature of the landscaping, and has tied in and recreated this landscaping style and land use. The 2 metre bund has been designed as a result of a careful earthworks balance, to ensure that no excess soil is created and no soil is required to be imported. There has been significant input from scheme ecologists, to ensure that the landscaping and habitat creation functions with existing ecological patterns of movement. Additional woodland creation has been provided on the south side of the NDR.	Yes – Design Change Ref: 8.5 in Appendix V of this report.

Norwich Northern Distributor Road - Application for Development Consent Order - Document Reference: 5.1
 Summary of Section 47 and 48 Consultation Responses

Category of Response	Typical Comments	No of Comments	Regard Given to Response	Design Change
	<p><u>Communities, businesses and individuals need better access to and from North Norfolk</u> Comments' suggesting better access is needed to North Norfolk for all</p>	1	<p>Comments noted. It is one of the purposes of the NDR to provide better access to and from North Norfolk.</p>	No
	<p><u>Any safety considerations regarding the airport must be addressed before the road is built</u> Comments stating that airport safety must be considered before the NDR is built</p>	1	<p>Norwich Airport and the Civil Aviation authority have been consulted as part of the Section 42 consultations and regard given to their concerns are contained in Appendix U and Appendix T of this report.</p>	No
	<p><u>Duplicate - comments already recorded</u> Duplicate comments received from the same person/organisation</p>	1	<p>Noted.</p>	No
	<p><u>Other Comment</u> Other comment not understood by the applicant</p>	1	<p>Noted.</p>	No

Appendix T

Section 42 Consultations Summary of Responses from Local Authorities and Prescribed Consultees

Norwich Northern Distributor Road - Application for Development Consent Order - Document Reference: 5.1
 Section 42 Consultations– Summary of Local Authority Responses

Consultee	Summary of Response	Category of Response	Regard Given to Response
<p>Ref: LA001 Norfolk County Council</p>	<p>Norfolk County Council's response to the Section 42 consultation – in its roles as consultee - was heard by its Planning and Highways (Delegations) Committee on 14 October 2013. The Cabinet member, using his delegated powers, made the following response to the consultation:</p> <p>(i) that no objection be raised to the proposed Nationally Strategic Infrastructure project (NSIP) proposal for the Norwich Northern Distributor Road (NDR);</p> <p>(ii) that the Preliminary Environmental Report (PEIR) needed to reflect the comments received from the internal consultees within the Environment, Transport and Development Directorate;</p> <p>(iii) the statement presented by the Green Group as an appendix to the submission.</p> <p>(Note: The applicant has included the statement presented by the Green Group within the Section 47 consultation responses.)</p>	<p>Need for NDR (K)</p>	<p>Regard: These responses have been considered by the applicant and regard has been given to them in putting together the need case for the NDR, which is detailed in Volume 1 Chapter 3 of the Environmental Statement (Document Ref 6.1).</p> <p>Design Change: No</p>

(K) Identifies key issue described in main report

Norwich Northern Distributor Road - Application for Development Consent Order - Document Reference: 5.1
 Section 42 Consultations– Summary of Local Authority Responses

Consultee	Summary of Response	Category of Response	Regard Given to Response
<p>Ref: LA002 Cambridgeshire County Council</p>	<p>Commented that the proposed project should greatly benefit the distribution of traffic around Norwich and bring environmental benefits within Norwich. However, it will be too remote to have a material impact on Cambridgeshire interest.</p>	<p>Need for NDR (K)</p>	<p>Regard: These responses have been considered by the applicant and regard has been given to them in putting together the need case for the NDR, which is detailed in Volume 1 Chapter 3 of the Environmental Statement (Document Ref 6.1). Design Change: No</p>
<p>Ref: LA003 Suffolk County Council</p>	<p>Commented that it has no matters to raise on the proposals.</p>	<p>Need for NDR (K)</p>	<p>Regard: Comments noted. Design Change: No</p>
<p>Ref: LA004 Breckland District Council</p>	<p>Commented that it had no major concerns as the joining point of the NDR and Fakenham Road is approximately 5 miles away from the Breckland boundary.</p>	<p>Need for NDR (K)</p>	<p>Regard: Comments noted. Design Change: No</p>
<p>Ref: LA005 Broadland District Council</p>	<p>Commented that the NDR is needed as part of NATS to service current transport requirements and as a pre-requisite for development of housing and employment as identified in the JCS. It will enable significantly enhanced public transport, cycling and walking networks. It indicated strong support for the NDR.</p>	<p>Need for NDR (K)</p>	<p>Regard: These responses have been considered by the applicant and regard has been given to them in putting together the need case for the NDR, which is detailed in Volume 1 Chapter 3 of the Environmental Statement (Document Ref 6.1). Design Change: No</p>

(K) Identifies key issue described in main report

Norwich Northern Distributor Road - Application for Development Consent Order - Document Reference: 5.1
 Section 42 Consultations– Summary of Local Authority Responses

Consultee	Summary of Response	Category of Response	Regard Given to Response
	<p>Welcomed that the Fir Covert Road Roundabout matter has been addressed, as the reinstatement of the junction will ensure the continued access to the successful business community along it.</p>	<p>On-line Proposals (K)</p>	<p>Regard: Comments noted. Design Change: No</p>
	<p>Commented that Beeston St Andrew and Rackheath Park are important assets which help form part of a landscape that forms the edge to the urban fringe, and their potential ongoing importance in forming a landscape edge to future development in the North East Growth Triangle (NEGT). This reinforces the need to implement effective landscaping along the southern edge of the NDR.</p>	<p>Landscaping/Planting Issues (K)</p>	<p>Regard: It is recognised that there is a need to provide further landscaping and biodiversity features in Rackheath. As such, further planting and landscaping to screen the NDR and promote further diversification of biodiversity has been incorporated into the schemes landscaping proposals.</p> <p>Landscaping proposals for the scheme now include further planning and landscaping at North Walsham Road and Wroxham Road, details of which can be found in Volume 1 Chapter 7 of the Environmental Statement (Document Ref 6.1).</p> <p>Design Change: Yes – additional landscaping has been added to the proposals in the area around Beeston Park, Rackheath Park and The Springs. See Design Change Refs: 8.5 and 9.2 in Appendix V of this report.</p>

(K) Identifies key issue described in main report

Norwich Northern Distributor Road - Application for Development Consent Order - Document Reference: 5.1
Section 42 Consultations– Summary of Local Authority Responses

Consultee	Summary of Response	Category of Response	Regard Given to Response
	Noted the consultation work that has been done to date in relation to the NDR, considering it to have been appropriate and well run in accordance with the Statement of Community Consultation.	Consultation/Exhibitions (K)	<p>Regard: Comments noted.</p> <p>Design Change: No</p>
<p>Ref: LA006 Norwich City Council</p>	Commented that it had no objections to the proposals subject to the delivery of measures to secure major improvements enabling the promotion of more sustainable forms of transport as promoted within NATS.	Need for NDR (K)	<p>Regard: These responses have been considered by the applicant and regard has been given to them in putting together the need case for the NDR, which is detailed in Volume 1 Chapter 3 of the Environmental Statement (Document Ref 6.1).</p> <p>Design Change: No</p>
	Commented that the application for the NDR should include a demonstration of its place within the overall NATS Strategy by giving a commitment to deliver the whole of the NATS implementation programme by 2026.	Other Comment (K)	<p>Regard: The NDR is a key element of NATS. The applicant has an implementation plan for NATS, developed following consultations in 2009, which outlines the programme of proposed measures.</p> <p>Design Change: No</p>
	Requested the proposals ensure that the NDR enhances the potential for walking, cycling and public transport use between the expanding communities to the north and east of the city to ensure that any potential severance effects are fully mitigated.	Walking/Cycling/Horse Riding Issues (K)	<p>Regard: During the April/May/June 2012 public consultations the applicant had various requests for improved walking and cycling facilities. As a result a strategy was developed to consider and prioritise these consultation requests. The strategy published as part of the February/March 2013 public consultations identified a network of</p>

(K) Identifies key issue described in main report

Norwich Northern Distributor Road - Application for Development Consent Order - Document Reference: 5.1
 Section 42 Consultations– Summary of Local Authority Responses

Consultee	Summary of Response	Category of Response	Regard Given to Response
<p>Ref: LA007 South Norfolk Council</p>	<p>Commented that it recognises that the NDR is an important piece of infrastructure to enable the scale of growth envisaged in the JCS to be delivered, and as such it is supported in principle.</p>	<p>Need for NDR (K)</p>	<p>routes to link areas that generate NMUs (such as villages, employment areas, future development) with each other, the Norwich Cycle Network and the Marriotts Way. Part of these routes utilised narrow country lanes, roads closed to motor vehicles and existing public rights of way. The applicant has prioritised NMU improvements on this network, and these improvements have included new NMU facilities as part of the proposals. Design Change: No</p>
	<p>Commented that whilst a 'full' NDR is not currently under consideration, it would encourage consideration of the benefits of completing the final 'missing' section between the A1067 and A47(w) across the River Wensum at the earliest possible date.</p>	<p>Route of NDR (K)</p>	<p>Regard: These responses have been considered by the applicant and regard has been given to them in putting together the need case for the NDR, which is detailed in Volume 1 Chapter 3 of the Environmental Statement (Document Ref 6.1). Design Change: No Regard: A road linking the A1067 and the A47(w) would have to cross the Wensum Valley, which is designated a Special Area of Conservation (SAC) under the European Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora - often referred to as the Habitats Directive. An</p>

(K) Identifies key issue described in main report

Norwich Northern Distributor Road - Application for Development Consent Order - Document Reference: 5.1
 Section 42 Consultations– Summary of Local Authority Responses

Consultee	Summary of Response	Category of Response	Regard Given to Response
			<p>assessment of options across the Wensum Valley concluded, in 2005, that significant impacts on the SAC would be likely, and there was doubt as to whether, under the terms of the Habitats Directive, it would be possible to design an acceptable scheme. This in turn raised the prospect that consent for a wider scheme including such a link might not be granted. On 19 September 2005, the applicant’s Cabinet resolved to have no NDR link between the A47(w) and the A1067. It therefore did not form part of the adopted route.</p> <p>At its meeting of 16 September 2013 the meeting of the Norfolk County Council resolved to recommend to Cabinet that they submit an application for a DCO in respect of the NDR as proposed (i.e. between the A47 at Postwick and the A1067 near Attlebridge) and to also commission a report on a feasibility study of providing a link across the Wensum Valley from the A1067 to the A47(w). Whilst at its meeting of 7 October 2013 the applicant’s Cabinet resolved that a “scoping report on the feasibility of providing a link across the Wensum Valley from the A1067 – A47 be written once consultation work was completed”, this study has not been carried out and there is therefore</p>

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Norwich Northern Distributor Road - Application for Development Consent Order - Document Reference: 5.1
 Section 42 Consultations– Summary of Local Authority Responses

Consultee	Summary of Response	Category of Response	Regard Given to Response
			<p>currently no proposal establishing the form any link between the A1067 and A47(w) would take, or indeed whether any such link is feasible. The Transport Assessment for the NDR (Document Ref 5.5.) shows that the NDR can provide substantial benefits without a further link between the A1067 and A47(w) and that the NDR will reduce daily traffic on existing routes between the A1067 and the A47(w) between Drayton/Taverham and Costessey. The feasibility and environmental acceptability of a link to the A47(w) have not been established and the previous assessment in 2005 discarded this option. Accordingly, it is the position of the applicant that the NDR can and should be considered on its own merits without such a link. Design Change: No</p>
	<p>Commented that the information in the supporting documentation appears generally adequate in enabling an accurate assessment of the likely environmental impacts of the NDR to be made.</p>	<p>Consultation/Exhibitions (K)</p>	<p>Regard: Comments noted. Design Change: No</p>
	<p>Commented that it is highly likely that there will be an increase in traffic along the roads connecting the A1067 to the A47 at Longwater/Easton (roads such as West End and Longwater Lane, for example). This will cause an increase in</p>	<p>Specific Road Effects (K)</p>	<p>Regard: Traffic flows are generally predicted to decrease on these roads with an NDR. Refer to the Traffic Forecasting Report, Appendix I (Document Ref 5.6) for forecast traffic flows.</p>

(K) Identifies key issue described in main report

Norwich Northern Distributor Road - Application for Development Consent Order - Document Reference: 5.1
 Section 42 Consultations– Summary of Local Authority Responses

Consultee	Summary of Response	Category of Response	Regard Given to Response
	<p>congestion, noise and worsening air quality in Costessey and along Ringland Lane. Requested that the application included reports detailing the noise and air quality impacts along the above mentioned routes. Also requested that it include appropriate mitigation measures to address the impacts on South Norfolk residents including consideration of average speed cameras along West End and Longwater Lane which could go a long way to addressing local fears of an increase in speeding.</p>		<p>Design Change: No</p>
<p>Ref: LA008 Waveney District Council</p>	<p>Commented that it had no objection to the proposal.</p>	<p>Other Comment</p>	<p>Regard: Comments noted. Design Change: No</p>
<p>Ref: LA009 Broads Authority</p>	<p>Commented that it welcomed the route of the proposed NDR as improving access to the Broads and thereby benefitting the tourist economy of the Broads.</p>	<p>Need for NDR (K)</p>	<p>Regard: Comments noted. Design Change: No</p>
	<p>Noted that the proposed route will have a significant impact on the communities to the north of Norwich and has the potential for a significant indirect impact on the Broads. Recommended that the landscaping and green infrastructure component be strengthened and that enhanced</p>	<p>Landscaping/Planting Issues (K)</p>	<p>Regard: Extensive planting and landscaping is planned along the route of the NDR. Planting will comprise of native, locally present species of woodland, scrub and grassland habitats, hedgerows, and wetland areas. It will tie in with landscaping schemes of adjacent developments.</p>

(K) Identifies key issue described in main report

Norwich Northern Distributor Road - Application for Development Consent Order - Document Reference: 5.1
 Section 42 Consultations– Summary of Local Authority Responses

Consultee	Summary of Response	Category of Response	Regard Given to Response
	<p>biodiversity measures are incorporated. It also considered that this development is one which would strongly benefit from biodiversity offsetting.</p>		<p>However it is recognised that there is a need to provide further landscaping and biodiversity features in Rackheath. As such, further planting and landscaping to screen the NDR and promote further diversification of biodiversity has been incorporated into the landscaping proposals.</p> <p>Design Change: Yes – additional landscaping has been added to the proposals, particularly in the area around Beeston Park, Rackheath Park and The Springs. See Design Change Refs: 8.5 and 9.2 in Appendix V of this report.</p>

(K) Identifies key issue described in main report

Norwich Northern Distributor Road - Application for Development Consent Order - Document Reference: 5.1
 Section 42 Consultations– Summary of Prescribed Consultee Responses

Consultee	Summary of Response	Category of Response	Regard Given to Response
REF: PC001 Anglian Water	Commented that Anglian Water assets affected by the NDR will need to be diverted or protected as appropriate at the applicant's cost. The specific detail for any diversions or protection would need to be agreed with Anglian Water and a number of discussions have already taken place and proposals are being agreed.	Other comments	Regard: Comments noted. Design Change: No
Ref: PC002 Canal Trust	Commented that it does not own or manage any land or water in this area, and it therefore has no comments to make.	Other comments	Regard: Comments noted. Design Change: No
Ref: PC003 Civil Aviation Authority	Commented that if Norwich International Airport needs any aviation regulatory input they will approach the CAA direct.	Other comments	Regard: Comments noted. Design Change: No
Ref: PC004 Energetics Electricity Limited	Confirmed that it does not have any plant within the areas specified.	Other comments	Regard: Comments noted. Design Change: No
Ref: PC005 English Heritage	Commented that the report provides for the necessary assessment of the impacts on heritage assets and addressing their settings, which appears satisfactory based on the information supplied.	Historic Environment	Regard: Comments noted. Design Change: No

(K) Identifies key issue described in main report

Norwich Northern Distributor Road - Application for Development Consent Order - Document Reference: 5.1
 Section 42 Consultations– Summary of Prescribed Consultee Responses

Consultee	Summary of Response	Category of Response	Regard Given to Response
<p>Ref: PC006 Environment Agency</p>	<p>Commented on Nature Conservation and Ecology, and at this stage appropriate mitigation measures for the relocation of protected species are in place. It also noted that:</p> <ul style="list-style-type: none"> the detailed design of the drainage scheme will be required to demonstrate appropriate measures to ensure that water quality is appropriately protected, the quality of water discharged to The Springs should be at least as good as the known existing water quality, support for proposals that the landscaping proposals will link with ecological corridors in the wider environment, and the Norfolk Green Infrastructure Strategy. Recommend that the drainage strategy, as far as possible, makes similar links. 	<p>On-Line Proposals</p>	<p>Regard: Comments noted. Design Change: No</p>
	<p>Commented on geology and soils and that the proposed mitigation measures to be employed during construction works should prevent any impacts to water resources from construction works.</p>	<p>Geology/ Soils Issues</p>	<p>Regard: Comments noted. Design Change: No</p>
	<p>Commented on road drainage and subject to certain comments below at this stage it appears</p>	<p>On-Line Proposals</p>	<p>Regard: Comments noted.</p>

(K) Identifies key issue described in main report

Norwich Northern Distributor Road - Application for Development Consent Order - Document Reference: 5.1
 Section 42 Consultations– Summary of Prescribed Consultee Responses

Consultee	Summary of Response	Category of Response	Regard Given to Response
	<p>that suitable drainage methods are employed. Specific comments included:</p> <ul style="list-style-type: none"> • all phases of the scheme must have no detrimental impact on water quality, • note that in accordance with the SuDS Manual, a three tier treatment system will be put in place as part of the scheme and this must ensure that sufficient treatment measures appropriate to the individual sensitivities of each element of the scheme are incorporated. 	(K)	Design Change: No
	<p>Noted the scheme will store the surface water in all rainfall events up to the 1 in 100 year climate change event, so will prevent the proposed road from increasing flood risk elsewhere.</p> <p>Noted the road will incorporate culverts to allow existing watercourses, drains and flow paths to continue to flow underneath. Commented that it should be ensured that the culverts are designed to contain the 1% chance (1 in 100) flow.</p> <p>Noted that where spreader ditches are going to be used to allow overland flows to infiltrate rather than pass underneath the road it should be ensured that they will also be sized to contain this 1% chance event.</p>	On-Line Proposals (K)	<p>Regard: : Through continued correspondence the Environment Agency previously advised that in accordance with BRE365 a minimum infiltration rate in the area of the lagoons was used rather than an average. It also advised that lagoons with longer drain down times exceeding 7 days should be able to accommodate a 1 in 100 follow on storm.</p> <p>Design Change: Yes – changes to lagoon size and position have been made as a result of on-going discussions with the Environment Agency. See Appendix V of this report.</p>

(K) Identifies key issue described in main report

Norwich Northern Distributor Road - Application for Development Consent Order - Document Reference: 5.1
 Section 42 Consultations– Summary of Prescribed Consultee Responses

Consultee	Summary of Response	Category of Response	Regard Given to Response
	<p>Commented that in respect of groundwater, it would accept in principle the drainage proposals for the majority of the scheme. However, the detailed designs for selected parts are yet to be agreed.</p>		
	<p>Commented that it will be essential to ensure that deterioration in water quality and habitat does not occur as a result of the proposed scheme, in particular the tributaries of the Bure (Spixworth and Dobbs Beck) and the Wensum are particularly sensitive to deterioration in water quality.</p> <p>Commented that the quality of water discharged to The Springs should be at least as good as the known existing water quality.</p>	<p>Wildlife Issues (K)</p>	<p>Regard Given to Response: A Habitats Regulations Assessment has been undertaken to ensure there are no impacts on the Wensum. There are no anticipated impacts on Spixworth and Dobbs Beck.</p> <p>Design Change: No</p>
	<p>Commented that a feasibility study is to be undertaken for the outstanding western section of the previously proposed NDR route, which would cross the Wensum SAC. Although not part of this consultation, it suggested that consideration should be given as to how that study might need to be considered as part the assessment of impacts of this scheme.</p>	<p>Route of the NDR (K)</p>	<p>Regard: See response to LA007.</p> <p>Design Change: No</p>

(K) Identifies key issue described in main report

Norwich Northern Distributor Road - Application for Development Consent Order - Document Reference: 5.1
 Section 42 Consultations– Summary of Prescribed Consultee Responses

Consultee	Summary of Response	Category of Response	Regard Given to Response
<p>Ref: PC007 Fisher German Pipelines</p>	<p>Confirmed that it is already in discussions with the applicant regarding its client's requirements.</p>	<p>Other Comments</p>	<p>Regard: Comments noted. Design Change: No</p>
<p>Ref: PC008 Health and Safety Executive</p>	<p>Commented on the high pressure gas main and that it can have some confidence appropriate discussions with the pipeline operator have taken place and are on-going. At this stage it has nothing to add until firm diversion plans are confirmed.</p> <p>Noted that the development as proposed does not fall within the consultation zones of Major Accident Hazard Sites.</p> <p>Commented that the proposed development is sufficiently well defined at this stage to allow the identification of potentially significant environmental effects and, therefore, the scope of the EIA.</p> <p>Commented that since the works will entail excavation and piling for new structures, it strongly recommends that the applicant liaises with the Pipeline Operator NRG. However provided appropriate risk reduction measures are employed then it would be unlikely that HSE</p>	<p>Other Comments</p>	<p>Regard: Comments noted. Design Change: No</p>

(K) Identifies key issue described in main report

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 Section 42 Consultations– Summary of Prescribed Consultee Responses

Consultee	Summary of Response	Category of Response	Regard Given to Response
<p>Ref: PC009 Highways Agency</p>	<p>would advise against the current proposal.</p> <p>Suggested that the applicant and its contractors should check if any of the named substances in Part A of the Schedule are present at or above the specified controlled quantities. If they are then an application would be required for a Hazardous Substances Consent.</p> <p>Commented that the NDR is intended to connect to the A47 trunk road via an amended junction at Postwick and therefore the Highways Agency has an interest in how the presence of the new road may affect future traffic patterns on associated lengths of the A47 and its junctions together with the trunk road interchange with the A11.</p> <p>Noted on-going discussions but as yet the detailed transport assessment and forecast modelling has not been concluded. It looks forward to further continued discussion in order that a fuller understanding of the future transport characteristics and demands for both the strategic and local highway networks in the Norwich area are known.</p>	Other Comments	<p>Regard: The Transport Assessment (Document Ref 5.5) and Forecasting Report (Document Ref 5.6) have been completed, including a dialogue with the Highways Agency. These set out the predicted impacts upon the trunk road network.</p> <p>Design Change: No</p>
	<p>Commented that NDR scheme will assist in bringing forward anticipated growth in both housing and jobs in areas both in and around</p>	Need for the NDR	<p>Regard: These responses have been considered by the applicant and regard has been given to them in putting together the need</p>

(K) Identifies key issue described in main report

Norwich Northern Distributor Road - Application for Development Consent Order - Document Reference: 5.1
 Section 42 Consultations– Summary of Prescribed Consultee Responses

Consultee	Summary of Response	Category of Response	Regard Given to Response
	Norwich.	(K)	case for the NDR, which is detailed in Volume 1 Chapter 3 of the Environment Statement (Document Ref 6.1). Design Change: No
Ref: PC010 KLM Engineering	Commented that it is inappropriate that part of the current airfield will be removed from the airport to use for part of an alternative infrastructure project. Whilst the piece of land, i.e. the North West corner of the airfield, is on a lease that expires in the near future it considers it short term thinking to reduce the size of the airfield in favour of this road.	Land/Property Issues (K)	Regard: The future development proposals of the Airport are not a matter for this application. In any event, the applicant has held discussions with Norwich International Airport Limited, who are content with the NDR alignment around the north of airport. Design Change: No
Ref: PC011 Ministry Of Defence	Commented that the application relates to a site outside of MOD safeguarding areas. Therefore it has no safeguarding objections to this proposal.	Other Comment	Regard: Comments noted. Design Change: No
Ref: PC012 Natural England	Commented that a figure of 20 km of new or improved routes are identified and it would be helpful to breakdown this figure to distinguish between routes created as part of mitigation for ones that will be severed, and those created solely as enhancement opportunities. Suggested that an assessment of how the NDR will affect the journeys for walkers, horse riders or cyclists in terms of time taken or distance	Walking/Cycling/ Horse Rider Issues	Regard: It is difficult to distinguish NMU facilities provided specifically as a result of severed routes from those that are new facilities because in most instances the routes provide both functions. Nine NMU surveys were undertaken in April 2013. Eight of these were on main radial routes into Norwich and one was on a non-radial route. These surveys counted the number of NMUs

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	<p>travelled, during construction and post-operation, should be included. With regard to the additional pedestrian and cyclist counts, it expects surveys to be undertaken over a wide range of weekdays and weekends, and include peak (both am and pm) and off-peak times, to accurately reflect usage and take into account factors such as weather and seasonality.</p>		<p>using routes in the vicinity of the proposed NDR. The surveys were undertaken on a weekday between 07:00 - 19:00. The collected data was used to assess the impact on NMUs using the proposed informal at-grade crossings on the new NDR roundabouts.</p> <p>An additional four surveys were undertaken on non-radial routes in September 2013 to further assess the impact of the NDR on NMUs.</p> <p>Design Change: No</p>
	<p>Commented that the proposals for the road need to clearly demonstrate how climate change over the longer term has been taken into account, including flood risk, increased runoff and changes to biodiversity and landscape.</p> <p>Commented that the mitigation and compensation measures for the road should be assessed against climate change to ensure that they would be robust, and that risks could be managed through suitable adaptation measures, including the use of green infrastructure.</p>	<p>Emission/Noise Issues (K)</p>	<p>Regard: Climate change has been considered in all chapters of the Environmental Statement (Document Ref 6.1), including Ecology and Nature Conservation, and includes assessment of the NDR on the resilience to the effects of climate change on protected and other species.</p> <p>Design Change: No</p>
	<p>Noted that the PEIR identified an agricultural soil survey has been carried out to determine the quality of land affected by the scheme although no</p>	<p>Soils/Geology Issues</p>	<p>Regard Given to Response: The loss of productive agricultural land and commitments regarding the minimisation of impacts to soils</p>

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	<p>details of the methodology are given.</p>		<p>are detailed in Volume 1 Chapter 13 and Volume 1 Chapter 9 of the Environmental Statement (Document Ref 6.1). Assessments of Noise and Air Quality are contained in Volume 1 Chapter 4 and 11 of the Environmental Statement (Document Ref 6.1 and 6.2). Design Change: No</p>
	<p>Welcomed commitments in the PEIR to minimising impacts to soils including use of the Defra Construction Code of Practice for the Sustainable Use of Soil on Development Sites and restoration of all areas of temporarily affected agricultural land to their existing grades.</p>	<p>Soils/Geology Issues</p>	<p>Regard: Comments noted. Design Change: No</p>
	<p>Noted that surveys have identified adverse impacts on bats and great crested newts, both of which are European Protected Species (EPS) and the range of avoidance, mitigation and compensation measures have been identified to reduce the impacts. Commented that once draft EPS mitigation licence applications have been submitted for bats and great crested newts Natural England will provide detailed comments on the mitigation proposals. Noted a wide range of measures that are proposed including seven bat galletries, two</p>	<p>Wildlife Issues</p>	<p>Regard: Comments regarding protected species, mitigation and licensing noted. Although BAPs and Habitats or Species of Principal Importance were not described in the PEIR, they are expressly referred to and assessed in the Environmental Statement (Document Ref 6.1). Design Change: No</p>

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	<p>green bridges and an underpass, which together with habitat creation and enhancement measures, are designed to mitigate for the loss and severance of foraging and feeding corridors. Commented that the design and location of these measures has been heavily influenced by the comprehensive surveys that have been undertaken.</p> <p>In relation to other protected species, it commented that it is satisfied with the level of surveys undertaken and their assessment.</p> <p>Noted that there is no mention specifically of any Habitats or Species of Principal Importance or local Biodiversity Action Plan (BAP) species or habitats in the PEIR. If any are affected, then survey details, impact assessment and mitigation proposals (if appropriate) should be included in the Environmental Statement.</p>		
	<p>Noted measures have been identified to mitigate impacts including aligning the road through cuttings and landscaped bunds or embankments, and detailed natural landscape planting. Requested that evidence should be provided in the Environmental Statement to demonstrate why the selected route was chosen in terms of</p>	<p>Landscaping/Planting Issues</p>	<p>Regard: Reasons for selected routes are detailed in Volume 1 Chapter 3 of the Environmental Statement (Document Ref 6.1). Design Change: No</p>

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<p>Ref: PC013 New Anglia Local Enterprise Partnership</p>	<p>landscape impact and benefit.</p> <p>Expressed support for the proposals for the NDR and the decision for it to be considered as a nationally significant infrastructure project.</p> <p>Commented that the NDR will provide a crucial link for businesses and other road users and directly facilitates the expansion of three strategic employment locations.</p> <p>Noted that the scheme will also address existing transport problems in northern Norwich which currently operate as a constraint on existing business development and will also bring significant benefits to communities in North Norfolk, Broadland and Great Yarmouth.</p>	<p>Need for the NDR (K)</p>	<p>Regard: These responses have been considered by the applicant and regard has been given to them in putting together the need case for the NDR, which is detailed in Volume 1 Chapter 3 of the Environment Statement (Document Ref 6.1).</p> <p>Design Change: No</p>
	<p>Commented that it is critical that the NDR is part of a wider package of public transport measures including improved bus services and an increase in cycling routes.</p>	<p>Other Comments</p>	<p>Regard: The NDR is a key element of the Norwich Area Transportation Strategy. The applicant has an implementation plan for NATS, developed following consultations in 2009, which outlines the programme of proposed measures.</p>
<p>Ref: PC014 Norfolk Constabulary</p>	<p>Requested to be kept informed of any temporary population changes that may be associated with the construction.</p> <p>With the increased movement of construction vehicles/plants/materials it seeks reassurance as</p>	<p>Other Comments</p>	<p>Regard: The applicant intends to maintain dialogue with Norfolk Constabulary regarding these matters.</p> <p>Design Change: No</p>

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	<p>to how the impact on the existing road infrastructure in and around Norwich will be managed.</p> <p>Requested to be kept informed about the potential for any environmental protest that might occur before or during the construction of the road in order that any need to police such protests can be suitably planned for. It seeks assurances that the applicant will enter into early dialogue with regard to sharing the costs of any such policing operations.</p> <p>Commented that the NDR, as part of the growth plans within the GNDP area, may lead to an increased demand on police resources and infrastructure.</p>		
	<p>Commented that with the dualling of the A11 and the building of the NDR a more reliable road network could attract a wider number of travelling criminals to Norfolk. Suggested that one of the ways to address this would be through additional investment in Automatic Number Plate Recognition (ANPR). Requested that the applicant consider funding new ANPR infrastructure through Community Infrastructure Levy as part of this development.</p>	<p>Specific Road Effects</p>	<p>Regard: Norfolk County Council does not have any current plans to introduce ANPR infrastructure.</p> <p>Design Change: No</p>

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<p>Ref: PC015 Norfolk NHS Primary Care Trust</p>	<p>Advised that it is no longer in operation and the NHS Anglia Commissioning Support Unit would welcome receiving similar documents. Also advised that the 5 new statutory NHS Clinical Commissioning Groups covering Norfolk should be consulted.</p>	<p>Other Comments</p>	<p>Regard: These additional consultees were included in the consultation as advised. Design Change: No</p>
<p>Ref: PC016 North Norfolk Clinical Commissioning Group</p>	<p>Expressed support for the proposal which will improve access and travel times for people living in North Norfolk and Broadland who have to access health care in the greater Norwich area.</p>	<p>Need for NDR (K)</p>	<p>Regard: These responses have been considered by the applicant and regard has been given to them in putting together the need case for the NDR, which is detailed in Volume 1 Chapter 3 of the Environment Statement (Document Ref 6.1). Design Change: No</p>
	<p>Commented that it is regrettable that the NDR does not extend as far as the A47 Southern Bypass which would provide better access to and from the Norfolk and Norwich Hospital.</p>	<p>Route of NDR (K)</p>	<p>Regard: See response to LA007. Design Change: No</p>
	<p>Commented that one area where the population fares less well is death and injury caused by road traffic accidents. Requested that road safety and accident reduction measures are prioritised in the development of the NDR.</p>	<p>Other Comments</p>	<p>Regard: The applicant has considered road safety in the development of the proposals, which has included a Stage 1 Road Safety Audit. Design Change: No</p>

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<p>Ref: PC017 Norwich International Airport</p>	<p>Commented that the planned drainage lagoons and temporary topsoil storage areas are potential bird attractants. Requested that a Bird Control Management Plan (BCMP) should be developed to define and implement the appropriate bird control measures to reduce or mitigate the risk of birds coming into contact with aircraft.</p> <p>Provided this request above can be complied with it would offer no aerodrome safeguarding objection.</p>	<p>On-Line Proposals (K)</p>	<p>Regard: The assessment of the bird strike hazard was undertaken for the scheme. Following the risk assessment and recommendations of specialists, the NDR was developed to eliminate any source of bird attracting features and activity on or in the vicinity (13km) of the airport.</p> <p>The landscaping has been designed to minimise nesting activity near the airport.</p> <p>Design Change: Yes – an additional area of grassland creation has been incorporated into the proposals to prevent issues arising from bird and wildlife management concerns. See Design Change Ref: 6.6 in Appendix V of this report.</p>
<p>Ref: PC018 Police & Crime Commissioner</p>	<p>Expressed support for the NDR as whilst recognising the concerns expressed in terms of ecology, the fact that Norwich does not have a 360° route around it is an impediment to the future overall health and prosperity of the city.</p> <p>Commented that the inadequate links to the airport and to the tourist areas north of the city inhibit development and considers the new road will give a new clearer definition to the city and its</p>	<p>Need for NDR (K)</p>	<p>Regard: These responses have been considered by the applicant and regard has been given to them in putting together the need case for the NDR, which is detailed in Volume 1 Chapter 3 of the Environment Statement (Document Ref 6.1).</p> <p>Design Change: No</p>

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	<p>wider urbanised perimeters.</p> <p>Noted that there are those that argue that Norfolk will become less safe but believes on balance that the likely overall gains (as spelt out in the relevant supporting literature from the NCC and LEP) significantly outweigh the potential risks.</p> <p>Commented that investment in the future is essential if Norwich and Norfolk is to remain a diverse and economically viable city and county.</p>		
	<p>Endorsed the Norfolk Constabulary concerns over indemnification of the costs of policing any protest in relation to the construction of the road or any stage of it.</p>	Other Comments	<p>Regard: Comments noted. Design Change: No</p>
	<p>Expressed concern that the NDR is not a complete 360° package and considers that the overall benefits will only be completely exploited if it is a full 360° road.</p>	Route of NDR (K)	<p>Regard: See response to LA007. Design Change: No</p>
<p>Ref: PC019 Public Health England</p>	<p>Noted that the preliminary assessment indicates that once in operation the development will contribute to improvement in air quality at some locations in Norwich city centre but is likely to cause deterioration at other locations on the development route.</p> <p>Requested that the final report should clearly</p>	Noise/Emissions Issues (K)	<p>Regard: This is assessed within Volume 1 Chapter 4 of the Environmental Statement (Document Ref 6.1). Design Change: No</p>

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	<p>identify both the positive and negative air quality impacts, with reference to the current UK Air Quality Objectives. In cases where a new breach of the Air Quality Objectives is predicted or where an existing breach will be significantly worsened, the applicant is requested to provide a clear indication of the sensitivity of the location, the nature of the receptors and an estimate of the number of households affected.</p>		
	<p>Welcomed the use of readily available soil quality data, resources and reports and noted that additional investigations/assessments will be undertaken and included in the final report being submitted at the next stage of the planning process.</p> <p>Requested that the location of any vulnerable human receptors be identified and that the final documentation demonstrate that there will be no significantly adverse human health impacts arising from the construction of the proposed road.</p>	Soils/Geology Issues	<p>Regard: Chapter 13 of Volumes 1 and 2 of the Environmental Statement (Document Ref 6.1 and 6.2) assesses the impacts of the NDR on soils and agriculture.</p> <p>A Health Impact Assessment is included in Volume 2 of the Environmental Statement (Document Ref 6.2).</p> <p>Design Change: No</p>
	<p>Commented that the current documentation does not address the possible Electro Magnetic Fields impacts which may arise from the proximity, installation or relocation of any high voltage electricity supplies, substations or similar.</p>	Other Comments	<p>Regard: The scheme does not include or impact infrastructure associated with high voltage electricity supplies, substations or similar.</p> <p>Design Change: No</p>

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	Requested confirmation whether the scheme does not include or impact such infrastructure or that said infrastructure will comply with International Commission on Non-ionising Radiation Protection public exposure guidelines.		
Ref: PC020 Bawburgh Parish Council	Stated that the NDR should link to the southern bypass and not stop at the A1067 Fakenham Road.	Route of NDR (K)	Regard: See response to PC016. Design Change: No
Ref: PC021 Blofield Parish Council	Commented that if alterations and expansion takes place as planned at the Postwick Park and Ride then Norfolk County Council should improve the facilities and services there. Comments that the plans refer to the A47 as part of the national trunk road network and that large parts of the A47 are still single carriageway. Suggested increased priority should be given to dualling all remaining sections of the A47.	Other Comments	Regard: Comment regarding Postwick Park and Ride does not relate to the NDR proposals. Norfolk County Council is responsible for all roads within Norfolk apart from the trunk roads (A47, A17, A11 and A12), which are the responsibility of government and improved/maintained on their behalf by the Highways Agency. Norfolk County Council has campaigned extensively for full dualling of the A11 and is pleased to see that this is now in the process of being completed. It is now turning its attention to the A47 to try to influence government to commit to improvements on this road. Design Change: No

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Ref: PC022 Caister St Edmund Parish Council	Commented that its response regarding the NDR is unchanged.	Other Comments	Regard: Comments noted. Design Change: No
Ref: PC023 Colney Parish Council	Considered that this NDR consultation is not effective and omits the “necessary information” for the wider community that will be affected by the NDR to make an informed decision and destroys any vestige of the applicant’s much vaunted support for “localism”.	Consultation/Exhibitions (K)	Regard: The consultation pack consisted of a cover letter, scheme information document, non-technical summary to the PEIR, a full copy of the PEIR, non-technical note on transport modelling and a CD containing these documents and the appendices to the scheme information document. This is considered a full pack of information to enable the consultees to provide informed responses on the NDR. Design Change: No
	Commented that the large housing developments proposed are hugely unpopular with most residents but welcomed as a potential “gravy train” by developers. Considers that many parishes would accept small developments where the emphasis is on affordable houses to satisfy local housing needs. Suggested that recent government population growth statistics indicate that some housing schemes could be dropped altogether and others	Other Comments	Regard: The strategy for the scale and location of development is determined through the development plan process, in this case the JCS for Broadland, Norwich and South Norfolk. The JCS is fully supported by evidence and has been the subject of statutory consultation and public examination by the independent Planning Inspectorate. The relationship between the NDR and planned growth in the Joint Core Strategy (JCS) is detailed in Volume 1 Chapters 2 and 3 of the Environmental Statement

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	<p>significantly reduced.</p> <p>Commented that Norfolk County Council has stated that most new houses associated with the NDR would not be for existing local needs but will be for economic migrants and considers there is something fundamentally wrong when, apparently, thousands of future jobs in the Greater Norwich area have to rely on migrant workers and the plan to build thousands of homes to house them.</p>		<p>(Document Ref 6.1).</p> <p>Design Change: No</p>
	<p>Commented that thousands of acres of productive agricultural land will be permanently lost and great swathes of the Norfolk countryside with pleasant landscape values will be suburbanised beyond recognition.</p>	<p>Land/Property Issues (K)</p>	<p>Regard: The loss of productive agricultural land is detailed in Volume 1 Chapter 13 of the Environmental Statement (Document Ref 6.1). This identifies that the proposed NDR will have a total spatial footprint of 354ha (874acres), of which 329.4ha (814acres) is currently used for agriculture.</p> <p>Design Change: No</p>
	<p>Commented that the NDR from Postwick to Attlebridge will cost nearly £142 million; any extension will cost tens of millions of pounds more and it is likely that the present figure will underestimate costs. Local councils will experience an increase in shortfall costs and already face a shortfall in their budgets for years</p>	<p>Need for NDR (K)</p>	<p>Regard: These responses have been considered by the applicant and regard has been given to them in putting together the need case for the NDR, which is detailed in Volume 1 Chapter 3 of the Environment Statement (Document Ref 6.1).</p> <p>Design Change: No</p>

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<p>Ref: PC024 Felthorpe Parish Council</p>	<p>ahead even without the expense of the NDR.</p> <p>Commented that it supports the re-instatement of the Fir Covert Road Roundabout as this will support both businesses along this road and villagers access into the village.</p> <p>Commented that it supported the full dualling of the whole route, rather than making some stretches single carriageway.</p>	<p>On-Line Proposals (K)</p>	<p>Regard: Comments noted. Design Change: No</p>
<p>Ref: PC025 Gt and Lt Plumstead Parish Council</p>	<p>Commented that a case can be made for an NDR, the issue is what route it should take and what priority this proposed road should have over other much needed road infrastructure the country needs.</p> <p>Commented that evidence does not support the proposal that the NDR is needed to create road space for buses and other sustainable measures, but in fact points to the opposite conclusion. A road built so far out will not seriously affect traffic within the City, but it will create a lot more traffic on the radial roads.</p> <p>Commented that it is a fallacy to think that the NDR promotes sustainable economic growth and creates wealth in Broadland, rather it will add to the massive and unsustainable Sovereign Debt</p>	<p>Need for NDR (K)</p>	<p>Regard: These responses have been considered by the applicant and regard has been given to them in putting together the need case for the NDR, which is detailed in Volume 1 Chapter 3 of the Environment Statement (Document Ref 6.1). Design Change: No</p>

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	<p>the country is already overburdened with.</p> <p>Noted that alternatives to the NDR, including the works proposed at Postwick Interchange, are awaited from the respective public inquiries and to grant permission for the road layout proposed in any application would pre-empt the new policy requirements.</p>	Other Comments	<p>Regard: The outcome of the public inquiry for a stand alone Postwick Hub Junction is awaited. The DCO application is for a Postwick Hub Junction associated with the NDR, which is a different proposal.</p> <p>Design Change: No</p>
	<p>Commented that the only consultation on the route options for a possible NDR was in 2003 and many things have changed in the last ten years. Suggested that all the originally proposed routes should now be re examined.</p> <p>Commented that whilst the consultation in 2003 showed residents in favour of the Blue Route option (the currently proposed route) the proposals have changed significantly since then as the 2003 consultation NDR was a full length route from the A47 west of Norwich to the A47 east of Norwich, and did not include Postwick Hub Junction. Therefore support for the NDR should only be seen on this basis and this basis alone.</p> <p>Commented that there has been no consultation on the half-NDR scheme with presentations only addressing minor issues and changes, not</p>	Consultations/Exhibitions (K)	<p>Regard: All consultations on the NDR since 2005 showed the NDR being proposed between the A47 at Postwick and the A1067 near Attlebridge including the more recent consultations in April/May/June 2012 (described in Section 3.3) and in February/March 2013 (described in Section 3.4). During these consultations there was the opportunity to comment on the route. In addition there has been opportunity to comment on the route as part of the statutory pre-application consultations.</p> <p>Design Change: No</p>

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	<p>whether the half scheme is supported.</p> <p>Commented that no alternative transport strategies based on smaller scale road building and greater front-loading of public transport have been tested. In addition since 2003 the plans for the three quarter NDR route have never been properly tested against alternatives, although both local campaigners and developers have called for an alternative route and options for light railway connections.</p>	<p>Alternative s to NDR (K)</p>	<p>Regard: These responses have been considered by the applicant and regard has been given to them in putting together the need case for the NDR, which is detailed in Volume 1 Chapter 3 of the Environment Statement (Document Ref 6.1).</p> <p>Design Change: No</p>
	<p>Commented that the NDR cuts the parish in two with plans to close off Low Load and Smees Lane, together with a massive flyover crossing the C874 Plumstead Road.</p> <p>Commented that the proposals together with the large housing proposed for the North East Triangle will funnel traffic along Plumstead Road and cause a projected traffic increase of 100% on a very busy C class road. This will cause significant increase in noise, carcinogenic pollution, increased congestion and a loss of quality of life through the heart of a conservation area.</p>	<p>Specific Road Effects (K)</p>	<p>Regard: One of the reasons for introducing a bridge over the NDR at Middle Road was to improve access options to Gt and Lt Plumstead and help mitigate concerns that the NDR cut the parish in two. The bridge was located here, rather than at Low Road or Smees Lane, because Middle Road was considered the better standard road.</p> <p>Traffic modelling indicates that flows will reduce on Plumstead Road with an NDR. See Appendix I to the Traffic Forecasting Report (Document Ref 5.6) for forecast traffic flows.</p> <p>Design Change: No</p>

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	<p>Commented that closing roads will force cars and motor cycles to drive either to Wroxham Road or Plumstead Road to enter the City, increasing travel time, travel cost, increased carbon footprint and carcinogenic pollution.</p>	<p>Other Comments</p>	<p>Regard: Middle Road is now being left open to provide better connectivity to Norwich for residents of Great Plumstead. Design Change: No</p>
	<p>Questioned why the line of the NDR is different from that which is in the local plan, for Broadland, which was to connect the Postwick Hub via Green Lane South to the C874 Plumstead Road at the top of Dussindale Drive. By changing the local plan, it will thwart the option of the more cost effective Pink Route. Suggested that by changing to the Pink Route the inner transport link could be delivered in a more cost effective and timely manner.</p> <p>It would link up with significant housing already approved at Laurel Farm/Brook Farm, Blue Boar Lane and at a modified Beyond Green application, to facilitate a direct connection from the Postwick Hub coming close to Tesco Superstore and then to Sprowston Park and Ride onward to Norwich Airport.</p>	<p>Route of NDR (K)</p>	<p>Regard: Section 3 outlines the process by which the current route of the NDR was adopted. The alternative of an inner orbital link road using routes through proposed development considered as Alternative No 5 in the need and alternatives case (Volume 1 Chapter 3 of the Environment Statement (Document Ref 6.1)). Design Change: No</p>
	<p>Commented that an NDR-centred transport policy will lead to greater vehicle use, greater journeys and greater congestion that will prevent any future</p>	<p>Emission/Noise Issues (K)</p>	<p>Regard: Carbon emissions is one of the topics considered in the Environmental Impact Assessment (EIA) process. These assessments</p>

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	development of a transport strategy that integrates sustainable modes and modal shift. From the start, the road would generate 25,000 extra tonnes of CO2 emissions per year, which is not consistent with national government policies.		are included in Volume 1 Chapter 5 of the Environmental Statement (Document Ref 6.1). The assessment shows a slight increase in carbon emissions with the NDR, but this needs to be considered within the wider context of NATS which will enable other sustainable travel modes to be introduced. Design Change: No
Ref: PC026 Hainford Parish Council	Expressed concerns that there will be a negative impact on the village due to the potential for increased traffic.	Specific Road Effects	Regard: Traffic flows on the B1354 through Hainford are predicted to decrease with an NDR. See Appendix I to the Traffic Forecasting Report (Document Ref 5.6) for forecast traffic flows. Design Change: No
Ref: PC027 Hellesdon Parish Council	Resolved to support proposals particularly the roundabouts on the junctions of A1067 and Fir Covert Road and the dualling of the road between the A140 and A1067.	On-Line Proposals (K)	Regard: Comments noted. Design Change: No
	Expressed support for proposals to carry out a further feasibility study to link the NDR with the existing A47 southern bypass.	Route of NDR (K)	Regard: See response to LA007. Design Change: No
Ref: PC028 Horsford Parish Council	Commented that it does not wish to add any further comments to those given at earlier consultations with the parish council.	Other Comment	Regard: Comments noted. Design Change: No

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<p>Ref: PC029 Horsham and Newton St Faiths Parish Council</p>	<p>Commented that it is deeply against the NDR in its current form and believes that unless the NDR joins up with the A47 by going through the Wensum Valley then the whole project will be worthless.</p> <p>Considered that in its current planned state the negative impacts of the NDR will far outweigh any positives that are achieved and urges the applicant to complete the circle round to the A47. The Parish Council would then support the plans.</p>	<p>Route of NDR (K)</p>	<p>Regard: See response to PC016. Design Change: No</p>
	<p>Objected to the proposed plans as huge areas of rural countryside will be destroyed and the NDR will lead the way for increased development that will eventually encroach onto Horsham and Newton St Faith.</p>	<p>Landscaping/Planting Issues (K)</p>	<p>Regard: The strategy for the scale and location of development is determined through the development plan process, in this case the Joint Core Strategy for Broadland, Norwich and South Norfolk. Individual sites for growth are set out in more detailed local plan documents that are currently in production and have been subject to consultation. The JCS is supported by evidence and has been the subject of statutory consultation and public examination by the independent Planning Inspectorate. Individual applications for development in villages as elsewhere will be determined by the district councils in accordance with the plan unless there are material considerations that indicate</p>

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			<p>otherwise. Design Change: No</p>
	<p>Expressed concerns regarding the impact of the increased noise and pollution on the village.</p>	<p>Emission/Noise Issues (K)</p>	<p>Regard: Traffic flows are predicted to increase through Horsford with an NDR. See Appendix I to the Forecasting Report (Document Ref 5.6) for forecast traffic flows. This reflects traffic which is currently using rural orbital routes switching to the NDR and using routes such as the B1149 through Horsford to access the NDR. Traffic calming through Horsford does not form part of the application proposals. However, the applicant has given a commitment to monitor vehicles flows/speeds post NDR implementation with a view to considering such measures if appropriate. Design Change: No</p>
	<p>Objected to the plans for an at grade informal pedestrian crossing for access to and from Petans and Horsham. Suggested that having a crossing with no traffic lights would be highly dangerous and completely inappropriate. Commented that the customers of Petans are very important to the public houses and shops within</p>	<p>Walking/Cycling/Horse Riding Issues (K)</p>	<p>Regard: It is proposed to maintain connectivity with the provision of a segregated shared use footway/cycleway around the perimeter of the junction with uncontrolled crossing points. This is considered appropriate provision to cater for the anticipated level of usage. Design Change: No</p>

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	<p>the village so it still hopes to see this taken into account. Commented that it would like to see an underpass built under the NDR linking Petans to Horsham St Faith.</p>		
<p>Ref: PC030 Norton Subcourse Parish Council</p>	<p>Commented that it would like to see the new road join the A47 at its western end. The current plans for the NDR, to only join the A1067 Fakenham Road in the west, will result in many vehicles taking a shortcut through Ringland Hills, which would be unacceptable and dangerous.</p>	<p>Route of NDR (K)</p>	<p>Regard: See response to PC016. Design Change: No</p>
<p>Ref: PC031 Rackheath Parish Council</p>	<p>Commented on its disappointment and frustration regarding the poor organisation of the consultation meeting. Noted that the letters to the Rackheath residents, turned up on the day of the consultation and for those who were at work it meant they didn't get the letter until the evening. This allowed no time to prepare for a consultation there and meant that many people did not or could not attend the meeting.</p>	<p>Consultation/Exhibitions (K)</p>	<p>Regard: Whilst Rackheath residents were able to attend any of the other exhibitions, in light of the comments the applicant decided to schedule an additional exhibition on 12 August 2013 (between 13:00 to 20:00) at the Holy Trinity Church on Salhouse Road. Letters notifying people of this new exhibition were sent to addresses within Rackheath Parish (Appendix K-5 of this report). Design Change: No</p>
	<p>Commented that there is not enough proof that the benefits to the area would be greater than if</p>	<p>Need for NDR (K)</p>	<p>Regard: The Transport Assessment (Document Ref 5.5), Economic Appraisal Report (Document</p>

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	<p>the Council were to put the money into the improvement of existing roads.</p> <p>Commented that it is a fallacy the NDR promotes sustainable economic growth and creates wealth in Broadland and does not agree that the NDR will reduce traffic in the city. There has been no real evidence to support this.</p>		<p>Ref 5.7) and Land Use and Economic Development Report (Document Ref 10.3) demonstrates that there will be traffic reductions in the city and economic growth with the NDR.</p> <p>Design Change: No</p>
	<p>Commented that their opinion is that the NDR is too far out to make any real difference. Suggested that the problem with buses and other sustainable measures is a route and timing problem. The residents of Rackheath complain about the lack of buses not the time it takes to get in city or the route they take.</p>	Route of NDR (K)	<p>Regard: These responses have been considered by the applicant and regard has been given to them in putting together the assessment of alternatives, which is detailed in Volume 1 Chapter 3 of the Environment Statement (Document Ref 6.1).</p> <p>The alternative of an inner orbital link road closer to Norwich is considered as Alternative No 5 in the need and alternatives case (Volume 1 Chapter 3 of the Environmental Statement (Document Ref 6.1)).</p> <p>Design Change: No</p>
	<p>Commented that the only consultation on the route options for a possible NDR was in 2003, where there was no option for people to say they did not feel a road was needed. There was only a request to choose the best route option.</p>	Consultation/Exhibitions (K)	<p>Regard: See response to PC025.</p> <p>Design Change: No</p>

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	Suggested that many things have changed in the last ten years and therefore all the original proposed routes should now be re examined.		
	Commented that the NDR will cause most of the predicted new traffic in north east Norwich and plans for both the NDR and Postwick Hub have never been properly tested against alternatives, this includes light railway. Suggested that money could be better spent on improving public transport and introducing free transport for children. This would encourage parents to put their child on a bus and leave the car in the garage.	Alternative s to NDR (K)	Regard: These responses have been considered by the applicant and regard has been given to them in putting together the assessment of alternatives, which is detailed in Volume 1 Chapter 3 of the Environment Statement (Document Ref 6.1). Design Change: No
	Commented that the proposals will cut the parish off from the Plumstead area and the city, and its parishioners would have to take a detour onto the NDR turning a 5 minute journey into a 10minute journey at least. This will not only cost more in fuel and cause more environmental damage, but is going against current government policy.	Off-Line Proposals (K)	Regard: Whilst the comments are noted, the reasons for closure of Green Lane East/Broad Lane at its junction with Plumstead Road are primarily to improve highway safety at this junction. The closure of Green Lane East/Broad Lane at its junction with Plumstead Road will remove the existing crossroads junction making it a more conventional and safer T-junction. Design Change: No

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	<p>Suggested the road closures are going to be a problem in many parishes and this leads to greater vehicle use, longer journeys and increased congestion that will put any future transport plans at risk. The existing roads, all in their time were created to ease traffic, have now been proven to be ineffective.</p>	<p>Off-Line Proposals (K)</p>	<p>Regard: The applicant has tried to keep the number of road closures to a minimum and they are generally only provided for reasons of highway safety where minor roads are severed by the NDR or to encourage traffic to use more appropriate routes. Design Change: No</p>
<p>Ref: PC032 Salhouse Parish Council</p>	<p>Commented that it is wrong that the proposed NDR has become inextricably linked to the planned development of the North East Growth Triangle as designated in the Joint Core Strategy. This was not the purpose of the road when it was first proposed. As such there is a risk the road will become a facilitator for excessive development.</p> <p>Considered that the net impact on residents of Salhouse could be an increase in traffic which counteracts any benefits due to the new infrastructure. The NDR might marginally reduce traffic on the outer ring road, but it cannot see any argument for the NDR reducing traffic in Norwich city centre.</p>	<p>Need for NDR (K)</p>	<p>Regard: The NDR was developed to resolve existing problems of congestion and rat-running to the north and east of Norwich and to improve access to business, the strategic road network, Norwich International Airport and the wider area of North Norfolk. It has been a key element of NATS before the development of the JCS. However, the NDR would also provide supporting infrastructure for the housing growth identified in the JCS. Development serves people's needs for homes, jobs and services. The relationship between the NDR and planned growth in the Joint Core Strategy (JCS) is detailed in Volume 1 Chapters 2 and 3 of the Environmental Statement (Document Ref 6.1). Design Change: No</p>
	<p>Expressed concern regarding effects to the peace and tranquillity of historic Rackheath Park, the</p>	<p>Wildlife</p>	<p>Regard: Environment Agency and Natural England have been consulted on the habitat and</p>

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	<p>wetland habitat of Dobb's Beck and The Springs, to the north west of the A1151 (which drains into the River Bure) and the peace and beauty of the area around Beeston St. Andrew.</p> <p>Commented that a further environmental concern is that the new road will cause increased surface drainage runoff into local (Broadland) water courses and that it will contain pollutants from the road.</p>	<p>Issues (K)</p>	<p>water quality of these areas. Measures have been incorporated into the scheme design to mitigate for any impacts. The NDR is proposed to be drained by a comprehensive and sustainable drainage system. The capacity of the system makes allowance for climate change. (See Volume 1 Chapter 14 of the Environmental Assessment (Document Ref 6.1)).</p> <p>Design Change: No</p>
	<p>Expressed concern regarding the predicted increase in traffic along the A1151 and B1140 between the NDR and the new housing developments around Wroxham and Hoveton. Suggested that this would result in further tailbacks and delays on an already popular and crowded tourist route thus threatening the sustainability and economic viability of local tourism and quality of life of local residents.</p> <p>Noted that local traffic from Salhouse uses this route to the local shopping centre and other facilities at Wroxham. As congestion increases on the A1151, it considers that traffic will increasingly use Salhouse as a 'rat run' to avoid the congestion.</p>	<p>Specific Road Effects (K)</p>	<p>Regard: Traffic flows are predicted to increase on Wroxham Road close to the NDR and this is to be expected as it reflects traffic using Wroxham Road to access the NDR. Refer to the Traffic Forecasting Report, Appendix I (Document Ref 5.6) for forecast traffic flows.</p> <p>Traffic flows are predicted to increase on Salhouse Road north and south of the NDR and this is to be expected as it reflects traffic using it to access the NDR. However, on Salhouse Road in the built up area traffic flows are predicted to decrease. This reflects traffic wishing to access external destinations changing behaviour by travelling out to the NDR rather than travelling through the built up area. Refer to the Traffic Forecasting Report,</p>

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			<p>Appendix I (Document Ref 5.6) for forecast traffic flows.</p> <p>Design Change: No</p>
	<p>Commented that the Postwick Hub is poorly designed and its complicated nature will actually deter traffic from using the NDR, thus causing overspill traffic onto other roads. Considers that the extra time and fuel consumption will force HGV drivers to seek alternative routes through Gt Plumstead and Salhouse. The money should be spent improving elsewhere on the A47.</p>	<p>On-Line Proposals (K)</p>	<p>Regard: During design development a number of significant engineering constraints influenced the scheme design. These include the River Yare/Railway Bridge, the existing Postwick Bridge, a high pressure gas main and the nearby property settlements at Heath Farm and Postwick village.</p> <p>Given the constraints at the site and having assessed a number of options the proposed design is considered the most practicable solution to address the capacity issues and accommodate the committed development at Broadland Gate Business Park.</p> <p>Design Change: No</p>

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	<p>Commented that the elevated section of the NDR between Thorpe End and Rackheath will be an enormous blot on the landscape and will increase traffic noise for miles around. Considers that the junction with Plumstead Road and the railway crossing needs to be re-designed.</p>	<p>On-Line Proposals (K)</p>	<p>Regard: The applicant has previously examined routing the NDR below Plumstead Road and the railway line and it is technically difficult due to groundwater conditions. There would be a high risk of flooding of any tunnel and a need for a permanent pumping system. This would have resulted in high maintenance costs. Design Change: No</p>
	<p>Commented that the argument in favour of closure of local lanes and forcing traffic onto NDR should be resisted. These lanes are used by the farm vehicles, cyclists and horse-riders and should be able to continue their traditional travel patterns without having to venture onto the NDR. Noted that there have been a number of serious accidents on A47 Southern Bypass due to slow moving vehicles using a road designed for high speed and such vehicles should be deterred from using the NDR.</p>	<p>Off-Line Proposals (K)</p>	<p>Regard: The applicant has tried to keep the number of road closures to a minimum and they are generally only provided for reasons of highway safety where minor roads are severed by the NDR or to encourage traffic to use more appropriate routes. Design Change: No</p>
	<p>Commented that the roundabouts on Salhouse Road and other radial routes may cause delays for drivers going into and out of Norwich, and cyclists, horse-riders and pedestrians will find it almost impossible to cross this busy road intersection and other similar junctions. Consider</p>	<p>Walking/Cycling/Horse Riding Issues (K)</p>	<p>Regard: Salhouse Road junction operates below its theoretical capacity for the predicted traffic levels. Whilst it exceeds it desirable capacity in 2032 the delay is considered reasonable and the queues can be accommodated safely. See Chapter 8 of the</p>

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	<p>that provisions must be made to enable them to cross.</p> <p>Commented that the isolated pedestrian over-bridges proposed will be too far apart to attract users who will seek the shortest route.</p>		<p>Transport Assessment (Document Ref 5.5).</p> <p>During the April/May/June 2012 public consultations the applicant had various requests for improved walking and cycling facilities. As a result a strategy was developed to consider and prioritise these consultation requests. The strategy published as part of the February/March 2013 public consultations identified a network of routes to link areas that generate NMUs (such as villages, employment areas, future development) with each other, the Norwich Cycle Network and the Marriotts Way. Part of these routes utilised narrow country lanes, roads closed to motor vehicles and existing public rights of way. The applicant has prioritised NMU improvements on this network, and these improvements have included new NMU facilities as part of the proposals.</p> <p>Design Change: No</p>
	<p>Commented that the B1140 is the designated sugar beet route from north of Wroxham Bridge to Cantley. The NDR will, if adequately managed, take HGV traffic away from Salhouse and onto the NDR and A47, especially if that is also improved. Suggested that villagers said they would accept</p>	<p>Suggested Changes (K)</p>	<p>Regard: Norfolk County Council has a Route Hierarchy network which classifies roads according to their function and level of use. This was developed following assessments of roads and public consultations during the 1990s and early 2000s. Within this Route Hierarchy roads</p>

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	<p>the NDR with the proviso that HGV traffic would be taken away by enforceable restrictions and signage put in place.</p> <p>Commented on the HGV designated route to Rackheath Industrial Estate via Salhouse which was put in place some years ago following pressure from Rackheath residents in Green Lane West. Suggested that traffic must be encouraged to access the industrial estate direct from NDR.</p>		<p>designated as a Main Distributor Route and classified a B road are identified as being a distributor of local through traffic. The applicant would not normally provide a weight restriction on such routes.</p> <p>Design Change: No</p>
	<p>Commented that given the level of development already proposed around Thorpe End, Thorpe St Andrew and Sprowston an alternative proposal in the form of an Orbital Link Road closer to the city could be a viable alternative to the NDR.</p> <p>Suggested that this should be shorter, require less engineering and as a result, be cheaper, less environmentally damaging and more deliverable in the short term.</p>	Route of NDR (K)	<p>Regard: The alternative of an inner orbital link road using routes through proposed development is considered as Alternative No 5 in the needs and alternative case (Volume 1 Chapter 3 of the Environment Statement (Document Ref 6.1)).</p> <p>Design Change: No</p>
	<p>Commented that the benefit of the NDR, if constructed, will be severely diminished if it does not fulfil its original purpose of linking the A47 from Postwick in the East to Longwater in the west.</p>	Route of NDR (K)	<p>Regard: See response to PC016.</p> <p>Design Change: No</p>

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	<p>Commented that residents of Salhouse have not had the benefit of an exhibition. The only view of maps and plans for the NDR were exhibited by the Parish Council as part of their Neighbourhood Plan public sessions.</p>	<p>Consultation/Exhibitions (K)</p>	<p>Regard: The rationale for selection of exhibition venues is outlined in Section 4.4 of this report. Design Change: No</p>
<p>Ref: PC033 Spixworth Parish Council</p>	<p>Spixworth Parish Council commented that it supports the need for the NDR.</p>	<p>Need for the NDR (K)</p>	<p>Regard: The need and alternatives case for the NDR is detailed in Volume 1 Chapter 3 of the Environment Statement (Document Ref 6.1). Design Change: No</p>
	<p>Commented that it debated its response to the consultation at its last meeting, and by a narrow majority supported the proposal for the Crostwick Lane/Rackheath Lane/B1150 junction. Noted that an alternative option for the junction was put forward which the Councillors felt had some merit.</p>	<p>Off-Line Proposals (K)</p>	<p>Regard: The alternative suggested involved diversion of the Rackheath Lane arm of the junction so that it joins North Walsham Road to the south of Crostwick Lane (thereby reversing the stagger of the side road arms of this junction) and restricting traffic exiting Rackheath Lane to left turn only. This alternative has been considered and is not appropriate for the following reasons:</p> <ul style="list-style-type: none"> • it is unlikely that physical measures alone could prevent the right turn out of Rackheath Lane making the restriction difficult to enforce; • the additional distance to travel to the North Walsham Road Roundabout and back could

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			<p>encourage vehicles to turn right out of Rackheath Lane thereby introducing an illegal movement and additional vehicles at the junction;</p> <ul style="list-style-type: none"> vehicles from Crostwick Road wishing to access Rackheath Lane would have a difficult manoeuvre to make unless the left turn into Rackheath Lane from North Walsham Road was also restricted; it does not fulfil the intention to simplify the junction. <p>Design Change: No</p>
Ref: PC034 Sprowston Parish Council	Commented that given the previous responses made it did not wish to make any further comment at this time. Except to say that it is looking forward to work commencing on this scheme.	Other Comments	<p>Regard: Comments noted. Design Change: No</p>
Ref: PC035 Swannington Parish Council	Commented that the revised route of the NDR does not join up with the A47, and many are now calling the project the Road to Nowhere.	Route of NDR (K)	<p>Regard: See response to PC016. Design Change: No</p>
	Commented that the proposed NDR will cause congestion and rat runs through the small parishes and villages, particularly Swannington, Attlebridge, Taverham, Ringland and Costessey. This congestion will be exacerbated by the	Specific Road Effects (K)	<p>Regard: From the traffic modelling work that has been carried out, over time traffic levels are likely to increase over River Wensum. However, the traffic modelling shows that these flows are about the same or slightly less with the NDR in</p>

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	<p>additional housing in the Aylsham Area and the proposed supermarket development on Fir Covert Road should it gain approval.</p>		<p>place compared to the scenario without the NDR, that is to say, the NDR doesn't encourage additional trips between Taverham and Costessey on these routes. Refer to the Traffic Forecasting Report, Appendix I (Document Ref 5.6) for forecast traffic flows. Design Change: No</p>
	<p>Commented that it is alleged that the road will generate an additional 25,000 tonnes of CO2 emissions each year, have adverse impacts on many protected species, and have adverse impact on the landscape. Given this the Parish Council considers that the project does not merit construction, and that the NDR is merely an access road for the proposed development in the growth triangle. It does not believe the NDR in its current form will bring the sustained and economic benefit to the county that Transport for Norwich has suggested.</p>	<p>Need for NDR (K)</p>	<p>Regard: Carbon emissions is one of the topics considered in the Environmental Impact Assessment (EIA) process. These assessments are included in Volume 1 Chapter 5 of the Environmental Statement (Document Ref 6.1). The assessment shows a slight increase in carbon emissions with the NDR, but this needs to be considered within the wider context of NATS which will enable other sustainable travel modes to be introduced. The Land Use and Economic Development Report (Document Ref 10.3) demonstrates that there will be economic growth with the NDR. Design Change: No</p>
	<p>Commented that it remains firmly opposed to the proposed mineral extraction from Swannington Bottom Plantation and is concerned that this site will be exploited in the need to source locally</p>	<p>Other Comments</p>	<p>Regard: The scheme earthworks have been designed to maintain an earthworks balance, to ensure that no excess soil is created and no soil</p>

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	available construction aggregate.		is required to be imported. Design Change: No
	Commented that growth should be by gradual means, and housing provided when industry is established and requires a workforce.	Other Comments	Regard: Comment does not relate to NDR proposals. Design Change: No
Ref: PC036 Wroxham Parish Council	Commented that the general view amongst a large number of residents seems to be that there is little justification for building the NDR, unless to facilitate the creation of new housing development. Considered that there is no doubt that the principal beneficiaries will be landowners and housing developers.	Need for NDR (K)	Regard: The NDR was developed to resolve existing problems of congestion and rat-running to the north and east of Norwich and to improve access to business, the strategic road network, Norwich International Airport and the wider area of North Norfolk. It has been a key element of NATS before the development of the JCS. However, the NDR would also provide supporting infrastructure for the housing growth identified in the JCS. Development serves people's needs for homes, jobs and services. The relationship between the NDR and planned growth in the Joint Core Strategy (JCS) is detailed in Volume 1 Chapters 2 and 3 of the Environmental Statement (Document Ref 6.1). Design Change: No
	Expressed concern at the number of roundabouts proposed over the length of the route, which will cause slow moving traffic jams during busy	On-Line Proposals (K)	Regard: Wroxham Road junction operates below its theoretical capacity for the predicted traffic levels. Whilst it exceeds it desirable

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	<p>periods. Particular concerns are regarding the close proximity of roundabouts at North Walsham Road, Wroxham Road, Salhouse Road and Plumstead Road.</p> <p>Suggested the solution to the problem is to replace the proposed Wroxham Road Roundabout with a bridging arrangement either under or over the NDR, which will provide a good traffic flow along the A1151.</p>		<p>capacity in 2032 the delay is considered reasonable and the queues can be accommodated safely. See Chapter 8 of the Transport Assessment (Document Ref 5.5). The NDR is a distributor road and not a bypass and so not many users are expected to drive from one end to the other. In view of this the delay at the roundabouts is not expected to be a deterrent to the use of the route. Grade separated junctions would have a much greater environmental impact and be more difficult to justify.</p> <p>Design Change: No</p>
	<p>Commented on existing traffic problems that already exist on the A1151 in Wroxham and Hoveton and traffic volumes have increased considerably over the ensuing years. With new houses being planned in Hoveton, Wroxham, and Rackheath the A1151 will be seriously overburdened during busy periods.</p> <p>Commented that a steady flow of traffic on the A1151 will not be maintained when it will be obstructed by a two-lane dual carriageway NDR with a single lane roundabout to cross.</p> <p>Suggested a special inquiry/consultation to</p>	<p>Specific Road Effects (K)</p>	<p>Regard: Traffic flows are predicted to increase on Wroxham Road close to the NDR and this is to be expected as it reflects traffic using Wroxham Road to access the NDR. Refer to the Traffic Forecasting Report, Appendix I (Document Ref 5.6) for forecast traffic flows.</p> <p>Design Change: No</p>

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Ref: PC036 Greater Anglia	evaluate improvements that could be undertaken. Commented that it has no objection to the scheme and fully supports the proposed development which will be a sustainable transport system for Norwich.	Other Comments	Regard: Comments noted. Design Change: No
Ref: PC037 Fulcrum Pipelines	Confirmed that it had no comments to make.	Other Comments	Regard: Comments noted. Design Change: No
Ref: PC038 NATS En-Route (NERL) Safeguarding	Commented that it had no safeguarding objection to the proposal.	Other Comments	Regard: Comments noted. Design Change: No

Appendix U

Section 42 Consultations Summary of Responses from Those with Interest in Land




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Section 42 Consultations - Summary of Those With Interest in Land Responses

Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
<p>Ref: IT001 [REDACTED] – Beeston Lane, Rackheath</p>	<p>NA</p>	<p>Commented that the landscape to north of Beeston Lane relies on a 2m high bund and fails to adequately screen the road with tree planting.</p>	<p>Landscaping/ Planting Issues (K)</p>	<p>Regard: The landscaping through Beeston Park has been designed with regard to the existing nature of the landscaping, and has tied in and recreated this landscaping style and land use. The 2 metre bund has been designed as a result of a careful earthworks balance, to ensure that no excess soil is created and no soil is required to be imported. There has been significant input from scheme ecologists, to ensure that the landscaping and habitat creation functions with existing ecological patterns of movement. Additional woodland creation has been provided on the south side of the NDR. Design Change: Yes – Design Change Ref 8.5 in Appendix V of this report.</p>
<p>Ref: IT002 [REDACTED] – Hall Lane, Drayton</p>	<p>NA</p>	<p>Commented on concerns that traffic off the NDR to Drayton will now be directed via Hall Lane. Considers Drayton Lane a much safer option.</p>	<p>On-Line Proposals (K)</p>	<p>Regard: See response to Ref: IT051 Design Change: No</p>

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
Ref: IT003 [REDACTED] Fir Covert Road, Felthorpe	NA	Commented that keeping Fir Covert Road open is the best course of action for the local economy and community. Also the roundabout with A1067 Fakenham Road will be beneficial.	On-Line Proposals (K)	Regard: Comments noted. Design Change: No
Ref: IT003A [REDACTED] Fir Covert Road, Felthorpe	NA	Commented that keeping Fir Covert Road open is the best course of action for the local economy and community. Also the roundabout with A1067 Fakenham Road will be beneficial.	On-Line Proposals (K)	Regard: Comments noted. Design Change: No
Ref: IT004 [REDACTED] [REDACTED] Fir Covert Road, Taverham	NA	Commented on support for the reintroduction of the Fir Covert Road roundabout with the NDR whilst also retaining the roundabout with the A1067 Fakenham Road.	On-Line Proposals (K)	Regard: Comments noted. Design Change: No
Ref: IT004A [REDACTED] [REDACTED]	NA	Commented on support for the reintroduction of the Fir Covert	On-Line Proposals (K)	Regard: Comments noted.

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Fir Covert Road, Taverham		Road roundabout with the NDR whilst also retaining the roundabout with the A1067 Fakenham Road.		Design Change: No
Ref: IT005    Upper King Street, Norwich	10/45	Commented on concerns about the closure of Green Lane East/Broad Lane at Plumstead Road and that this will have a significant inconvenience to farming operations. Alternative would be the construction of an agricultural access to link clients land to the west of the railway line.	Off-Line Proposals (K)	Regard: Consultation proposals already included private mean of access to land from Plumstead Road to the west of the railway line. Design Change: Yes – Design Change Ref 10.2 in Appendix V of this report.
	10/37	Commented on security concerns about the bridleway adjacent to the railway line.	Land/Property Issues	Regard: Boundary fencing and hedgerows will be considered as part of detailed design and will include discussions with land owners. Design Change: No
	10/41 10/42	Noted that land to east of the railway line is likely to be entirely severed, and requires	Land/Property Issues	Regard: Issue will be resolved by proposed acquisition of plots 10/41 and 10/42 by the applicant.

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
<p>Ref: IT006 [Redacted] [Redacted] [Redacted] – Upper King Street, Norwich</p>	<p>1/21</p>	<p>access. Expressed concern about the lane that will be stopped up, which runs adjacent to their property. Requested the stopped up section be gated.</p>	<p>Land/Property Issues</p>	<p>Design Change: No Regard: Provision of gate will be considered as part of detailed design, although it is noted that access to adjacent land will still be required by other third parties. Design Change: No</p>
<p>Ref: IT007 [Redacted] [Redacted] [Redacted] – Upper King Street, Norwich</p>	<p>1/23 2/1</p>	<p>Commented on concerns about security of property and land west of property due to grassland/woodland creation. Request suitable security fencing.</p>	<p>Land/Property Issues</p>	<p>Regard: Boundary fencing and hedgerows will be considered as part of detailed design and will include discussions with land owners. Design Change: No</p>
<p>Ref: IT008 [Redacted] Old Norwich Road, Horsham St Faith</p>	<p>NA</p>	<p>Believed the NDR will give license to commercial and domestic building, both of which will result in the loss of agricultural land. States that no one has been able to explain how the water, sewerage, health care and education needs required by the</p>	<p>Need for NDR (K)</p>	<p>Regard: Infrastructure capacity for growth, and the requirement and deliverability of enhanced infrastructure, has been tested through the development plan process, in this case the Joint Core Strategy for Broadland, Norwich and South Norfolk. Design Change: No</p>

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
		additional development will be provided.		
	NA	Questioned how the funding will be found to maintain the NDR.	Other Comments	Regard: The Local Highways Maintenance grant is calculated, for the A class road network, purely on length. Therefore the NDR, a future A class road, would attract extra funding through this formula. Design Change: No
Ref: IT009 [Redacted] [Redacted] [Redacted] Fir Covert Farm, Fir Covert Road, Felthorpe	NA	Commented that he is pleased to see the reintroduction of the Fir Covert Road roundabout with the NDR.	On-Line Proposals (K)	Regard: Comments noted. Design Change: No
Ref: IT010 [Redacted] [Redacted] Fir Covert Road, Taverham	NA	Commented that it is fully supportive of the NDR on the basis that it be dual carriageway and that roundabout junctions be provided at both Fir Covert Road and the A1067	On-Line Proposals (K)	Regard: Comments noted. Design Change: No

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
		Fakenham Road.		
	NA	<p>Considered that the only scheme that gives maximum benefit is one which links to the A47 to the west of Norwich.</p>	Route of NDR (K)	<p>Regard: A road linking the A1067 and the A47(w) would have to cross the Wensum Valley, which is designated a Special Area of Conservation (SAC) under the European Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora - often referred to as the Habitats Directive. An assessment of options across the Wensum Valley concluded, in 2005, that significant impacts on the SAC would be likely, and there was doubt as to whether, under the terms of the Habitats Directive, it would be possible to design an acceptable scheme. This in turn raised the prospect that consent for a wider scheme including such a link might not be granted. On 19 September 2005, the applicant's Cabinet resolved to have no NDR link between the A47(w) and the A1067. It therefore did not form part of the adopted route.</p> <p>At its meeting of 16 September 2013 the meeting of the Norfolk County Council</p>

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
				<p>resolved to recommend to Cabinet that they submit an application for a DCO in respect of the NDR as proposed (i.e. between the A47 at Postwick and the A1067 near Attlebridge) and to also commission a report on a feasibility study of providing a link across the Wensum Valley from the A1067 to the A47(w). Whilst at its meeting of 7 October 2013 the applicant's Cabinet resolved that a "scoping report on the feasibility of providing a link across the Wensum Valley from the A1067 – A47 be written once consultation work was completed", this study has not been carried out and there is therefore currently no proposal establishing the form any link between the A1067 and A47(w) would take, or indeed whether any such link is feasible. The Transport Assessment for the NDR (Document Ref 5.5.) shows that the NDR can provide substantial benefits without a further link between the A1067 and A47(w) and that the NDR will reduce daily traffic on existing routes between the A1067 and the</p>

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
<p>Ref: IT011 [REDACTED] – Fir Covert Road Taverham</p>	<p>NA</p>	<p>Commented that it wholeheartedly supports the reintroduction of the Fir Covert Road roundabout with the NDR.</p>	<p>On-Line Proposals (K)</p>	<p>A47(w) between Drayton/Taverham and Costessey. The feasibility and environmental acceptability of a link to the A47(w) have not been established and the previous assessment in 2005 discarded this option. Accordingly, it is the position of the applicant that the NDR can and should be considered on its own merits without such a link. Design Change: No</p>
<p>Ref: IT012 [REDACTED] – Costessey Lane, Drayton</p>	<p>NA</p>	<p>Considered road fundamentally flawed as it does not link to the A47 to the west of Norwich.</p>	<p>Route of NDR (K)</p>	<p>Regard: See responses to Ref: IT010 Design Change: No</p>
	<p>NA</p>	<p>Commented that it believes Reepham Road, between Hall</p>	<p>Route of NDR (K)</p>	<p>Regard: This route was one of the options considered in the Stage 1 Environmental</p>

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
		Lane and Fir Covert Road, is good quality single carriageway road and could be used as the route for the NDR.		Assessment undertaken prior to developing a manageable number of route alternatives to take forward to the 2003 public consultations. It was rejected at this stage as a result of this assessment. Design Change: No
	NA	Objected to the closure of Holly Lane as this will encourage rat running in the local area.	Off-Line Proposals (K)	Regard: This junction is closed for reasons of highway safety. Junctions are not permitted on slip roads. See Forecasting Report (Document Ref 5.6) for the traffic effects of the severance. Design Change: No
	3/32 4/1 4/2	Commented that land will become permanently bisected having long term effects on its viability. Considers the access provided to the land is inadequate.	Land/Property Issues	Regard: Matter to be addressed through compensation negotiations. Access proposals have been discussed with landowner. Design Change: No
	4/2	Concerned that surface water run-off into the attenuation ponds will have contaminates such as poly-carbons, plastics	On-Line Proposals (K)	Regard: All attenuation ponds are designed to contain and treat any potential contaminants before the treated water is passed into the infiltration lagoon. (See

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
		and oils and this may leak into the surrounding arable land.		Volume 1 Chapter 14 of the Environmental Assessment (Document Ref 6.1). Design Change: No
	NA	Commented that it has long term crops planted as government funded project which yield over a 25 year period. Any disruption will cause a loss of the grant and failure to fulfil contract.	Land/Property Issues	Matter to be addressed through compensation negotiations. Design Change: No
	NA	Commented that land is irrigated via a network of below and above ground pipes. If disrupted there will be a claim for disruption and loss of crop.	Land/Property Issues	Regard: Matter to be addressed through compensation negotiations. Design Change: No
	NA	Commented that the scheme area will have considerable disruption, loss of crop and loss of profit.	Land/Property Issues	Regard: Matter to be addressed through compensation negotiations. Design Change: No
	NA	Requested pdf of full plan of proposals.	Request for Information	Regard: Link to on-line version of plan was e-mailed.

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
				Design Change: No
Ref: IT013 [Redacted] [Redacted] Holly Lane, Horsford	NA	Considered road fundamentally flawed as it does not link to the A47 to the west of Norwich	Route of NDR (K)	Regard: See response to Ref IT010. Design Change: No
	NA	Believed Reepham Road, between Hall Lane and Fir Covert Road, is good quality single carriageway road and could be used as the route for the NDR.	Route of NDR (K)	Regard: This route was one of the options considered in the Stage 1 Environmental Assessment undertaken prior to developing a manageable number of route alternatives to take forward to the 2003 public consultations. It was rejected at this stage as a result of this assessment. Design Change: No
	NA	Objected to closure of Holly lane and this will encourage rat running in the local area.	Off-Line Proposals (K)	Regard: This junction is closed for reasons of highway safety. Junctions are not permitted on slip roads. See Forecasting Report (Document Ref 5.6) for the traffic effects of the severance. Design Change: No
	NA	Commented that land owned will be permanently affected	Land/Property	Regard: Matter to be addressed through

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
		with long term effects on viability, economics of scale, crop planning and increased transport costs.	Issues	compensation negotiations. Design Change: No
	5/12	Considered the loss of access to Manor Sports Ground unacceptable and requested the proposed access is amended.	Land/Property Issues	Regard: Access will be maintained. Design Change: No
	NA	Is concerned that surface water run-off into the attenuation ponds will have contaminants such as poly-carbons, plastics and oils and this may leak into the surrounding arable land.	On-Line Proposals (K)	Regard: All attenuation ponds are designed to contain and treat any potential contaminants before the treated water is passed into the infiltration lagoon. See Volume 1 Chapter 14 of the Environmental Assessment (Document Ref 6.1). Design Change: No
	NA	Commented that it has long term crops planted as a government funded project which yield over a 25 year period. Any disruption will cause a loss of the grant and	Land/Property Issues	Regard: Matter to be addressed through compensation negotiations. Design Change: No

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
Ref: IT014 [Redacted] [Redacted] [Redacted] Upper King Street, Norwich	NA	failure to fulfil contract. Requested that Green Lane South remains open up to Middle Road so that their client can travel via Middle Road to Gt Plumstead and then Low Road to access severed land to the east of the NDR. Client has gated access onto Green Lane South that should be maintained at all times.	Land/Property Issues	Regard: The Brook Farm/Laurel Farm development (which has been granted outline planning consent and is not part of the NDR DCO application) proposes that Green Lane South becomes a pedestrian/cycle route between Smeel Lane and Low Road. However, it does propose an alternative traffic route to the west. Design Change: No
Ref: IT015 [Redacted] [Redacted] Spixworth	NA	Requested consultation information pack in PDF format or a link to the online version of it.	Request for Information	Regard: Link to on-line version was e-mailed as requested. Design Change: No
Ref: IT016 [Redacted] Drayton Lane, Horsford	NA	Requested replacement information CD.	Request for Information	Regard: Replacement CD was posted as requested. Design Change: No
Ref: IT017 [Redacted] [Redacted]	NA	Requested replacement information CD.	Request for Information	Regard: Replacement CD was posted as requested.



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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
Arthurton Road, Spixworth				Design Change: No
Ref: IT018 [REDACTED] [REDACTED] Plumstead Road, Gt Plumstead	NA	Commented that hopefully the NDR will ease congestion at this junction. Supports closure of Broad Lane at its junction with Plumstead Road.	Off-Line Proposals (K)	Regard: See Transport Assessment (Document Ref 5.5). Design Change: No
	NA	Considered the decision to terminate the NDR at the A1067 as strange as an A1067 to A47(W) link would greatly benefit Taverham, Drayton and Thorpe Marriott.	Route of NDR (K)	Regard: See response to Ref IT010. Design Change: No
Ref: IT019 [REDACTED] Smee Lane, Gt Plumstead	NA	Suggested land to east side of NDR would be more appropriate location for Lagoon 25. Commented that agricultural access is required from the link road roundabout to land on the east side of the NDR.	On-Line Proposals (K)	Regard: Requests have been considered and lagoon relocated to new location. New access is now provided from the Broadland Gate Roundabout. Design Change: Yes – Design Change Ref 12.5 and 12.9 in Appendix V of this report.
	NA	Commented that access is also	Land/Property	Regard: Access omitted from consultation

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		required from the [redacted] access road to the land to the north and east of the NDR.	Issues	plan now added. Design Change: Yes – Design Change Ref 12.11 in Appendix V of this report.
Ref: IT020 [redacted] – General Comments for all clients land owners IT021 to IT034 and IT052	NA	Requested that the impact of noise be minimised by the use of an ultra low noise road surface.	Noise/Emissions Issues (K)	Regard: Exact specification of carriageway surfacing will be determined at the detailed design stage although a low noise surface is proposed. Design Change: No
	NA	Suggested that the farm road specification is generally agreed as 4m wide with 2 m verges. Areas where boundary treatment, gating and splays need to be properly designed are identified in specific responses.	Land/Property Issues	Regard: Road specification has been widened to that suggested at certain locations. Design Change: Yes – Design Change Ref: 3.2, 8.3 in Appendix V of this report.
	NA	Suggested there are areas where further raising of the roadside embankments will be necessary to reduce disturbance. These are	Landscaping/Planting Issues (K)	Regard: Noise assessment can be found in Volume 1 Chapter 11 of the Environmental Statement (Document Ref 6.1). Design Change: No

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		identified in specific responses.		
	NA	Expressed concern that lateral ground water flows will be impacted by the scheme.	On-Line Proposals (K)	<p>Regard: These issues have been addressed within the scheme design and detailed within the Flood Risk Assessment (Document Ref 5.2).</p> <p>Design Change: No</p>
	NA	Requested that fencing will be necessary to provide a permanent manageable boundary feature.	Land/Property Issues	<p>Regard: Boundary fencing will be considered as part of detailed design and will include discussions with land owners.</p> <p>Design Change: No</p>
<p>Ref: IT021   - St George's Street, Norwich</p>	5/39 5/40	<p>Commented that an area of airport land is allocated for commercial development and there is concern that as little land as possible be acquired. For this reason there are concerns that land to both the north and south side of the NDR will be acquired. Suggested that the land will have to be viewed for commercial purposes in later</p>	Land/Property Issues	<p>Regard: Matter to be addressed through compensation negotiations.</p> <p>Design Change: No</p>


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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
		discussions about compensation.		
	5/40	Noted that discussions have been on-going regarding estate road access via a spur from Cromer Road Roundabout North to New Home Lane. Suggested one access here for all neighbouring land holdings will be less onerous in land take terms than a number of lesser accesses.	Land/Property Issues	<p>Regard: One main access spur is proposed off the Cromer Road Roundabout North to New Home Lane.</p> <p>Design Change: No</p>
	5/40	Commented that the boundary treatments for this area have not been sufficiently addressed.	Land/Property Issues	<p>Regard: Boundary fencing and hedgerows will be considered as part of detailed design and will include discussions with land owners.</p> <p>Design Change: No</p>
	5/40	Commented that the owners have concerns regarding the main site compound being adjacent to their land. Requested that access be	Land/Property Issues	<p>Regard: The scheme contractors will control access to the site compound. Discussions with neighbouring landowners over the precise details of this will occur prior to construction commencing.</p>

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
		strictly controlled along the proposed access corridor and final line of acquisition.		Design Change: No
Ref: IT022 [Redacted] [Redacted] [Redacted] St George's Street, Norwich	3/8	Noted that the scheme affects the southeast corner of the land.	Land/Property Issues	Regard: Land is required for the construction of the Reepham Road Roundabout. Design Change: No
	3/8	Noted that there is a historic permission for a new estate access to the land near the site of the Reepham Road Roundabout, which needs to be included in the design.	Land/Property Issues	Regard: Land is required for the construction of the Reepham Road Roundabout and alternative access has been provided in the proposals. Design Change: No
	3/8, 3/9	Questioned the proposal that the bridleway, private means of access and Drayton Restricted Byway No 6 should be on retained land. Requested that parties meet on site to consider the most appropriate	Land/Property Issues	Regard: The proposed design is considered appropriate for all affected parties. Design Change: No

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
		route, particularly whether the various paths can be combined and the boundary re-aligned.		
	3/8	Noted that the proposals leave an area of severed land.	Land/Property Issues	<p>Regard: This area is now included within the area of acquisition.</p> <p>Design Change: No</p>
<p>Ref: IT023  - St George's Street, Norwich</p>	9/4 9/6 9/7	Commented that the enclosure will be badly affected by the works the use of scheme land. Requested the following:	Land/Property Issues	<p>Regard: Matter to be addressed through compensation negotiations.</p> <p>Design Change: No</p>
	9/6	<ul style="list-style-type: none"> on the line of severance from retained land the applicant construct and maintain a fence and establish a hedge. Requested further embankment planting as a future boundary. 	Land/Property Issues	<p>Regard: Boundary fencing and hedgerows will be considered as part of detailed design and will include discussions with land owners.</p> <p>Design Change: No</p>
	9/4 9/6	<ul style="list-style-type: none"> acquisition of the northern part of the enclosure is accepted for landscaping and woodland creation. 	Landscaping/ Planting Issues (K)	<p>Regard: Comments noted.</p> <p>Design Change: No</p>

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	9/4 9/6	<ul style="list-style-type: none"> either side of the road raised banks be provided and trees planted on the north side between the NDR and The Springs. 	Landscaping/ Planting Issues (K)	<p>Regard: Additional planting has been provided on the north side.</p> <p>Design Change: Yes – Design Change Ref: 9.2 in Appendix V of this report.</p>
	9/4	<ul style="list-style-type: none"> trees are planted on the temporary soil storage area after reinstatement rather than the proposed scrub and grassland creation. 	Landscaping/ Planting Issues (K)	<p>Regard: Additional landscaping and woodland creation added to area of top soiling.</p> <p>Design Change: Yes – Design Change Ref: 9.11 in Appendix V of this report.</p>
	NA	Advised that the applicant needs to be aware of the right of access from Lady's Carr to Beeston Lane.	Land/Property Issues	<p>Regard: The applicant is aware of the right.</p> <p>Design Change: No</p>
<p>Ref: IT024</p> <p>██████████ - St George's Street, Norwich</p>		Suggested that there are a number of aspects that should be amended as follows:		
	6/10	<ul style="list-style-type: none"> the drainage lagoon should be relocated on other land of 	On-Line	<p>Regard: The lagoon was reduced in size following the overland flows assessment</p>

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		<p>more appropriate size and shape. If this is absolutely not possible then it should be re-aligned to leave a sensible proportion and shape of retained land. (i.e. situated alongside the NDR, towards the roundabout and with the bridleway located between the lagoon and the NDR).</p>	Proposals (K)	<p>and reshaped along Calf Lane/Bullock Hill corner. The topography of the site influenced the position of the lagoon to minimise the earthworks. Design Change: No</p>
	NA	<ul style="list-style-type: none"> with the suggested reduced usage of Bullock Hill this should be managed to limit future misuse, and gates provided at all entrances from the road. Suggested a site meeting to assess access points. 	Land/Property Issues	<p>Regard: Provision of gates at existing accesses will be considered as part of detailed design. Design Change: No</p>
	6/10 6/11	<ul style="list-style-type: none"> the boundary with the NDR and the lagoons should be fenced and a hedge planted. 	Land/Property Issues	<p>Regard: Boundary fencing and hedgerows will be considered as part of detailed design and will include discussions with land owners.</p>

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
				Design Change: No
	NA	Noted that it is imperative the telecoms mast site remains operable, full access granted for the owners and sufficient space provided to allow for reinstatement of the site after termination of the lease.	Land/Property Issues	Regard: Access to the telecoms mast site is to be provided via the new link road south of the Airport Roundabout. Design Change: No
Ref: IT025 [REDACTED] [REDACTED] St George's Street, Norwich		Commented that the property is very close to the route of the NDR and therefore it is imperative that all of the following items are taken on board:		
	5/45	<ul style="list-style-type: none"> the bank height near West Farm should be increased and constructed at the very start of occupation of the site. 	Landscaping/ Planting Issues (K)	Regard: Discussions with neighbouring landowners over the precise operational details of this will occur prior to construction commencing. Design Change: No
	5/43	<ul style="list-style-type: none"> method statements should be provided for the management of materials, 	Other Comments	Regard: The scheme contractors will control the site compound. Discussions with neighbouring landowners over the

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		soils heaps, temporary storage areas and other works in the main site compound.		<p>precise operational details of this will occur prior to construction commencing. See Volume 2 Chapter 19 (Document Ref 6.2) for the Construction Environment Management Plan.</p> <p>Design Change: No</p>
	NA	<ul style="list-style-type: none"> • arrange a site meeting with a noise consultant to allow consideration whether it is more effective to plant on the north side of the bank or not. 	Landscaping Issues	<p>Regard: Planting has been determined by landscape considerations, planting is not considered to be solely noise mitigation. Assessment of Noise is contained in Volume 1 Chapter 11 of the Environmental Statement (Document Ref 6.1).</p> <p>Design Change: No</p>
	5/45	<ul style="list-style-type: none"> • confirmation be provided on whether the bank will be handed to the client for long term control. 	Land/Property Issues	<p>Regard: The intention is that all landscaping areas will remain in the ownership of the applicant but this request will be considered as part of detailed design and will include discussions with land owners.</p> <p>Design Change: No</p>
	NA	<ul style="list-style-type: none"> • with Old Norwich Road 	Land/Property	<p>Regard: Boundary fencing and hedgerows</p>

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		<p>remaining but used less access points should be assessed and those not used fenced or hedged.</p>	Issues	<p>will be considered as part of detailed design and will include discussions with land owners. Design Change: No</p>
	NA	<ul style="list-style-type: none"> Old Norwich Road should be closed during the aviation museum's closed season. 	Suggested Change	<p>Regard: Although the aviation museum may be closed the road would still remain public highway and access still required to the museum and adjacent land. Therefore, the applicant does not consider such a closure appropriate. Design Change: No</p>
	5/45	<ul style="list-style-type: none"> the main embankment behind the farmyard should be extended east on adjacent land, or alternatively acoustic fencing should be provided as far as Old Norwich Road. 	Landscaping/ Planting Issues (K)	<p>Regard: The noise assessment has determined the most effective sites for acoustic fencing. See Volume 1 Chapter 11 of the Environmental Statement (Document Ref 6.1). Design Change: No</p>
	6/5	<ul style="list-style-type: none"> boundary locations on the banks to the east should be agreed to minimise land take. 	Land/Property Issues	<p>Regard: This will be considered as part of detailed design and will include discussions with land owners.</p>

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
	6/5	<ul style="list-style-type: none"> severance of the parcel of land is a concern and access to the land should be maintained. If not possible then prompt confirmation is needed of the tentative agreement that the land will be acquired as commercial land. 	Land/Property Issues	<p>Design Change: No</p> <p>Regard: Matter to be addressed through compensation negotiations.</p> <p>Design Change: No</p>
	NA	<ul style="list-style-type: none"> with the road expected to arrest lateral water drainage a meeting is requested to address drainage patterns to resolve any issues. 	Land/Property Issues	<p>Regard: This will be considered as part of detailed design and will include discussions with land owners.</p> <p>Design Change: No</p>
	NA	<ul style="list-style-type: none"> with the suggested reduced usage of Bullock Hill this should be managed to limit future misuse, and gates provided at all entrances from the road. Suggested a site meeting to assess 	Land/Property Issues	<p>Regard: Provision of gates at existing accesses will be considered as part of detailed design.</p> <p>Design Change: No</p>

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
Ref: IT026 [Redacted] [Redacted] - St George's Street, Norwich	NA	access points. Commented that the impact on the property is huge and there remains concerns about the impact of the NDR and the extent to which it can be mitigated.	Land/Property Issues	Regard: Matters to be addressed through compensation negotiations. Design Change: No
		Requested the following items be addressed:		
	4/21	<ul style="list-style-type: none"> the boundary with the improved Holt Road/Drayton Lane link be hedged. 	Land/Property Issues	Regard: Boundary fencing and hedgerows will be considered as part of detailed design and will include discussions with land owners. Design Change: No
	NA	<ul style="list-style-type: none"> boundary openings on Reepham Road, Hall Lane and Holt Road should be assessed to agree those openings (no longer required because of revised access arrangements) that are closed off with hedges and 	Land/Property Issues	Regard: Boundary fencing and hedgerows will be considered as part of detailed design and will include discussions with land owners. Design Change: No

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
		fences.		
	4/23 4/37 4/38 5/1	<ul style="list-style-type: none"> as the NDR will be constructed straight across the farm, temporary fencing should be provided whilst new hedging be established on the line of severance on both sides of the road. 	Land/Property Issues	<p>Regard: Boundary fencing and hedgerows will be considered as part of detailed design and will include discussions with land owners.</p> <p>Design Change: No</p>
	4/23 4/37 4/38 5/1	<ul style="list-style-type: none"> access to the farm should remain available during the scheme work. 	Land/Property Issues	<p>Regard: The scheme contractors will discuss access requirements to all parts of the farm prior to construction commencing.</p> <p>Design Change: No</p>
	NA	<ul style="list-style-type: none"> permanent points of access, whether existing or new, should be set back and gated for security. 	Land/Property Issues	<p>Regard: Provision of gates at existing accesses will be considered as part of detailed design.</p> <p>Design Change: No</p>
	5/1	<ul style="list-style-type: none"> the hammerhead at the southern end of Holt Road should be fenced and hedged for security. 	Land/Property Issues	<p>Regard: Boundary fencing and hedgerows will be considered as part of detailed design and will include discussions with land owners.</p> <p>Design Change: No</p>

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
	NA	<ul style="list-style-type: none"> Holt Road remains a concern and consideration should be given on how to limit its use and restrict against unlawful use. 	Off-Line Proposals	<p>Regard: Although not connecting to the Cromer Road Junction, Holt Road would still remain public highway and access still required to adjacent land. Therefore, the applicant does not consider any closure appropriate.</p> <p>Design Change: No</p>
		<p>Commented on the impact of the NDR on Glebe Farm and that anything that can be done to mitigate the impact will be important. Requested the following items be addressed:</p>		
	4/23 4/37 4/38 5/1	<ul style="list-style-type: none"> the bank height should be maintained to as great a height as possible to protect all the properties on the north side including in the village. 	Landscaping/ Planting Issues (K)	<p>Regard: Assessment of the proposed landscape treatments and of noise is contained in Volume 1 Chapter 7 and Volume 1 Chapter 11 of the Environmental Statement (Document Ref 6.1).</p> <p>Design Change: No</p>
	5/1	<ul style="list-style-type: none"> the embanked area north-west of the Holt Road roundabout should be raised 	Landscaping/ Planting	<p>Regard: Assessment of the proposed landscape treatments and of noise is contained in Volume 1 Chapter 7 and</p>



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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
		in level to as great a height as possible.	Issues (K)	Volume 1 Chapter 11 of the Environmental Statement (Document Ref 6.1). Design Change: No
		Noted that the farm is to be severed and requested the following items be addressed:		
	4/23 4/37 4/38 5/1	<ul style="list-style-type: none"> the farm operator's routes to the centre of the farm will be significantly increased by the road and include several junctions. Therefore the internal roadways should be planned as far as possible to minimise travel times. 	Land/Property Issues	<p>Regard: This will be considered as part of detailed design and will include discussions with land owners.</p> <p>Design Change: No</p>
	4/23 4/37 4/38 5/1	<ul style="list-style-type: none"> access gates should be provided from Reepham Road and Hall Lane, and internal roads will be required to link these access points with the various enclosures. 	Land/Property Issues	<p>Regard: Provision of gates at existing accesses will be considered as part of detailed design.</p> <p>Design Change: No</p>
Ref: IT027	NA	Commented that the NDR has an adverse impact on the	Land/Property	<p>Regard: It is accepted that the present irrigation system will require alteration.</p>

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
<p>██████████ - St George's Street, Norwich</p>		<p>present irrigation scheme and it is important to finalise the agreement that the internal reorganisation of the irrigation system.</p>	<p>Issues</p>	<p>Consideration of the requirements is ongoing but it is intended that the landowner will organise the finally agreed works with their current drainage contractors with the costs reimbursed by the applicant. Design Change: No</p>
		<p>Requested the following issues be addressed:</p>		
	<p>3/25</p>	<ul style="list-style-type: none"> a full width over-bridge and vehicular access to should be provided to Bell Farm and that the client should retain ownership of this roadway. The boundary adjacent to the west side of the track/drive would need to be relocated due to the increased land area required for the wider track. 	<p>Land/Property Issues</p>	<p>Regard: A 4m wide hardened access with 2m verges will be provided from Reepham Road along the Horsford Restricted Byway No.5 and over the proposed Bell Farm Bridge. Boundary fencing and hedgerows will be considered as part of detailed design and will include discussions with land owners. Design Change: No</p>
	<p>3/25</p>	<ul style="list-style-type: none"> the placement of the fences and hedges should be 	<p>Land/Property Issues</p>	<p>Regard: Boundary fencing and hedgerows will be considered as part of detailed</p>

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
		<p>carefully considered to ensure sufficient provision for overhang on what, may on occasions, be a very busy access roadway.</p>		<p>design and will include discussions with land owners. Design Change: No</p>
	3/25	<ul style="list-style-type: none"> the line of severance will require further discussion to address provision of boundary hedging and fencing to enable the grassland to continue to be used safely. 	Land/Property Issues	<p>Regard: Boundary fencing and hedgerows will be considered as part of detailed design and will include discussions with land owners. Design Change: No</p>
<p>Ref: IT028   St George's Street, Norwich</p>	3/23	<p>Commented that full and suitable access to the property from Reepham Road is essential. Requested that the current access track from the Reepham Road (which is due to be stopped up) be retained with an over bridge provided rather than using Horsford Restricted Byway No.5.</p>	Land/Property Issues	<p>Regard: The applicant wished to retain the existing Horsford Restricted Byway No 5 along its current line and therefore provided the Bell Farm Overbridge. Maintaining the current private access track would have resulted in a further bridge being provided in very close proximity. Design Change: No</p>

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
	3/25	Expressed concern that over time, as Horsford Restricted Byway No 5 is widened, any increase in usage will impact upon Bell Farm. Widening of this would take significantly more land whereas the existing access is already wide.	Land/Property Issues	<p>Regard: Matter to be addressed through compensation negotiations.</p> <p>Design Change: No</p>
	3/25	Commented that it is vital to ensure the width, any overhangs and grant of rights of way on Horsford Restricted Byway No 5 are secured.	Land/ Property Issues	<p>Regard: A 4m wide hardened access with 2m verges will be provided from Reepeham Road along the Horsford Restricted Byway No.5 and over the proposed Bell Farm Bridge.</p> <p>Design Change: No</p>
	3/25	Recommended that the applicant should consider making Horsford Restricted Byway No 5 an extra wide track and wide verges as anything not granted at acquisition will not be provided later. This is to enable access for all purposes including amongst other uses;	Land/Property Issues	<p>Regard: A 4m wide hardened access with 2m verges will be provided from Reepeham Road along the Horsford Restricted Byway No.5 and over the proposed Bell Farm Bridge.</p> <p>Design Change: No</p>

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
		car boot sales, the fishing club, stables and housing as exists at present.		
	3/21	Commented that the area planted on the north side adjacent to the NDR should be omitted from the scheme to leave the farm area as large as possible.	Land/Property Issues	Regard: Land is required for landscaping purposes and to avoid leaving a small severed portion of the much larger field to the south of the NDR. Design Change: No
	NA	Once boundaries have been established it is important that hedging and fencing are agreed for the line of severance for security and livestock safety.	Land/Property Issues	Regard: Boundary fencing and hedgerows will be considered as part of detailed design and will include discussions with land owners. Design Change: No
Ref: IT029 [Redacted] [Redacted] – St George's Street, Norwich	1/3	Commented that the NDR will reduce the width of this long enclosure resulting in a general reduction in usefulness and value.	Land/Property Issues	Regard: Matter to be addressed through compensation negotiations. Design Change: No
	1/3	Commented that it is vital that	Land/Property	Regard: Comment noted and it is agreed

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
		<p>the two access points on the northern side of the furthest extremity of the NDR remain passable during and after construction.</p>	<p>Issues</p>	<p>that access points should be maintained. Design Change: No</p>
	<p>1/3</p>	<p>Commented that the current fence demarking the boundary of the land alongside the road will need to be replaced with an appropriate alternative and to fence the eastern boundary at the time of the realignment. Also commented that the current hedge alongside the road will need to be replaced with an appropriate alternative.</p>	<p>Land/Property Issues</p>	<p>Regard: Boundary fencing and hedgerows will be considered as part of detailed design and will include discussions with land owners. Design Change: No</p>
	<p>1/3</p>	<p>Commented that questions remain as to whether the boundary on the eastern side of the land taken should also be planted with a hedge as a long term screen.</p>	<p>Land/Property Issues</p>	<p>Regard: Boundary fencing and hedgerows will be considered as part of detailed design and will include discussions with land owners. Design Change: No</p>

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
Ref: IT030 [Redacted] [Redacted] [Redacted] St George's Street, Norwich	NA	Commented that whilst efforts are being made to allay some of the concerns over the impact of the scheme on The Springs woodland and fishing lakes, not enough is being done in relation to protection from noise and increased local traffic generally.		
		Requested the following issues be addressed:		
	9/6	<ul style="list-style-type: none"> the land between the NDR and The Springs should be bounded as high as possible and planted with trees. Ideally this land severed from the adjacent holding should be transferred to the estate for optimum management. 	Landscaping/ Planting Issues (K)	<p>Regard: Assessment of the proposed landscape treatments and of noise is contained in Volume 1 Chapter 7 and Volume 1 Chapter 11 of the Environmental Statement (Document Ref 6.1). Additional woodland creation has been provided to bunding south of The Springs.</p> <p>Design Change: Yes – see Design Change Ref 9.2 in Appendix V of this report.</p>
	9/6	<ul style="list-style-type: none"> the access along the 	Land/Property	<p>Regard: Provision of gates at existing</p>

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
		concrete roadway to The Springs should be gated.	Issues	<p>accesses will be considered as part of detailed design.</p> <p>Design Change: No</p>
	9/10	<ul style="list-style-type: none"> the PMA into the silt trap in The Springs should be maintained and gated, with the boundary hedged and fenced. 	Land/Property Issues	<p>Regard: Boundary fencing and hedgerows will be considered as part of detailed design and will include discussions with land owners.</p> <p>Design Change: No</p>
	9/10	<ul style="list-style-type: none"> strict pollution and drainage control measures should be undertaken further to the site inspection undertaken recently. 	Land/Property Issues	<p>Regard: The NDR drainage was designed in accordance with SUDS techniques to ensure that the water quality is appropriately managed. See Volume 1 Chapter 14 of the Environmental Assessment (Document Ref 6.1).</p> <p>Design Change: No</p>
	9/10	<ul style="list-style-type: none"> a quiet road surface should be used to protect the Springs and the remainder of the estate. 	Land/Property Issues	<p>Regard: Exact specification of carriageway surfacing will be determined at the detailed design stage although a low noise surface is proposed.</p> <p>Design Change: No</p>

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
	NA	<p>Requested a discussion group be arranged to assess the most efficient way to deal with the following concerns:</p> <ul style="list-style-type: none"> the ground levels/contours and the existing noise contours. 		
	9/10	<ul style="list-style-type: none"> the expected noise profile at the date of build plus 5, 10 and 20 years to assess the best way to minimise the impact on the remainder of the estate land and property. 	Noise/Emissions Issues (K)	<p>Regard: Assessments of Noise and Air Quality are contained in Volume 1 Chapter 11 of the Environmental Statement (Document Ref 6.1). Design Change: No</p>
	9/10	<ul style="list-style-type: none"> how to minimise the reduction in value with offsite planting, onsite planting along the edge of the NDR and more bunding. 	Landscaping/Planting Issues (K)	<p>Regard: Assessments of Noise and Air Quality are contained in Volume 1 Chapter 11 of the Environmental Statement (Document Ref 6.1). Design Change: No</p>
	9/10			<p>Regard: Assessment of the proposed landscape treatments and of noise is contained in Volume 1 Chapter 7 and Volume 1 Chapter 11 of the Environmental Statement (Document Ref 6.1). Design Change: No</p>

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
		<p>In relation to the North Walsham Road/Rackheath Lane junction closure it commented that this will result in :</p> <ul style="list-style-type: none"> • a roundtrip for the occupiers of the houses of several miles each way. 	Off-Line Proposals (K)	<p>Regard: Whilst the comments are noted, the reasons for the closure are primarily to improve highway safety at the junction. Closure of Rackheath Lane will simplify turning movements allowing drivers waiting at the Crostwick Lane arm to concentrate on the vehicle movements on the main road.</p> <p>Design Change: No</p>
	NA	<ul style="list-style-type: none"> • the farming of the Beeston Estate on either side of the North Walsham Road becoming untenable due to increased journey times and poor access to the severed holding. 	Off-Line Proposals (K)	<p>Regard: Matter to be addressed through compensation negotiations.</p> <p>Design Change: No</p>
	NA	<ul style="list-style-type: none"> • a rat-run through Dow Lane with safety and road vehicle 	Off-Line Proposals (K)	<p>Regard: With the NDR providing an appropriate alternative route it is not</p>



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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
		capacity issues across all of the Beeston, Wroxham and Heggatt Estates.		considered that Dow Lane would be utilised by significant through traffic. However, this situation would be monitored post NDR implementation. Design Change: No
	NA	Commented that this junction should be kept open, or if the closure is necessary it should be realigned as a private access or located east of the cottages with access for the farm.	Off-Line Proposals (K)	Regard: Reasons for closure of Rackheath Lane at its junction with North Walsham Road are detailed above. Closure of Rackheath Lane further east could be an alternative option for reducing through movements at the junction although it would not simplify the physical layout of it. Design Change: No
	NA	Commented that the applicant needs to be ready to manage the largely unused lane (resulting from the closure) more effectively that tends to happen on similar roads.	Off-Line Proposals (K)	Regard: This will be considered as part of detailed design and will include discussions with land owners. Design Change: No
Ref: IT031 [REDACTED]		Wished to ensure that following recent discussions the final		

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
<p>– St George's Street, Norwich</p>		<p>proposals include:</p>		
	7/26	<ul style="list-style-type: none"> the PMA to the substation and the field access is to be gated and set back. 	Land/Property Issues	<p>Regard: Provision of gates at existing accesses will be considered as part of detailed design. Design Change: No</p>
	7/16	<ul style="list-style-type: none"> the NDR should be fenced and have a hedge planted on the boundary of bridleway and cycle track. 	Land/Property Issues	<p>Regard: Boundary fencing and hedgerows will be considered as part of detailed design and will include discussions with land owner. Design Change: No</p>
	7/18	<ul style="list-style-type: none"> the field access to the north side is set back and gated. 	Land/Property Issues	<p>Regard: Provision of gates at existing accesses will be considered as part of detailed design. Design Change: No</p>
	7/17	<ul style="list-style-type: none"> the reinstatement of areas to be handed back after works whether after top soil storage or landscaping have careful 	Land/Property Issues	<p>Regard: This will be considered as part of detailed design and will include discussions with land owner. Design Change: No</p>




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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
<p>Ref: IT032   - St George's Street, Norwich</p>	<p>2/20</p>	<p>consideration and agreement. Requested that access to land should be directly from the Fir Covert Road Roundabout rather than via a gateway from Fir Covert Road. The gateway should be set back to allow manoeuvring.</p>	<p>Land/Property Issues</p>	<p>Regard: Access provided off Fir Covert Road is considered more appropriate. Design Change: No</p>
	<p>2/20 2/41 3/1</p>	<p>Noted that the south side of the NDR should be temporary fenced or better to prevent trespass with a suitable mixed thorn and native species hedge. Considered the embankments should be higher on the south side of road.</p>	<p>Land/Property Issues</p>	<p>Regard: Boundary fencing and hedgerows will be considered as part of detailed design and will include discussions with land owners. Design Change: No</p>
	<p>NA</p>	<p>With the changes to Breck Farm Lane/Furze Lane proposed, it requested that the appropriate farm accesses remain open but need gating to</p>	<p>Land/Property Issues</p>	<p>Regard: Provision of gates at existing accesses will be considered as part of detailed design. Design Change: No</p>

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
		<p>avoid uncontrolled access. Commented that it is important to agree how best to allow for emergency access.</p>		
	2/30 2/42	<p>Accepted the new access track layout to Marriotts Way crossing but comments that this needs to be slightly wider and fenced and hedged against open access on either side.</p>	Land/Property Issues	<p>Regard: Boundary fencing and hedgerows will be considered as part of detailed design and will include discussions with land owners. The applicant has undertaken assessment of articulated vehicle turning movements here and considers the track width sufficient. Design Change: No</p>
	2/29	<p>Commented that there is a need to ensure there is a totally secure grant right of way for all purposes across Marriotts Way and not just for agricultural vehicles.</p>	Land/Property Issues	<p>Regard: The proposals will provide a right of way for all purposes. Design Change: No</p>
	NA	<p>Commented that the Marriotts Way to Reepham Road proposals show a combined farm access and cycle track.</p>	Land/Property Issues	<p>Regard: This arrangement is proposed in various places along the scheme and this location is no different. Discussions were held with the affected landowner and the</p>

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
		<p>Considered this a hazard and requested a separate farm access on retained land separated from the cycle track by a hedge and fence.</p>		<p>farm manager. The combined track is proposed to be 4m wide, which is more than most of the county lanes commonly used by NIMUs and farm traffic. Design Change: No</p>
	NA	<p>Commented that the access track in areas of vehicle manoeuvring should be strengthened and widened.</p>	Land/Property Issues	<p>Regard: This will be considered as part of detailed design and will include discussions with land owners. Design Change: No</p>
	2/42	<p>Requested that the boundaries on the line of severance and the boundary with Furze Lane need to be hedged and fenced and the scheme needs to allow for a gated access from Furze Lane at the manoeuvring hammerhead to the land.</p>	Land/Property Issues	<p>Regard: Boundary fencing and hedgerows will be considered as part of detailed design and will include discussions with land owners. Design Change: No</p>
<p>Ref: IT033   </p>	NA	<p>Commented that the farm most directly affected is Glebe Farm, which will be severed against the owner's requests to redirect the NDR so it would have less</p>	Land/Property Issues	<p>Regard: Matter to be addressed through compensation negotiations. Design Change: No</p>

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
St George's Street, Norwich		impact.		
	NA	Requested that the Glebe Farm boundaries need to be assessed further whether on the line of severance or due to the changes in the way the lesser local roads will be used, to prevent a recurrence of problems with tipping and travellers.	Land/Property Issues	Regard: Boundary fencing and hedgerows will be considered as part of detailed design and will include discussions with land owners. Design Change: No
	NA	Requested that the boundary with the improved Holt Road/Drayton Lane link should be hedged to provide security and boundary openings on Reepham Road, Hall Lane and Holt Road need to be assessed to agree that openings no longer required, which should be closed off with fences and hedges.	Land/Property Issues	Regard: Boundary fencing and hedgerows will be considered as part of detailed design and will include discussions with land owners. Design Change: No

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
	4/23 4/37 4/38 5/1	Commented that the NDR will be constructed straight across the farm and it is important to ensure that the boundary is secured by temporary fencing whilst new hedging is established on the line of severance on both sides of the road. In addition it is vital that access remains available during the scheme works.	Land/Property Issues	<p>Regard: Boundary fencing and hedgerows will be considered as part of detailed design and will include discussions with land owners. The scheme contractors will control the site compound. Discussions with neighbouring landowners over the precise operational details of this will occur prior to construction commencing. See Volume 2 Chapter 19 (Document Ref 6.2) for the Construction Environment Management Plan</p> <p>Design Change: No</p>
	NA	Commented that accesses are envisaged from Reepham Road and Holly Lane/Hall Road.	Land/Property Issues	<p>Regard: These are existing access locations outside the extent of the scheme which will continue to be available for use by the land owner.</p> <p>Design Change: No</p>
	5/1	Requested that the hammerhead at the southern end of the Holt Road be fenced and hedged for security	Land/Property Issues	<p>Regard: Boundary fencing and hedgerows will be considered as part of detailed design and will include discussions with land owners.</p>

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
	NA	<p>Expressed continuing concern regarding the use of the closed off Holt Road. Suggested that it remains important to consider carefully how to restrict against unlawful uses. Requested that the road is likely to become misused and the whole length be planted with a hedge to off-set some of the probable access difficulties.</p>	Off-Line Proposals	<p>Design Change: No</p> <p>Regard: Although not connecting to the Cromer Road Junction, Holt Road would still remain public highway and access still required to adjacent land. Therefore, the applicant does not consider any closure appropriate.</p> <p>Design Change: No</p>
	4/23, 4/37 4/38 5/1	<p>Commented that the bank height along the full length of road should be maintained to as great a height as possible to protect properties on the north side of the road including in the village. In addition the embanked area north west of the Holt Road Roundabout should be raised in level to as great a height as possible to</p>	Landscaping/ Planting Issues (K)	<p>Regard: Assessment of the proposed landscape treatments and of noise is contained in Volume 1 Chapter 7 and Volume 1 Chapter 11 of the Environmental Statement (Document Ref 6.1).</p> <p>Design Change: No</p>

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
		reduce the impact from the roundabout in noise and visual terms.		
	4/23 4/37 4/38 5/1	Commented that the south side has no or limited landscaping and an embankment should also be constructed on the south side to offer some protection to the properties to the south as far as Drayton. These banks should be planted for long term visual and noise protection.	Landscaping/ Planting Issues (K)	Regard: Assessment of the proposed landscape treatments and of noise is contained in Volume 1 Chapter 7 and Volume 1 Chapter 11 of the Environmental Statement (Document Ref 6.1). Design Change: No
	NA	Commented that the farm is to be severed, and the occupiers have represented against a roundabout on the link road to Horsford, preferring a bridge.	On-Line Proposals	Regard: Farm traffic will be able to access the severed fields using the existing roads and new links. Design Change: No
	NA	Commented that the farm operator's routes to the centre of the farm will be significantly increased by the road and include several junctions.	Land/Property Issues	Regard: This will be considered as part of detailed design and will include discussions with land owners. Design Change: No

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
		Therefore the internal roadways should be planned as far as possible to minimise travel times.		
	NA	Requested that access gates should be provided from Reepham Road and Hall Lane, and internal roads will be required to link these access points with the various enclosures.	Land/Property Issues	<p>Regard: Provision of gates at existing accesses will be considered as part of detailed design.</p> <p>Design Change: No</p>
	NA	Commented that the NDR has an adverse impact on the present irrigation scheme and it is important to finalise the agreement on the internal reorganisation of the irrigation system and that this will be paid for by the applicant.	Land/Property Issues	<p>Regard: It is accepted that the present irrigation system will require alteration. Consideration of the requirements is ongoing but it is intended that the landowner will organise the finally agreed works with their current drainage contractors with the costs reimbursed by the applicant.</p> <p>Design Change: No</p>
	4/39 5/2	Commented that the owners are not totally against the use	Land/Property Issues	<p>Regard: This will be considered as part of detailed design and will include discussions</p>

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
		of land for the temporary topsoil storage area. Noted that the use of temporary fences, agreement of licence terms, and ensuring that reinstatement is fully overseen and undertaken in suitable conditions have not yet been discussed.		with land owners. See Volume 2 Chapter 19 (Document Ref 6.2) for the Construction Environment Management Plan Design Change: No
	NA	Suggested a meeting with noise consultants to assess present and predicted noise levels and to assess how and whether mitigation can be ensured across the whole estate.	Noise/Emissions Issues (K)	Regard: Assessments of Noise and Air Quality are contained in Volume 1 Chapter 4 and 11 of the Environmental Statement (Document Ref 6.1). Design Change: No
Ref: IT034 [Redacted] - St George's Street, Norwich	NA	Commented that the proposals to the north and south of the NDR affect the totality of the owner's property in this area and they would prefer to retain as much as possible, if indeed the road has to be constructed	Land/Property Issues	Regard: Matter to be addressed through compensation negotiations. Design Change: No

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
		at all.		
	1/7 1/9	Commented on the north side of the NDR that the owners wish the landscaping to be reduced to a minimal amount and for the drainage attenuation lagoon to be realigned or removed to enable as much of the property to be retained in a sensible useable form.	On-Line Proposals (K)	<p>Regard: Following earlier discussion with the landowner the landscape area was reassessed and reduced in size as far as possible. The lagoons were designed to attenuate 1 in 100 year storm event as required by the Environment Agency.</p> <p>Design Change: No</p>
	1/10	Commented on the south side of the NDR that the owners wish the drainage attenuation lagoon relocated onto adjacent land to the east and with the current private means of access retained from the main road.	On-Line Proposals (K)	<p>Regard: Relocation of Lagoon 1 was considered unfeasible due to topography of the site.</p> <p>Design Change: No</p>
	1/10	Commented that access is required to the severed portion of land, which it is suggested	Land/Property Issues	<p>Regard: Access to this land remains available to the land owner from the adjoining track.</p>

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
		should be increased by a reduction of the acquired area.		Design Change: No
	1/10	Requested temporary fencing with hedge planting on the line of acquisition.	Land/Property Issues	<p>Regard: Boundary fencing and hedgerows will be considered as part of detailed design and will include discussions with land owners.</p> <p>Design Change: No</p>
	1/7	With regard to the temporary topsoil storage area on the north side, commented on concerns that it is suitable for this use and well located. Suggested that the owners will possibly accede to the request to use it for this purpose as long as the conditions for works, reinstatement and compensation can be agreed in advance.	Land/Property Issues	<p>Regard: Temporary topsoil area is within the permanent acquisition area and will become landscaping. (See Volume 1 Appendix 7 (Document Ref 6.1) for the Construction Environment Management Plan). Matter to be addressed through compensation negotiations.</p> <p>Design Change: No</p>
Ref: IT035 [REDACTED]		Objected to the proposals for the NDR based upon the effects to Thorpe End as		

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
Padgate, Thorpe End		outlined in the following points:		
	NA	<ul style="list-style-type: none"> properties in Thorpe End are likely to experience a major increase in noise impact and that the figures in the "Preliminary Environmental Review" are indeed preliminary and take no account of the fact that the NDR alignment is raised on a high embankment as it passes Thorpe End. Suggested the mitigation proposals (trees and shrubs!) will not have any real effect. 	Specific Road Effects (K)	<p>Regard: Assessments of Noise and Air Quality are contained in Volume 1 Chapter 4 and 11 of the Environmental Statement (Document Ref 6.1).</p> <p>Design Change: No</p>
	NA	<ul style="list-style-type: none"> the new noise from the predicted increase in traffic through Thorpe End, generated by the NDR. 	Specific Road Effects (K)	<p>Regard: Traffic modelling indicates that flows will reduce at this location with an NDR. See Appendix I to the Traffic Forecasting Report (Document Ref 5.6) for forecast traffic flows.</p> <p>Design Change: No</p>
	NA	<ul style="list-style-type: none"> it is unreasonable to delay 	Specific Road	<p>Regard: Assessments of Noise and Air</p>

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		<p>accurate noise calculations and noise contour mapping until after the consultation period and keeping it from the affected residents.</p>	<p>Effects (K)</p>	<p>Quality are contained in Volume 1 Chapter 4 and 11 of the Environmental Statement (Document Ref 6.1). Detailed information was not available at the time of consultation. However, the PEIR provided preliminary assessment information. Design Change: No</p>
	<p>NA</p>	<ul style="list-style-type: none"> it appears that Thorpe End will suffer the effects of nitrogen oxides, particulate matter and dust, generated by the NDR traffic, together with that generated by the increased traffic through Thorpe End itself. 	<p>Specific Road Effects (K)</p>	<p>Regard: Assessments of Noise and Air Quality are contained in Volume 1 Chapter 4 and 11 of the Environmental Statement (Document Ref 6.1). Design Change: No</p>
	<p>NA</p>	<ul style="list-style-type: none"> Thorpe End will suffer much increased traffic on Plumstead Road through the village, and at Green Lane. 	<p>Specific Road Effects (K)</p>	<p>Regard: Traffic modelling indicates that flows will reduce on Plumstead Road with an NDR. See Appendix I to the Traffic Forecasting Report (Document Ref 5.6) for forecast traffic flows. Design Change: No</p>


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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
	NA	<p>Commented that it is not sensible or sustainable, to build a business case for the NDR on the range of traffic predictions which show an ever-increasing car usage when the traffic congestion in Norwich is improving yearly, as people use their cars less and walk, cycle and use the buses.</p>	<p>Need for NDR (K)</p>	<p>Regard: These responses have been considered by the applicant and regard has been given to them in putting together the need and alternatives case for the NDR, which is detailed in Volume 1 Chapter 3 of the Environmental Statement (Document Ref 6.1).</p> <p>Design Change: No</p>
	NA	<p>Commented that the implementation of the NDR is inconsistent with the national policy to reduce carbon emissions. The NDR proposal will divert funds away from carbon reduction schemes such as improving public transport and encouraging cycling and walking.</p>	<p>Noise/Emissions Issues (K)</p>	<p>Regard: Carbon emissions is one of the topics considered in the Environmental Impact Assessment (EIA) process. These assessments are included in Volume 1 Chapter 5 of the Environmental Statement (Document Ref 6.1). The assessment shows a slight increase in carbon emissions with the NDR, but this needs to be considered within the wider context of NATS which will enable other sustainable travel modes to be introduced.</p> <p>Design Change: No</p>

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
	NA	<p>Commented on the significant visual impact to those living adjacent to the elevated length of road crossing the railway line and running adjacent to Thorpe End and Rackheath, which will have a disastrous effect on the landscape. Suggested that the proposed landscaping is not considered as mitigation as it will be a barrier obstructing the skyline at sunrise, with Thorpe End effectively being in the shadow of the elevated road. Recommended putting the whole alignment in cut-and-cover tunnel.</p>	On-Line Proposals (K)	<p>Regard: The applicant has previously examined routing the NDR below Plumstead Road and the railway line and it is technically difficult due to groundwater conditions. There would be a high risk of flooding of any tunnel and a need for a permanent pumping system. This would have resulted in high maintenance costs.</p> <p>Design Change: No</p>
	NA	<p>Commented that the potential for contamination hazards associated with the proposed NDR, such as diffuse pollution from highway runoff, or spillage of chemicals associated with</p>	On Line Proposals (K)	<p>Regard: The NDR drainage was designed in accordance with SUDS techniques to ensure that the water quality is appropriately managed. (See Volume 1 Chapter 14 of the Environmental Assessment (Document Ref 6.1)).</p>


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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
<p>Ref: IT036  Middle Road, Gt Plumstead</p>	<p>NA</p>	<p>traffic. Suggested the drainage mitigation proposals put forward for the protection of ground water resources appear to be entirely inadequate. Commented that the original plan to help traffic flow round Norwich would have been helpful, but it has no real validity since the A1067 to A47 link has been removed as the road goes nowhere and will only help in destroying acres of countryside whilst furthering the plan to put more farmland under housing.</p>	<p>Route of NDR (K)</p>	<p>Design Change: No Regard: See response to Ref: IT010. Design Change: No</p>
	<p>NA</p>	<p>Expressed concerns of people living in Church Road and Middle Road about the proposed road bridge over the NDR. Commented that this does not reflect the wishes of the people living in both Church</p>	<p>On-Line Proposals (K)</p>	<p>Regard: There has been extensive consideration of Middle Road Bridge and whilst the concerns of residents of Middle Road are acknowledged the wider view of the highway network (including the alternative routes to Middle Road) need to be considered. There has also been</p>

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
		Road and Middle Road.		extensive discussion with the parish council on this issue and they have expressed a similar view. On this basis the bridge is to be retained as part of the proposal, so there is no change to the scheme. Design Change: No
		Commented against the proposed Middle Road Bridge for the following reasons:		
	NA	<ul style="list-style-type: none"> when the Brook Farm development and the industrial area are complete and the connection onto Plumstead Road goes in then Gt Plumstead will become the main rat-run from the A47. Commented that Plumstead Road is far more suited to take the increase in traffic and at the moment Church Road and Middle Road are both very narrow, have houses close to 	On-Line Proposals (K)	Regard: See above response. Design Change: No

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
		the road, are unlit and the absence of a continuous footpath is very dangerous for pedestrians.		
	NA	<ul style="list-style-type: none"> it is unlikely that priority will be given to improvements on Church Road and Middle Road or that they may be considered for traffic calming. 	Suggested Change	<p>Regard: Improvements would need to be considered and prioritised by Norfolk County Council alongside other requests for highway improvements.</p> <p>Design Change: No</p>
	NA	<ul style="list-style-type: none"> an interesting proposal suggested by villagers would be to shut the access to Church Road/Middle Road from the A47 and it could then become exit only from the village. 	Suggested Change	<p>Regard: One of the reasons for introducing the Middle Road Bridge was as a result of increasing the options available for accessing Gt Plumstead. Providing such a closure would reduce these options.</p> <p>Design Change: No</p>
<p>Ref: IT037</p> <p></p> <p>Fir Covert Road, Taverham</p>	NA	Commented on the need for a new road to the north of the city and the access requirements of the businesses operating from the northern half of Fir Covert Road. However, suggested	On-Line Proposals (K)	<p>Regard: There has been extensive consideration regarding the provision of the roundabout at the Fir Covert Road junction with the NDR. After the April/May/June 2012 consultations the roundabout was relocated to the junction with Fakenham</p>

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
		<p>that traffic should be excluded from the southern half of Fir Covert Road by constructing a three-exit roundabout at this junction. Considers the benefits of this suggestion are:</p> <ul style="list-style-type: none"> the reduction of vehicles using Fir Covert Road and its junction with Fakenham Road, particularly as a supermarket is proposed here. easier movements to enter and exit from Taverham Garden Centre and the 2 children's nurseries on this road. reduction in traffic that would be tempted to use unsuitable routes between the A1067 at Taverham and the A47 at Costessey/Easton including 		<p>Road. The February/March 2013 consultations identified support for the roundabout at the Fakenham Road/NDR junction. However, it also identified concerns regarding the closure of Fir Covert Road, particularly by businesses here. Having given regard to these concerns, the NDR proposal was further amended so that it included an additional roundabout at the NDR junction with Fir Covert Road. This was in addition to the roundabout at the Fakenham Road/NDR junction.</p> <p>The applicant considers the provision of a 4 arm roundabout here as the most appropriate solution, particularly as traffic flow on Fir Covert Road is predicted to be similar or lower with the NDR. See Appendix I to the Traffic Forecasting Report (Document Ref 5.6) for forecast traffic flows.</p> <p>Design Change: No</p>

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
<p>Ref: IT038 [REDACTED] Trafford Road, Norwich</p>	<p>NA</p>	<p>Beech Avenue and the roads through Ringland.</p> <p>Feels strongly that the NDR project is unnecessary and money would be better spent on improving public transport links. This is because:</p> <ul style="list-style-type: none"> • people don't need to drive from Fakenham to Gt Yarmouth. • the road will generate additional traffic which will cause environmental damage and change the rural nature of the area. • the money could be better spent on public transport links and cycle facilities. 	<p>Need for NDR (K)</p>	<p>Regard: These responses have been considered by the applicant and regard has been given to them in putting together the need case for the NDR, which is detailed in Volume 1 Chapter 3 of the Environmental Statement (Document Ref 6.1). Design Change: No</p>
<p>Ref: IT039 [REDACTED]</p>	<p>NA</p>	<p>Questioned why the NDR has to be key to the delivery of NATS and how it will free up road space because</p>	<p>Need for NDR (K)</p>	<p>Regard: The Transport Assessment (Document Ref 5.5) shows that the NDR does provide relief on key radial routes and on the orbital routes both in 2017 and 2032</p>

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
Sigismund Road, Norwich		experience with the Southern Bypass has shown that in the long term its generates traffic. Commented that improvements to public transport and facilities for cyclists and pedestrians could be made without the building of the NDR.		and improves public transport journey times and journey time reliability. Design Change: No
	NA	Commented that despite the intention to replace trees the NDR would have a serious and detrimental affect on ecology and wildlife in the area.	Landscaping/ Planting Issues (K)	Regard: It is acknowledged that the landscaping scheme will take some time to become established and viable as landscaping and as habitat for protected and other species. However, extensive mitigation measures would be installed such that impacts are reduced as far as possible. (See Volume 1 Chapter 7 and 8 of the Environmental Statement (Document Ref 6.1)). Design Change: No
Ref: IT040 [REDACTED] Bill Todd Way, Thorpe	NA	Commented that the NDR should be dual carriageway from the A47 to just beyond the	Route of NDR (K)	Regard: The alternative of a dual carriageway NDR between the A47 at Postwick and the A140 Cromer Road is

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
Marriott		A140, and beyond this point (from the A140 to the A1067) there should only be improvements to existing roads.		considered as Alternative No 2 in the need and alternatives case (Volume 1 Chapter 3 of the Environmental Statement (Document Ref 6.1)). Design Change: No
	NA	<p>If the A140 to A1067 section should be provided then this should only be single carriageway. The reason for this view are:</p> <ul style="list-style-type: none"> • there are areas of beautiful countryside and wildlife to the north of the city that should be protected. • the A47 to A1067 closes certain roads (e.g. Breck Farm Lane) that would be inconvenient for local people. • the road would not go anywhere other than Fakenham Road and if this traffic needs to get to the 	Route of NDR (K)	<p>Regard: The alternative of a dual carriageway NDR between the A47 at Postwick and the A140 Cromer Road, with a single carriageway NDR between the A140 and A1067 is considered as Alternative No 3 in the need and alternatives case (Volume 1 Chapter 3 of the Environmental Statement (Document Ref 6.1)).</p> <p>Design Change: No</p>

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
<p>Ref: IT041 [REDACTED] Middle Road, Gt Plumstead</p>	<p>NA</p>	<p>A47 it will use unsuitable roads between the A1067 and Taverham/Drayton and the A47 at Costessey/Easton.</p> <ul style="list-style-type: none"> • the speed at which traffic will join the smaller Fakenham Road would be excessive. • there would be additional noise and emissions. 		
		<p>Objected to the proposed road bridge on Middle Road, Great Plumstead and does not believe that due consideration has been given to the detrimental impact on the inhabitants of Great Plumstead. Commented that the proposal will funnel traffic to Broadland Business Park, and that generated by proposed developments at Little</p>	<p>On-Line Proposals (K)</p>	<p>Regard: See response to Ref IT036. Design Change: No</p>

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
		<p>Plumstead, along Middle Road where as at present it is shared amongst this road, Low Road and Smees Lane. None of these are designed for or are suitable for heavy or speedy traffic. Considers that Middle Road is not capable of handling the additional traffic safely.</p>		
	NA	<p>Suggested that it would be vital to provide a footpath/cycle way along the entire length of Middle Road for which, in certain sections, there is no space.</p>	On-Line Proposals (K)	<p>Regard: A shared use footway/cycle track will be provided along Middle Road between Toad Lane and a point approximately 150m west of the railway bridge. At this location the NDR scheme will adjoin the Brook Farm/Laurel Farm development which has been granted outline planning permission in 2013. Further shared use facilities are proposed as part of the Brook Farm/Laurel Farm development.</p> <p>During the 2012 public consultation the applicant had various requests for improved walking and cycling facilities. As a result a strategy was developed to</p>

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
				<p>consider and prioritise these consultation requests. The strategy published as part of the February/March 2013 public consultation identified Low Road as a suitable route for walkers, cyclists and equestrians. Whilst the continuation of the footway/cycletrack would be a useful facility for the village it is not considered an essential element of the NDR scheme and would need to be considered and prioritised by Norfolk County Council alongside other requests for highway improvements.</p> <p>Design Change: No</p>
	NA	<p>Noted an alternative suggestion by a resident of Middle Road, Great Plumstead, which suggested a new road leaving the west side of Broad Lane and joining Plumstead Road further west of its existing junction.</p>	Suggested Change	<p>Regard: The closure of Broad Lane at its junction with Plumstead Road will remove the existing crossroads junction making it a more conventional and safer T-junction. This element of the scheme together with the provision of an all purpose road bridge over the NDR at Middle Road was developed in consultation with the parish council as the preferred access solution for</p>

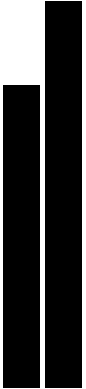



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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
Ref: IT042 [Redacted] [Redacted] [Redacted] – Postwick	NA	<p>Objected to the proposed Middle Road Bridge and requested that the original proposal of an agricultural bridge at Low Road be reinstated because :</p> <ul style="list-style-type: none"> it focuses all traffic on Middle Road which is not suitable for such additional volumes especially when one considers the proposed developments at Brook Farm/Laurel Farm and adding all of the agricultural traffic from the client's yard. it will add considerably to the overall cost of the scheme and is a much more expensive option than closing Middle Road and 	On-Line Proposals (K)	<p>the local communities.</p> <p>Design Change: No</p> <p>Regard: See response to Ref IT036. Design Change: No</p>

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
		<p>providing a much less expensive agricultural bridge over Low Road.</p> <ul style="list-style-type: none"> the bridge compound, soil storage area and probably much of drainage Lagoon 23 would not be necessary providing a further cost saving on both construction and in compensation. 		
	9/22	<p>Objected to the loss of land occurring to the south of Lagoon 18 and suggested there is no justification given for the additional land take compared to the previous proposals.</p>	Land/Property Issues	<p>Regard: Land is required for landscaping purposes. Design Change: No</p>
	9/23	<p>Commented that land immediately to the south of the Wroxham Road Roundabout has not been provided with an adequate, alternative means of</p>	Land/Property Issues	<p>Regard: Access to the land is now provided off the Wroxham Road Roundabout. Design Change: Yes – see Design Change Ref 9.9 in Appendix V.</p>

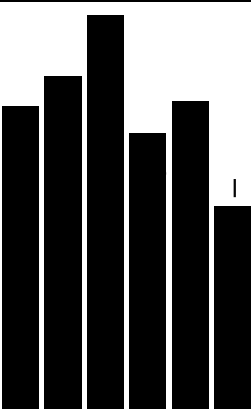
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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
		access.		
	10/36	Commented that Lagoons 19 and 20 on land at Salhouse Road should be located to the south of the NDR rather than to the north in order to create an economically viable area to farm.	On-Line Proposals (K)	<p>Regard: Proposed lagoons are in optimal location. Matter of farm viability to be addressed through compensation negotiations.</p> <p>Design Change: No</p>
<p>Ref: IT043     Postwick</p>	NA	<p>Objected to the scheme because it will sever the client's land holding and they will now have to travel onto the public highway to get to their land and this will only be possible by going north onto Middle Road, east into the village of Great Plumstead and back west along Low Road. Noted that under a previous planning permission, Green Lane South is to be closed at its junction with Smees Lane and as a result it is vital that Green Lane South</p>	Land/Property Issues	<p>Regard: The Brook Farm/Laurel Farm development (which has been granted outline planning consent and is not part of the NDR DCO application) proposes that Green Lane South becomes a pedestrian/cycle route between Smees Lane and Low Road. However, it does propose an alternative traffic route to the west.</p> <p>Design Change: No</p>

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
		is kept open to the north of the Smea Lane junction.		
Ref: IT044 [Redacted] [Redacted] [Redacted] Postwick	NA	Commented that the NDR and the Business Park Roundabout will sever its clients land the north and south.	Land/Property Issues	Regard: Access is being provided to both areas. Design Change: No
	NA	Noted that an agricultural access has been agreed off the Postwick North East Roundabout but is not shown on the plan.	Land/Property Issues	Regard: Access is now shown. Design Change: Yes – see Design Change Ref: 12.11 in Appendix V of this report.
	NA	Commented that changes to field shapes and sizes should be minimised wherever possible to ensure farming viability.	Land/Property Issues	Regard: Matter to be addressed through compensation negotiations. Design Change: No
	NA	Commented that Lagoon 25 cuts into an otherwise regular shaped field creating a field shape that is harder to farm.	On-Line Proposals (K)	Regard: Location of lagoon has been moved. Design Change: Yes – see Design Change Ref 12.5 in Appendix V of this

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<p>Ref: IT045  Postwick</p>	NA	<p>Requested that this is relocated to the east side where an irregular field shape is already being created by the NDR route.</p> <p>Commented that the extent of the proposed Middle Road Bridge conflicts with land that has planning permission granted by Broadland District Council. As a result it objected to the proposed bridge and associated compulsory purchase of land as this would prevent the link for the development being constructed. Commented that the Middle Road Bridge should be removed and the scheme should revert to the original proposals.</p>	On-Line Proposals (K)	<p>report.</p> <p>Regard: The applicant believes that the both the Middle Road Bridge and the development could be accommodated. The applicant is willing to work with the developers consultants to find an acceptable solution for all parties. Design Change: No</p>
<p>Ref: IT046</p>	2/35	<p>Commented that their client has no objection to the</p>	Land/Property	<p>Regard: This is not directly related to the NDR scheme and will need to be the</p>

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
<p>██████████ ██████████ ██████████ - Postwick</p>		<p>proposal but considers that the compound should become a permanent car park after construction is finished so that members of the public can use it and gain access to Marriott's Way.</p>	<p>Issues</p>	<p>subject of a separate discussion with the landowner and other interested parties. Design Change: No</p>
<p>Ref: IT047 ██████████ ██████████ - Upper King Street, Norwich</p>	<p>10/16 10/17</p>	<p>Commented that no new rights of way/access be granted to the land belonging to ██████████ from the access road to Home Farm.</p>	<p>Land/Property Issues</p>	<p>Regard: The extension to right of way is described by Ref 10.14 in Appendix V of this report) and is not proposed to extend beyond the point identified as “End of Scheme” as shown on General Arrangement Plan Sheet No 10 (Document Ref 2.6)). Design Change: No</p>
	<p>NA</p>	<p>Commented that deer migrate north eastwards across the NDR and therefore requested that deer fencing is installed in place of the proposed fence.</p>	<p>Land/Property Issues</p>	<p>Regard: The applicant proposes to install deer reflectors. They deflect the light from headlights of approaching vehicles towards the roadside to create a constantly changing optical warning fence, which prompts deer to stop moving or to flee back into the woods or fields. See Volume 1</p>






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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
				Chapter 8 of the Environmental Statement (Document Ref 6.1). Design Change: No
	10/17	Requested a gate be provided at point A and signage clearly indicating "Private Property - strictly no public right of way" to ensure privacy.	Land/Property Issues	Regard: Point A was identified as approximately 40m west of the end of Newnan Road Bridge prior to where the private access track forks to the south and north west. This will be considered as part of detailed design and will include discussions with land owners. Design Change: No
	10/17	Commented that the access at Newnan Road Bridge be maintained by Norfolk County Council and a side gate, with a combination lock, provided here for any horses that may exercise north via Newnan Road.	Land/Property Issues	Regard: This will be considered as part of detailed design and will include discussions with land owners. Design Change: No
	NA	Requested warning signs are provided adjacent to the cattle grid, stating that the land to the	Land/Property Issues	Regard: This will be considered as part of detailed design and will include discussions

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
		southwest is private. Re-iterated that there is no public access through or within Rackheath Park.		with land owners. Design Change: No
	NA	Commented that Newman Road will be the access to Home Farm and therefore the bridge should be designed to accommodate lorries of over 50 tonnes gross weight. Commented that access must be maintained to Home Farm via Newman Road at all times during the construction of the NDR.	Land/Property Issues	Regard: Bridge has been designed to accommodate vehicles of 44 tonnes gross vehicle weight which is the maximum legal weight for vehicles on the highway. Discussions with neighbouring landowners over the precise details on access will occur prior to construction commencing. Design Change: No
	10/7	Noted that Gazebo Farm is being/will be used as a contractors' office and site compound. Therefore a record of condition should be prepared of the existing road prior to the commencement of construction and that the road be upgraded	Land/Property Issues	Regard: This will be considered as part of detailed design and will include discussions with land owners. Design Change: No

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
		as necessary to take account of the extra traffic during the construction period.		
<p>Ref: IT048    Upper King Street, Norwich</p>	NA	<p>Commented that during sugar beet harvesting 44 tonne articulated HGVs enter Smeel Lane from its western end, load the produce and then leave from the eastern end. When the NDR is constructed, this procedure will no longer be possible. Therefore the turning head on Smeel Lane at the eastern side of the NDR should be of a suitable specification for these vehicles to turn around.</p>	Land/Property Issues	<p>Regard: All turning heads proposed as part of the NDR were designed to the same standard. As an alternative the consultee could consider providing turning facilities on their own land. Design Change: No</p>
<p>Ref: IT049   Reepham Road, Horsford</p>	3/21 3/22	<p>Commented that they are directly affected by the NDR with it dissecting their land, spoiling views from their house and due to noise and air pollution.</p>	Land/Property Issues	<p>Regard: Matter to be addressed through compensation negotiations. Design Change: No</p>


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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
	3/21 3/22	Commented that they are a Free Range Egg Farm and losing some of the land, will result in the loss of production and having to scale down the business.	Land/Property Issues	Regard: Matter to be addressed through compensation negotiations. The potential availability of replacement land has been offered to the landowners in mitigation. Design Change: No
	3/21 3/22	Commented on concerns about the affect of noise and air pollution the hens, and that they cannot plan for future flocks because they are not sure what is happening yet. They consider that they are nowhere near the stage of agreeing anything.	Land/Property Issues	Regard: Assessments of Noise and Air Quality are contained in Volume 1 Chapter 4 and 11 of the Environmental Statement (Document Ref 6.1). Design Change: No
Ref: IT050 [Redacted] - Low Road, Gt Plumstead	NA	Requested that in addition to the woodland being planted on the verges of the road, sound proof hoarding should be placed at the top of the verges for the benefit of residents and users of the bridleways.	Noise/Emission Issues (K)	Regard: Assessments of Noise and Air Quality are contained in Volume 1 Chapter 4 and 11 of the Environmental Statement (Document Ref 6.1). Design Change: No

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
	11/12	Requests that the grassland creation associated with Lagoon 23 and extending southwards be woodland instead in order to reduce noise.	Landscaping/ Planting Issues (K)	<p>Regard: Woodland is not considered effective sole mitigation.</p> <p>Design Change: No</p>
	NA	Questioned why the modelled predictions for Middle Road reduce given that Low Road and Smees Lane will be closed.	Other Comment	<p>Regard: Low Road and Smees Lane are not represented in the traffic model as they are predominantly single track roads. Therefore in modelling terms Middle Road is acting as a proxy for all three routes. This is evidenced by the fact that the 2012 modelled flow is higher than the 2012 traffic count. Traffic is predicted to increase on these routes over time but will be less with an NDR in place as it will provide an alternative route for some of the users of these roads.</p> <p>Design Change: No</p>
	NA	Noted that the property mains water access is through the land between the road and the	Land/Property Issues	<p>Regard: This will be considered as part of detailed design and will include discussions with land owners.</p>

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
		property and requested that this be considered when constructing the road.		Design Change: No
<p>Ref: IT051  Hall Lane, Drayton</p>		<p>Commented on his and neighbours concerns regarding the proposed closure of Drayton Lane South of its junction with Reepham Road and the dangers of sending all vehicles between Drayton and the NDR via Hall Lane. Considered this road a dangerous and unsuitable route, when a safe and suitable alternative via Drayton Lane South is readily available.</p>	On-Line Proposals (K)	<p>Regard: Meetings have been held regarding this issue which have also been attended by a representative of Drayton Parish Council and the Local County Councillor. These have established the key concerns, which are commented on further below. As a result of the initial meetings it was agreed to undertake some further modelling assessment of the impacts of suggested changes to the proposals. Design Change: No</p>
	NA	<p>Suggested a roundabout at the junction of Drayton Lane South with Reepham Road and a closure of Hall Lane. This would allow Hall Lane to be used as a walking/cycling route. Commented that even if</p>	On-Line Proposals (K)	<p>Regard: Further tests have been undertaken in the model to look into the option of a roundabout at the Drayton Lane/Reepham Road junction and also a more conventional priority ('T') junction. The findings for all options tested, some of which also included traffic calming on the</p>

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
		<p>a roundabout is not suitable then there are other designs that would allow the use of Drayton Lane South, which is considered the safer route.</p>		<p>section of Hall Lane between Drayton Lane South and Drayton village, showed that the use of Drayton Lane South, either instead of, or as well as Hall Lane, was less effective at reducing traffic flows into Drayton than the NDR scheme as proposed. In view of this, and the fact that the NDR scheme as proposed showed a benefit of reducing the amount of traffic on Hall Lane when compared to a non-NDR scenario, there was no evidence to support changing the NDR scheme as proposed.</p> <p>Design Change: No</p>
	NA	<p>Commented that use of the strategic transport model to test its affect on the surrounding road network should not be used to overrule providing a safe route for road users. Considers that the full range of accidents including non-injury accidents should be considered, as well as the</p>	On-Line Proposals (K)	<p>Regard: The use of the strategic model is necessary to assess options when developing the scheme details. Provision of a safe route is also considered as part of the design of the scheme and has not been ignored in this case. The model enables a comparison of options and in the case of Hall Lane it has shown that traffic will be reduced with the NDR scheme as proposed when compared with a non-NDR scenario.</p>

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
		safety of pedestrians who have to walk in the road.		As such there is a predicted net future traffic flow benefit as a result of the NDR scheme. Design Change: No
	NA	Commented on previous correspondence and a site meeting with the applicant regarding this matter. These comments included:		
	NA	<ul style="list-style-type: none"> there are inadequate sections of Hall Lane including a dangerous bend with poor visibility. This included reference to a photo of a non-injury car accident which left the road and finished in the adjacent field as an example of the type of accidents. Suggestion is that this is a result of excessive speed. 	On-Line Proposals (K)	Regard: Accident records show that there is only one slight accident in the section of Hall Lane being referred to. Evidence was provided in the form of photos of a car in a field that highlight the concerns. This accident was damage only and is therefore not recorded on the applicant's accident database, as only Slight, Serious & Fatal accidents are recorded (based on details provided by the Police). The applicant has to use this information when prioritising its spending in relation to accident locations to ensure a consistent approach exists. Hall Lane at this location in a 'non-NDR'

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
				<p>scenario would not warrant corrective works as it does not have a significant enough accident record.</p> <p>Design Change: No</p>
	NA	<ul style="list-style-type: none"> sections of Hall Lane are narrow and not suitable for large vehicles to pass each other, causing erosion of the verges and danger for any pedestrians trying to use the road to get from properties to Drayton village centre. 	On-Line Proposals (K)	<p>Regard: The introduction of the NDR scheme as proposed will provide a net reduction in traffic compared with a non-NDR scenario. Therefore there will be a future slight net benefit. Whilst discussed at the initial meeting as being necessary, an environmental weight restriction on this section of Hall Lane already exists and is there to limit the numbers of larger vehicles accessing Drayton from Reepham Road via Hall Lane. Some vehicles are still large but will be under the restricted weight. Traffic surveys being undertaken in late November 2013 will highlight how much larger or HGV traffic is using Hall Lane and will inform any future decisions. Further consultation, separate to the NDR scheme would need to be undertaken in order to consider any amendments to the weight restriction.</p>

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				<p>Some improvement to the existing signing to better identify the restriction may be possible but would be separate to the NDR scheme as this is an existing issue.</p> <p>Design Change: No</p>
	NA	<ul style="list-style-type: none"> residents walk down Hall Lane into their village and the proposal will increase the danger for these users. The number, size and speed of vehicles and the lack of a footway exacerbate this. 	On-Line Proposals (K)	<p>Regard: In view of the number of properties on this section of Hall Lane and the fact that the NDR will provide a projected net reduction in traffic on Hall Lane, then it is not for the NDR scheme to resolve this concern. However there may be scope for provision of a simple footpath or 'trod' on the northern verge, which would provide a safer route/refuge for pedestrians to use. This is something that the applicant will consider but as part of a separate programme of local improvements separate to the NDR project (i.e. using Highway Authority powers). Such an improvement would not form part of the NDR scheme.</p> <p>Design Change: No</p>
	NA	<ul style="list-style-type: none"> in addition to Hall Lane, there 	On-Line	<p>Regard: The Reepham Road connection to</p>



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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
		<p>would be negative effects to Reepham Road (between Drayton Lane and Hall Lane) and the junction of Reepham Road/Hall Lane. In particular there are concerns about the speed of traffic on Reepham Road particularly on the bend between Drayton Lane South and Hall Lane. These concerns are increased as a result of the NDR scheme due to the way traffic will leave the NDR and enter Reepham Road to negotiate the bend to then have to turn right at Hall Lane. The amount of right turning traffic at Hall Lane will significantly increase and this will create a new hazard for motorists.</p>	<p>Proposals (K)</p>	<p>the NDR will be designed to current highway design standards and will therefore be safer than the current road. Reepham Road at this location already has a 50mph speed restriction, which would be retained. Accident records do show a range of accidents (slight and serious) occurring at both Drayton Lane and Hall Lane junctions with Reepham Road. Much of the issue relating to these junctions is that they currently consist of a staggered cross-road layout with high levels of traffic crossing Reepham Road. In relation to Drayton Lane, this would be closed as part of the scheme proposals, thereby removing the stagger at this location. In addition the closure of Holly Lane will reduce the currently large amount of traffic crossing Reepham Road on the staggered cross at Hall Lane and simplify turning movements. Whilst it is considered that the Hall Lane junction will operate safely, a further assessment of the junction operation is to be completed as part of ongoing work. An</p>

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				<p>additional localised safety audit review will also be completed.</p> <p>Design Change: No</p>
	NA	<ul style="list-style-type: none"> • traffic calming should be considered on Hall Lane south of the junction with Drayton Lane South. 	On-Line Proposals (K)	<p>Regard: Traffic calming on Hall Lane between Drayton village and Drayton Lane has been considered as part of the modelling tests mentioned above. It does show that this has the effect of discouraging through traffic, however the NDR proposals with Hall Lane open and Drayton Lane South closed are more effective at reducing the amount of through traffic at this location. The parish council have raised their concerns about this section of Hall Lane as it has a number of accidents already and one of these was a fatal accident in 2012. It is therefore possible to consider traffic calming, however this would be separate to the NDR scheme and would need to be assessed and funding prioritised by Norfolk County Council alongside other locations across Norfolk.</p>

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
				<p>Design Change: No</p>
	NA	<ul style="list-style-type: none"> the closure on Drayton Lane South should be removed because if any road needed closing it is Hall Lane as this has residential properties on it and Drayton Lane South does not. Drayton Lane South would therefore be a safer route, and would enable local residents to use their road (Hall Lane) in safety. 	On-Line Proposals (K)	<p>Regard: Following all of the comparative testing from the modelling and taking account of the points raised, the applicant considers there is no justification for changing the NDR scheme as currently proposed. The scheme remains the most effective way of reducing traffic accessing Drayton from Reepham Road and therefore focuses traffic onto more appropriate routes. Further traffic surveys are being undertaken to establish the scale of any localised issues and will inform the modelling further. At this time however, there are no proposals to amend the NDR scheme as proposed.</p> <p>Design Change: No</p>
<p>Ref: IT052   St George's Street,</p>	NA	Commented that after construction of the road, the estate will be diminished to four lesser areas of land with	Land/Property Issues	<p>Regard: Matter to be addressed through compensation negotiations.</p> <p>Design Change: No</p>

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Norwich		scattered houses. The works will without doubt cause the estate to lose its integrity, amenity, value and enjoyment.		
		Commented on the following requirements to enable an agreement to be reached:		
	7/30 7/31	<ul style="list-style-type: none"> • gate and set back the access shared with Lagoon 14. 	Land/Property Issues	<p>Regard: Provision of gates at existing accesses will be considered as part of detailed design.</p> <p>Design Change: No</p>
	7/30 7/31 8/1 8/10	<ul style="list-style-type: none"> • hedge and fence the line of severance on the new Buxton Road alignment, the drainage lagoon and the line of severance along whole length on the north and south side. 	Land/Property Issues	<p>Regard: Boundary fencing and hedgerows will be considered as part of detailed design and will include discussions with land owners.</p> <p>Design Change: No</p>
	7/32	<ul style="list-style-type: none"> • gate and set back the shared access with the 	Land/Property	<p>Regard: Provision of gates at existing accesses will be considered as part of</p>

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
		Lagoon 14A.	Issues	detailed design. Design Change: No
	7/32	<ul style="list-style-type: none"> hedge, fence and realign Lagoon 14A to utilise the space adjacent NDR. 	Land/Property Issues	<p>Regard: Boundary fencing and hedgerows will be considered as part of detailed design and will include discussions with land owners. Lagoon 14A is positioned along the existing woodland and moving it closer to the NDR would require removal of the woodland.</p> <p>Design Change: No</p>
	7/31	<ul style="list-style-type: none"> secure the boundary with the bridleway with a hedge using a temporary fence if necessary to ensure establishment. 	Land/Property Issues	<p>Regard: Boundary fencing and hedgerows will be considered as part of detailed design and will include discussions with land owners.</p> <p>Design Change: No</p>
	7/33	<ul style="list-style-type: none"> agree the method statement, reinstatement terms and conditions for the bridge compound and for the temporary storage area. 	Land/Property Issues	<p>Regard: This will be considered as part of detailed design and will include discussions with land owners. See Volume 2 Chapter 19 (Document Ref 6.2) for the Construction Environment Management Plan.</p> <p>Design Change: No</p>

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
	7/31 8/1	<ul style="list-style-type: none"> reduce as far as possible the land taken for the landscaping area on north side of road which has a marked impact on the farm. Suggested that it could be better located on the south side nearby, 	Landscaping/ Planting Issues (K)	<p>Regard: Land is required for landscaping purposes. Matter to be addressed through compensation negotiations.</p> <p>Design Change: No</p>
	8/1	<ul style="list-style-type: none"> provide further banking and landscaping to the south of NDR near Red Hall to protect the various properties in this location. 	Landscaping/ Planting Issues (K)	<p>Regard: Assessment of the proposed landscape treatments and of noise is contained in Volume 1 Chapter 7 and Volume 1 Chapter 11 of the Environmental Statement (Document Ref 6.1).</p> <p>Design Change: No</p>
	8/1	<ul style="list-style-type: none"> agree a method statement for use and reinstatement of the site compound on the north side of the NDR. Clarify the proposals for future ownership and management of this and the landscaping land expected 	Land/Property Issues	<p>Regard: The scheme contractors will control the site compound. Discussions with neighbouring landowners over the precise operational details of this will occur prior to construction commencing. See Volume 2 Chapter 19 (Document Ref 6.2) for the Construction Environment Management Plan.</p>

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
		to be retained.		Design Change: No
	8/10	<ul style="list-style-type: none"> • set back and gate the access from the North Walsham Road and hedge the line of severance. Do not fence on north of the private means of access/shared use access to Lagoons 16 and 17. 	Land/Property Issues	<p>Regard: Boundary fencing and hedgerows will be considered as part of detailed design and will include discussions with land owners.</p> <p>Design Change: No</p>
	NA	<ul style="list-style-type: none"> • construct further banks with landscaping to protect property to the north and the adjoining estate depending upon the outcome of promised deliberations about noise studies. 	Land/Property Issues	<p>Regard: Assessment of the proposed landscape treatments and of noise is contained in Volume 1 Chapter 7 and Volume 1 Chapter 11 of the Environmental Statement (Document Ref 6.1).</p> <p>Design Change: No</p>
	8/12 8/13	<ul style="list-style-type: none"> • hedge and fence Lagoon 16 and 17 for security and long term management. 	Land/Property Issues	<p>Regard: Boundary fencing and hedgerows will be considered as part of detailed design and will include discussions with land owners.</p> <p>Design Change: No</p>

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	NA	<ul style="list-style-type: none"> construct a new concrete pad in a location to be approved on the north side of the works due to the severance of the current pad from the main block of arable land. 	Land/Property Issues	<p>Regard: This will be considered as part of detailed design and will include discussions with land owners.</p> <p>Design Change: No</p>
	NA	<ul style="list-style-type: none"> relocate underground irrigation mains as quoted. Suggested works need to be undertaken before the construction works take place. 	Land/Property Issues	<p>Regard: This will be considered as part of detailed design and will include discussions with land owners.</p> <p>Design Change: No</p>
	8/10	<ul style="list-style-type: none"> fence temporarily on the line of severance south of the NDR to prevent access from the bridle path and assist the establishment of a new hedge. 	Land/Property Issues	<p>Regard: Boundary fencing and hedgerows will be considered as part of detailed design and will include discussions with land owners.</p> <p>Design Change: No</p>
	NA	<ul style="list-style-type: none"> consider the crossing of the North Walsham Road at Beeston Lane, which is very 	Specific Road Effects (K)	<p>Regard: The registered planning application for development at North Sprowston and Old Catton by Beyond</p>

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
		dangerous. Suggested it would be better to realign the access for improved safety.		Green Developments Ltd includes proposals to re-align this junction. Design Change: No
	8/10	<ul style="list-style-type: none"> maintain the landscaping works on the south side between the North Walsham Road through to the concrete road to protect Beeston Hall. 	Landscaping/ Planting Issues (K)	<p>Regard: Assessment of the proposed landscape treatments and of noise is contained in Volume 1 Chapter 7 and Volume 1 Chapter 11 of the Environmental Statement (Document Ref 6.1).</p> <p>Design Change: No</p>
	NA	<ul style="list-style-type: none"> agree the presumptions for future management and the most appropriate boundary line and treatment for the banks. 	Land/Property Issues	<p>Regard: Boundary fencing and hedgerows will be considered as part of detailed design and will include discussions with land owners.</p> <p>Design Change: No</p>
	NA	<ul style="list-style-type: none"> maintain accesses during and after the scheme for the estate, farm and the Farm Shop and Garden Centre. 	Land/Property Issues	<p>Regard: This will be considered as part of detailed design and will include discussions with land owners. See Volume 2 Chapter 19 (Document Ref 6.2) for the Construction Environment Management Plan.</p> <p>Design Change: No</p>

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	8/1	<ul style="list-style-type: none"> gate and set back accesses from North Walsham Road to the landscaped area west of road to the north of NDR for management purposes. 	Land/Property Issues	<p>Regard: Provision of gates at existing accesses will be considered as part of detailed design.</p> <p>Design Change: No</p>
	NA	<ul style="list-style-type: none"> ensure drainage from the road is traced, planned and managed to prevent pollution in lakes. 	Land/Property Issues	<p>Regard: The NDR drainage was designed in accordance with SUDS techniques to ensure that the water quality is appropriately managed. (See Volume 1 Chapter 14 of the Environmental Assessment (Document Ref 6.1)).</p> <p>Design Change: No</p>
	NA	<p>Commented on concerns that environmental issues take priority over local residents and property interests and that the impact of noise has not been fully considered. Requested that current and predicted noise is considered fully and openly to assist the parties to finalise landscaping</p>	Noise/Emissions Issues (K)	<p>Regard: Assessments of Noise and Air Quality are contained in Volume 1 Chapter 4 and 11 of the Environmental Statement (Document Ref 6.1).</p> <p>Exact specification of carriageway surfacing will be determined at the detailed design stage although a low noise surface is proposed.</p> <p>Design Change: No</p>

Norwich Northern Distributor Road - Application for Development Consent Order – Document Reference: 5.1
 Section 42 Consultations - Summary of Those With Interest in Land Responses

Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
Ref: IT053 Lloyds TSB Bank	NA	proposals and that a quiet road surface is used. Requested information relating to customers address and bank account numbers.	Request for Information	Regard: The request was for personal bank account information that the applicant was unable to supply. Design Change: No
Ref: IT054 NatWest Bank	NA	Requested information relating to customers address and bank account numbers.	Request for Information	Regard: The request was for personal bank account information that the applicant was unable to supply. Design Change: No

Appendix V

Summary of Key Refinements Made to Proposals

Norwich Northern Distributor Road Application for Development Consent Order Document Reference: 5.1
 Summary of Key Refinements Made to Proposals

Change Ref	Chainage	General Arrangement Sheet No.	Location	Change	Reason for change
1.1	0 to 510	No 1	South west of Fakenham Road Roundabout – area of existing carriageway to be broken out and top soiled.	Area of grassland extended to include area of carriageway to be broken out. Boundary fence line and DCO boundary limits extended to include area.	Area of existing carriageway was shown beyond scheme boundary.
1.2	Not Used	Not Used	Not Used	Not Used	Not Used
1.3	200	No 1	Fakenham Road long lay-by.	Access from the southern end stopped up.	Due to realignment of Fakenham Road.
1.4	650	No 1	Lagoon 1 and 1A – either side of NDR.	Lagoons reduced in size.	Due to minimum infiltration rate used for corresponding depth trial pit as advised by the Environment Agency. As a result of on-going discussions with Environment Agency.
1.5	1100	No 1	National Grid High Pressure Gas Main – crossing NDR.	Diversion of gas main re-aligned. Note diversion still remains an indicative alignment at present as National Grid has yet to design detailed diversion.	To comply with 80m proximity rule.

Norwich Northern Distributor Road Application for Development Consent Order Document Reference: 5.1
 Summary of Key Refinements Made to Proposals

Change Ref	Chainage	General Arrangement Sheet No.	Location	Change	Reason for change
1.6	500	No 1	North of Fakenham Road Roundabout.	Scrubland creation replaced by woodland and small area of woodland creation added.	Excluded from consultation plans.
2.1	Not Used	Not Used	Not Used	Not Used	Not Used
2.2	2390	No 2	Marriotts Way Bridge – crossing NDR.	Area of realigned Marriotts Way Overbridge shown as public open space.	Existing Marriotts Way is the public open space and diverted Marriotts Way over the NDR will remain as public open space into which the bridleways from north and south connect.
2.3	Not Used	Not Used	Not Used	Not Used	Not Used
2.4	1950 to 2390	No 2	West of Marriotts Way Bridge – both sides of NDR.	Indicative badger fence added.	As per the Environmental Mitigation Plan August 2013.
2.5	1650	No 2	Lagoon 2 - North west of Fir Covert Road Roundabout.	Lagoon enlarged in size.	Due to minimum infiltration rate used for corresponding depth trial pit, as advised by the Environment Agency. As a result of on-going discussions with Environment Agency.
2.6	1550	No 2	Temp topsoil storage area - adjacent to Lagoon 2.	Area of temp topsoil storage reduced.	Due to larger Lagoon 2.

Norwich Northern Distributor Road Application for Development Consent Order Document Reference: 5.1
 Summary of Key Refinements Made to Proposals

Change Ref	Chainage	General Arrangement Sheet No.	Location	Change	Reason for change
2.7	1650	No 2	Land around Lagoon 2 - North west of Fir Covert Road Roundabout.	Additional grass creation added.	In correctly shown on consultation plans.
2.8	800 to 1000	No 2	Mid way between Fakenham Road Roundabout and Fir Covert Road Roundabout – north side of NDR.	New private means of access added to area of land.	No access originally provided to land because party interested in purchasing this land post scheme could have accessed it through already owned land.
2.9	1750	No 2	Fir Covert Road Roundabout – northern arm.	Informal equestrian crossing (not signalised) relocated further from roundabout.	To provide better visibility for equestrians.
3.1	2910	No 3	Reepham Road Roundabout – northern arm.	Informal equestrian crossing (not signalised) relocated further from roundabout.	To provide better visibility for equestrians.
3.2	2400 to 2910	No 3	Private means of access between Breck Farm Lane and Reepham Road Roundabout – south side of NDR.	Width of private means of access widened to 4m with 2m verges either side.	As a result of consultations. See Response Ref IT020 in Appendix U of this report.
3.3	3400	No 3	South side of NDR.	Access provided to	To ensure preservation and management

Norwich Northern Distributor Road Application for Development Consent Order Document Reference: 5.1
 Summary of Key Refinements Made to Proposals

Change Ref	Chainage	General Arrangement Sheet No.	Location	Change	Reason for change
				severed area of woodland.	of existing woodland for noise and visual mitigation purposes
3.4	Not Used	Not Used	Not Used.	Not Used	Not Used
4.1	Off Line	No 4	Holt Rd/Drayton Lane Roundabout – east side.	Cycle track amended to footway/cycleway.	Shown incorrectly as cycle track on consultation plans.
4.2	Off Line	No 4	Drayton Lane Link – north east of Drayton Lane Roundabout and linking with Horsford Restricted Byway No 7.	Footway/cycleway amended to bridleway.	Shown incorrectly as footway/cycleway on consultation plans.
4.3	Not Used	Not Used	Not Used	Not Used	Not Used
4.4	Off Line	No 4	Lagoon 6 – Drayton Lane link south west of Drayton Lane Roundabout.	Grassland creation added around lagoon.	Landscaping omitted from consultation plans.
4.5	4000 to 6600	No 3/4/5	Between Bell Farm Track and A140 Cromer Road Junction – both sides of NDR.	Woodland/grassland creation and hedgerow added to earthwork bunds.	To provide extra screen of the NDR. As a result of on-going discussions with land owner.
4.6	Off Line	No 4	Lagoon 6A – north west side of Holt Road/Drayton	Lagoon reduced in size.	Due to minimum infiltration rate used for corresponding depth trial pit as advised by the Environment Agency. As a result

Norwich Northern Distributor Road Application for Development Consent Order Document Reference: 5.1
 Summary of Key Refinements Made to Proposals

Change Ref	Chainage	General Arrangement Sheet No.	Location	Change	Reason for change
			Lane Roundabout.		of on-going discussions with Environment Agency.
4.7	Not Used	Not Used	Not Used	Not Used	Not Used
4.8	Off Line	No 4	Private means of access adjacent to Drayton Lane – North West of Drayton lane Roundabout	New field access added.	Access to paddock omitted from consultation plans.
4.9	Not Used	Not Used	Not Used	Not Used	Not Used
4.10	Not Used	Not Used	Not Used	Not Used	Not Used
4.11	Off Line	No 4	Holt Road/Drayton Lane Roundabout.	The roundabout was moved within the DCO boundary limits to avoid impact on residual property.	As a result of verbal comments received at exhibition (Section 47 and Section 48 consultations).
4.12	Off Line	No 4	North east of Holt Road/Drayton Lane Roundabout.	Removal of area designed for temporary traffic management, which removes need to effect mature trees and stable block.	Advice from contractor identified that tie-in could be completed by alternative means. As a result of design change consultations. See Ref: DC008.

Norwich Northern Distributor Road Application for Development Consent Order Document Reference: 5.1
 Summary of Key Refinements Made to Proposals

Change Ref	Chainage	General Arrangement Sheet No.	Location	Change	Reason for change
5.1	Off Line	No 5	West of Cromer Road Roundabout North – cycle track between Cromer Road and Holt Road.	Cycle track amended to footway/cycleway.	Shown incorrectly as cycle track on consultation plans.
5.2	Off-Line	No 5	Holt Road – south eastern end at point of closure.	Turning head replaced by combined turning head and field access.	Field access not shown on consultation plans.
5.3	Off Line	No 5	Lagoon 9 – west side of Cromer Road to north of NDR.	Lagoon made deeper.	Due to minimum infiltration rate used for corresponding depth trial pit as advised by the Environment Agency. As a result of on-going discussions with Environment Agency.
5.4	6800	No 5	South west of A140 Cromer Road Junction.	New Lagoon 8A added.	Overland flow assessments highlighted potential flooding of west bound merge lane of junction due to natural flow.
5.5	6800	No 5	Lagoon 8 - south west of A140 Cromer Road Junction.	Lagoon made deeper and larger.	Due to minimum infiltration rate used for corresponding depth trial pit as advised by the Environment Agency. As a result of on-going discussions with Environment Agency.
5.6	Not Used	Not Used	Not Used	Not Used	Not Used

Norwich Northern Distributor Road Application for Development Consent Order Document Reference: 5.1
 Summary of Key Refinements Made to Proposals

Change Ref	Chainage	General Arrangement Sheet No.	Location	Change	Reason for change
5.7	Off Line	No 5	Holly Lane between Cromer Road Junction west bound merge slip road and turning head.	Cycle track changed to private means of access combined with cycle track.	To provide access to new Lagoon 8A.
6.1	Not Used	Not Used	Not Used	Not Used	Not Used
6.2	10050 to 9120	No 6/7	Private means of access between St Faiths Road and Airport Roundabout– south west side of NDR.	Width of private means of access widened to 4m with 2m verges either side.	As a result on-going discussions with the landowner/occupier/agent.
6.3	9120	No 6	South west of Airport Roundabout.	New access provided to airport development site to replace Petans only access shown on consultation plans.	Planning consent for airport development granted in Summer 2013.
6.4	8900	No 6	Lagoon 12 – north side of NDR.	Lagoon reduced in size.	Due to minimum infiltration rate used for corresponding depth trial pit as advised by the Environment Agency. Overland flow reduced following analysis of airport drainage plan As a result of on-going discussions with Environment Agency and Norwich Airport.
6.5	9800	No 6	Lagoon 13 – east side of	Lagoon made deeper and	Due to wider private means of access

Norwich Northern Distributor Road Application for Development Consent Order Document Reference: 5.1
 Summary of Key Refinements Made to Proposals

Change Ref	Chainage	General Arrangement Sheet No.	Location	Change	Reason for change
			NDR.	moved away from private means of access.	track and minimum infiltration rate used for corresponding depth trial pit as advised by the Environment Agency. As a result of on-going discussions with Environment Agency.
6.6	8000	No 6	South side of NDR.	Additional grassland creation.	To prevent issues arising from bird and wildlife management concerns. As a result of consultations. See Response Ref PC017 in Appendix T of this report.
6.7	Not Used	Not Used	Not Used	Not Used	Not Used
6.8	Not Used	Not Used	Not Used	Not Used	Not Used
6.9	9120	No 6	North west of Airport Roundabout.	New field access added from bridleway/private means of access.	As a result on-going discussions with the landowner/occupier/agent.
7.1	10850	No 7	West of Buxton Road Bridge – bridleway adjacent to Buxton Road, south side of NDR.	New bridleway section added on west side of Buxton Road with crossing from west side to Beeston Lane.	Concern that bridleway under bridge may be a safety risk for horse riders. Informal discussion with British Horse Society identified preference for crossing where Beeston Lane meets Buxton Road.
7.2	9900	No 7	Lagoon 13A – south west side of NDR.	Lagoon reduced in size.	Due to minimum infiltration rate used for corresponding depth trial pit as advised by the Environment Agency As a result

Norwich Northern Distributor Road Application for Development Consent Order Document Reference: 5.1
 Summary of Key Refinements Made to Proposals

Change Ref	Chainage	General Arrangement Sheet No.	Location	Change	Reason for change
7.3	11000	No 7	Lagoon 14 – north side of NDR.	Lagoon reduced in size.	of on-going discussions with Environment Agency. Due to minimum infiltration rate used for corresponding depth trial pit as advised by the Environment Agency. As a result of on-going discussions with Environment Agency.
7.4	Not Used	Not Used	Not Used	Not Used	Not Used
7.5	10000	No 7	East of Lagoon 13A – south side of NDR.	Turning head access on St Faiths Road removed and new field access provided from cycletrack/private means of access.	As a result on-going discussions with the landowner/occupier/agent.
7.6	10050	No 7	Bridleway west of St Faiths Road – south side of NDR.	Private means of access over bridleway from St Faiths Road extended to east of bat gantry (approx 50m) and field access provided.	As a result on-going discussions with the landowner/occupier/agent.
8.1	12000	No 8	North Walsham Road Roundabout – east and	Flare length of amended.	Design change to improve capacity of roundabout.

Norwich Northern Distributor Road Application for Development Consent Order Document Reference: 5.1
 Summary of Key Refinements Made to Proposals

Change Ref	Chainage	General Arrangement Sheet No.	Location	Change	Reason for change
8.2	12750	No 8	west arms. Lagoon 16 - north side of NDR.	Lagoon reduced in size and moved away from private means of access.	Due to wider private means of access track and minimum infiltration rate used for corresponding depth trial pit as advised by the Environment Agency. As a result of on-going discussions with Environment Agency.
8.3	12100	No 8	North east of North Walsham Road Roundabout.	Width of private means of access widened to 4m with 2m verges either side.	As a result of consultations. See Response Ref IT020 in Appendix U of this report.
8.4	Off Line	No 8	North Walsham Road/Crostwick Lane/Rackheath Junction.	Off line scheme proposals amended.	Further development of design.
8.5	12500 to 13700	No 8	South side of NDR	Additional landscaping and woodland creation added.	As a result of Section 47 and Section 48 consultations. Also see: <ul style="list-style-type: none"> Response Ref LA005 and LA009 in Appendix T of this report; Response Ref IT001 in Appendix U of this report.
9.1	14240	No 9	Wroxham Road Roundabout – north, east	Extended flare on approach to roundabout	Design change to improve capacity of roundabout.

Norwich Northern Distributor Road Application for Development Consent Order Document Reference: 5.1
 Summary of Key Refinements Made to Proposals

Change Ref	Chainage	General Arrangement Sheet No.	Location	Change	Reason for change
			and west arms.	added.	
9.2	13800 to 14200	No 9	North of NDR - bunding south of The Springs Lake	New woodland added instead of grass planting.	As a result of Section 47 and Section 48 consultations. Also see: <ul style="list-style-type: none"> • Ref LA005 and LA009 in Appendix T of this report; • Ref IT023 and IT030 in Appendix U of this report.
9.3	14800	No 9	Southern end of bat underpass	Turning head removed from private access track where it meets bat underpass.	Turning head no longer necessary.
9.4	Not Used	Not Used	Not Used	Not Used	Not Used
9.5	Not Used	Not Used	Not Used	Not Used	Not Used
9.6	14500 to 14950	No 9	North side of NDR area around Lagoon 18 and 18B.	New hedgerow added north side of grassland creation to provide greater screening for properties in Rackheath. Note – this change shown on detailed landscape plans.	As a result of Section 47 and Section 48 consultations.
9.7	Not Used	Not Used	Not Used	Not Used	Not Used

Norwich Northern Distributor Road Application for Development Consent Order Document Reference: 5.1
 Summary of Key Refinements Made to Proposals

Change Ref	Chainage	General Arrangement Sheet No.	Location	Change	Reason for change
9.8	14240	No 9	Wroxham Road Roundabout – south western arm.	Informal equestrian crossing (not signalised) relocated further from roundabout.	To provide better visibility for equestrians.
9.9	14240	No 9	Wroxham Road Roundabout – between western and southern arms.	Field access provided from Wroxham Road Roundabout rather than Wroxham Road.	To provide access to land. As a result of consultations see Response Ref IT042 in Appendix U of this report.
9.10	Off Line	No 9	Wroxham Road/Green Lane West Junction.	Off line scheme proposals added.	Not originally shown on consultation plans but on separate plans.
9.11	13450	No 9	North east side of NDR around Lagoon 17.	Additional landscaping and woodland creation added to area of top soiling.	As a result of consultations see Response Ref IT023 in Appendix U of this report.
9.12	Off Line	No 9	Wroxham Road/Green Lane West Junction	Changes to re-alignment of diverted Green Lane West	Further development of design.
10.1	16100	No 10	Salhouse Road Roundabout – north, east and west arms.	Extended flare on approach to roundabout added.	Design change to improve capacity of roundabout.
10.2	17000 to	No 10	Private means of access from Plumstead Road – to	Width of private means of access widened to 4m	As a result of consultations see Response Ref IT005.

Norwich Northern Distributor Road Application for Development Consent Order Document Reference: 5.1
 Summary of Key Refinements Made to Proposals

Change Ref	Chainage	General Arrangement Sheet No.	Location	Change	Reason for change
	16750		west of NDR.	with 2m verges either side.	
10.3	15250	No 10	North west of Newman Road Bridge – west side of NDR.	Newt ponds added.	Identified in Environmental Mitigation Plan August 2013.
10.4	Not Used	Not Used	Not Used	Not Used	Not Used
10.5	Not Used	Not Used	Not Used	Not Used	Not Used
10.6	Not Used	Not Used	Not Used	Not Used	Not Used
10.7	16100	No 10	Salhouse Road - South west of Salhouse Road Roundabout.	New field access added from Salhouse Road.	No access to severed land previously provided.
10.8	Not Used	Not Used	Not Used	Not Used	Not Used
10.9	Not Used	Not Used	Not Used	Not Used	Not Used
10.10	Not Used	Not Used	Not Used	Not Used	Not Used
10.11	Not Used	Not Used	Not Used	Not Used	Not Used
10.12	15500 to 16100	No 10	Between Newman Road Bridge and Salhouse Road Roundabout – south west	Bridleway amended to cycle track.	Shown incorrectly as bridleway on consultation plans.

Norwich Northern Distributor Road Application for Development Consent Order Document Reference: 5.1
 Summary of Key Refinements Made to Proposals

Change Ref	Chainage	General Arrangement Sheet No.	Location	Change	Reason for change
			side of NDR.		
10.13	Off Line	No 10	North side of Newman Road track immediately west of the Newman Road Bridge.	New private means of access to Gazebo Farm Bungalow.	To enable post scheme access to Gazebo Farm Bungalow.
10.14	Off Line	No 10	Newman Road track west of Newman Road Bridge.	Extension of private means of access westwards to provide access to land.	Use of existing access track to land not practical due to issues with newt ponds.
10.15	Off Line	No 10	North side of Newman Road track beside new area of newt ponds.	Provision of length of private means of access to land to the north.	To provide right of access to land.
10.16	16150 to 17150	No 10	NDR between Salhouse Road Roundabout and Plumstead Road Roundabout South	Originally proposed 60mph speed limit changed to national speed limit applies	Shown incorrectly consultation plans.
11.1	Off Line	No 11	Plumstead Road north side.	Bridleway amended to footway/cycleway.	Shown incorrectly as bridleway on consultation plans.
11.2	18100	No 12	South west of Middle Road Bridge.	Bridleway realigned across the embankment slope.	To shorten the detour for NMUs travelling between Gt and Lt Plumstead and Broadland Business Park.
11.3	18150	No 11	Lagoon 23 – east side of	Lagoon reduced in size.	Due to minimum infiltration rate used for corresponding depth trial pit as advised

Norwich Northern Distributor Road Application for Development Consent Order Document Reference: 5.1
 Summary of Key Refinements Made to Proposals

Change Ref	Chainage	General Arrangement Sheet No.	Location	Change	Reason for change
			NDR.		by the Environment Agency. As a result of on-going discussions with Environment Agency.
11.4	Off Line	No 11	Lagoon 21 – east of Plumstead Road Roundabout North. Lagoon 22 – north of Plumstead Road Roundabout South.	Lagoon 21 reduced in size. Lagoon 22 increased in size.	Due to minimum infiltration rate used for corresponding depth trial pit as advised by the Environment Agency. As a result of on-going discussions with Environment Agency.
11.4	17200	No 11	Lagoon 22 – north of Plumstead Road Roundabout South.	Lagoon increased in size.	Due to minimum infiltration rate used for corresponding depth trial pit as advised by the Environment Agency. As a result of on-going discussions with Environment Agency.
11.5	Off Line	No 11	Middle Road – west of NDR.	Tie in updated.	Due to updated topographical data.
11.6	Not Used	Not Used	Not Used	Not Used	Not Used
11.7	Not Used	Not Used	Not Used	Not Used	Not Used
11.8	Not Used	Not Used	Not Used	Not Used	Not Used

Norwich Northern Distributor Road Application for Development Consent Order Document Reference: 5.1
 Summary of Key Refinements Made to Proposals

Change Ref	Chainage	General Arrangement Sheet No.	Location	Change	Reason for change
11.9	Off Line	No 11	Link between Plumstead Road Roundabout North and Plumstead Road Roundabout South – east side.	Private means of access adjacent to Lagoon 21 extended.	To provide access to land east of the NDR.
11.10	Off Line	No 11	Plumstead Road south side – west of Broad Lane.	Bridleway extended eastwards.	So that bridleway ends on Broad Lane.
11.11	Off Line	No 11	Plumstead Road through Thorpe End.	Off line scheme proposals added.	Not originally shown on consultation plans but on separate plans.
12.1	24000	No 12	Postwick Hub Junction.	Landscaping proposals added.	Postwick Junction landscape was included in the main exhibition plan but omitted from the General Arrangement Plans.
12.2	Not Used	Not Used	Not Used	Not Used	Not Used
12.3	Not Used	Not Used	Not Used	Not Used	Not Used
12.4	Not Used	Not Used	Not Used	Not Used	Not Used
12.5	19200	No 12	Lagoon 25 – east side of NDR.	Lagoon moved from west side of the NDR to the east side.	As a result of consultation. See Response Ref IT019 and IT044 in Appendix U of this report.

Norwich Northern Distributor Road Application for Development Consent Order Document Reference: 5.1
 Summary of Key Refinements Made to Proposals

Change Ref	Chainage	General Arrangement Sheet No.	Location	Change	Reason for change
12.6	18800	No 12	Lagoon 24 – west side of NDR.	Lagoon increased in size.	Due to minimum infiltration rate used for corresponding depth trial pit as advised by the Environment Agency. As a result of on-going discussions with Environment Agency.
12.7	Not Used	Not Used	Not Used	Not Used	Not Used
12.8	19500 to 19000	No 12	Between Business Park Roundabout and Smees Lane – east side of NDR.	Top soil storage area relocated to land east of NDR and south of Smees Lane.	Request from landowner/occupier. As a result of the relocation of Lagoon 25 (Design Change Ref 12.5).
12.9	Off Line	No 12	Broadland Gate Roundabout.	New field access added from roundabout.	As a result of consultations. See Response Ref IT019 in Appendix U of this report.
12.10	19000 to 19250	No 12	Between Smees Lane and Lagoon 25 – east side of NDR.	New lagoon maintenance access added from south side of Smees Lane. New field access provided from Smees Lane turning head east of NDR.	As a result of providing Lagoon 25 on east side of NDR. As a result of on-going discussions with the landowner/occupier/agent.
12.11	20050	No 12	East of Postwick North East Roundabout.	New field access added from private means of	Access omitted from consultation now added. As a result of consultations.

Norwich Northern Distributor Road Application for Development Consent Order Document Reference: 5.1
 Summary of Key Refinements Made to Proposals

Change Ref	Chainage	General Arrangement Sheet No.	Location	Change	Reason for change
				access.	See Response Ref IT019 and IT044 in Appendix U of this report.
12.12	Not Used	Not Used	Not Used	Not Used	Not Used
12.13	Not Used	Not Used	Not Used	Not Used	Not Used
12.14	24000	No 12	Postwick Hub Junction.	Postwick Hub Junction lagoon numbers added. Infiltration Swale 27 to be lined. Lagoon 29 and 30 to be split into primary lined pond and infiltration pond.	Due to recently introduced Special Protection Zone at Postwick as Advised by the Environment Agency.

Appendix W-1

Further Consultations Consultation Letter and Schedule of Consultees

«NAME1» «NAME2» «NAME3»
«Company»
«Address_1»
«Address_2»
«Address_3»
«Address_4»
«Address_5»
«Postcode»

NCC contact number: 0344 800 8020
Textphone: 0344 800 8011

Your Ref:

Date: 11 October 2013

My Ref: HI/R1C093/GB/Design Change

Tel No.: 0344 800 8020

Email: norwich.transport@norfolk.gov.uk

Dear Sir or Madam

**Norwich Northern Distributor Road (NDR)
Further Consultation on Design Change Proposals Following Public Consultation
between July and September 2013**

Norfolk County Council recently consulted you under Section 42 of the Planning Act 2008 on its proposals for the abovementioned NDR project. As part of this consultation you were sent the following documents associated with the project:

- the scheme information document,
- the non-technical summary to the Preliminary Environmental Information Report,
- the non-technical note on Transport Modelling,
- a CD containing PDFs of these documents, the appendices to the scheme information document and a full copy of the Preliminary Environmental Information Report.

These documents were also available to view online and in various locations around the route of the proposed NDR.

Following the receipt of consultation responses and ongoing review of the detailed design of the proposed NDR by Norfolk County Council, a number of minor design amendments are proposed from those shown as part of the previous formal consultation process. The Council is therefore undertaking a further consultation with those parties directly affected by these changes.

The new or altered proposals which affect your property/interests are shown on the attached schedule and plan(s).

The deadline for receipt of your response to this additional consultation is **13 November 2013**.

Any response to this consultation should be made by:

- writing to:- Norwich Northern Distributor Road, Norfolk County Council, Martineau Lane, Norwich, NR1 2DH
- e-mailing:- norwich.transport@norfolk.gov.uk

Responses should include an indication of who is making the response and their correspondence address. Responses will be summarised in a consultation report that will form part of the application documents for the Development Consent Order. Please note that responses may be published. Personal details will be held securely and used solely for purposes in connection with the pre-application consultations, development consent application process, and further development of the scheme. Personal details will not be disclosed to any third parties although the County Council may be required to provide certain information if specifically requested by the Planning Inspectorate or as part of a formal Freedom of Information Act request.

Please note that the previous consultation materials are still available online (www.norfolk.gov.uk/tfn) should you wish to view them again.

Yours sincerely

A handwritten signature in black ink, appearing to read 'Gavin Broad', written in a cursive style.

Gavin Broad – Project Engineer

Norwich Northern Distributor Road Application for Development Consent Order Document Reference: 5.1
 Further Consultations – Schedule of Consultees for Letter Dated 11 October 2013

NAME 1	NAME 2	NAME 3	Company	Address 1	Address 2	Address 3	Address 4	Address 5	Post-code	Received	Deadline Date
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	BT Group plc	BT Centre	81 Newgate Street	London		EC1A 7AJ	15/10/13	13/11/13
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	Old Hall Farm	Fakenham Road	Attlebridge			NR9 5TQ	14/10/13	13/11/13
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	2 Triton Square	Regents Place	London			NW1 3AN	15/10/13	13/11/13
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	Heathwood	Fakenham Road	Taverham	Norwich		NR8 6HR	14/10/13	13/11/13
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	Thorpe Lodge	1 Yarmouth Road	Thorpe St Andrew	Norwich		NR7 0DU	14/10/13	13/11/13
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	Deighton Hills House	Fakenham Road	Taverham	Norwich		NR8 6HS	14/10/13	13/11/13
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	Deighton Hills House	Fakenham Road	Taverham	Norwich		NR8 6HS	14/10/13	13/11/13
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	1 St James Court	Whitefriars	Norwich			NR3 1RJ	14/10/13	13/11/13
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	1 St James Court	Whitefriars	Norwich			NR3 1RJ	14/10/13	13/11/13

Norwich Northern Distributor Road Application for Development Consent Order Document Reference: 5.1
 Further Consultations – Schedule of Consultees for Letter Dated 11 October 2013

NAME 1	NAME 2	NAME 3	Company	Address 1	Address 2	Address 3	Address 4	Address 5	Post-code	Received	Deadline Date
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	620 Bristol Business Park	Coldharbour Lane	Bristol			BS16 1EJ	15/10/13	13/11/13
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	44 Pentonville Road	London				N1 9HF	15/10/13	13/11/13
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	Twysden	Kildown	Cranbrook	Kent		TN17 2SG	14/10/13	13/11/13
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	Mill House	Mill Court	Station Road	Great Shelford	Cams	CB22 5LD	15/10/13	13/11/13
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	The Mound	Edinburgh				EH1 1YZ	15/10/13	13/11/13
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	Flint House	80 High Street	Lowestoft	Suffolk		NR32 1XN	14/10/13	13/11/13
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	Amsterdam Way	Norwich				NR6 6JA	14/10/13	13/11/13
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	c/o Lancaster House	St Andrews Business Park	Norwich			NR7 0HR	14/10/13	13/11/13

Norwich Northern Distributor Road Application for Development Consent Order Document Reference: 5.1
 Further Consultations – Schedule of Consultees for Letter Dated 11 October 2013

NAME 1	NAME 2	NAME 3	Company	Address 1	Address 2	Address 3	Address 4	Address 5	Post-code	Received	Deadline Date
[Redacted]	[Redacted]	[Redacted]	[Redacted]	260 Bath Road	Slough				SL1 4DX	15/10/13	13/11/13
[Redacted]	[Redacted]	[Redacted]	[Redacted]	Bullock Hill	Horsham St Faith	Norwich			NR10 3HT	14/10/13	13/11/13
[Redacted]	[Redacted]	[Redacted]	[Redacted]	Five Berries Farm	Brick Kiln Road	Hevingham			NR10 5NL	14/10/13	13/11/13
[Redacted]	[Redacted]	[Redacted]	[Redacted]	Five Berries Farm	Brick Kiln Road	Hevingham			NR10 5NL	14/10/13	13/11/13
[Redacted]	[Redacted]	[Redacted]	[Redacted]	2 Barber Place	Thorpe St Andrew	Norwich			NR7 OHG	14/10/13	13/11/13
[Redacted]	[Redacted]	[Redacted]	[Redacted]	340 Buxton Road	Spixworth	Norwich			NR10 3PN	14/10/13	13/11/13
[Redacted]	[Redacted]	[Redacted]	[Redacted]	338 Buxton Road	Spixworth	Norwich			NR10 3PN	14/10/13	13/11/13
[Redacted]	[Redacted]	[Redacted]	[Redacted]	336 Buxton Road	Spixworth	Norwich			NR10 3PN	14/10/13	13/11/13
[Redacted]	[Redacted]	[Redacted]	[Redacted]	334 Buxton Road	Spixworth	Norwich			NR10 3PN	14/10/13	13/11/13
[Redacted]	[Redacted]	[Redacted]	[Redacted]	332 Buxton Road	Spixworth	Norwich			NR10 3PN	14/10/13	13/11/13

Norwich Northern Distributor Road Application for Development Consent Order Document Reference: 5.1
 Further Consultations – Schedule of Consultees for Letter Dated 11 October 2013

NAME 1	NAME 2	NAME 3	Company	Address 1	Address 2	Address 3	Address 4	Address 5	Post-code	Received	Deadline Date
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	330 Buxton Road	Spixworth	Norwich			NR10 3PN	14/10/13	13/11/13
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	328 Buxton Road	Spixworth	Norwich			NR10 3PN	14/10/13	13/11/13
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	326A Buxton Road	Spixworth	Norwich			NR10 3PN	14/10/13	13/11/13
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	326 Buxton Road	Spixworth	Norwich			NR10 3PN	14/10/13	13/11/13
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	324 Buxton Road	Spixworth	Norwich			NR10 3PN	14/10/13	13/11/13
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	322 Buxton Road	Spixworth	Norwich			NR10 3PN	14/10/13	13/11/13
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	320 Buxton Road	Spixworth	Norwich			NR10 3PN	14/10/13	13/11/13
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	318 Buxton Road	Spixworth	Norwich			NR10 3PN	14/10/13	13/11/13
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	321 Buxton Road	Spixworth	Norwich			NR10 3PN	14/10/13	13/11/13
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	343 Buxton Road	Spixworth	Norwich			NR10 3PN	14/10/13	13/11/13
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	345 Buxton Road	Spixworth	Norwich			NR10 3PN	14/10/13	13/11/13
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	Beeston Lodge	Beeston Lane	Spixworth			NR10 3TN	14/10/13	13/11/13

Norwich Northern Distributor Road Application for Development Consent Order Document Reference: 5.1
 Further Consultations – Schedule of Consultees for Letter Dated 11 October 2013

NAME 1	NAME 2	NAME 3	Company	Address 1	Address 2	Address 3	Address 4	Address 5	Post-code	Received	Deadline Date
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	Hill Farm Lodge	Wroxham Road	Rackheath			NR13 6NE	14/10/13	13/11/13
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	Hill Farm Lodge	Wroxham Road	Rackheath			NR13 6NE	14/10/13	13/11/13
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	Hill Farm House	Wroxham Road	Rackheath			NR13 6NE	14/10/13	13/11/13
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	Hill Farm House	Wroxham Road	Rackheath			NR13 6NE	14/10/13	13/11/13
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	Grange Lodge	Wroxham Road	Rackheath			NR13 6NE	14/10/13	13/11/13
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	Rackheath Grange	Wroxham Road	Rackheath			NR13 6NF	14/10/13	13/11/13
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	Rackheath Grange	Wroxham Road	Rackheath			NR13 6NF	14/10/13	13/11/13
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	139 Bull Close Road	Norwich				NR3 1NY	14/10/13	13/11/13
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	c/o Wiggins Osborne Fullerlove	95 The Promenade	Cheltenham	Glos		GL50 1HH	15/10/13	13/11/13

Norwich Northern Distributor Road Application for Development Consent Order Document Reference: 5.1
 Further Consultations – Schedule of Consultees for Letter Dated 11 October 2013

NAME 1	NAME 2	NAME 3	Company	Address 1	Address 2	Address 3	Address 4	Address 5	Post-code	Received	Deadline Date
█	█	█	█	Heath Farm	Postwick				NR13 5HB	14/10/13	13/11/13
█	█	█	█	Field Barn, Heath Farm	Postwick				NR13 5HB	14/10/13	13/11/13
█	█	█	█	Burchell Barn, Heath Farm	Postwick				NR13 5HB	14/10/13	13/11/13
█	█	█	█	2 Oak Cottages	Postwick				NR13 5HB	14/10/13	13/11/13
█	█	█	█	1 Oak Cottages	Postwick				NR13 5HB	14/10/13	13/11/13
█	█	█	█	Cicero Bungalow	Postwick				NR13 5HB	14/10/13	13/11/13
█	█	█	█	Field House	Postwick				NR13 5HB	14/10/13	13/11/13
█	█	█	█	Spring Farm	Fir Covert Road	Felthorpe	Norwich		NR10 4DT	14/10/13	13/11/13
█	█	█	█	Spring Farm	Fir Covert Road	Felthorpe	Norwich		NR10 4DT	14/10/13	13/11/13
█	█	█	█	Fir Covert Farm	Fir Covert Road	Felthorpe	Norwich		NR10 4DT	14/10/13	13/11/13

Norwich Northern Distributor Road Application for Development Consent Order Document Reference: 5.1
 Further Consultations – Schedule of Consultees for Letter Dated 11 October 2013

NAME 1	NAME 2	NAME 3	Company	Address 1	Address 2	Address 3	Address 4	Address 5	Post-code	Received	Deadline Date
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	59 Low Road	Drayton	Norwich			NR8 6RR	14/10/13	13/11/13
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	MW House	1 Penman Way	Grove Park	Enderby	LEICESTER	LE19 1SY	15/10/13	13/11/13
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	Bryn House	Beech Road	Wroxham	Norwich		NR12 8TP	14/10/13	13/11/13
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	Bryn House	Beech Road	Wroxham	Norwich		NR12 8TP	14/10/13	13/11/13
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	Seymour House	Littlemoney Road	Loddon	Norwich		NR14 6JD	14/10/13	13/11/13
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	Pear Tree Cottage	Town Road	Fleggburgh	Great Yarmouth		NR29 3AB	14/10/13	13/11/13
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	Pear Tree Cottage	Town Road	Fleggburgh	Great Yarmouth		NR29 3AB	14/10/13	13/11/13
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	Pear Tree Cottage	Town Road	Fleggburgh	Great Yarmouth		NR29 3AB	14/10/13	13/11/13

Norwich Northern Distributor Road Application for Development Consent Order Document Reference: 5.1
 Further Consultations – Schedule of Consultees for Letter Dated 11 October 2013

NAME 1	NAME 2	NAME 3	Company	Address 1	Address 2	Address 3	Address 4	Address 5	Post-code	Received	Deadline Date
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	Dairy Farm	Plumstead Road	Thorpe End			NR13 5BX	14/10/13	13/11/13
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	Heath Farmhouse	Heath Farm	Postwick	Norwich		NR13 5HB	14/10/13	13/11/13
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	Faiers House	Gilray Road	Diss			IP22 4WR	14/10/13	13/11/13
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	45 Clarges Street		London			W1J 7EP	15/10/13	13/11/13
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	Apple Tree Farm	Smea Lane	Great Plumstead			NR13 5AX	14/10/13	13/11/13

Norwich Northern Distributor Road Application for Development Consent Order Document Reference: 5.1
 Further Consultations – Schedule of Consultees for Letter Dated 11 October 2013

NAME 1	NAME 2	NAME 3	Company	Address 1	Address 2	Address 3	Address 4	Address 5	Post-code	Received	Deadline Date
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	Apple Tree Farm	Smeel Lane	Great Plumstead			NR13 5AX	14/10/13	13/11/13
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	Glebe Farm	Holt Road	Horsford			NR10 3AG	14/10/13	13/11/13
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	Glebe Farm	Holt Road	Horsford			NR10 3AG	14/10/13	13/11/13
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	Harts Hill Cottage	Holt Road	Horsford			NR10 3AQ	14/10/13	13/11/13
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	Manor Farm	Holly Lane	Horsford	Norwich		NR10 3TO	14/10/13	13/11/13
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	Grange Farm	2 Buxton Road	Spixworth	Norwich		NR10 3PR	14/10/13	13/11/13
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	Quaker Farm	Spixworth	Norwich			NR12 7BH	14/10/13	13/11/13
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	Peacock Lodge	Barford Road	Marlingford	Norwich		NR9 5HU	14/10/13	13/11/13

Norwich Northern Distributor Road Application for Development Consent Order Document Reference: 5.1
 Further Consultations – Schedule of Consultees for Letter Dated 11 October 2013

NAME 1	NAME 2	NAME 3	Company	Address 1	Address 2	Address 3	Address 4	Address 5	Post-code	Received	Deadline Date
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	Red Hall Farm	Beeston	Norwich			NR12 7BL	14/10/13	13/11/13
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	135 Bishopsgate	London				EC2M 3UR	15/10/13	13/11/13
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	Woodlands	Strumpshaw	Norwich			NR13 4WS	14/10/13	13/11/13
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	Oaks Farm	Toad Lane	Great Plumstead	Norwich		NR13 5EQ	14/10/13	13/11/13
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	Oaks Farm	Toad Lane	Great Plumstead	Norwich		NR13 5EQ	14/10/13	13/11/13
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	The Wroxham Estate Office	Home Farm	Wroxham	Norwich		NR12 8SY	14/10/13	13/11/13
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	Fairdale Lodge	22 Staithe Way Road	Wroxham	Norwich		NR12 8TH	14/10/13	13/11/13

Norwich Northern Distributor Road Application for Development Consent Order Document Reference: 5.1
 Further Consultations – Schedule of Consultees for Letter Dated 11 October 2013

NAME 1	NAME 2	NAME 3	Company	Address 1	Address 2	Address 3	Address 4	Address 5	Post-code	Received	Deadline Date
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	Park Farm	Neatishead Road	Ashmanau gh	Wroxham	Norwich	NR12 8YJ	14/10/13	13/11/13
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	20 Villa Lane	Stanwick	Wellingbor ough			NN9 6QQ	15/10/13	13/11/13
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	The Old Piggery	Brewery Lane	Trunch	North Walsham	Norfolk	NR28 0PU	14/10/13	13/11/13
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	Mayes Green Cottage	Mayes Green	Ockley	Surrey		RH5 5PN	14/10/13	13/11/13
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	Teelings	South Badclewsle y	Lymington	Hants		SO41 5RP	14/10/13	13/11/13
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	Home Farm	Rackheath Park	Rackheath			NR13 6LP	14/10/13	13/11/13
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	Home Farm	Rackheath Park	Rackheath			NR13 6LP	14/10/13	13/11/13
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	March Farm	Rackheath Park	Rackheath			NR13 6LP	14/10/13	13/11/13
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	The Fold	Rackheath Park	Rackheath			NR13 6LP	14/10/13	13/11/13
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	The Fold	Rackheath Park	Rackheath			NR13 6LP	14/10/13	13/11/13

Norwich Northern Distributor Road Application for Development Consent Order Document Reference: 5.1
 Further Consultations – Schedule of Consultees for Letter Dated 11 October 2013

NAME 1	NAME 2	NAME 3	Company	Address 1	Address 2	Address 3	Address 4	Address 5	Post-code	Received	Deadline Date
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	Crown Bungalow	Drayton Lane	Horsford	Norwich		NR10 3AN	14/10/13	13/11/13
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	Crown Bungalow	Drayton Lane	Horsford	Norwich		NR10 3AN	14/10/13	13/11/13
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	Rookery Nook	Drayton Lane	Horsford	Norwich		NR10 3AN	14/10/13	13/11/13
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	The Barn	Drayton Lane	Horsford	Norwich		NR10 3AN	14/10/13	13/11/13
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	Caiplie	Church Street	Horsford	Norwich		NR10 3DB	14/10/13	13/11/13
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	Caiplie	Church Street	Horsford	Norwich		NR10 3DB	14/10/13	13/11/13
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	West Wing	Horsford Hall	Church Street	Horsford		NR10 3DG	14/10/13	13/11/13
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	West Wing	Horsford Hall	Church Street	Horsford		NR10 3DG	14/10/13	13/11/13
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	9-11 Drayton High Road	Drayton	Norwich			NR8 6AH	14/10/13	13/11/13

Norwich Northern Distributor Road Application for Development Consent Order Document Reference: 5.1
 Further Consultations – Schedule of Consultees for Letter Dated 11 October 2013

NAME 1	NAME 2	NAME 3	Company	Address 1	Address 2	Address 3	Address 4	Address 5	Post-code	Received	Deadline Date
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	The Chestnuts	Fir Covert Road	Felthorpe	Norwich		NR10 4DT	14/10/13	13/11/13
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	The Chestnuts	Fir Covert Road	Felthorpe	Norwich		NR10 4DT	14/10/13	13/11/13
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	Fir Covert Farm	Fir Covert Road	Felthorpe	Norwich		NR10 4DT	14/10/13	13/11/13

Norwich Northern Distributor Road Application for Development Consent Order Document Reference: 5.1
 Further Consultations – Schedule of Consultees for Letter Dated 11 October 2013

NAME 1	NAME 2	NAME 3	Company	Address 1	Address 2	Address 3	Address 4	Address 5	Post-code	Received	Deadline Date
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	Fir Covert Farm	Fir Covert Road	Felthorpe	Norwich		NR10 4DT	14/10/13	13/11/13
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	Woodside Cottage	Beeston Lane	Rackheath	Norwich		NR13 6ND	14/10/13	13/11/13
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	Nursery Office, The Croft	Clint Green	Yaxham	Norfolk		NR19 1RY	14/10/13	13/11/13
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	130 Wilton Road	LONDON				SW1V 1LQ	15/10/13	13/11/13
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	Oakwood House	Wroxham Road	Rackheath	Norwich		NR13 6LY	14/10/13	13/11/13
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	Glebe Farm	Holt Road	Horsford			NR10 3AG	14/10/13	13/11/13



Sik On Street
Wanchai
Hong Kong

Your Ref:
Date: 12 October 2013

My Ref: HI/R1C093/GB/Design Change
Tel No.: 0344 800 8020
Email: norwich.transport@norfolk.gov.uk

Dear Sir or Madam

**Norwich Northern Distributor Road (NDR)
Further Consultation on Design Change Proposals Following Public Consultation
between July and September 2013**

Norfolk County Council recently consulted you under Section 42 of the Planning Act 2008 on its proposals for the abovementioned NDR project. As part of this consultation you were sent the following documents associated with the project:

- the scheme information document,
- the non-technical summary to the Preliminary Environmental Information Report,
- the non-technical note on Transport Modelling,
- a CD containing PDFs of these documents, the appendices to the scheme information document and a full copy of the Preliminary Environmental Information Report.

These documents were also available to view online and in various locations around the route of the proposed NDR.

Following the receipt of consultation responses and ongoing review of the detailed design of the proposed NDR by Norfolk County Council, a number of minor design amendments are proposed from those shown as part of the previous formal consultation process. The Council is therefore undertaking a further consultation with those parties directly affected by these changes.

The new or altered proposals which affect your property/interests are shown on the attached schedule and plan(s).

The deadline for receipt of your response to this additional consultation is **14 November 2013**.

Any response to this consultation should be made by:

- writing to:- Norwich Northern Distributor Road, Norfolk County Council, Martineau Lane, Norwich, NR1 2DH
- e-mailing:- norwich.transport@norfolk.gov.uk

Responses should include an indication of who is making the response and their correspondence address. Responses will be summarised in a consultation report that will form part of the application documents for the Development Consent Order. Please note that responses may be published. Personal details will be held securely and used solely for purposes in connection with the pre-application consultations, development consent application process, and further development of the scheme. Personal details will not be disclosed to any third parties although the County Council may be required to provide certain information if specifically requested by the Planning Inspectorate or as part of a formal Freedom of Information Act request.

Please note that the previous consultation materials are still available online (www.norfolk.gov.uk/tfn) should you wish to view them again.

Yours sincerely

A handwritten signature in black ink, appearing to read 'Gavin Broad', with a stylized flourish at the end.

Gavin Broad – Project Engineer

«NAME1» «NAME2» «NAME3»
«Company»
«Address_1»
«Address_2»
«Address_3»
«Address_4»
«Address_5»
«Postcode»

NCC contact number: 0344 800 8020
Textphone: 0344 800 8011

Your Ref:

Date: 16 October 2013

My Ref: HI/R1C093/GB/Design Change

Tel No.: 0344 800 8020

Email: norwich.transport@norfolk.gov.uk

Dear Sir or Madam

**Norwich Northern Distributor Road (NDR)
Further Consultation on Design Change Proposals Following Public Consultation
between July and September 2013**

Norfolk County Council recently consulted you under Section 42 of the Planning Act 2008 on its proposals for the abovementioned NDR project. As part of this consultation you were sent the following documents associated with the project:

- the scheme information document,
- the non-technical summary to the Preliminary Environmental Information Report,
- the non-technical note on Transport Modelling,
- a CD containing PDFs of these documents, the appendices to the scheme information document and a full copy of the Preliminary Environmental Information Report.

These documents were also available to view online and in various locations around the route of the proposed NDR.

Following the receipt of consultation responses and ongoing review of the detailed design of the proposed NDR by Norfolk County Council, a number of minor design amendments are proposed from those shown as part of the previous formal consultation process. The Council is therefore undertaking a further consultation with those parties directly affected by these changes.

The new or altered proposals which affect your property/interests are shown on the attached schedule and plan(s).

The deadline for receipt of your response to this additional consultation is **15 November 2013**.

Any response to this consultation should be made by:

- writing to:- Norwich Northern Distributor Road, Norfolk County Council, Martineau Lane, Norwich, NR1 2DH
- e-mailing:- norwich.transport@norfolk.gov.uk

Responses should include an indication of who is making the response and their correspondence address. Responses will be summarised in a consultation report that will form part of the application documents for the Development Consent Order. Please note that responses may be published. Personal details will be held securely and used solely for purposes in connection with the pre-application consultations, development consent application process, and further development of the scheme. Personal details will not be disclosed to any third parties although the County Council may be required to provide certain information if specifically requested by the Planning Inspectorate or as part of a formal Freedom of Information Act request.

Please note that the previous consultation materials are still available online (www.norfolk.gov.uk/tfn) should you wish to view them again.

Yours sincerely

A handwritten signature in black ink, appearing to read 'Gavin Broad', with a stylized flourish at the end.

Gavin Broad – Project Engineer

Norwich Northern Distributor Road - Application for Development Consent Order - Document Reference: 5.1
 Further Consultations – Schedule of Consultees for Letter Dated 16 October 2013

NAME 1	NAME 2	NAME 3	Company	Address 1	Address 2	Address 3	Address 4	Address 5	Postcode	Received	Deadline Date
[REDACTED]	[REDACTED]	[REDACTED]		The Woodlands	Barn Hill	Strumpshaw	Norwich		NR13 4NS	17/10/13	15/11/13
[REDACTED]	[REDACTED]	[REDACTED]		Oaks Farm	Toad Lane	Great Plumstead	Norwich		NR13 5EQ	17/10/13	15/11/13
[REDACTED]	[REDACTED]	[REDACTED]		Oaks Farm	Toad Lane	Great Plumstead	Norwich		NR13 5EQ	17/10/13	15/11/13
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	Diocesan House	109 Dereham Road	Easton	Norwich		NR9 5ES	17/10/13	15/11/13
[REDACTED]	[REDACTED]	[REDACTED]		Denver House	Green Lane West	Rackheath			NR13 6LU	17/10/13	15/11/13
[REDACTED]	[REDACTED]	[REDACTED]		The Old Rectory	Stone Hill	Rackheath			NR13 6NG	17/10/13	15/11/13

«NAME1» «NAME2» «NAME3»
«Company»
«Address_1»
«Address_2»
«Address_3»
«Address_4»
«Address_5»
«Postcode»

NCC contact number: 0344 800 8020
Textphone: 0344 800 8011

Your Ref:

Date: 17 October 2013

My Ref: HI/R1C093/GB/Design Change

Tel No.: 0344 800 8020

Email: norwich.transport@norfolk.gov.uk

Dear Sir or Madam

**Norwich Northern Distributor Road (NDR)
Further Consultation on Design Change Proposals Following Public Consultation
between July and September 2013**

Norfolk County Council recently consulted you under Section 42 of the Planning Act 2008 on its proposals for the abovementioned NDR project. As part of this consultation you were sent the following documents associated with the project:

- the scheme information document,
- the non-technical summary to the Preliminary Environmental Information Report,
- the non-technical note on Transport Modelling,
- a CD containing PDFs of these documents, the appendices to the scheme information document and a full copy of the Preliminary Environmental Information Report.

These documents were also available to view online and in various locations around the route of the proposed NDR.

Following the receipt of consultation responses and ongoing review of the detailed design of the proposed NDR by Norfolk County Council, a number of minor design amendments are proposed from those shown as part of the previous formal consultation process. The Council is therefore undertaking a further consultation with those parties directly affected by these changes.

The new or altered proposals which affect your property/interests are shown on the attached schedule and plan(s).

The deadline for receipt of your response to this additional consultation is **18 November 2013**.

Any response to this consultation should be made by:

- writing to:- Norwich Northern Distributor Road, Norfolk County Council, Martineau Lane, Norwich, NR1 2DH
- e-mailing:- norwich.transport@norfolk.gov.uk

Responses should include an indication of who is making the response and their correspondence address. Responses will be summarised in a consultation report that will form part of the application documents for the Development Consent Order. Please note that responses may be published. Personal details will be held securely and used solely for purposes in connection with the pre-application consultations, development consent application process, and further development of the scheme. Personal details will not be disclosed to any third parties although the County Council may be required to provide certain information if specifically requested by the Planning Inspectorate or as part of a formal Freedom of Information Act request.

Please note that the previous consultation materials are still available online (www.norfolk.gov.uk/tfn) should you wish to view them again.

Yours sincerely

A handwritten signature in black ink, appearing to read 'Gavin Broad', with a stylized flourish at the end.

Gavin Broad – Project Engineer

Norwich Northern Distributor Road Application for Development Consent Order Document Reference: 5.1
 Further Consultations – Schedule of Consultees for Letter Dated 17 October 2013

NAME 1	NAME 2	NAME 3	Company	Address 1	Address 2	Address 3	Address 4	Address 5	Postcode	Received	Deadline Date
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	2 Station View	Guildford				GU1 4JY	18/10/13	18/11/13
[REDACTED]			[REDACTED]	1 Albemarle Way	London				EC1V 4JB	18/10/13	18/11/13

Appendix W-2

**Further Consultations (also sent original consultation pack)
Consultation Letter and Schedule of Consultees**

«NAME1» «NAME2» «NAME3»
«Company»
«Address_1»
«Address_2»
«Address_3»
«Address_4»
«Address_5»

NCC contact number: 0344 800 8020
Textphone: 0344 800 8011

Your Ref:
Date: 11 October 2013

My Ref:HI/R1C093/GB/Pack 2 & Design Change
Tel No.: 0344 800 8020
Email: norwich.transport@norfolk.gov.uk

Dear Sir or Madam

**Norwich Northern Distributor Road
Formal Consultation under Section 42 of the Planning Act 2008**

Norfolk County Council is proposing to construct the Norwich Northern Distributor Road (NDR). The proposed NDR comprises a 20.4km primarily dual carriageway road around north Norwich linking the A1067 Fakenham Road near Attlebridge to the A47 Trunk Road at Postwick. It includes roundabout junctions with the main radial routes (running into and out of Norwich on the north side of the city) and grade-separated interchanges with the A140 Cromer Road and the A47 at Postwick.

The proposed NDR falls within the definition of a 'nationally significant infrastructure project' under the Planning Act 2008 (2008 Act). In accordance with the 2008 Act, the Council is required to submit an application for a Development Consent Order (DCO application) to construct, operate and maintain the NDR, including the Postwick Hub Junction. Any Development Consent Order would include provisions relating to development consent, compulsory acquisition of land, road closures, new roads and other highway related matters.

Between July and September 2013 Norfolk County Council undertook consultations under Section 42 of the Planning Act 2008 and Regulation 10 of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2009 on the abovementioned project. However further investigations have identified additional consultees we are therefore writing to consult you under Section 42 of the 2008 Act on the Council's proposals

Continued...

For the purposes of this formal pre-application consultation, a Preliminary Environmental Information Report (PEI Report) has been prepared in accordance with Regulations 2 and 10 of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2009. The PEI Report details the current proposals, and explains the methods and preliminary findings of our assessment of the environmental impacts of the proposals.

A non-technical summary of this PEI Report has been prepared and forms part of the consultation documents for this formal consultation, along with a scheme information document and this covering letter. A full version of the PEI Report is available from Norfolk County Council's specific project website www.norfolk.gov.uk/tfn. The full version of the PEI Report is also included on the enclosed CD, together with the appendices to the scheme information document.

A separate non-technical note on transport modelling has been provided in order to describe the process that has been undertaken to produce the provisional daily traffic flow information supplied in the scheme information document.

Therefore, in accordance with Section 42 of the 2008 Act and the Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 we enclose with this letter the following documents:

- the scheme information document,
- the non-technical summary to the PEI Report;
- the non-technical note on Transport Modelling,
- a CD containing pdfs of these documents, the appendices to the scheme information document and a full copy of the PEI Report (details of the contents of the CD are attached to this letter).

Please note that following the receipt of consultation responses and ongoing review of the detailed design of the proposed NDR by Norfolk County Council, a number of minor design amendments are proposed from those shown as part of the July to September 2013 formal consultation process.

The new or altered proposals which affect your property/interests are shown on the attached schedule and plan(s). The Council is therefore also undertaking a consultation with those parties directly affected by these changes.

Should you wish to respond to either the original consultation or the design amendments, the deadline for receipt of your response is «Dead_Line_Date» The original consultation deadline detailed in the above documents is stated as 20 September. However, this has been extended to the «Dead_Line_Date» to ensure that you have the minimum statutory 28 days (from receipt of the consultation documents) to provide a consultation response.

Any response to this consultation should be made by:

- writing to:- Norwich Northern Distributor Road, Norfolk County Council, Martineau Lane, Norwich, NR1 2DH
- e-mailing:- norwich.transport@norfolk.gov.uk

Responses should include an indication of who is making the response and their correspondence address. Responses will be summarised in a consultation report that will form part of the application documents for the Development Consent Order. Please note that responses may be published. Personal details will be held securely and used solely for purposes in connection with the pre-application consultations, development consent application process, and further development of the scheme. Personal details will not be disclosed to any third parties although the County Council may be required to provide certain information if specifically requested as part of a formal Freedom of Information Act request.

Attached to this letter is a list of documents and drawings contained on the enclosed CD. Electronic copies of these documents can be viewed free of charge by visiting www.norfolk.gov.uk/tfn.

Paper copies and CD copies of the consultation documents and the full version of the PEI Report are available on request to the project postal address or e-mail address set out above. For paper copies a charge of £10 for each drawing or £50 for each document will be made.

The Council expects to submit the DCO application for examination by Secretary of State via the Planning Inspectorate in Autumn 2013. A full Environmental Impact Assessment will be submitted as part of the DCO application. If the application is accepted, there will be an opportunity to submit representations on the application to the Planning Inspectorate.

Should you have any queries on the consultation documents or any other elements of the NDR proposal please do not hesitate to contact me by telephoning 01603 224279 or e-mailing norwich.transport@norfolk.gov.uk.

Yours faithfully



Gavin Broad
Project Engineer

Norwich Northern Distributor Road Pre-Application Consultation under Section 42 of the Planning Act 2008 - List of Documents and Drawings Contained on CD

Folder Name	File Name	Description
Scheme Information Document	Scheme Information Document	Text document entitled ' <i>Norwich Northern Distributor Road Pre-Application Consultations Scheme Information Document July 2013</i> ' as pdf
	Appendix A - Outline Route Plan with Proposed DCO Boundary	General Route With Proposed Development Consent Order Boundary Plan as pdf
	Appendix B - General Arrangement Drawings	General Arrangement Drawing Location Plan and General Arrangement Plan Sheets 1 to 12 as single pdf
	Appendix C - Typical Cross Sections	Typical Cross Sections Location Plan and Cross Sections AA to TT as single pdf
	Appendix D - Structure Drawings	Structure Drawing Location Plan and Detailed Structure Drawings as single pdf
	Appendix E - Offline Improvement Drawings	Off-Line Improvements Location Plan and Detailed Improvement Drawings as single pdf
	Appendix F - Permanent Traffic Regulation Order Schedule	Text document as pdf
	Appendix G - Temporary Carriageway Re-alignment and Road Closures	Text document as pdf
	Appendix H - Photo Visualisation	Photo Visualisation Location Plan and Detailed Visualisation 1 to 4 as single pdf
	Appendix I - Alternative Option Drawings	Alternative Option Location Plan and Alternative Option Sheets 1 and 2 as single pdf
	Appendix J – Provisional Daily Traffic Flow	Provisional Daily Traffic Flows Plans and Supplementary Data Tables as single pdf
Non Technical Summary of PEIR	NDR PEIR Non Technical Summary	Text document entitled ' <i>NDR Preliminary Environmental Information Report - Non Technical Summary July 2013</i> ' as pdf
Preliminary Environmental Information Report	Preliminary Environmental Information Report	Text document entitled ' <i>NDR Preliminary Environmental Information Report June 2013</i> ' as pdf
	Appendix A - General Arrangement Drawings	General Arrangement Drawing Location Plan and General Plan Sheets 1 to 12 as single pdf
	Appendix Bi - Environmental Constraints - Ecology and Landscape	Environmental Constraints Map Ecology and Historic Landscape Plans 1 to 12 as single pdf
	Appendix Bii - Environmental Constraints - Water	Environmental Constraints Map Water Plans 1 to 6 as single pdf
Non Technical Note on Transport Modelling	Non Technical Note on Transport Modelling	Text document entitled ' <i>Norwich Northern Distributor Road - Non Technical Note on NDR Transport Modelling July 2013</i> ' as pdf

Norwich Northern Distributor Road Application for Development Consent Order Document Reference: 5.1
 Further Consultations (also sent original consultation pack) – Schedule of Consultees for Letter Dated 11 October 2013

NAME 1	NAME 2	NAME 3	Company	Address 1	Address 2	Address 3	Address 4	Address 5	Post-code	Received	Deadline Date
			[REDACTED]	Portland House	Brickenhill Lane	Solihull	Birmingham		B37 7BQ	15 October 2013	13 November 2013
			[REDACTED]	8 Canada Square	London				E14 5HQ	NA * 1	14 November 2013
			[REDACTED]	Bow Bells House	1 Bread Street	London			EC4M 9BE	15 October 2013	14 November 2013
[REDACTED]			[REDACTED]	20 Villa Lane	Stanwick	Wellingborough			NN9 6QQ	15 October 2013	13 November 2013
			[REDACTED]	Ashwellthorpe Industrial Estate	Ashwellthorpe	Norwich			NR16 1ER	14 October 2013	13 November 2013
			[REDACTED]	Kettlewell House	Austin Fields Industrial Estate	King's Lynn			PE30 1PH	15 October 2013	14 November 2013
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	Wilmslow					SK9 5DH	14 October 2013	13 November 2013
			[REDACTED]	Portland House	Bressenden Place	London	SW1E 5DS		SW1E 5DS	14 October 2013	14 November 2013

Norwich Northern Distributor Road Application for Development Consent Order Document Reference: 5.1
 Further Consultations (also sent original consultation pack) – Schedule of Consultees for Letter Dated 11 October 2013

NAME 1	NAME 2	NAME 3	Company	Address 1	Address 2	Address 3	Address 4	Address 5	Post-code	Received	Deadline Date
█	█	█	█	1 St James Court	Whitefriars	Norwich			NR3 1RJ	14 October 2013	13 November 2013
█	█	█	█	130 Wilton Road	LONDON				SW1V 1LQ	15 October 2013	13 November 2013



Notes

- * 1 Would not accept documents

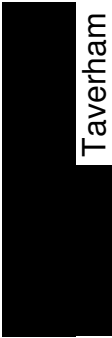
Appendix X

Further Consultations Summary of Responses

Norwich Northern Distributor Road - Application for Development Consent Order – Document Reference 5.1
Design Change Consultations - Summary of Responses

Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
<p>Ref: DC001  Buxton Road, Spixworth Consulted on Design Change Ref 7.1</p>	<p>NA</p>	<p>Noted that their property goes to the end of the grass verge onto Buxton Road and under the grass verge is the water and gas supply to all the properties in the row of houses. Requested details of the development to overcome this. Commented that they are not happy with and object to the proposed change of design which places a bridleway in front of their property.</p>	<p>Comments regarding Design Change Ref: 7.1</p>	<p>Regard: The bridleway was extended along the Buxton Road to link with Beeston Lane. All the utilities will be diverted as necessary. The details of the diversion works are not know at this stage. Further Design Change: No</p>
<p>Ref: DC002  Taverham Consulted on Design Change Ref 2.8</p>	<p>1/23 2/1</p>	<p>Commented that the addition of a private means of access suitable for modern agricultural machinery to such a small parcel of land severed by the scheme is unsatisfactory. It will necessitate this machinery using the private means of access from the western roundabout. Questioned who is going to pay for the upkeep of the access and that wider means of access along this strip will increase the security risk to their property.</p>	<p>Comments regarding Design Change Ref: 2.8</p>	<p>Regard: The applicant had not previously provided an access because it had assumed its purchase by a neighbouring landowner. Once it was noticed that the land had no access it considered it appropriate to provide one. Negotiations with the landowner over post scheme ownership of land and access maintenance responsibility will continue as part of detailed design and compensation discussions Boundary fencing to mitigate security risks will be considered as part of detailed design and will include discussions with</p>

Norwich Northern Distributor Road - Application for Development Consent Order – Document Reference 5.1
Design Change Consultations - Summary of Responses

Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
		<p>Questioned whether:</p> <ul style="list-style-type: none"> the area could be used for tree planting over the Gas Main where it traverses the new road. an access could be provided from the NDR at this point?. this small patch could be assigned to the adjacent land owners. 		<p>land owners.</p> <p>Landscaping proposals do not identify a need for further planting in this area.</p> <p>The applicant does not consider a direct access off the NDR to be safe.</p> <p>Further Design Change: No</p>
<p>Ref: DC002A  Taverham Consulted on Design Change Ref 2.8 Provided comment previously Ref: IT007</p>	NA	<p>Commented that the addition of a private means of access is unacceptable for the micro benefit it will bring to the small area of land that is severed as a result of the scheme.</p> <p>Commented that the new access will result in an increased use of the access track, particularly by heavy agricultural machinery. Expressed concern that this will require a higher level of maintenance in the future.</p> <p>Also expressed concern that the new access will also result in an increased security risk posed to</p>	<p>Comments regarding Design Change Ref: 2.8</p>	<p>Regard: See response to DC002.</p> <p>Further Design Change: No</p>


Norwich Northern Distributor Road - Application for Development Consent Order – Document Reference 5.1
Design Change Consultations - Summary of Responses

Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
Ref: DC003 [REDACTED] Wroxham Road, Rackheath Consulted on Design Change Ref 9.1	NA	their client's property, which is unacceptable. Requested if the new field access off Wroxham Road Roundabout could be extended south westwards to provide an alternative access to a property. Commented that this would also ease the amount of traffic using the existing access via the lay-by off Wroxham Road which will be very close to the proposed equestrian crossing.	Comments regarding Design Change Ref: 9.9	Regard: The property already has an access from Wroxham Road. However, this suggestion will be considered as part of detailed design and will include discussions with land owners. Further Design Change: No
Ref: DC004 [REDACTED] Buxton Road, Spixworth Consulted on Design Change Ref 7.1	NA	Commented that the proposed amendment to the bridle path route, may affect their land and requested further details about this.	Comments regarding Design Change Ref: 7.1	Regard: Further details of the proposed bridleway will be considered as part of detailed design and will include discussions with land owner. Further Design Change: No
Ref: DC005 [REDACTED] Holly Lane, Horsford Consulted on Design Change Ref 4.11 and 5.4	5/7	Objected to the creation of the new drainage Lagoon 8A to the west of the Cromer Road A140 slip road. Commented that this will result in removal of the farm's slurry pit, which is shown as a pond on the proposals. This is not a pond but	Comments regarding Design Change Ref: 5.4	Regard: Lagoon 8A was positioned in the natural low spot to minimise the flood risk. Other options were explored, but proved not feasible due to topography of the site. Further Design Change: No


Norwich Northern Distributor Road - Application for Development Consent Order – Document Reference 5.1
Design Change Consultations - Summary of Responses

Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
Provided comment previously Ref: IT0013		part of operations of a working farm.		
		Also objected in the strongest possible context to the following:		
	NA	<ul style="list-style-type: none"> limiting of the width of Holly Lane. Commented that it is an operational farm, including potato stores, cattle buildings, residential properties, farm office etc which uses Holly Lane. 	Comments regarding other proposals (also made in previous consultation) – On-Line Proposals	<p>Regard: Access to the field at the eastern end of Holly Lane is maintained, the access being provided before Holly Lane is reduced in width.</p> <p>Further Design Change: No</p>
	NA	<ul style="list-style-type: none"> the stopping up in any respect of the irrigation pipe work under the existing Holt Road which needs to be retained. 	Comments regarding other proposals - Land/Property Issues	<p>Regard: Irrigation pipes will be diverted as necessary and the details of the diversion will be discussed with the landowner.</p> <p>Further Design Change: No</p>
	NA	<ul style="list-style-type: none"> the loss of agricultural land to the north east of Holt Road. 	Comments regarding other proposals - Land/Property Issues	<p>Regard: Matter to be addressed through compensation negotiations.</p> <p>Further Design Change: No</p>

Norwich Northern Distributor Road - Application for Development Consent Order – Document Reference 5.1
 Design Change Consultations - Summary of Responses

Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
	4/21	<ul style="list-style-type: none"> the creation of a roundabout where Drayton Lane meets Holt Road with the loss of agricultural land. 	Comments regarding other proposals – On-Line Proposals	<p>Regard: The roundabout is considered to be the most suitable junction type in this location.</p> <p>Further Design Change: No</p>
<p>Ref: DC006  Brick Kiln Road, Hevingham Consulted on Design Change Ref 6.6</p>	5/49 6/2	<p>Noted that they have always stated that they would not be letting the land south of the proposed NDR go with the land that is intended to be compulsory purchased.</p> <p>Noted this land is required so that Norwich Airport has control of any birds on it and that, as Norwich Airport is a commercial business, it has no power to compulsory purchase it. Also as the applicant wants this land to give control to another commercial business, it also has no power to compulsory purchase it.</p> <p>Commented that Norfolk County Council has obtained or virtually obtained planning permission for a commercial aeroplane paint spraying business right up to the</p>	Comments regarding Design Change Ref: 6.6	<p>Regard: The additional area of grassland creation has been incorporated into the proposals to prevent issues arising from bird strike hazards associated with Norwich Airport.</p> <p>Further Design Change: No</p>


Norwich Northern Distributor Road - Application for Development Consent Order – Document Reference 5.1
Design Change Consultations - Summary of Responses

Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
		<p>border of the land. Commented that this would suggest that the land between the NDR and the paint spraying operation would soon become industrial. Therefore if no access is provided to their future industrial land, it will be blighted and they will hold the applicant responsible for the difference between industrial and agricultural land.</p> <p>Considered that an underhand approach is being used to obtain industrial land for an agricultural price.</p> <p>Commented that they will be expecting access to be provided to this land and that this land is not for sale at anything less than industrial price.</p>		
<p>Ref: DC007  Smea Lane, Gt</p>	<p>12/10 12/9</p>	<p>Objected to the relocation of Lagoon 25 and the temporary topsoil storage as the proposed position will seriously affect the peace and tranquility of their property.</p>	<p>Comments regarding Design Change Ref: 12.5 and 12.8</p>	<p>Regard: The lagoon was relocated following discussions with the directly affected landowner, who owns the fields on either side of the NDR.</p> <p>The suggested location south of the Business Park Roundabout between</p>

Norwich Northern Distributor Road - Application for Development Consent Order – Document Reference 5.1
Design Change Consultations - Summary of Responses

Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
Plumstead Consulted on Design Change Ref 12.5		<p>Suggest that the area best suited would be that land directly south of the Business Park Roundabout and between the proposed NDR and the Postwick Footpath No 2. This could then be accessed jointly with Lagoon 30 and be the maximum distance from both properties on Smees Lane and the Heath Farm area.</p> <p>Commented on the noise and pollution of heavy plant/equipment, the interference experienced, and the increased activity of support vehicles/personnel in areas of intended work and are strongly against the lagoon, the temporary topsoil storage and the combined turning head/ field access on our doorstep.</p> <p>Commented that there is a perfectly good operational field access is established at the junction of Smees Lane and Postwick FP2.</p>		<p>NDR and the Postwick Footpath No 2 cannot be utilised due to its distance from the proposed drainage system outfall.</p> <p>Further Design Change: No</p>


Norwich Northern Distributor Road - Application for Development Consent Order – Document Reference 5.1
Design Change Consultations - Summary of Responses

Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
	NA	Commented that at no time has anyone made an approach to discuss the effects and impact on their land, option land, residence or business activity until now.	Comments regarding other proposals – Consultation Issues	<p>Regard: Consultee is not a known directly affected landowner. Matters would be addressed through appropriate compensation negotiations.</p> <p>Further Design Change: No</p>
	12/1	Commented that there is a strong need to create woodland screening and fencing to the east of the proposed NDR to mitigate future noise, pollution, trespass and safe guard what is regarded as a particularly environmentally friendly and enjoyable living and working location.	Comments regarding other proposals – Landscaping/ Planting Issues	<p>Regard: Assessment of the proposed landscape treatments and of noise is contained in Volume 1 Chapter 7 and Volume 1 Chapter 11 of the Environmental Statement (Document Ref 6.1).</p> <p>Further Design Change: No</p>
<p>Ref: DC008  Street, Horsford Consulted on Design Change Ref 4.11</p>	4/16	<p>Commented that whilst they are in favour of the concept of the NDR, they object to the proposal for temporary widening of a 200m length of the existing highway on the north side of Holt Road in order to divert traffic for the construction of the tie-ins from the new Holt Road/Drayton Lane roundabout.</p> <p>Identified that the reasons for this objection are:</p>	Comments regarding Design Change Ref: 4.11	<p>Regard: Having considered this consultation response with the applicant's contractor, it was determined that a tie-in could be completed by alternative means.</p> <p>Further Design Change: Yes - See design Change Ref: 4.12 in Appendix V of this report.</p>

Norwich Northern Distributor Road - Application for Development Consent Order – Document Reference 5.1
 Design Change Consultations - Summary of Responses

Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
		<ul style="list-style-type: none"> • the strip of land in question comprises part preserved woodland, part garden and part amenity land. Identified that there would be the need to fell up to 10 mature trees, including 3 mature oaks which are estimated to be between 100 and 200 years old, and an ancient yew tree estimated at least 150 years old. • the ground levels between the existing road and the proposed development strip vary considerably by an estimated 6 feet. To allow traffic to safely drive over this strip, it will require tying in and this will require the levelling of the ground which will have further detrimental effect on the trees. • the trees along the whole length of the proposed strip of land were planted in the early 1950's to protect Horsford Hall from prevailing south westerly winds and to offer a degree of privacy 		

Norwich Northern Distributor Road - Application for Development Consent Order – Document Reference 5.1
Design Change Consultations - Summary of Responses

Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
<p>Ref: DC009  Fir Covert Road, Taverham Consulted on Design Change Ref 2.9</p>	2/21	<p>from passing traffic. The felling of this shelterbelt would seriously affect the enjoyment of the gardens of the properties on the South side of Church Street by increasing both prevailing winds and traffic noise. Commented that there is no indication of what will replace this shelter belt to give continued protection.</p> <p>Commented that the first time they learnt that land from their property would be required for the construction of the scheme was during a site meeting with the applicant whereupon it materialised that they had not received the letter from the applicant dated 11 October 2013.</p>	Comments regarding other proposals – Consultation Issues	<p>Regard: The applicant apologised for this error. A copy of the letter was hand delivered following the site meeting and the owners confirmed they would respond within consultation timescale. Further Design Change: No</p>
	NA	<p>Commented that they are very disappointed to see the reinstatement of the roundabout on the Fir Covert Road because:</p> <ul style="list-style-type: none"> there are already certain periods throughout the day when exiting 	Comments regarding other proposals – On-Line Proposals	<p>Regard: There has been extensive consideration regarding the provision of the roundabout at the Fir Covert Road junction with the NDR. After the April/May/June 2012 consultations the roundabout was relocated to the junction with Fakenham Road. The</p>

Norwich Northern Distributor Road - Application for Development Consent Order – Document Reference 5.1
Design Change Consultations - Summary of Responses

Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
		<p>their priority is very difficult due to the heavy flow of traffic and the inclusion of the roundabout is going to greatly increase the flow of traffic along Fir Covert Road.</p> <ul style="list-style-type: none"> they are extremely apprehensive about how difficult it is going to be for both them and their customers to exit their premises, as well as the general impact it will have on their lives. not enough consideration has been given to the actual residents of Fir Covert Road and the louder, more persistent voices of just a few of the businesses located along the road have greatly contributed to this change of plan. a considerable number of drivers will treat the Fir Covert Road Roundabout as the start/end of the NDR rather than using the roundabout on the A1067 Fakenham Road. 		<p>February/March 2013 consultations identified support for the roundabout at the Fakenham Road/NDR junction. However, it also identified concerns regarding the closure of Fir Covert Road, particularly by businesses here. Having given regard to these concerns, the NDR proposal was further amended so that it included an additional roundabout at the NDR junction with Fir Covert Road. This was in addition to the roundabout at the Fakenham Road/NDR junction.</p> <p>The applicant considers the provision of a 4 arm roundabout here as the most appropriate solution, particularly as traffic flow on Fir Covert Road is predicted to be similar or lower with the NDR. See Appendix I to the Traffic Forecasting Report (Document Ref 5.6) for forecast traffic flows.</p> <p>Further Design Change: No</p>

Norwich Northern Distributor Road - Application for Development Consent Order – Document Reference 5.1
Design Change Consultations - Summary of Responses

Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
	NA	Suggested that consideration be given to making the Fir Covert Road Roundabout a 3 arm roundabout with the exit to Fir Covert Road (south) being removed as this would force drivers to use the intended start/end of the NDR. In addition it would still allow any traffic from the northern end of Fir Covert Road to join the NDR whilst access to the other businesses/properties could be from the Fakenham Road end of Fir Covert Road.	Comments regarding other proposals – Suggested Change	<p>Regard: The proposed 4 arm roundabout maintains connectivity between north and south which is considered important for the local businesses.</p> <p>Further Design Change: No</p>
	NA	<p>Noted the proposed developments at the southern end of Fir Covert Road, which are:</p> <ul style="list-style-type: none"> the proposed planning application for a supermarket and car parking with petrol filling station. outline planning permission for public house/restaurant and a lifestyle leisure unit. <p>Commented that these will result in even more traffic short cutting</p>	Comments regarding other proposals – Other Comments	<p>Regard: See above responses.</p> <p>Further Design Change: No</p>

Norwich Northern Distributor Road - Application for Development Consent Order – Document Reference 5.1
Design Change Consultations - Summary of Responses

Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
		along Fir Covert Road rather than accessing the various sites from the Fakenham Road.		
	NA	Suggested that by positioning the roundabout slightly further forward, along the NDR, the extra land needed could be taken from open farmland rather than disrupting existing properties.	Comments regarding other proposals – On-Line Proposals	Regard: Repositioning the roundabout further along the NDR actually creates further disruption to land along Fir Covert Road as this would need to be re-aligned to join the relocated roundabout. Further Design Change: No
	NA	Commented that the proposals will result in chopping down a very old oak tree and probably upsetting the root system of a 50ft cedar tree, so much so that it possibly wouldn't survive.	Comments regarding other proposals – Land/Property Issues	Regard: Comment noted. See above responses for reasons for introducing the Fir Covert Road Roundabout. Further Design Change: No
		Questioned that knowing what the preferred route for the NDR would be why was it not borne in mind when allowing a new property to be built? If it was felt that the farmland between the two properties was potentially not adequate then why were they given planning permission?	Comments regarding other proposals – Land/Property Issues	Regard: Planning issues for the property were not determined by the applicant. Further Design Change: No
Ref: DC010	NA	Commented that it is not clear	Comments	Regard: The regard given by the

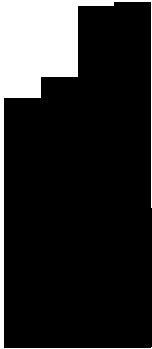
Norwich Northern Distributor Road - Application for Development Consent Order – Document Reference 5.1
Design Change Consultations - Summary of Responses

Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
<p>██████████ Not specifically consulted on design change Provided comment previously Ref: IT024</p>		<p>what matters will be dealt with through the formal examination and what is available to be discussed and agreed at an officer level beforehand. With this in mind it considers that the consultation has been unsatisfactory and further amendments are required.</p>	<p>regarding other proposals – Consultations</p>	<p>applicant to the original statutory consultation with those with interest in land is contained in Appendix U of this report (see Ref IT024 of this Appendix). Further Design Change: No</p>
		<p>Commented that the impact of the scheme is significant, taking a large proportion of the field and leaving a most inconvenient shape which is not really useable for modern farming. Suggested a number of aspects that would improve significantly the final outcome. These included:</p>		
	6/10	<ul style="list-style-type: none"> remove the drainage lagoon and relocate it on other land of a more appropriate size and shape that will have a lesser impact on the affected holding. If this is absolutely not possible, then realign the drainage lagoon to leave a sensible portion and 	<p>Comments regarding other proposals (also made in previous consultation) – On-Line</p>	<p>Regard: Lagoon 12 was reduced in size following the overland flows assessment and reshaped along Calf Lane/Bullock Hill corner. The topography of the site influenced the position of the lagoon to minimise the earthworks. Further Design Change: No</p>

Norwich Northern Distributor Road - Application for Development Consent Order – Document Reference 5.1
Design Change Consultations - Summary of Responses

Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
		shape of retained land. It is presumed this will be situated alongside the NDR towards the roundabout with the bridleway located between the NDR and the drainage lagoons.	Proposals	
	NA	<ul style="list-style-type: none"> because Bullock Hill will reduce in intensity of use the lane should be managed to limit misuse in the future. The suggestion is to gate all the entrances from Bullock Hill to minimize trespass. 	Comments regarding other proposals (also made in previous consultation) – Land/Property Issues	<p>Regard: Provision of gates at existing accesses will be considered as part of detailed design.</p> <p>Further Design Change: No</p>
	NA	<ul style="list-style-type: none"> close Bullock Hill off other than as a bridle path as near to the village as possible. 	Comments regarding other proposals – On-Line Proposals	<p>Regard: The road would still remain public highway and access still required to adjacent land. Therefore, the applicant does not consider such a closure appropriate.</p> <p>Further Design Change: No</p>
	6/10 6/11	<ul style="list-style-type: none"> the boundary with the NDR and for the avoidance of doubt the lagoons should be fenced for security and with a hedge planted for long term ease of 	Comments regarding other proposals (also made in	<p>Regard: Boundary fencing and hedgerows will be considered as part of detailed design and will include discussions with land owners.</p>


Norwich Northern Distributor Road - Application for Development Consent Order – Document Reference 5.1
Design Change Consultations - Summary of Responses

Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
		management.	previous consultation) – Land/Property Issues	Further Design Change: No
	NA	<ul style="list-style-type: none"> ensure the telecoms mast site remains operable with full access granted for the owners and the occupiers, with sufficient space allowed for reinstatement of the site after the termination of the lease. 	Comments regarding other proposals (also made in previous consultation) – Land/Property Issues	<p>Regard: Access to the telecoms mast site is to be provided via the new link road south of the Airport Roundabout.</p> <p>Further Design Change: No</p>
<p>Ref: DC011  , Beeston Consulted on Design Change Ref 7.1, 8.2 and 8.3 Provided comment previously Ref: IT031</p>	NA	<p>Commented that it is not clear what matters will be dealt with through the formal examination and what is available to be discussed and agreed at an officer level beforehand. With this in mind it considers that the consultation has been unsatisfactory and further amendments are required.</p>	Comments regarding other proposals – Consultations	<p>Regard: The regard given by the applicant to the original statutory consultation with those with interest in land is contained in Appendix U of this report (see Ref IT031 of this Appendix).</p> <p>Further Design Change: No</p>
		Commented that the owners wish		

Norwich Northern Distributor Road - Application for Development Consent Order – Document Reference 5.1
 Design Change Consultations - Summary of Responses

Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
		to ensure recent discussions feed in to the final decisions. These include:		
	7/26	<ul style="list-style-type: none"> the PMA to the substation and the field access is to be gated and set back. 	Comments regarding other proposals (also made in previous consultation) Land/Property Issues	<p>Regard: Provision of gates at existing accesses will be considered as part of detailed design.</p> <p>Further Design Change: No</p>
	7/16	<ul style="list-style-type: none"> the NDR should be fenced and have a hedge planted on the boundary to prevent trespass from the bridleway and cycle track. 	Comments regarding other proposals (also made in previous consultation) Land/Property Issues	<p>Regard: Boundary fencing and hedgerows will be considered as part of detailed design and will include discussions with land owner.</p> <p>Further Design Change: No</p>
	7/18	<ul style="list-style-type: none"> the field access to the north side is set back and gated. 	Comments regarding other proposals (also made in	<p>Regard: Provision of gates at existing accesses will be considered as part of detailed design.</p> <p>Further Design Change: No</p>

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Design Change Consultations - Summary of Responses

Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
			previous consultation) Land/Property Issues	
	7/17	<ul style="list-style-type: none"> the reinstatement of areas to be handed back after works whether after top soil storage or landscaping need careful consideration. The owners need to agree reinstatement provisions for the temporary topsoil storage and for the applicant to recognise the impact on the usefulness of this portion of field during the works. 	Comments regarding other proposals (also made in previous consultation) - Land/Property Issues	<p>Regard: This will be considered as part of detailed design and will include discussions with land owner.</p> <p>Further Design Change: No</p>
<p>Ref: DC012  Consulted on Design Change Ref 3.2 Provided comment previously Ref: IT032</p>	NA	<p>Commented that it is not clear what matters will be dealt with through the formal examination and what is available to be discussed and agreed at an officer level beforehand. With this in mind it considers that the consultation has been unsatisfactory and further amendments are required.</p>	Comments regarding other proposals – Consultations	<p>Regard: The regard given by the applicant to the original statutory consultation with those with interest in land is contained in Appendix U of this report (see Ref IT032 of this Appendix).</p> <p>Further Design Change: No</p>

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Design Change Consultations - Summary of Responses

Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
	2/20	Commented that access to the field must be directly from Fir Covert Road Roundabout rather than from Fir Covert Road itself. Suggested the access gates will need to be set back to enable maneuvering and to ensure free flow of traffic.	Comments regarding other proposals (also made in previous consultation) - Land/Property Issues	Regard: Access provided off Fir Covert Road is considered more appropriate. Further Design Change: No
	2/20	Commented that it is important to construct a farm access track from this access by the roundabout part of the way across to Breck Farm Lane to ensure access across the field adjacent to Fir Covert Road.	Comments regarding other proposals (also made in previous consultation) - Land/Property Issues	Regard: Existing route between Fir Covert Road and Breck Farm Lane is across field with no access track so no new track is considered necessary. Further Design Change: No
	2/20 2/41 3/1	Commented that boundary treatments are important and it has been discussed/agreed that the boundary on the south of the NDR will be temporary fenced or better to prevent trespass with a suitable mixed thorn and native species hedge to be planted.	Comments regarding other proposals	Regard: Boundary fencing and hedgerows will be considered as part of detailed design and will include discussions with land owners. Design Change: No

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 Design Change Consultations - Summary of Responses

Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
	NA	<p>Commented that with the change in status of Breck Farm Lane/Furze Lane and a new linkage between Marriotts Way and Breck Farm Lane, there will be more pedestrian and other related access generally. As a result the applicant needs to ensure that all the appropriate farm accesses remain open but with all entrances gated along Breck Farm Lane and Furze Lane to avoid uncontrolled access.</p> <p>Commented that with Breck Farm Lane being stopped up at the buildings (with gated access to serve the buildings on the west of Breck Farm Lane) it is important to discuss and agree how best to allow for emergency access and for farm traffic to access the grain store and fields whilst protecting against open access generally.</p>	<p>Comments regarding other proposals (also made in previous consultation) - Land/Property Issues</p>	<p>Regard: Provision of gates at existing accesses will be considered as part of detailed design. Further Design Change: No</p>
		<p>Commented that with the new access from Breck Farm Lane to Marriotts Way there are a number of issues that need to be assessed on site to ensure against useless severed areas and unfettered public access.</p>		

Norwich Northern Distributor Road - Application for Development Consent Order – Document Reference 5.1
Design Change Consultations - Summary of Responses

Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
		<p>Namely:</p> <ul style="list-style-type: none"> the layout of the new access track to the Marriotts Way crossing is accepted in principle but it may need to be slightly wider than the proposed specification for farm tracks as well as the need for it to be fenced and hedged against open access on either side. 	<p>Comments regarding other proposals (also made in previous consultation) - Land/Property Issues</p>	<p>Regard: Boundary fencing and hedgerows will be considered as part of detailed design and will include discussions with land owners. The applicant has undertaken assessments of articulated vehicle turning movements here and considers the track width sufficient.</p> <p>Further Design Change: No</p>
	<p>2/30 2/42</p>	<ul style="list-style-type: none"> access to the land on either side will need to be agreed and then gated securely. 	<p>Comments regarding other proposals - Land/Property Issues</p>	<p>Regard: Boundary fencing and hedgerows will be considered as part of detailed design and will include discussions with land owners.</p> <p>Further Design Change: No</p>
	<p>2/29</p>	<ul style="list-style-type: none"> it is important to ensure that there is a totally secure grant of a right of way for all purposes and not only for agricultural purposes across Marriotts Way. 	<p>Comments regarding other proposals (also made in previous consultation) - Land/Property Issues</p>	<p>Regard: The proposals will provide a right of way for all purposes.</p> <p>Further Design Change: No</p>

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Design Change Consultations - Summary of Responses

Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
	NA	<p>Commented on the bridleway from the north east of Marriotts Way to the Reephams Road and the owners strongly held conviction this should run separate from the farm access on retained land. These should be separated by a fence with a hedge to be planted on the line of acquisition to secure the private means of access and to protect against trespass with gates set back at Reephams Road to enable maneuverability.</p> <p>Commented that it is important to assess the width of the access track and any areas that may need to be widened or strengthened on the corners and in areas for maneuvering. Clearly one of the significant issues for this holding is the requirement to ensure access is available during works.</p>	<p>Comments regarding other proposals (also made in previous consultation) - Land/Property Issues</p>	<p>Regard: This arrangement is proposed in various places along the scheme and this location is no different. Discussions were held with the affected landowner and the farm manager. The combined track is proposed to be 4m wide, which is more than most of the county lanes commonly used by NIMUs and farm traffic.</p> <p>Further Design Change: No</p>
	3/3	<p>Noted that the owners accept the principle of the shared access with Lagoon 3 which it has been agreed will be set back and gated. Noted that the boundaries on the line of severance and the</p>	<p>Comments regarding other proposals (also made in</p>	<p>Regard: Boundary fencing and hedgerows will be considered as part of detailed design and will include discussions with land owners.</p>

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Design Change Consultations - Summary of Responses

Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
		boundary with Furze Lane need to be fenced and have hedges planted to protect against the increased risk of access and to enable continued use of the land which will no longer be suitable for arable production.	previous consultation) - Land/Property Issues	Further Design Change: No
	2/40	Commented that the proposals need to allow for gated access from Furze Lane at the maneuvering hammerhead to the land to enable access whilst ensuring security for the land.	Comments regarding other proposals (also made in previous consultation) - Land/Property Issues	Regard: Boundary fencing and hedgerows will be considered as part of detailed design and will include discussions with land owners. Further Design Change: No
Ref: DC013 [Redacted] West Lane, Horsford Consulted on Design Change Ref 9.3, 10.13 and 10.14 Provided comment previously Ref: IT025	NA	Commented that it is not clear what matters will be dealt with through the formal examination and what is available to be discussed and agreed at an officer level beforehand. With this in mind it considers that the consultation has been unsatisfactory and further amendments are required.	Comments regarding other proposals – Consultations	Regard: The regard given by the applicant to the original statutory consultation with those with interest in land is contained in Appendix U of this report (see Ref IT025 of this Appendix). Further Design Change: No

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Design Change Consultations - Summary of Responses

Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
		Commented that the house their clients live in is as close as any to the route and one of the largest junctions. Suggested that they will suffer serious impact not just in value terms but in the standard of living.		
		Commented that whilst some issues have been altered, it is imperative that all of the following items are taken on board:		
	5/45	<ul style="list-style-type: none"> ensure the bank height is increased near West Farm and that the bunding is constructed at the very start of the occupation of the site. 	Comments regarding other proposals (also made in previous consultation) - Landscaping/ Planting Issues	<p>Regard: Discussions with neighbouring landowners over the precise operational details relating to the construction of the bunding will occur prior to construction commencing.</p> <p>Further Design Change: No</p>
	5/43	<ul style="list-style-type: none"> recognise the interference to the house and neighbours from the main site compound, crushing plant and recycling plant which are too close and will deliver 	Comments regarding other proposals (also made in	<p>Regard: The scheme contractors will control the site compound. Discussions with neighbouring landowners over the precise operational details of this will occur prior to construction commencing.</p>

Norwich Northern Distributor Road - Application for Development Consent Order – Document Reference 5.1
Design Change Consultations - Summary of Responses

Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
		<p>weed seeds, dust and noise. To mitigate this there must be a method statement to manage handling of the materials and management of the spoil heaps, temporary storage areas and other works. It is arguable whether the spoil heaps should be located to the south so that the site manager attends to weed seeds blowing into their site or to the north to protect further the houses to the north.</p>	<p>previous consultation) - Other Comments</p>	<p>See Volume 2 Chapter 19 (Document Ref 6.2) for the Construction Environment Management Plan. Further Design Change: No</p>
	NA	<ul style="list-style-type: none"> provide a meeting to consider the present noise profile, compare the predicted noise and consider the best way to mitigate against it as their client is undecided as to whether it is more effective to plant on the north side of the permanent bank or not. 	<p>Comments regarding other proposals (also made in previous consultation) - Landscaping Issues</p>	<p>Regard: Planting has been determined by landscape considerations, planting is not considered to be solely noise mitigation. Assessment of Noise is contained in Volume 1 Chapter 11 of the Environmental Statement (Document Ref 6.1). Further Design Change: No</p>
	5/45	<ul style="list-style-type: none"> confirm that the bank will be transferred to their client for long term control. 	<p>Comments regarding other proposals (also made in</p>	<p>Regard: The intention is that all landscaping areas will remain in the ownership of the applicant but this request will be considered as part of detailed design and will include</p>


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Design Change Consultations - Summary of Responses

Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
			previous consultation) - Land/Property Issues	discussions with land owners. Further Design Change: No
	NA	<ul style="list-style-type: none"> assess access points on Old Norwich Road for future use and those not used need to be fenced and hedged to ensure security. 	Comments regarding other proposals (also made in previous consultation) - Land/Property Issues	<p>Regard: Boundary fencing and hedgerows will be considered as part of detailed design and will include discussions with land owners.</p> <p>Further Design Change: No</p>
	NA	<ul style="list-style-type: none"> enable Old Norwich Road to be temporarily closed off during the museum's closed season. 	Comments regarding other proposals (also made in previous consultation) - Suggested Change	<p>Regard: Although the aviation museum may be closed the road would still remain public highway and access still required to the museum and adjacent land. Therefore, the applicant does not consider such a closure appropriate.</p> <p>Design Change: No</p>
	5/45	<ul style="list-style-type: none"> the main embankment behind the farm yard should ideally be extended to the east on adjacent land. If this is not 	Comments regarding other proposals	<p>Regard: The noise assessment has determined the most effective sites for acoustic fencing. See Volume 1 Chapter 11 of the Environmental Statement</p>

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Design Change Consultations - Summary of Responses

Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
		<p>possible agree an embankment on their clients land or acoustic fencing on the boundary as far as the Old Norwich Road.</p>	<p>(also made in previous consultation) - Landscaping/ Planting Issues</p>	<p>(Document Ref 6.1). Further Design Change: No</p>
	6/5	<ul style="list-style-type: none"> agree the boundary location on the banks to the east and generally to minimise land take and interference during works. 	<p>Comments regarding other proposals (also made in previous consultation) - Land/Property Issues</p>	<p>Regard: This will be considered as part of detailed design and will include discussions with land owners. Further Design Change: No</p>
	6/5	<ul style="list-style-type: none"> maintain access to the severed parcel of land. If this is not possible, then provide confirmation of the tentative agreement that part of the land severed and acquired has commercial land for acquisition purposes. 	<p>Comments regarding other proposals (also made in previous consultation) - Land/Property Issues</p>	<p>Regard: Matter to be addressed through compensation negotiations. Further Design Change: No</p>
	NA	<ul style="list-style-type: none"> arrange a meeting to discuss proposals to mitigate their 	<p>Comments regarding</p>	<p>Regard: This will be considered as part of detailed design and will include</p>

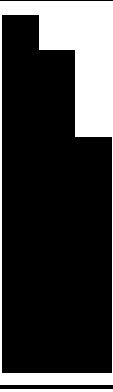
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Design Change Consultations - Summary of Responses

Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
		clients concerns that the road will arrest lateral ground drainage on the north side of the NDR.	other proposals (also made in previous consultation) - Land/Property Issues	discussions with land owners. Further Design Change: No
	NA	<ul style="list-style-type: none"> as access is to be reduced along Bullock Hill, the entrances should be closed off and fenced and have hedges planted to ensure security. It would be sensible to assess closing off the road to public vehicles to prevent misuse. 	Comments regarding other proposals (also made in previous consultation) - Suggested Change	Regard: Provision of gates at existing accesses will be considered as part of detailed design. Further Design Change: No
Ref: DC014  Mill Lane, Horsford Not specifically consulted on design change Provided comment	NA	Commented that it is not clear what matters will be dealt with through the formal examination and what is available to be discussed and agreed at an officer level beforehand. With this in mind it considers that the consultation has been unsatisfactory and further amendments are required as	Comments regarding other proposals – Consultations	Regard: The regard given by the applicant to the original statutory consultation with those with interest in land is contained in Appendix U of this report (see Ref IT021 of this Appendix). Further Design Change: No

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Design Change Consultations - Summary of Responses

Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
previously Ref: IT021		follows.		
	5/40	<ul style="list-style-type: none"> ensure the estate road access from a spur from the roundabout to New House Lane which will enable access for agricultural and other future access. The provision of one proper access is likely to be less onerous in land take terms than from a number of lesser tracks serving parcels individually. 	Comments regarding other proposals (also made in previous consultation) - Land/Property Issues	<p>Regard: One main access spur is proposed off the Cromer Road Roundabout North to New Home Lane.</p> <p>Further Design Change: No</p>
	5/40	<ul style="list-style-type: none"> ensure there is provision of a suitable boundary fence and the planting of a new hedge on the line of severance. 	Comments regarding other proposals - Land/Property Issues	<p>Regard: Boundary fencing and hedgerows will be considered as part of detailed design and will include discussions with land owners.</p> <p>Further Design Change: No</p>
	5/40	<ul style="list-style-type: none"> ensure access will be strictly controlled with fencing along the proposed access corridor and on the final line of acquisition with the planting of a new hedge. 	Comments regarding other proposals - Land/Property Issues	<p>Regard: Boundary fencing and hedgerows will be considered as part of detailed design and will include discussions with land owners.</p> <p>Further Design Change: No</p>
	5/40	<ul style="list-style-type: none"> the owners will continue to farm the land and there are concerns that access must be 	Comments regarding other	<p>Regard: The scheme contractors will control access to the site compound. Discussions with neighbouring</p>


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Design Change Consultations - Summary of Responses

Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
		available throughout the works.	proposals - Land/Property Issues	landowners over the precise details of this will occur prior to construction commencing. Further Design Change: No
	5/40	<ul style="list-style-type: none"> the owners have concerns about the main site compound being adjacent their land and there should be a method statement for the establishment and management of the works, materials, crushing and recycling plant and the plant yard which will have noise and dust implications. 	Comments regarding other proposals (also made in previous consultation) - Land/Property Issues	Regard: The scheme contractors will control the site compound. Discussions with neighbouring landowners over the precise operational details of this will occur prior to construction commencing. See Volume 2 Chapter 19 (Document Ref 6.2) for the Construction Environment Management Plan. Further Design Change: No
Ref: DC015  Honingham Lane, Ringland Not specifically consulted on design change Provided comment	NA	Commented that it is not clear what matters will be dealt with through the formal examination and what is available to be discussed and agreed at an officer level beforehand. With this in mind it considers that the consultation has been unsatisfactory and further amendments are required as follows.	Comments regarding other proposals – Consultations	Regard: The regard given by the applicant to the original statutory consultation with those with interest in land is contained in Appendix U of this report (see Ref IT029 of this Appendix). Further Design Change: No

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Design Change Consultations - Summary of Responses

Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
previously Ref: IT029	1/3	<ul style="list-style-type: none"> the two access points into the field on the north side of what will be the furthest extremity of the Norwich Distributor Road need to remain passable during and after construction. 	Comments regarding other proposals (also made in previous consultation) - Land/Property Issues	<p>Regard: Comment noted and it is agreed that access points will be maintained.</p> <p>Further Design Change: No</p>
	1/3	<ul style="list-style-type: none"> replace the current fence marking current boundary along side the road with an appropriate alternative and to fence the eastern boundary at the time of the realignment. 	Comments regarding other proposals (also made in previous consultation) - Land/Property Issues	<p>Regard: Boundary fencing and hedgerows will be considered as part of detailed design and will include discussions with land owners.</p> <p>Further Design Change: No</p>
	1/3	<ul style="list-style-type: none"> replace the current hedge alongside the road with an appropriate alternative at the time of the realignment. 	Comments regarding other proposals (also made in previous consultation) -	<p>Regard: Boundary fencing and hedgerows will be considered as part of detailed design and will include discussions with land owners.</p> <p>Design Change: No</p>

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
			Land/Property Issues	
	1/3	<ul style="list-style-type: none"> examine and agree whether the boundary on the eastern side of the land taken should also be planted with a hedge as a long term screen. 	Comments regarding other proposals (also made in previous consultation) - Land/Property Issues	<p>Regard: Boundary fencing and hedgerows will be considered as part of detailed design and will include discussions with land owners.</p> <p>Further Design Change: No</p>
<p>Ref: DC016  Dog Lane, Horsford Not specifically consulted on design change Provided comment previously Ref: IT027</p>	NA	Commented that it is not clear what matters will be dealt with through the formal examination and what is available to be discussed and agreed at an officer level beforehand. With this in mind it considers that the consultation has been unsatisfactory and further amendments are required as follows.	Comments regarding other proposals – Consultations	<p>Regard: The regard given by the applicant to the original statutory consultation with those with interest in land is contained in Appendix U of this report (see Ref IT027 of this Appendix).</p> <p>Further Design Change: No</p>
		The details to be left as proposed in the earlier discussions with applicant. Namely these include:		

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
	3/25	<ul style="list-style-type: none"> a full width over-bridge and vehicular access to Bell Farm and their client should retain ownership of the roadway. The boundary adjacent the west side of the track/drive should be relocated due to the increased land area required for a wider track. 	Comments regarding other proposals (also made in previous consultation) - Land/Property Issues	<p>Regard: A 4m wide hardened access with 2m verges will be provided from Reepham Road along the Horsford Restricted Byway No.5 and over the proposed Bell Farm Bridge. Boundary fencing and hedgerows will be considered as part of detailed design and will include discussions with land owners.</p> <p>Further Design Change: No</p>
	3/25	<ul style="list-style-type: none"> placement of the fences and hedges should be carefully considered to ensure sufficient provision of overhang to prevent disputes with other users in future on what may be a very busy access roadway. 	Comments regarding other proposals (also made in previous consultation) - Land/Property Issues	<p>Regard: Boundary fencing and hedgerows will be considered as part of detailed design and will include discussions with land owners.</p> <p>Further Design Change: No</p>
	3/25	<ul style="list-style-type: none"> the line of severance requires further discussion to address provision of boundary hedging and fencing to enable the grassland to continue to be used safely. 	Comments regarding other proposals (also made in previous consultation) - Land/Property Issues	<p>Regard: This will be considered as part of detailed design and will include discussions with land owners.</p> <p>Further Design Change: No</p>


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Design Change Consultations - Summary of Responses

Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
Ref: DC017 [REDACTED] Meadow Way, Reepham Not specifically consulted on design change Provided comment previously Ref: IT034	NA	Commented that it is not clear what matters will be dealt with through the formal examination and what is available to be discussed and agreed at an officer level beforehand. With this in mind it considers that the consultation has been unsatisfactory and further amendments are required as follows.	Issues Comments regarding other proposals – Consultations	Regard: The regard given by the applicant to the original statutory consultation with those with interest in land is contained in Appendix U of this report (see Ref IT034 of this Appendix). Further Design Change: No
	1/7 1/9	<ul style="list-style-type: none"> on the northern side, the landscaping should be reduced to a minimal amount and the drainage attenuation lagoon be realigned or removed to enable as much of the property to be retained. 	Comments regarding other proposals (also made in previous consultation) - Land/Property Issues	Regard: Following earlier discussion with the landowner the landscape area was reassessed and reduced in size as far as possible. The lagoons were designed to attenuate 1 in 100 year storm event as required by the Environment Agency. Further Design Change: No
	1/10	<ul style="list-style-type: none"> on the southern side, the drainage lagoon should be relocated onto the adjacent land to the east and with the current private means of access 	Comments regarding other proposals (also made in	Regard: Relocation of the Lagoon 1 was considered unfeasible due to topography of the site. Further Design Change: No

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 Design Change Consultations - Summary of Responses

Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
		retained from the main road.	previous consultation) - Land/Property Issues	
	1/10	<ul style="list-style-type: none"> access is required to the severed portion of land which should be enlarged with the reduction of the acquired area. The line of severance will need attention and temporary fencing with hedge planting provided on the line of acquisition. 	Comments regarding other proposals (also made in previous consultation) - Land/Property Issues	<p>Regard: Access to this land remains available to the land owner from the adjoining track.</p> <p>Further Design Change: No</p>
	1/7	<ul style="list-style-type: none"> the plans refer to a temporary topsoil storage area on the north side. There are concerns that although this land is no longer available for acquisition, it is suitable for this use and well located. As long as the conditions for works, reinstatement and compensation can be agreed in advance the owners will possibly accede to the request to use it for this purpose. 	Comments regarding other proposals (also made in previous consultation) - Land/Property Issues	<p>Regard: Temporary topsoil area is within the permanent acquisition area and will become landscaping. (See Volume 1 Appendix 7 (Document Ref 6.1) for the Construction Environment Management Plan). Matter to be addressed through compensation negotiations.</p> <p>Further Design Change: No</p>

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Design Change Consultations - Summary of Responses

Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
<p>Ref: DC018  Dog Lane, Horsford Not specifically consulted on design change Provided comment previously Ref: IT028</p>	NA	<p>Commented that it is not clear what matters will be dealt with through the formal examination and what is available to be discussed and agreed at an officer level beforehand. With this in mind it considers that the consultation has been unsatisfactory and further amendments are required as follows.</p>	<p>Comments regarding other proposals – Consultations</p>	<p>Regard: The regard given by the applicant to the original statutory consultation with those with interest in land is contained in Appendix U of this report (see Ref IT028 of this Appendix). Further Design Change: No</p>
	3/25	<ul style="list-style-type: none"> if the plan is to stop up the access, the applicant will have to acquire the access strip and replace it with a full vehicular right of way of the same width along the route chosen with an over bridge to enable access for all purposes including amongst other uses; car boot sales, the fishing club, stables and housing. 	<p>Comments regarding other proposals (also made in previous consultation) - Land/Property Issues</p>	<p>Regard: The applicant wished to retain the existing Horsford Restricted Byway No 5 along its current line and therefore provided the Bell Farm Overbridge. Maintaining the current private access track would have resulted in a further bridge being provided in very close proximity. Further Design Change: No</p>
	3/25	<ul style="list-style-type: none"> it is vital to ensure the width required, including any overhangs, and the grant of the rights of way are fully 	<p>Comments regarding other proposals</p>	<p>Regard: A 4m wide hardened access with 2m verges will be provided from Reepham Road along the Horsford Restricted Byway No.5 and over the</p>

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
		<p>considered. For this reason it is recommended that the applicant should consider an extra wide track and wide verges as anything not granted at acquisition will not be provided later.</p>	<p>(also made in previous consultation) - Land/ Property Issues</p>	<p>proposed Bell Farm Bridge. Further Design Change: No</p>
	NA	<ul style="list-style-type: none"> it is important to consider the current boundary as there has been dispute in the past. Once ownership is confirmed, if their client owns the area planted adjacent to the NDR it is requested that this be omitted from the scheme to leave the farm area as large as possible. Once boundaries have been established it is important that hedging and fencing are agreed on the line of severance for security and livestock safety. 	<p>Comments regarding other proposals (also made in previous consultation) - Land/Property Issues</p>	<p>Regard: Comments noted. Boundary fencing and hedgerows will be considered as part of detailed design and will include discussions with land owners. Further Design Change: No</p>
<p>Ref: DC019 [REDACTED] Consulted on Design</p>	NA	<p>Commented that it is not clear what matters will be dealt with through the formal examination and what is available to be discussed and agreed at an officer level beforehand. With this</p>	<p>Comments regarding other proposals – Consultations</p>	<p>Regard: The regard given by the applicant to the original statutory consultation with those with interest in land is contained in Appendix U of this report (see Ref IT022 of this Appendix).</p>

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
Change Ref 7.1, 8.2 and 8.3 Provided comment previously Ref: IT022		in mind it considers that the consultation has been unsatisfactory and further amendments are required as follows.		Further Design Change: No
	3/8	<ul style="list-style-type: none"> the line of acquisition needs to be protected by fencing and hedge planting. 	Comments regarding other proposals (also made in previous consultation) - Land/Property Issues	<p>Regard: Boundary fencing and hedgerows will be considered as part of detailed design and will include discussions with land owners.</p> <p>Further Design Change: No</p>
	3/8	<ul style="list-style-type: none"> the suggestion that the bridleway, the private means of access and Drayton Restricted Byway No. 6 should be on the retained land is questioned as the current layout also leaves an area severed which is quite useless and which will over time cause problems from misuse and untidiness. the design in this area appears 	Comments regarding other proposals (also made in previous consultation) - Land/Property Issues	<p>Regard: This area is now included within the area of acquisition.</p> <p>Further Design Change: No</p>
	3/8		Comments	Regard: The proposed design is

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
		<p>very cumbersome with access from the roundabout combined with the restricted byway separate from the bridleway. The access from the roundabout is likely to be necessary but meetings are suggested to assess whether the various paths can be combined and the boundary realigned to ensure security for future livestock.</p>	<p>regarding other proposals (also made in previous consultation) - Land/Property Issues</p>	<p>considered appropriate for all affected parties. Further Design Change: No</p>
<p>Ref: DC020 [REDACTED] Staitheaway Road, Wroxham Consulted on Design Change Ref 9.1 and 9.2 Provided comment previously Ref: IT023</p>	<p>NA</p>	<p>Commented that it is not clear what matters will be dealt with through the formal examination and what is available to be discussed and agreed at an officer level beforehand. With this in mind it considers that the consultation has been unsatisfactory and further amendments are required as follows.</p>	<p>Comments regarding other proposals – Consultations</p>	<p>Regard: The regard given by the applicant to the original statutory consultation with those with interest in land is contained in Appendix U of this report (see Ref IT023 of this Appendix). Further Design Change: No</p>
	<p>9/6</p>	<ul style="list-style-type: none"> on the line of severance from the eventual retained land, construct and maintain a fence whilst establishing a hedge and 	<p>Comments regarding other proposals</p>	<p>Regard: Boundary fencing and hedgerows will be considered as part of detailed design and will include</p>

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
		further embanked planting.	(also made in previous consultation) - Land/Property Issues	discussions with land owners. Further Design Change: No
	NA	<ul style="list-style-type: none"> be aware of a right of access from Lady's Carr to Beeston Lane and allow time for discussions (post advice from solicitors) on how to deal with this. 	Comments regarding other proposals (also made in previous consultation) - Land/Property Issues	<p>Regard: The applicant is aware of the right.</p> <p>Further Design Change: No</p>
	9/4	<ul style="list-style-type: none"> plant trees on the temporary topsoil storage area after reinstatement to protect Lady's Carr fishing lakes from the noise interference rather than scrub/grassland creation which is unlikely to be managed in the long term. 	Comments regarding other proposals (also made in previous consultation) - Landscaping/Planting Issues	<p>Regard: Additional landscaping and woodland creation added to area of top soiling.</p> <p>Further Design Change: Yes – Design Change Ref: 9.11 in Appendix V of this report.</p>
Ref: DC021 [REDACTED]	NA	Commented that it is not clear what matters will be dealt with	Comments regarding	Regard: The regard given by the applicant to the original statutory

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
<p>██████████, Holt Road, Horsford Consulted on Design Change Ref 4.4 and 4.5 Provided comment previously Ref: IT026</p>		<p>through the formal examination and what is available to be discussed and agreed at an officer level beforehand. With this in mind it considers that the consultation has been unsatisfactory and further amendments are required as follows.</p>	<p>other proposals – Consultations</p>	<p>consultation with those with interest in land is contained in Appendix U of this report (see Ref IT026 of this Appendix). Design Change: No</p>
	<p>NA</p>	<ul style="list-style-type: none"> the boundaries will need to be assessed whether on the line of severance or due to the changes in the way the lesser routes will be used, to prevent a recurrence of problems with tipping and travellers taking up residence. 	<p>Comments regarding other proposals - Landscaping/ Planting Issues</p>	<p>Regard: Boundary fencing and hedgerows will be considered as part of detailed design and will include discussions with land owners. Further Design Change: No</p>
	<p>4/21</p>	<ul style="list-style-type: none"> the boundary with the improved Holt Road/Drayton Lane link should be hedged to provide security. 	<p>Comments regarding other proposals (also made in previous consultation) - Land/Property Issues</p>	<p>Regard: Boundary fencing and hedgerows will be considered as part of detailed design and will include discussions with land owners. Further Design Change: No</p>

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
	NA	<ul style="list-style-type: none"> boundary openings on Reepham Road, Hall Lane and Holt Road need to be assessed to agree those openings no longer required are closed off with fences and hedges. 	Comments regarding other proposals (also made in previous consultation) - Land/Property Issues	<p>Regard: This will be considered as part of detailed design and will include discussions with land owners.</p> <p>Further Design Change: No</p>
	4/23 4/37 4/38 5/1	<ul style="list-style-type: none"> the boundary of the road through the farm be secured by temporary fencing whilst new hedging is established on the line of severance on both sides of the road. 	Comments regarding other proposals (also made in previous consultation) - Land/Property Issues	<p>Regard: Boundary fencing and hedgerows will be considered as part of detailed design and will include discussions with land owners.</p> <p>Further Design Change: No</p>
	4/23	<ul style="list-style-type: none"> access should remain available to the farm during the scheme works. 	Comments regarding other proposals (also made in previous consultation) - Land/Property Issues	<p>Regard: The scheme contractors will discuss access requirements to all parts of the farm prior to construction commencing.</p> <p>Further Design Change: No</p>

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
	NA	<ul style="list-style-type: none"> permanent points of access, whether existing or new, be set back and gated for security. 	<p>Issues</p> <p>Comments regarding other proposals (also made in previous consultation) - Land/Property Issues</p>	<p>Regard: Provision of gates at existing accesses will be considered as part of detailed design.</p> <p>Further Design Change: No</p>
	5/1	<ul style="list-style-type: none"> the hammerhead at the southern end of the Holt Road should be fenced and hedged for security. 	<p>Comments regarding other proposals (also made in previous consultation) - Land/Property Issues</p>	<p>Regard: Boundary fencing and hedgerows will be considered as part of detailed design and will include discussions with land owners.</p> <p>Further Design Change: No</p>
	NA	<ul style="list-style-type: none"> the extent to which Holt Road can be used for traffic assessed and to consider carefully how to redesign the scheme to restrict against unlawful uses. 	<p>Comments regarding other proposals (also made in previous consultation) -</p>	<p>Regard: Although not connecting to the Cromer Road Junction, Holt Road would still remain public highway and access still required to adjacent land. Therefore, the applicant does not consider any closure appropriate.</p>


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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
			On-Line Proposals	Further Design Change: No
	4/23 4/37 4/38 5/1	<ul style="list-style-type: none"> the bank height along the full length of road should be maintained to as great a height as possible to protect all the properties on the north side of the road including in the village. 	Comments regarding other proposals (also made in previous consultation) - Landscaping/ Planting Issues	<p>Regard: Assessment of the proposed landscape treatments and of noise is contained in Volume 1 Chapter 7 and Volume 1 Chapter 11 of the Environmental Statement (Document Ref 6.1).</p> <p>Further Design Change: No</p>
	NA	<ul style="list-style-type: none"> the embanked area north west of the Holt Road Roundabout should be raised to as great a height as possible to reduce the impact from the roundabout in noise and visual terms. To maximise the benefit, the landscaped banks and the roundabout bank should be planted for long term visual and noise protection as specified in the revisions but absent from the plan. 	Comments regarding other proposals (also made in previous consultation) - Landscaping/ Planting Issues	<p>Regard: Assessment of the proposed landscape treatments and of noise is contained in Volume 1 Chapter 7 and Volume 1 Chapter 11 of the Environmental Statement (Document Ref 6.1).</p> <p>Further Design Change: No</p>
	NA	<ul style="list-style-type: none"> the carriageway surface should 	Comments	Regard: Exact specification of

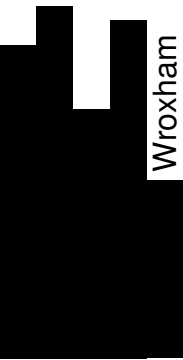
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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
		be to a quiet specification.	regarding other proposals (also made in previous consultation) - Emission/Noise Issues	carriageway surfacing will be determined at the detailed design stage although a low noise surface is proposed. Further Design Change: No
	4/23 4/37 4/38 5/1	Commented that the occupiers have represented against a roundabout on the link road to Horsford, preferring a bridge. Operators will have to leave the farmyard and travel up to 2,500 metres by road (rather than 500m) to the centre of the farm. Therefore, it is imperative that the internal roadways are planned to minimise travel times. In particular:	Comments regarding other proposals (also made in previous consultation) - Land/Property Issues	Regard: This will be considered as part of detailed design and will include discussions with land owners. Further Design Change: No
	4/23 4/37 4/38 5/1	<ul style="list-style-type: none"> access gates should be provided from Reepham Road and Hall Lane, and internal roads provided to link these access points with the various enclosures. 	Comments regarding other proposals (also made in previous consultation) -	Regard: Provision of gates at existing accesses will be considered as part of detailed design. Further Design Change: No

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
			Land/Property Issues	
	NA	<ul style="list-style-type: none"> the road scheme has an adverse impact on the present irrigation scheme and it is necessary to finalise agreement for the relocation of mains and hydrants, for which prices have already been obtained. 	Comments regarding other proposals (also made in previous consultation) - Land/Property Issues	<p>Regard: It is accepted that the present irrigation system will require alteration. Consideration of the requirements is ongoing but it is intended that the landowner will organise the finally agreed works with their current drainage contractors with the costs reimbursed by the applicant.</p> <p>Further Design Change: No</p>
<p>Ref: DC022</p> <p></p> <p>Consulted on Design Change Ref 3.3</p>	NA	<p>Commented that it is not clear what matters will be dealt with through the formal examination and what is available to be discussed and agreed at an officer level beforehand. With this in mind it considers that the consultation has been unsatisfactory and further amendments are required as follows.</p> <ul style="list-style-type: none"> the addition of boundary treatment to ensure against increased access, including the recommendation that planting is 	Comments regarding other proposals – Consultations	<p>Regard: The regard given by the applicant to the original statutory consultation with those with interest in land is contained in Appendix U of this report.</p> <p>Further Design Change: No</p>
	3/16 3/18	<ul style="list-style-type: none"> the addition of boundary treatment to ensure against increased access, including the recommendation that planting is 	Comments regarding other proposals -	<p>Regard: Boundary fencing and hedgerows will be considered as part of detailed design and will include</p>

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
		<p>considered alongside the road to enable a sustainable long term barrier.</p> <ul style="list-style-type: none"> management prescriptions for the woodland edge be addressed as carving a slice through plantation woodland might well lead to severe wind-blow. 	Land/Property Issues	<p>discussions with land owners. Further Design Change: No</p>
	3/16 3/18		Comments regarding other proposals – Landscaping/Planting Issues	<p>Regard: This will be considered as part of detailed design and will include discussions with land owners. Further Design Change: No</p>
<p>Ref: DC023  Wroxham Consulted on Design Change Ref 9.1 and 9.2 Provided comment previously Ref: IT030</p>	NA	<p>Commented that it is not clear what matters will be dealt with through the formal examination and what is available to be discussed and agreed at an officer level beforehand. With this in mind it considers that the consultation has been unsatisfactory and further amendments are required as follows.</p>	Comments regarding other proposals – Consultations	<p>Regard: The regard given by the applicant to the original statutory consultation with those with interest in land is contained in Appendix U of this report (see Ref IT030 of this Appendix). Further Design Change: No</p>
	9/10	<p>Commented that the impact of the road and the use of the land for the scheme will be significant and are causing serious concerns. Whilst efforts</p>	Comments regarding other proposals (also made in	<p>Regard: Assessment of the proposed landscape treatments and of noise is contained in Volume 1 Chapter 7 and Volume 1 Chapter 11 of the Environmental Statement (Document Ref</p>

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
		are being made to allay some of the concerns over the impact on The Springs woodland and fishing lakes, not enough is being done to protect from noise and increased local traffic.	previous consultation) - Emission/Noise Issues	6.1). Additional woodland creation has been provided to bunding south of The Springs. Design Change: Yes – see Design Change Ref 9.2 in Appendix V of this report.
		Requested that the following should be considered/agreed or incorporated into the design changes:		
	9/6	<ul style="list-style-type: none"> set back the gated access along the concrete roadway to The Springs. 	Comments regarding other proposals (also made in previous consultation) - Land/Property Issues	Regard: Provision of gates at existing accesses will be considered as part of detailed design. Further Design Change: No
	9/10	<ul style="list-style-type: none"> maintain the private means of access to the silt trap in The Springs but ensure this access is gated and ensure the boundary is fenced and hedged for future security. 	Comments regarding other proposals (also made in previous consultation) -	Regard: Provision of gates at existing accesses will be considered as part of detailed design. Boundary fencing and hedgerows will be considered as part of detailed design and will include discussions with land owners.

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
			Land/Property Issues	Further Design Change: No
	9/10	<ul style="list-style-type: none"> maintain strict pollution and drainage control measures. 	Comments regarding other proposals (also made in previous consultation) - Land/Property Issues	<p>Regard: The NDR drainage was designed in accordance with SUDS techniques to ensure that the water quality is appropriately managed. (See Volume 1 Chapter 14 of the Environmental Assessment (Document Ref 6.1)).</p> <p>Further Design Change: No</p>
	NA	<ul style="list-style-type: none"> ensure that a quiet road surface is used to protect The Springs and the remainder of the estate. 	Comments regarding other proposals (also made in previous consultation) - Emission/Noise Issues	<p>Regard: Exact specification of carriageway surfacing will be determined at the detailed design stage although a low noise surface is proposed.</p> <p>Further Design Change: No</p>
		Commented that discussions are needed to assess the most efficient ways to deal with the following concerns:		
	9/10	<ul style="list-style-type: none"> assessment of the ground 	Comments regarding	Regard: Assessments of Noise and Air Quality are contained in Volume 1

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
		levels/contours and the existing noise contours.	other proposals (also made in previous consultation) - Emission/Noise Issues	Chapter 11 of the Environmental Statement (Document Ref 6.1). Further Design Change: No
	9/10	<ul style="list-style-type: none"> clarification of the expected noise profile at the date of build plus 5, 10 and 20 years to assess the best way to minimise the impact on the remainder estate land and property. 	Comments regarding other proposals (also made in previous consultation) - Emission/Noise Issues	Regard: Assessments of Noise and Air Quality are contained in Volume 1 Chapter 11 of the Environmental Statement (Document Ref 6.1). Further Design Change: No
	9/10	<ul style="list-style-type: none"> the reduction in property value should be mitigated with onsite planting and onsite along the edge of roadway/NDR with planting and more bunding. 	Landscaping/ Comments regarding other proposals (also made in previous consultation) - Planting Issues	Regard: Assessment of the proposed landscape treatments and of noise is contained in Volume 1 Chapter 7 and Volume 1 Chapter 11 of the Environmental Statement (Document Ref 6.1). Further Design Change: No

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Design Change Consultations - Summary of Responses

Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
	NA	<p>Commented in relation to the North Walsham Road/Crostwick Lane junction proposals, and in particular the closure of Rackheath Lane, that:</p> <ul style="list-style-type: none"> it will mean a round trip for the occupiers of the houses of several miles each way as the estate farms to the east and west and north and south of this junction. 		
	NA	<ul style="list-style-type: none"> farming of the estate on either side of the North Walsham Road carried out in large part through this junction is likely to become untenable due to increased journey times and poor access to the severed holding. 	<p>Comments regarding other proposals (also made in previous consultation) – Off-Line Proposals</p>	<p>Regard: Whilst the comments are noted, the reasons for the closure are primarily to improve highway safety at the junction. Closure of Rackheath Lane will simplify turning movements allowing drivers waiting at the Crostwick Lane arm to concentrate on the vehicle movements on the main road.</p> <p>Further Design Change: No</p>
			<p>Comments regarding other proposals (also made in previous consultation) – Off-Line Proposals</p>	<p>Regard: Matter to be addressed through compensation negotiations.</p> <p>Further Design Change: No</p>
	NA	<ul style="list-style-type: none"> it will encourage a rat-run through Dow Lane with safety 	<p>Comments regarding other</p>	<p>Regard: With the NDR providing an appropriate alternative route it is not considered that Dow Lane would be</p>

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		and road vehicle capacity issues across all of the Beeston, Wroxham and Heggatt Estates.	proposals (also made in previous consultation) – Off-Line Proposals	utilised by significant through traffic. However, this situation would be monitored. Further Design Change: No
	NA	<ul style="list-style-type: none"> given the need for access across this junction and the preference to keep large agricultural vehicles off the NDR, this junction needs to be kept open – whether to all or if necessary, it must be realigned as a private access. 	Comments regarding other proposals (also made in previous consultation) – Off-Line Proposals	Regard: Reasons for closure of Rackheath Lane at its junction with North Walsham Road are detailed above. Keeping junction arm open for private access would be difficult to enforce and would not simplify the physical layout of it. Further Design Change: No
	NA	<ul style="list-style-type: none"> if it is closed, it would be sensible to close it to the east of the cottages with access for the farm. 	Comments regarding other proposals (also made in previous consultation) – Off-Line Proposals	Regard: Reasons for closure of Rackheath Lane at its junction with North Walsham Road are detailed above. Closure of Rackheath Lane further east could be an alternative option for reducing through movements at the junction although it would not simplify the physical layout of it. Further Design Change: No
	NA	<ul style="list-style-type: none"> the largely unused resulting lane needs to be managed more 	Comments regarding	Regard: This will be considered as part of detailed design and will include

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
		effectively than tends to happen on similar roads.	other proposals (also made in previous consultation) – Off-Line Proposals	discussions with land owners. Further Design Change: No
	NA	Suggested that the proposals need to be reconsidered and rejected as it will have a significant detrimental impact upon the business of [REDACTED] and others.	Comments regarding other proposals (also made in previous consultation) – Off-Line Proposals	Regard: Reasons for proposals at this junction are described above. Further Design Change: No
Ref: DC024 [REDACTED] Consulted on Design Change Ref 7.1, 8.2 and 8.3 Provided comment previously Ref: IT052	NA	Commented that it is not clear what matters will be dealt with through the formal examination and what is available to be discussed and agreed at an officer level beforehand. With this in mind it considers that the consultation has been unsatisfactory and further amendments are required as	Comments regarding other proposals – Consultations	Regard: The regard given by the applicant to the original statutory consultation with those with interest in land is contained in Appendix U of this report (see Ref IT052 of this Appendix). Further Design Change: No

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
		follows.		
		Commented that the impact on the estate cannot be underestimated. After construction of the road, the estate will be diminished into four lesser areas of land causing a loss of integrity, amenity, value and enjoyment. As a result it requested the following:		
	7/30 7/31	<ul style="list-style-type: none"> gate and set back the access shared with attenuation Lagoon 14. 	Comments regarding other proposals (also made in previous consultation) – Land/Property Issues	<p>Regard: Provision of gates at existing accesses will be considered as part of detailed design.</p> <p>Further Design Change: No</p>
	7/30 7/31 8/1 8/10	<ul style="list-style-type: none"> hedge and fence the line of severance on the new Buxton Road alignment, the drainage lagoon and the line of severance along the whole length on the north and south side. 	Comments regarding other proposals (also made in previous consultation) –	<p>Regard: Boundary fencing and hedgerows will be considered as part of detailed design and will include discussions with land owners.</p> <p>Further Design Change: No</p>

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
			Land/Property Issues	
	7/32	<ul style="list-style-type: none"> • set back and gate the shared field access with the drainage attenuation Lagoon 14A. 	Comments regarding other proposals (also made in previous consultation) – Land/Property Issues	<p>Regard: Provision of gates at existing accesses will be considered as part of detailed design.</p> <p>Further Design Change: No</p>
	7/32	<ul style="list-style-type: none"> • hedge and fence the attenuation lagoon and realign Lagoon 14A to utilise the space adjacent to the NDR to optimise retained land. Questioned whether it is necessary to use such a large area for Lagoons 14 and 14A. 	Comments regarding other proposals (also made in previous consultation) – Land/Property Issues	<p>Regard: Boundary fencing and hedgerows will be considered as part of detailed design and will include discussions with land owners. Lagoon 14A is positioned along the existing woodland and moving it closer to the NDR would require removal of the woodland.</p> <p>Further Design Change: No</p>
	7/31	<ul style="list-style-type: none"> • secure the boundary with the bridleway with a hedge and using a temporary fence if necessary to ensure establishment. 	Comments regarding other proposals (also made in previous	<p>Regard: Boundary fencing and hedgerows will be considered as part of detailed design and will include discussions with land owners.</p> <p>Further Design Change: No</p>

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
			consultation) – Land/Property Issues	
	7/33	<ul style="list-style-type: none"> agree terms for the bridge compound and for the temporary storage area, including the method statement and reinstatement terms for this and other land expected to be handed back. 	Comments regarding other proposals (also made in previous consultation) – Land/Property Issues	<p>Regard: This will be considered as part of detailed design and will include discussions with land owners. See Volume 2 Chapter 19 (Document Ref 6.2) for the Construction Environment Management Plan.</p> <p>Further Design Change: No</p>
	7/31 8/1	<ul style="list-style-type: none"> reduce as far as possible the land taken for the landscaping area on north side of road which has a negative impact on the farm. If this is required, it could be better located on the south side. 	Comments regarding other proposals (also made in previous consultation) – Landscaping/Planting Issues	<p>Regard: Land is required for landscaping purposes. Matter to be addressed through compensation negotiations.</p> <p>Further Design Change: No</p>
	8/1	<ul style="list-style-type: none"> provide further banking and landscaping to the south of the NDR near Red Hall to protect the various properties in this 	Comments regarding other proposals (a	<p>Regard: Assessment of the proposed landscape treatments and of noise is contained in Volume 1 Chapter 7 and Volume 1 Chapter 11 of the</p>

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
		location and the equestrian yard from noise.	also made in previous consultation) – Planting Issues	Environmental Statement (Document Ref 6.1). Further Design Change: No
	8/1	<ul style="list-style-type: none"> agree terms for use and reinstatement with a method statement of the site compound on the north side of the NDR. Commented that discussions are required to clarify the proposals for future ownership of this land and the landscaping land expected to be handed back. 	Comments regarding other proposals (also made in previous consultation) – Land/Property Issues	Regard: The scheme contractors will control the site compound. Discussions with neighbouring landowners over the precise operational details of this will occur prior to construction commencing. See Volume 2 Chapter 19 (Document Ref 6.2) for the Construction Environment Management Plan. Further Design Change: No
	8/10	<ul style="list-style-type: none"> set back and gate access from the North Walsham Road and hedge the line of severance. Do not fence on north of private means of access shared with Lagoon 16 and 17. 	Comments regarding other proposals (also made in previous consultation) – Land/Property Issues	Regard: Boundary fencing and hedgerows will be considered as part of detailed design and will include discussions with land owners. Further Design Change: No
	NA	<ul style="list-style-type: none"> construct further banks with landscaping to protect property 	Comments regarding	Regard: Assessment of the proposed landscape treatments and of noise is

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
		to the north and the adjoining estate depending upon the outcome of promised deliberations about noise studies in the area.	other proposals (also made in previous consultation) – Land/Property Issues	contained in Volume 1 Chapter 7 and Volume 1 Chapter 11 of the Environmental Statement (Document Ref 6.1). Further Design Change: No
	8/12 8/13	<ul style="list-style-type: none"> hedge and fence Lagoon 16 and 17 for security. 	Comments regarding other proposals (also made in previous consultation) – Land/Property Issues	Regard: Boundary fencing and hedgerows will be considered as part of detailed design and will include discussions with land owners. Further Design Change: No
	NA	<ul style="list-style-type: none"> construct a new concrete pad in a location to be approved on the north side of the works as the current pad will be severed from the main block of arable land and because the owners requests for a crossing have been refused. 	Comments regarding other proposals (also made in previous consultation) – Land/Property Issues	Regard: This will be considered as part of detailed design and will include discussions with land owners. Further Design Change: No
	NA	<ul style="list-style-type: none"> relocate the underground 	Comments	Regard: This will be considered as part

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
		<p>irrigation mains, which has been agreed but has not been confirmed. Commented that that the works need to be undertaken before the construction works as it will avoid the problem of working under the finished scheme and not being able to use the irrigation during the period of works.</p>	<p>regarding other proposals (also made in previous consultation) – Land/Property Issues</p>	<p>of detailed design and will include discussions with land owners. Further Design Change: No</p>
	8/10	<ul style="list-style-type: none"> fence temporarily, to assist the establishment of new hedge, planting on the line of severance south of the NDR to prevent access from the bridle path. 	<p>Comments regarding other proposals (also made in previous consultation) – Land/Property Issues</p>	<p>Regard: Boundary fencing and hedgerows will be considered as part of detailed design and will include discussions with land owners. Further Design Change: No</p>
	NA	<ul style="list-style-type: none"> consider carefully the off-site bridleway which will pass along Beeston Lane as the crossing on the North Walsham Road near Red Hall is very dangerous and it would be better to realign 	<p>Comments regarding other proposals (also made in previous consultation) –</p>	<p>Regard: The registered planning application for development at North Sprowston and Old Catton by Beyond Green Developments Ltd includes proposals to re-align this junction. Further Design Change: No</p>

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
		the access for improved safety.	Specific Road Effects	
	8/10	<ul style="list-style-type: none"> maintain the landscaping works on the south side to protect Beeston Hall as landscaped from North Walsham Road through to the concrete road. 	Comments regarding other proposals (also made in previous consultation) – Landscaping/Planting Issues	<p>Regard: Assessment of the proposed landscape treatments and of noise is contained in Volume 1 Chapter 7 and Volume 1 Chapter 11 of the Environmental Statement (Document Ref 6.1).</p> <p>Further Design Change: No</p>
	NA	<ul style="list-style-type: none"> agree the presumptions for future management and the most appropriate boundary line and treatment for the banks. Questioned why the area shown has been planted. 	Comments regarding other proposals (also made in previous consultation) – Land/Property Issues	<p>Regard: Boundary fencing and hedgerows will be considered as part of detailed design and will include discussions with land owners.</p> <p>Further Design Change: No</p>
	NA	<ul style="list-style-type: none"> maintain accesses during and after the scheme for the estate, farm and the Farm Shop and Garden Centre. 	Comments regarding other proposals (also made in	<p>Regard: This will be considered as part of detailed design and will include discussions with land owners. See Volume 2 Chapter 19 (Document Ref 6.2) for the Construction Environment</p>

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
			previous consultation) – Land/Property Issues	Management Plan. Further Design Change: No
	8/1	<ul style="list-style-type: none"> provide a set-back gated access from North Walsham Road to the landscaped area west of road and to the north of NDR. 	Comments regarding other proposals (also made in previous consultation) – Land/Property Issues	<p>Regard: Provision of gates at existing accesses will be considered as part of detailed design.</p> <p>Further Design Change: No</p>
	NA	<ul style="list-style-type: none"> ensure drainage from the road is traced, planned and managed to prevent pollution in lakes. 	Comments regarding other proposals (also made in previous consultation) – Land/Property Issues	<p>Regard: The NDR drainage was designed in accordance with SUDS techniques to ensure that the water quality is appropriately managed. (See Volume 1 Chapter 14 of the Environmental Assessment (Document Ref 6.1)).</p> <p>Further Design Change: No</p>
	NA	<ul style="list-style-type: none"> ensure current and predicted noise is considered fully and openly to assist the parties to finalise landscaping proposals. 	Comments regarding other proposals	<p>Regard: Assessments of Noise and Air Quality are contained in Volume 1 Chapter 4 and 11 of the Environmental Statement (Document Ref 6.1).</p>

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
			(also made in previous consultation) – Emission/Noise Issues	Further Design Change: No
	NA	<ul style="list-style-type: none"> ensure use of a quiet road surface to limit the loss of value as far as possible. 	Comments regarding other proposals (also made in previous consultation) – Emission/Noise Issues	<p>Regard: Exact specification of carriageway surfacing will be determined at the detailed design stage although a low noise surface is proposed.</p> <p>Further Design Change: No</p>
Ref: DC025 [Redacted] Green Lane West, Rackheath Consulted on Design Change Ref 9.12	9/42	Commented on opposition to the Green Lane West/Wroxham Road junction improvements and the construction of a new road linking to Wroxham Road further south-west.	Comments regarding other proposals – Off-Line Proposals	<p>Regard: Comments noted.</p> <p>Further Design Change: No</p>
	NA	Commented that this is green belt land and it should not have any construction or redevelopment on it under the Green Belt	Comments regarding other proposals –	<p>Regard: The land here is not identified as Green Belt land.</p> <p>Further Design Change: No</p>

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
		<p>Regulations.</p> <p>Commented that the proposals replace a perfectly good road and there are other viable options which would have less impact on homeowners around this proposed development.</p>	<p>Other Issues</p> <p>Comments regarding other proposals – Off-Line Proposals</p>	<p>Regard: The proposed changes to this junction were considered following comments from the previous April/May/June 2012 consultations, which identified the existing junction as an issue. By diverting Green Lane West further south west it joins Wroxham Road at a location where visibility is improved.</p> <p>Further Design Change: No</p>
	NA	<p>Requested information why alternative options have not been considered, namely:</p> <ul style="list-style-type: none"> • opening the junction and installing a traffic light system to control the traffic flow and speed. • install a road from Muck Lane junction and taking the road into the north end of the Industrial Estate thus taking away heavy volumes of traffic from Green Lane West which are bound for the industrial estate. 	<p>Comments regarding other proposals – Off-Line Proposals</p>	<p>Regard: See comments above, the proposals were developed as the most appropriate option to address visibility issues at the existing junction.</p> <p>Further Design Change: No</p>

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
	NA	Suggested that as the junction is only moving meters from the present one this will only create another accident hot spot. The site being proposed has a blind curving bend which will result in higher speed accidents and not the reduction that is being looked for.	Comments regarding other proposals – Off-Line Proposals	<p>Regard: The junction would be moved to a location where visibility from the side road would be improved. The proposals have been subject to a Stage 1 Safety Audit.</p> <p>Further Design Change: No</p>
	NA	Commented that the reason for purchasing the property was for its south facing aspect with views of open countryside and the house has been designed around this feature. In addition the field provided privacy, fresh air and peace/quiet. The proposed road will have a detrimental impact on these issues and on the quality of life.	Comments regarding other proposals – Off-Line Proposals	<p>Regard: Assessments of Noise and Air Quality are contained in Volume 1 Chapter 4 and 11 of the Environmental Statement (Document Ref 6.1).</p> <p>Further Design Change: No</p>
	NA	Commented that the proposed road is doing little more than putting the property on an island surrounded by roads. The constant north to north westerly wind is only going to carry noise to the property.	Comments regarding other proposals – Off-Line Proposals	<p>Regard: Assessments of Noise and Air Quality are contained in Volume 1 Chapter 4 and 11 of the Environmental Statement (Document Ref 6.1).</p> <p>Further Design Change: No</p>

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
	NA	<p>Commented that the constant stream of traffic and queues at the junction will cause an unacceptable rise in pollution and with the north to north westerly wind it can only result in the families health being put at risk. Commented that there is no way to guarantee well being in this matter or estimating the density of the pollution.</p>	<p>Comments regarding other proposals – Off-Line Proposals</p>	<p>Regard: Assessments of Noise and Air Quality are contained in Volume 1 Chapter 4 and 11 of the Environmental Statement (Document Ref 6.1). Further Design Change: No</p>
	NA	<p>Noted that the property is no longer as shown on the drawings received as it has been extended. If a vehicle was to leave the road to the north of the junction there would be a very high possibility it would arrive in the property grounds or even impale itself into the end of the house which happens to be a bedroom.</p>	<p>Comments regarding other proposals – Off-Line Proposals</p>	<p>Regard: Drawings were based the latest mapping information available to the applicant at the time of production. Further Design Change: No</p>
	NA	<p>Commented that the proposal will have a major impact on the environment of the farmland itself. The location chosen is a natural soak away for the more elevated land around the area. It also has</p>	<p>Comments regarding other proposals – Off Line</p>	<p>Regard: The loss of productive agricultural land and commitments regarding the minimisation of impacts to soils are detailed in Volume 1 Chapter 13 and Volume 1 Chapter 9 of the Environmental Statement (Document Ref</p>


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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
		an abundance of wildlife which will be disturbed and may never return.	Proposals	6.1) Assessments of Noise and Air Quality are contained in Volume 1 Chapter 4 and 11 of the Environmental Statement (Document Ref 6.1 and 6.2). Further Design Change: No
	NA	Considered that no consideration has been given to the proposal but has been chosen as the cheapest option to access the Industrial Estate from the Northern Distributor Road.	Comments regarding other proposals – Off Line Proposals	Regard: See comments above, the proposals were developed as the most appropriate option to address visibility issues at the existing junction. Further Design Change: No
	NA	Commented that the proposals will leave the property massively devalued, unappealing to live in and unsellable in the future.	Comments regarding other proposals – Land/Property Issues	Regard: Proposed lagoons are in optimal location. Matter of farm viability to be addressed through compensation negotiations. Further Design Change: No
	NA	Commented that the consultation document was dated the 16 October yet it was received on the 8 November, giving less than 7 days to respond. Therefore a meeting within the next 48 hours was requested.	Comments regarding other proposals – Consultations	Regard: The applicant's records show that the comments were delivered on 17 October 2013. A site meeting was held on 15 November 2013. Further Design Change: No
Ref: DC026	NA	Expressed concern regarding the		

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
██████████ Rackheath Consulted on Design Change Ref 9.12		proposed Wroxham Road/Green Lane West Junction and in particular:		
	NA	<ul style="list-style-type: none"> the issue with the existing junction is one of excess speed combined with poor visibility. Not just poor visibility. 	Comments regarding other proposals – Off Line Proposals	<p>Regard: A recent vehicle speed survey on Wroxham Road near this junction identified the 85%ile speed of vehicles as 52.0mph in a north bound direction and 48.3mph in a southbound direction, which indicates good compliance to the 50mph speed limit here.</p> <p>Further Design Change: No</p>
	NA	<ul style="list-style-type: none"> a mini roundabout at the existing junction would slow down the traffic making visibility not an issue. 	Comments regarding other proposals – Suggested Change	<p>Regard: The Design Manual for Roads and Bridges states that mini roundabouts should only be used on roads with a speed limit of 30mph or less, and therefore a mini roundabout is not considered appropriate.</p> <p>Further Design Change: No</p>
	NA	<ul style="list-style-type: none"> the proposal would have the effect of improving visibility but speeding up that traffic because the addition of a right turn traffic 	Comments regarding other proposals –	<p>Regard: Scheme has been subject to a Stage 1 Safety Audit. Road has a 50mph speed limit which has a good level of compliance (see above response).</p>

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
		lane ensures the traffic can speed through the junction.	Off Line Proposals	Further Design Change: No
	NA	<ul style="list-style-type: none"> the proposed scheme would ensure a stream of invisible (until too late) moving traffic when exiting the property. This would create an extremely dangerous situation as the unhindered traffic flow from the north would not be visible due to the hill and the unhindered traffic flow from the south would not be visible due to the bend. 	Comments regarding other proposals – Off Line Proposals	<p>Regard: Scheme has been subject to a Stage 1 Safety Audit.</p> <p>Further Design Change: No</p>
<p>Ref: DC027</p> <p></p> <p>Consulted on Design Change Ref 4.3,4.4 and 4.5</p> <p>Provided comment previously Ref: IT033</p>	NA	Commented that it is not clear what matters will be dealt with through the formal examination and what is available to be discussed and agreed at an officer level beforehand. With this in mind it considers that the consultation has been unsatisfactory and further amendments are required as follows.	Comments regarding other proposals – Consultations	<p>Regard: The regard given by the applicant to the original statutory consultation with those with interest in land is contained in Appendix U of this report (see Ref IT023 of this Appendix).</p> <p>Further Design Change: No</p>
		Commented that the property has very recently changed hands and	Comments regarding	Regard: Comments noted.

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
		<p>as part of the NSIP protocols significant consultation needs to be undertaken. Unfortunately the new owner has not had sufficient time to respond, so it writes in the general and a further supplement will be sent.</p> <p>In terms of Glebe Farm boundaries it requested that :</p>	<p>other proposals (also made in previous consultation) – Consultations</p>	<p>Further Design Change: No</p>
	NA	<ul style="list-style-type: none"> the boundary with the improved Holt Road/Drayton Lane link should be hedged to provide security. 	<p>Comments regarding other proposals (also made in previous consultation) – Land/Property Issues</p>	<p>Regard: Boundary fencing and hedgerows will be considered as part of detailed design and will include discussions with land owners. Further Design Change: No</p>
	NA	<ul style="list-style-type: none"> boundary openings on Reepham Road, Hall Lane and Holt Road all need to be assessed to agree those openings no longer required are closed off with fences and hedges. 	<p>Comments regarding other proposals (also made in previous consultation) – Land/Property</p>	<p>Regard: Boundary fencing and hedgerows will be considered as part of detailed design and will include discussions with land owners. Further Design Change: No</p>

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
	4/23 4/37 4/38 5/1	<ul style="list-style-type: none"> the boundary of the road through the farm be secured by temporary fencing whilst new hedging is established on the line of severance on both sides of the road. In addition it is vital that access remains available during the scheme works. 	<p>Issues</p> <p>Comments regarding other proposals (also made in previous consultation) – Land/Property Issues</p>	<p>Regard: Boundary fencing and hedgerows will be considered as part of detailed design and will include discussions with land owners. The scheme contractors will control the site compound. Discussions with neighbouring landowners over the precise operational details of this will occur prior to construction commencing.</p> <p>Further Design Change: No</p>
	NA	<ul style="list-style-type: none"> the permanent points of access established for the future, whether existing or new, will need to be set back and gated for security. 	<p>Comments regarding other proposals– Land/Property Issues</p>	<p>Regard: Proposed access locations will be considered as part of detailed design and will include discussions with land owner.</p> <p>Further Design Change: No</p>
	NA	<ul style="list-style-type: none"> accesses are envisaged from the Reepham Road and from Holly Lane/Hall Road. 	<p>Comments regarding other proposals (also made in previous consultation) – Land/Property Issues</p>	<p>Regard: These are existing access locations outside the extent of the scheme which will continue to be available for use by the land owner.</p> <p>Further Design Change: No</p>

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
			Issues	
	5/1	<ul style="list-style-type: none"> the hammerhead at the southern end of the Holt Road should be fenced and hedged for security. 	Comments regarding other proposals (also made in previous consultation) – Land/Property Issues	<p>Regard: Boundary fencing and hedgerows will be considered as part of detailed design and will include discussions with land owners.</p> <p>Further Design Change: No</p>
	NA	<ul style="list-style-type: none"> the extent to which Holt Road can be used for traffic be assessed and to consider carefully how to redesign the scheme to restrict against unlawful uses. 	Comments regarding other proposals (also made in previous consultation) – Land/Property Issues	<p>Regard: Although not connecting to the Cromer Road Junction, Holt Road would still remain public highway and access still required to adjacent land. Therefore, the applicant does not consider any closure appropriate.</p> <p>Further Design Change: No</p>
		In terms of landscaping it commented that as the impact on the property is significant, and that		
	4/23 4/37	<ul style="list-style-type: none"> the bank height along the full length of the road should be maintained to as great a height 	Comments regarding other	<p>Regard: Assessment of the proposed landscape treatments and of noise is contained in Volume 1 Chapter 7 and</p>

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Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
	4/38 5/1	as possible to protect all the properties on the north side of the road including in the village.	proposals (also made in previous consultation) – Landscaping/ Planting Issues	Volume 1 Chapter 11 of the Environmental Statement (Document Ref 6.1). Further Design Change: No
	NA	<ul style="list-style-type: none"> the embanked area north west of the Holt Road roundabout should be raised to as great a height as possible to reduce the impact from the roundabout. 	Comments regarding other proposals (also made in previous consultation) – Landscaping/ Planting Issues	Regard: Assessment of the proposed landscape treatments and of noise is contained in Volume 1 Chapter 7 and Volume 1 Chapter 11 of the Environmental Statement (Document Ref 6.1). Further Design Change: No
	4/23 4/37 4/38 5/1	<ul style="list-style-type: none"> the previously agreed amendment for planting on the southern embankment across Glebe Farm be planted with trees be shown on the plans. 	Comments regarding other proposals (also made in previous consultation) – Landscaping/ Planting	Regard: Assessment of the proposed landscape treatments and of noise is contained in Volume 1 Chapter 7 and Volume 1 Chapter 11 of the Environmental Statement (Document Ref 6.1). Further Design Change: No

Norwich Northern Distributor Road - Application for Development Consent Order – Document Reference 5.1
Design Change Consultations - Summary of Responses

Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
			Issues	
		<p>Commented that the occupiers have represented against a roundabout on the link road to Horsford, preferring a bridge. Operators will have to leave the farmyard and travel up to 2,500 metres by road (rather than 500m) to the centre of the farm. Therefore, it is imperative that:</p> <ul style="list-style-type: none"> the internal roadways are planned to minimise travel times. 		
	NA		Comments regarding other proposals (also made in previous consultation) – Land/Property Issues	<p>Regard: This will be considered as part of detailed design and will include discussions with land owners.</p> <p>Further Design Change: No</p>
	NA	<ul style="list-style-type: none"> access gates should be provided from Reepham Road and Hall Lane, and internal roads provided to link these access points with the various enclosures. 	Comments regarding other proposals (also made in previous consultation) –	<p>Regard: Provision of gates at existing accesses will be considered as part of detailed design.</p> <p>Further Design Change: No</p>

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Design Change Consultations - Summary of Responses

Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
			Land/Property Issues	
	NA	<ul style="list-style-type: none"> the road scheme has an adverse impact on the present irrigation scheme and it is necessary to finalise agreement for the relocation of mains and hydrants, for which prices have already been obtained. 	Comments regarding other proposals (also made in previous consultation) – Land/Property Issues	<p>Regard: It is accepted that the present irrigation system will require alteration. Consideration of the requirements is ongoing but it is intended that the landowner will organise the finally agreed works with their current drainage contractors with the costs reimbursed by the applicant.</p> <p>Further Design Change: No</p>
<p>Ref: DC028</p> <p>[REDACTED]</p> <p>Consulted on Design Change Ref 9.3, 10.13 and 10.14</p>	NA	<p>Commented that the route of the NDR severs the concrete road right of way, to this property, in the area of the pumping station.</p> <p>Suggested alternative access to the plot could be by:</p>		
	NA	<ul style="list-style-type: none"> increasing the size of the bat and newt culvert which is on the line of the existing right of way, to accommodate private road traffic. 	Comments regarding other proposals – Land/Property Issues	<p>Regard: The proposed Culvert and Bat Underpass is positioned within the natural floodplain. Risk of flooding in this area is too high to accommodate private road traffic.</p>

Norwich Northern Distributor Road - Application for Development Consent Order – Document Reference 5.1
Design Change Consultations - Summary of Responses

Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
		<ul style="list-style-type: none"> modifying the existing entrance and upgrading the existing concrete road as a new right of way from Newman Road. 	Issues	<p>The applicant considers that appropriate access is now provided by Design Change Ref: 10.14</p> <p>Further Design Change: No</p>
	10/17	<p>Expressed concerns that the plans do not show that the road coming off the Newman Road Bridge will be made up to Norfolk County Council standards and adopted up to the point where the track splits south eastwards and south westwards.</p> <p>Commented that the proposals will bring a considerable amount of new traffic into this area. In addition there are some seven landowners who have a right of way to this road and it would not be possible (or reasonable) for them to pave the track or be responsible for the demands of the general public resulting from the NDR.</p>	Comments regarding Design Change Ref: 10.14	<p>Regard: The proposals are for the applicant to adopt the PMA up to the point the bridleway crosses Newman Road track. Beyond this the intensification is to provide a right of access only.</p> <p>Further Design Change: No</p>
<p>Ref: DC029</p> <p>██████████</p>	NA	Expressed support for the removal of the turning head south of Rackheath Bat Underpass as it	Comments regarding Design	<p>Regard: Comments noted.</p> <p>Further Design Change: No</p>

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Design Change Consultations - Summary of Responses

Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
<p>██████████ Rackheath Consulted on Design Change Ref 9.3, 10.13 and 10.14 Provided comment previously Ref: IT047</p>		<p>removes the need for access to the turning head past the property and preserves the security and privacy of the property.</p>	<p>Change Ref: 9.3</p>	
	<p>NA</p>	<p>Expressed support for the amendment to the western end of Newman Road track (to provide access to Gazebo Farm Bungalow) as it allows safe and practical access to Gazebo Farm Bungalow.</p>	<p>Comments regarding Design Change Ref: 10.13</p>	<p>Regard: Comments noted. Further Design Change: No</p>
	<p>10/17 10/18</p>	<p>Expressed support for the extension to length of private means of access west of Newman Road Bridge strictly on the following basis:</p>	<p>Comments regarding Design Change Ref: 10.14</p>	<p>Regard: Comments noted. Further Design Change: No</p>
	<p>10/17 10/18</p>	<ul style="list-style-type: none"> that the extension to the private means of access is as shown on the plan and in no circumstances is it extended westwards beyond the "end of scheme". That this extension is 		<p>Regard: The extension to the right of way (Ref 10.14 in Appendix V of this report) is for ██████████ and is not proposed to extend beyond the point identified as "End of Scheme" as shown on General Arrangement Plan Sheet No 10</p>



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Design Change Consultations - Summary of Responses

Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
		only for the benefit of the property currently owned by [REDACTED] and for no other property.		(Document Ref 2.6). Further Design Change: No
<p>Ref: DC030 [REDACTED], Salisbury Road, Leicester Consulted on Design Change Ref 9.1, 10.1 and 11.3</p>	<p>11/8 11/11</p>	<p>Commented that insufficient account may have been taken of the outline planning approval for Broadland District Council (Ref: 20090886) and specifically the parameters needed to erect a bridge across the railway (at Middle Road) with a roundabout to the east.</p> <p>Noted that they are about to commission consultants to prepare outline designs for these proposals and any help in terms of existing technical information would be most useful.</p> <p>Commented that they wish to establish the issues as soon as possible and try to resolve them by informal discussion.</p>	<p>Comments regarding other proposals – On-Line Proposals/Request for Information</p>	<p>Regard: The applicant believes that the both the Middle Road bridge and the development could be accommodated. The applicant is willing to work with the developers consultants to find an acceptable solution for all parties. Design Change: No</p> <p>Further Design Change: No</p>
	NA	Noted that they have land interests to the north of Middle Road, which are currently served	Comments regarding other	Regard: The applicant is not aware of any land being landlocked as other existing accesses on adjoining roads are


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Design Change Consultations - Summary of Responses

Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
		from Middle Road and Toad Lane. Elements of this land may be 'landlocked' by the proposals and will require a new access from Middle Road or from elsewhere.	proposals – Land/property Issues	unaffected. Further Design Change: No
	NA	Asked for further clarification into the environmental impact (primarily noise and air quality) of the NDR on their landed interests as this may affect future development - i.e. master planning, to design out noise impact or loss of developable land as a result of the NDR.	Comments regarding other proposals – Noise/Emission Issues	Regard: Assessments of Noise and Air Quality are contained in Volume 1 Chapter 11 of the Environmental Statement (Document Ref 6.1). Further Design Change: No
Ref: DC031 [Redacted] Road, Diss Consulted on Design Change Ref 12.1, 12.6,12.5, 12.8, 12.9, 12.10 and 12.11 Provided comment previously Ref: IT044	12/9 12/10	Expressed support for design changes made at Heath Farm including the re-location of Lagoon 25 and the topsoil storage to the east of the NDR.	Comments regarding Design Change Ref: 12.5	Regard: Comments noted. Further Design Change: No

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Design Change Consultations - Summary of Responses

Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
<p>Ref: DC032 , Smea Lane, Gt Plumstead Not specifically consulted on design change Provided comment previously Ref: IT044</p>	NA	<p>Expressed disappointment that no changes to the NDR have been made in relation to the lack of agricultural access at Low Road as originally proposed. Instead a new bridge is being provided at Middle Road. Commented that they hope this decision will be reconsidered.</p>	<p>Comments regarding other proposals – On-Line Proposals</p>	<p>Regard: One of the reasons for introducing the Middle Road bridge was a result of options available for accessing Gt Plumstead. Providing such a closure would reduce these options. Further Design Change: No</p>
<p>Ref: DC033  Strumpshaw Consulted on Design Change Ref 9.1, 10.1, 11.3 Provided comment previously Ref: IT042</p>	NA	<p>Expressed disappointment that no changes to the NDR scheme have been made despite the significant impact that it will have on its client's farming business.</p>	<p>Comments regarding other proposals – Land/Property Issues</p>	<p>Regard: The regard given by the applicant to the original statutory consultation with those with interest in land is contained in Appendix U of this report (see Ref IT042 of this Appendix). Further Design Change: No</p>
	NA	<p>Reiterated their contention that the new bridge at Middle Road should be removed and the agricultural bridge at Low Road</p>	<p>Comments regarding other proposals</p>	<p>Regard: One of the reasons for introducing the Middle Road bridge was a result of options available for accessing Gt Plumstead. Providing such a closure</p>

Norwich Northern Distributor Road - Application for Development Consent Order – Document Reference 5.1
Design Change Consultations - Summary of Responses

Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
		re-instated as part of the NDR scheme.	(also made in previous consultation) – On-Line Proposals	would reduce these options. Further Design Change: No
	9/22	Expressed disappointment that no change has been made to the amount of land being taken to the south of Lagoon 18 on land to the south of Wroxham Road.	Comments regarding other proposals (also made in previous consultation) – Land/Property Issues	Regard: Land is required for landscaping purposes. Further Design Change: No
	10/36	Commented that no change is being proposed to the location of Lagoons 19 and 20 close to Salhouse Road and no explanation has been given as to why the lagoons cannot be located to the south of the NDR in order to create an economically viable area to farm.	Comments regarding other proposals (also made in previous consultation) – Land/Property Issues	Regard: Proposed lagoons are in optimal location. Matter of farm viability to be addressed through compensation negotiations. Further Design Change: No
Ref: DC034 	NA	Noted that response to the original consultation highlighted that the proposed Middle Road	Comments regarding other	Regard: Regard: The applicant believes that the both the Middle Road bridge and the development could be

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 Design Change Consultations - Summary of Responses

Consultee	BOR Plot No:	Summary of Response	Category of Response	Regard Given to Response
<p>[Redacted] Toad Lane, Gt Plumstead Consulted on Design Change Ref 9.1, 10.1, 11.3 Provided comment previously Ref: IT045</p>		<p>Bridge impacts on land that has planning permission granted by Broadland District Council (Ref: 20090886). Commented that despite recognition of this conflict, particularly with a critical roundabout on the link road that facilitates all of the development, no changes have been made to the proposal. They therefore object to the proposed the Middle Road Overbridge, which should be removed and the scheme revert to the original proposal showing Middle Road being closed at its junction with the NDR.</p>	<p>proposals (also made in previous consultation) – On-Line Proposals</p>	<p>accommodated. The applicant is willing to work with the developers consultants to find an acceptable solution for all parties. Further Design Change: No</p>

Appendix Y

Regulation 6 Notification Letter
(sent on 23 July 2013)



Norfolk County Council
at your service

Environment, Transport, Development
County Hall
Martineau Lane
Norwich
NR1 2SG

NCC contact number: 0344 800 8020
Textphone: 0344 800 8011

The Planning Inspectorate
Temple Quay House
Temple Quay
Bristol
BS1 6PN

FAO Kath Haddrell

Your Ref:
Date: 23 January 2013

My Ref: HI/R1C093/IDM/PI 001
Tel No.:
Email:

Dear Ms Haddrell

**NORWICH NORTHERN DISTRIBUTOR ROAD (NDR)
REGULATION 6 NOTIFICATION**

Further to our meeting on 22 January 2013, and subsequent Preliminary Notification, I can confirm that the proposals for the NDR constitute Environmental Impact Assessment (EIA) development under Schedule 1 section 7(c) of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2009.

In accordance with Regulation 6(1)(b) of the aforementioned regulations, an Environmental Statement in respect of the proposed development will be submitted with the application for a Development Consent Order.

Yours sincerely

David Allfrey
Major Projects Manager, Norfolk County Council

Appendix Z

Table Clarifying Section 44 Entries in the Book of Reference and the Consultation Report

Norwich Northern Distributor Road - Application for Development Consent Order - Document Reference: 5.1
 Table Clarifying Section 44 Entries in the Book of Reference and the Consultation Report

No.	Plot Number	Name and address of owner/lessee/person interested in the land Book of Reference entry	Name and address of owner/lessee/person interested in the land Consultation Report entry	Comment
1.	1/21	[Redacted] Taverham Norwich NR8 6HS	[Redacted] Taverham Norwich NR8 6HS	Typographical error in relation to surname. Consultation package was hand delivered to the property.
2.	2/19, 2/20, 2/30, 2/41, 2/42, 3/1, 3/2, 3/3 and 3/4	[Redacted], Lenwade Norwich NR9 5SQ and [Redacted] Norwich NR3 1RJ [Redacted] Rockland St Mary	[Redacted] Norwich NR3 1RJ	Consultation package was sent to the "[Redacted]" address, which was the known office address of the consultees at the time of the consultation (based on diligent inquiry carried out before the consultation). Following the return by the consultees of a Request For Information Questionnaire, the two residential addresses (referenced in the Book of Reference) were identified. A consultation response was received from the consultees.

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 Table Clarifying Section 44 Entries in the Book of Reference and the Consultation Report

No.	Plot Number	Name and address of owner/lessee/person interested in the land Book of Reference entry	Name and address of owner/lessee/person interested in the land Consultation Report entry	Comment
		Norwich NR14 7EY and [REDACTED] Norwich NR3 1RJ		
3.	2/18	[REDACTED] Felthorpe Norwich NR10 4DT	[REDACTED] Felthorpe Norwich NR10 4DT	Typographical error in relation to the name of the property. Consultation package was hand delivered to the property. The applicant has also held a meeting with the consultees since the consultation package was issued.
4.	3/12	[REDACTED] Horsford Norwich NR10 3DQ	[REDACTED] Horsford Norwich NR10 3DD	At the time of the consultation, [REDACTED] was identified as having an interest in the land. However, since the consultation exercise and through diligent inquiry, the applicant has learnt that [REDACTED] has passed away. [REDACTED] is [REDACTED]'s son and a beneficiary, and has therefore been referenced in the Book of Reference to ensure that the Book of Reference is as up to date as possible at the time of

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No.	Plot Number	Name and address of owner/lessee/person interested in the land Book of Reference entry	Name and address of owner/lessee/person interested in the land Consultation Report entry	Comment
				<p>submission.</p> <p>██████████ will therefore be provided the opportunity to make representations on the application under S56 of the Planning Act 2008.</p>
5.	3/28 and 3/30	<p>██████████ identified as occupier</p> <p>██████████</p> <p>c/o ██████████</p> <p>Horsford Norwich NR10 3AL</p>	<p>██████████</p> <p>c/o ██████████</p> <p>Horsford Norwich NR10 3AL</p>	<p>Consultation package was sent to ██████████ (██████████ which is the parent company of ██████████ is a wholly owned subsidiary of ██████████).</p> <p>Through diligent inquiry, the applicant understood that addressing the consultation package to ██████████ (whilst stating c/o ██████████) was the most appropriate way to address the consultation package.</p> <p>The applicant has also held meetings with ██████████.</p>
6.	4/21	<p>██████████</p> <p>Stratton Strawless Norwich</p>	<p>██████████</p> <p>Horsford Norwich</p>	<p>Typographical error in relation to surname.</p> <p>Consultation package was sent to the "██████████" address, which was the known address of the consultee at the time of the consultation (based on diligent inquiry carried out before the consultation).</p>

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No.	Plot Number	Name and address of owner/lessee/person interested in the land Book of Reference entry	Name and address of owner/lessee/person interested in the land Consultation Report entry	Comment
	NR10 5LS			<p>Following the return by the consultee of a Request For Information Questionnaire, the residential address referenced in the Book of Reference was identified as the appropriate address for any future correspondence.</p> <p>A consultation response was received from the consultee.</p>
7.	4/23, 4/24, 4/25, 4/26, 4/27, 4/28, 4/36, 4/37, 4/38, 4/39, 5/1, 5/2 and 5/5 Cromer Norfolk	[Redacted] Horsford Norwich	[Redacted] and [Redacted] (there was a typographical error in the surnames on the consultation package), are shareholders of [Redacted].	<p>Through diligent inquiry carried out before consultation, which included speaking to the consultee's agent, the applicant understood that the "[Redacted]" address was the most appropriate correspondence address.</p> <p>Following the return by [Redacted] of a Request For Information Questionnaire, it has since been identified that any future correspondence for [Redacted] should be addressed to another address (see item Error! Reference source not</p>

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 Table Clarifying Section 44 Entries in the Book of Reference and the Consultation Report

No.	Plot Number	Name and address of owner/lessee/person interested in the land Book of Reference entry	Name and address of owner/lessee/person interested in the land Consultation Report entry	Comment
				<p>found. above).</p> <p>Following further diligent inquiry, [REDACTED] (wife of [REDACTED]) has also been identified as a shareholder of [REDACTED]. [REDACTED] has confirmed to the applicant that all three shareholders are aware of the proposed NDR and the consultation response issued to the applicant is on all their behalf as shareholders of [REDACTED].</p>
8.	6/8, 6/10 and 6/11	[REDACTED] Marsham Norwich NR10 5PJ	[REDACTED] Haverlingland Norwich NR10 4QQ	<p>Typographical error in relation to surname (" [REDACTED]" instead of "[REDACTED]").</p> <p>The consultation package was addressed to "[REDACTED]" as this partnership is the sole owner of [REDACTED].</p> <p>The consultation package was sent to the "[REDACTED]" address as this is the address of the sole company Director of [REDACTED] and is also the known address of [REDACTED] at the time of the consultation (based on diligent inquiry carried out before the consultation).</p>

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 Table Clarifying Section 44 Entries in the Book of Reference and the Consultation Report

No.	Plot Number	Name and address of owner/lessee/person interested in the land Book of Reference entry	Name and address of owner/lessee/person interested in the land Consultation Report entry	Comment
				<p>Following the return by the consultee of a Request For Information Questionnaire, the address referenced in the Book of Reference was identified as the appropriate address for any future correspondence.</p> <p>A consultation response was received from the agent acting on behalf of the consultee.</p>

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No.	Plot Number	Name and address of owner/lessee/person interested in the land Book of Reference entry	Name and address of owner/lessee/person interested in the land Consultation Report entry	Comment
9.	6/13, 6/14, 6/15, 6/16, 6/17, 6/18, 6/20, 6/21, 7/1, 7/2, 7/3, 7/8, 7/9, 7/10, 7/11, 7/12, 7/13, 7/14, 7/15, 7/20 and 7/22	[redacted] (as owner and occupier) [redacted] (as occupier only) [redacted] Spixworth Norwich NR10 3PR [redacted] (as owner and occupier) [redacted] (as occupier only) [redacted] Spixworth Norwich NR12 7BH	[redacted] [redacted] Spixworth Norwich NR10 3PR [redacted] [redacted] Spixworth Norwich NR12 7BH	<p>The registered titles of the affected properties are in the names of [redacted] and [redacted]. Accordingly, the consultation package was addressed to these individuals at their respective addresses.</p> <p>Following the return by the consultees of a Request For Information Questionnaire, their wives, [redacted] and [redacted] were identified as occupiers of the plots affected.</p> <p>The applicant has held meetings with the registered owners as well as their wives and a consultation response has been received on all their behalf.</p>
10.	9/29, 9/30 and 9/37	[redacted] Discovery Bay Lantau Hong Kong	[redacted] [redacted] [redacted]	<p>On 19 December 2013, the applicant was informed by [redacted] that he had sold his interest in the plots and transferred them to [redacted].</p> <p>[redacted] will therefore be provided the opportunity</p>

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No.	Plot Number	Name and address of owner/lessee/person interested in the land Book of Reference entry	Name and address of owner/lessee/person interested in the land Consultation Report entry	Comment
			<p>[redacted] Wan Chai Hong Kong</p>	<p>to make representations on the application under S56 of the Planning Act 2008.</p>
11.	10/14	<p>[redacted] (address unknown)</p>	<p>[redacted] Rackheath Norwich NR13 6PN</p>	<p>Typographical error in relation to consultee name. Consultation letter was hand delivered to the affected property.</p>
12.	10/27 and 10/28	<p>Registered office: [redacted] London and Local office: [redacted] Sheringham</p>	<p>[redacted] [redacted] [redacted] Sheringham</p>	<p>Consultation package was sent to the local office which, through diligent inquiry, the applicant understands to be the most appropriate correspondence address in respect of the consultation package rather than the registered office.</p>
13.	10/35, 11/8, 10/36, 11/11,	<p>[redacted] [redacted]</p>	<p>[redacted] [redacted]</p>	<p>[redacted] is the farming business name of [redacted].</p>

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No.	Plot Number	Name and address of owner/lessee/person interested in the land Book of Reference entry	Name and address of owner/lessee/person interested in the land Consultation Report entry	Comment
	11/12, 11/13, 11/16 and 11/8	Strumpshaw	Strumpshaw	Consultation response received from agent representing [REDACTED].
14.	10/45	[REDACTED] c/o [REDACTED] (as occupier)	[REDACTED] each sent to individual home addresses	The [REDACTED] address is that of [REDACTED], who is the secretary of the Charity. Following diligent inquiry, the applicant issued consultation packages to the home addresses of each trustee (including [REDACTED]).
15.	10/49, 10/50, 11/2, 11/3 and 11/4	[REDACTED] (as occupier)	Letter addressed to "The Occupier" at [REDACTED]	At the time of the consultation, the applicant was not aware of the possible name of the occupier. However, following diligent inquiry (which included erecting site notices on the site and talking to neighbouring land owners and agents), the applicant now understands that [REDACTED] may be the occupier (although this is still unconfirmed). In order to keep the Book of Reference as up to date as possible with the results of continuing diligent inquiry, the applicant has included [REDACTED]'s name.
16.	11/15 (assumed half)	The Owner [REDACTED]	[REDACTED] Strumpshaw	Title to the properties is not registered. Through diligent inquiry, the applicant spoke with [REDACTED], who indicated that all these properties belong to him. The

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No.	Plot Number	Name and address of owner/lessee/person interested in the land Book of Reference entry	Name and address of owner/lessee/person interested in the land Consultation Report entry	Comment
	width sub soil ownership)	[REDACTED]		applicant therefore sent the consultation package to [REDACTED], based on the best available information the applicant has managed to obtain following diligent inquiry.
17.	12/19, 12/21, 12/23, 12/25, 12/27, 12/29, 12/37, 12/39, 12/42, 12/46 and 12/47	Secretary of State for Transport Great Minster House 33 Horseferry Road London SW1P 4DR	Secretary of State for Transport Great Minster House 76 Marsham Street London SW1P 4DR	Great Minster House is an office building on the corner of Horseferry Road and Marsham Street and from time to time the Department for Transport has used both street addresses (which share the same postcode) for Great Minster House. The applicant wrote to the Secretary of State using the correspondence address that it usually uses for the Department for Transport (for example, the Section 35 request letter was also sent to the Secretary of State at 76 Marsham Street). The consultation letter was sent by courier and signed for by the Department for Transport.
18.	12/61 (Postwick Compound)	[REDACTED] South Raynham	[REDACTED] South Raynham	Typographical error in relation to surname.

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No.	Plot Number	Name and address of owner/lessee/person interested in the land Book of Reference entry	Name and address of owner/lessee/person interested in the land Consultation Report entry	Comment
19.	12/61 (Postwick Compound)	[Redacted] Dorking and Office address: [Redacted] Norwich	[Redacted] Norwich	Consultation package was sent to the consultee's office address (referenced in the Consultation Report) which, through diligent inquiry, the applicant understands to be the most appropriate correspondence address for the consultee.
20.	12/61 (Postwick Compound)	[Redacted] Postwick Norwich NR13 5HQ	N/A	Through the Request for Information Questionnaire sent to the owners of this plot (and who received the consultation package under S42 of the Planning Act 2008), [Redacted] and [Redacted] were identified as having rights in the plot (such as access, services and shooting). Once the applicant had been informed of these rights, the applicant consulted with [Redacted] and [Redacted] pursuant to Section 42 of the Planning Act 2008 via the appointed agent, who now represents the owners as well as those who have rights in the plots.

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No.	Plot Number	Name and address of owner/lessee/person interested in the land Book of Reference entry	Name and address of owner/lessee/person interested in the land Consultation Report entry	Comment
				Furthermore, the applicant is in discussions with [REDACTED] and [REDACTED] regarding an option agreement in respect of the use of the plot for the Postwick Park & Ride.

Norwich Northern Distributor Road - Application for Development Consent Order - Document Reference: 5.1
 Table Clarifying Section 44 Entries in the Book of Reference and the Consultation Report

No.	Plot Number	Name and address of owner/lessee/person interested in the land Book of Reference entry	Name and address of owner/lessee/person interested in the land Consultation Report entry	Comment
21.	12/55	<p>[redacted] Lingwood</p> <p>[redacted] Martham</p>	<p>[redacted]</p> <p>Diss IP22 4WR</p>	<p>[redacted] and [redacted] are the shareholders of [redacted].</p> <p>A consultation response from the agent acting on their behalf has been received by the applicant and the agent has confirmed that the response is in respect of all interests owned by his clients, whether as individuals or as shareholders of a company.</p>
22.	Part 2 party	<p>[redacted], Attlebridge, Norwich NR9 5TA (in respect of [redacted], Taverham, Norwich NR8 6HR)</p> <p>[redacted], Franklin Lakes, New Jersey, 07417 USA (in respect of [redacted], Taverham, Norwich</p>	N/A	<p>The applicant was notified of the ownership details of [redacted] and [redacted] following the consultation period.</p> <p>The property had been believed to be in the ownership of [redacted] and [redacted] of P [redacted] (the adjoining property), who were served the consultation package as directly affected landowners.</p> <p>[redacted] is the son and [redacted] the daughter of [redacted] and [redacted].</p> <p>In order to keep the Book of Reference as up to date as possible with the results of continuing diligent</p>

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No.	Plot Number	Name and address of owner/lessee/person interested in the land Book of Reference entry	Name and address of owner/lessee/person interested in the land Consultation Report entry	Comment
		NR8 6HR)		inquiry, the applicant has included [REDACTED] and [REDACTED]'s names, who will therefore be provided the opportunity to make representations on the application under S56 of the Planning Act 2008.
23.	Part 2 party	[REDACTED] Horsford Norwich NR10 3AL	[REDACTED] Horsford Norwich NR10 3AL	Typographical error in relation to property name. Consultation package was hand delivered to the property.
24.	Part 3 party	Highways Historical Estate	Agency Railway (as prescribed body)	The body listed in the Book of Reference is the statutory successor body to that listed in the consultation report as from 30 September 2013.
25.	Part 3 party	[REDACTED] Holt and [REDACTED] Drayton	[REDACTED] [REDACTED] Drayton	Consultation package was sent to the address requested by the consultee's representative rather than the address identified in the Book of Reference.
26.	Part 3 party	[REDACTED] Company Secretary [REDACTED]	[REDACTED] [REDACTED]	The consultation package was sent to the current club secretary, rather than the trustees listed in the historic agreement which is reflected in the Book of

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No.	Plot Number	Name and address of owner/lessee/person interested in the land Book of Reference entry	Name and address of owner/lessee/person interested in the land Consultation Report entry	Comment
		<p>[Redacted] Norwich</p> <p>[Redacted] [Redacted], as set out in an historic agreement)</p>	Norwich	<p>Reference.</p> <p>Following diligent inquiry, this was considered to be the most appropriate correspondence address.</p>
27.	Part 3 party	[Redacted] Rackheath Park	The Occupier [Redacted] Rackheath Park	At the time of the consultation, the applicant had not identified the name of the occupier of [Redacted]. However, since the consultation exercise, and following diligent inquiry, the applicant has identified the occupier and has therefore inserted her name into the Book of Reference.
28.	Part 3 parties Heath Farm properties within Postwick Hub junction network	[Redacted]	The Occupier	At the time of the consultation, the applicant had not identified the consultee as a part 3 party (part 3 in the Book of Reference). However, following the continuous diligent inquiry that the applicant has been carrying out since the consultation period ended, and will continue to carry out, the applicant has identified the owners of this plot as being a part 3 party.

Norwich Northern Distributor Road - Application for Development Consent Order - Document Reference: 5.1
 Table Clarifying Section 44 Entries in the Book of Reference and the Consultation Report

No.	Plot Number	Name and address of owner/lessee/person interested in the land Book of Reference entry	Name and address of owner/lessee/person interested in the land Consultation Report entry	Comment
				<p>The applicant is actively seeking to arrange a meeting with the consultee, who has been aware of the proposed NDR through the consultation carried out under S47 of the Planning Act 2008. In addition, the consultee will be provided the opportunity to make representations on the application under S56 of the Planning Act 2008</p>

The Norfolk County Council (Norwich Northern Distributor Road (A1067 to A47(T))) Order

5.2 Flood Risk Assessment

Planning Act 2008

Infrastructure Planning

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009


PINS Reference Number: TR010015

Document Reference: 5.2

Regulation Number: 5(2)(e)

Author: Mott MacDonald

Revision	Date	Description
0	8 th January 2014	Revision For Submission

Mott MacDonald Internal Audit			 Mott MacDonald
Revision	Originator	Checked By	Approved By
0	R Day	R Gamble	G Hewson G Kelly

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We accept no responsibility for the consequences of this document being relied upon by any other party, or being used for any other purpose, or containing any error or omission which is due to an error or omission in data supplied to us by other parties.

This document is submitted in relation to the application for a proposed development by Norfolk County Council to the Planning Inspectorate, under the Planning Act 2008.

The application is for the Norfolk County Council (Norwich Northern Distributor Road (A1067 to A47(T))) Order, to grant development consent for the construction of a new highway running west-east between the A1067 Fakenham Road and the A47 Trunk Road at Postwick, including improvements to the existing highway network to the north and north east of Norwich.

This document comprises part of the application documents and relates to Regulation 5(2)(e) of the Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009.

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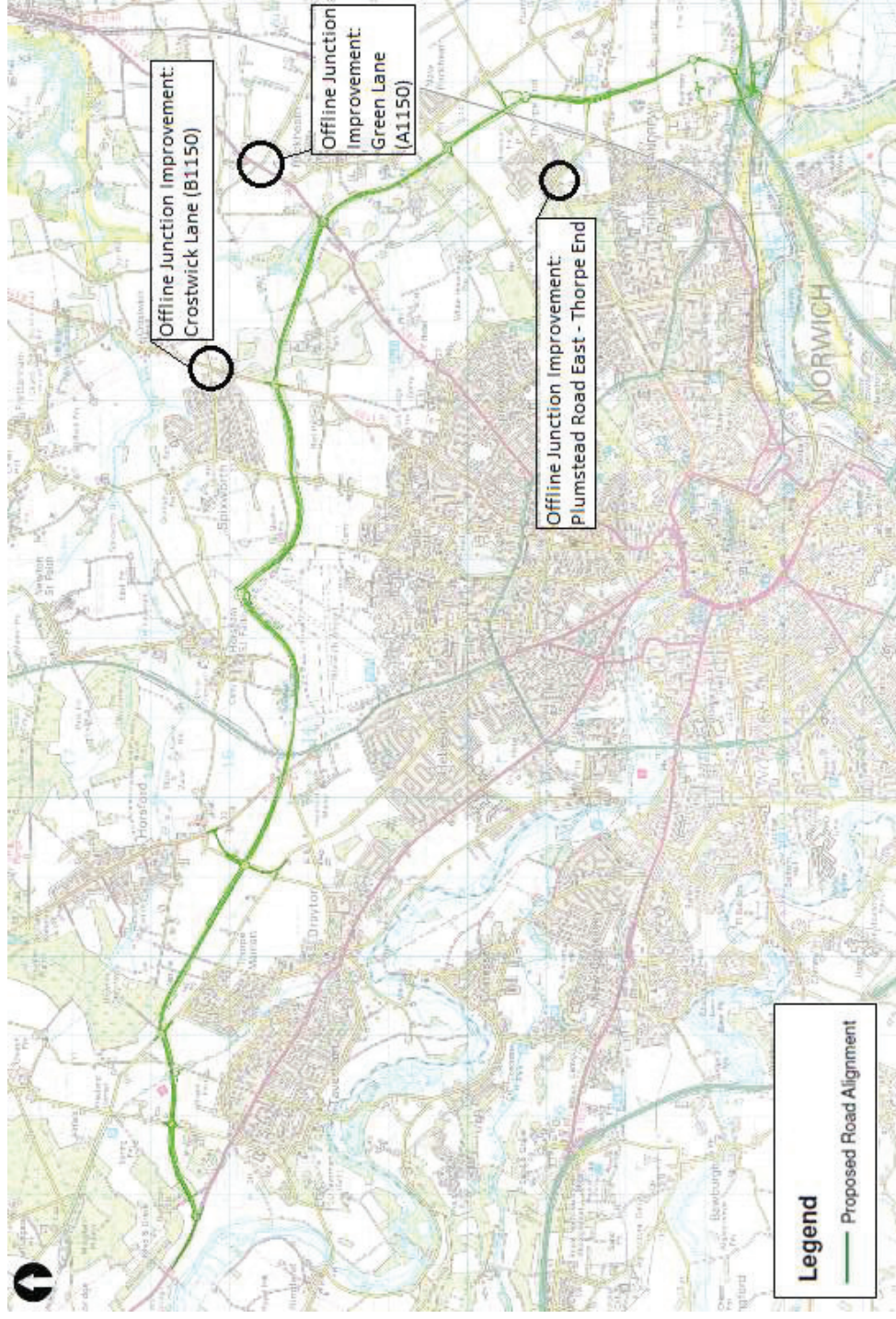
1. Executive Summary

- 1.1.1 Mott MacDonald was commissioned by Norfolk County Council to carry out a Flood Risk Assessment for the proposed Norwich Northern Distributor Road. This report provides the outcome of the assessment which follows the procedures outlined in the National Planning Policy Framework (NPPF) and the accompanying NPPF Technical Guidance (NPPFTG).
- 1.1.2 At no point does the proposed route of the NDR intersect any active watercourse. The route is largely located in Flood Zone 1 where there is little or no annual probability of fluvial or tidal flooding, and thus is considered to pass the Sequential Test. However, the road alignment crosses the catchment of Dobbs Beck near Rackheath where available surface water mapping indicates some pluvial flood risk. The depth, extent and duration of any flooding in this area is currently minimal, and the road will be built above the maximum flood levels and therefore removed from flood risk. The proposals for the new road are classified as 'Essential Infrastructure' by Table 2 of NPPFTG, and as such are permitted in Flood Zones 1 and 2.
- 1.1.3 In compliance with the NPPF, the highway drainage for the NDR has been designed in line with sustainable drainage system (SuDS) principles to restrict runoff to Greenfield discharge rates. Therefore flood risk due to surface water runoff will be mitigated to acceptable levels.
- 1.1.4 In terms of overland flow, the proposed route will bisect 43 natural catchments. Section 4.1.4 assesses the potential runoff from these catchments, as well as the resultant flood extents where natural drainage paths will be severed. At no point do these flood extents indicate any flooding to residential property.
- 1.1.5 Given the depth of the groundwater table beneath the preliminary road levels, flood risk to the NDR arising from groundwater is likely to be minimal. Any residual risks, due to climate change, for example, would be easily managed by the proposed surface water drainage system.
- 1.1.6 With the implementation of the recommended flood risk management and drainage proposals included in the Scheme and DCO, as set out in Section 4, the NDR proposals will have no significant impact upon the local flooding regime, neither will they pose any increased flood risk to neighbouring residential properties or infrastructure.

2. Introduction

- 2.1.1 Mott MacDonald has been commissioned by Norfolk County Council to carry out a Flood Risk Assessment (FRA) to support the planning application and Environmental Impact Assessment (EIA) for the proposed Norwich Northern Distributor Road scheme (NDR). This FRA has been produced to support the planning application for the proposed (NDR). In the FRA the term "NDR" is used interchangeably with "the proposed NDR", "the proposed Scheme" and "Scheme".
- 2.1.2 The Scheme (the Norwich Northern Distributor Road, known as the NDR) is a dual carriageway all-purpose strategic distributor road, which would link the A1067 Fakenham Road, near Attlebridge to the A47 Trunk Road (T) at Postwick. This will be over a length of approximately 20.4km. A full description of the NDR can be found in in the Scheme Description within Chapter 2 : Volume 1 of the Environmental Statement. See also General Arrangement Plans within Appendix 1 : Volume 1 of the Environmental Statement. Figure 2.1 shows the general location of the proposed Scheme and offline junction improvements. Figure 1.1 shows the general location of the proposed Scheme and offline junction improvements.
- 2.1.3 This assessment has been carried out in accordance with the general requirements of the National Planning Policy Framework (NPPF) 2010 and the accompanying Technical Guidance (NPPFTG) and in compliance with the recent Flood & Water Management Act 2010. The FRA assesses the risk of flooding to the proposed Scheme, the possible effect of the development on flood risk elsewhere and makes allowances for increased flows due to climate change. Fluvial, groundwater, surface water and drainage aspects of flood risks have all been considered in this study. The scale and nature of the FRA is considered appropriate for the proposed Scheme.
- 2.1.4 This FRA has been informed by the Strategic Flood Risk Assessment (SFRA) Stages 1 and 2 and Broadland Rivers CFMP undertaken for the region and the North East Norwich Water Cycle Study (WCS) for the Rackheath area.

Figure 2.1: Location Map



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3. Background Information

3.1 Proposed Scheme

- 3.1.1 The Scheme (the Norwich Northern Distributor Road, known as the NDR) is a dual carriageway all-purpose strategic distributor road, which would link the A1067 Fakenham Road, near Attlebridge to the A47 Trunk Road (T) at Postwick. This will be over a length of approximately 20.4km. A full description of the NDR can be found in in the Scheme Description within Chapter 2 : Volume 1 of the Environmental Statement. See also General Arrangement Plans within Appendix 1 : Volume 1 of the Environmental Statement. The entire length of the proposed NDR will be served by SuDS. This system will utilise a combination of swales, wetlands and attenuation lagoons to ensure that the scheme causes minimal impact to local water quality and flood risk. Runoff from the carriageway will be conveyed via shallow, longitudinal grassed swales approximately 3m wide by 0.2m deep. However, at junctions and roundabouts a standard network of kerbs and gullies will drain surface water runoff from the roadway. The swales and standard drainage networks will discharge to a primary lined lagoon, with the purpose of containing accidental spillage from traffic accidents, before discharging to a secondary attenuation lagoon. No primary lagoon is proposed at attenuation lagoons serving to contain overland flows only.
- 3.1.2 A detailed engineering layout and associated Sustainable Drainage System (SuDS) design of the proposed Scheme is shown in Appendix A (Drawing No. R1C093-R1-5064 to 5087, sheets 1 to 12). As part of the Development Consent Order (DCO) planning application (which this FRA supports), and for reasons unrelated to flood risk, the NDR works could potentially deviate from the current proposed elevations by up to 0.25m higher (earthworks, bunds and banks) or lower (carriageway and adjacent verges). The detailed design of the roundabouts could result in a variation in levels of up to 0.5m higher or lower than the current design. This has been considered within this assessment in relation to groundwater and pluvial flood risk.
- 3.1.3 Three offline road junction improvements are required to support the proposed NDR at Green Lane West, Plumstead Road East and Crostwick Lane. Aerial plans showing the engineering design are provided in Appendix A.
- 3.1.4 In terms of flood risk, the proposed development is classified as 'Essential Infrastructure' as per Table 2 of NPPF Technical Guidance. With reference to

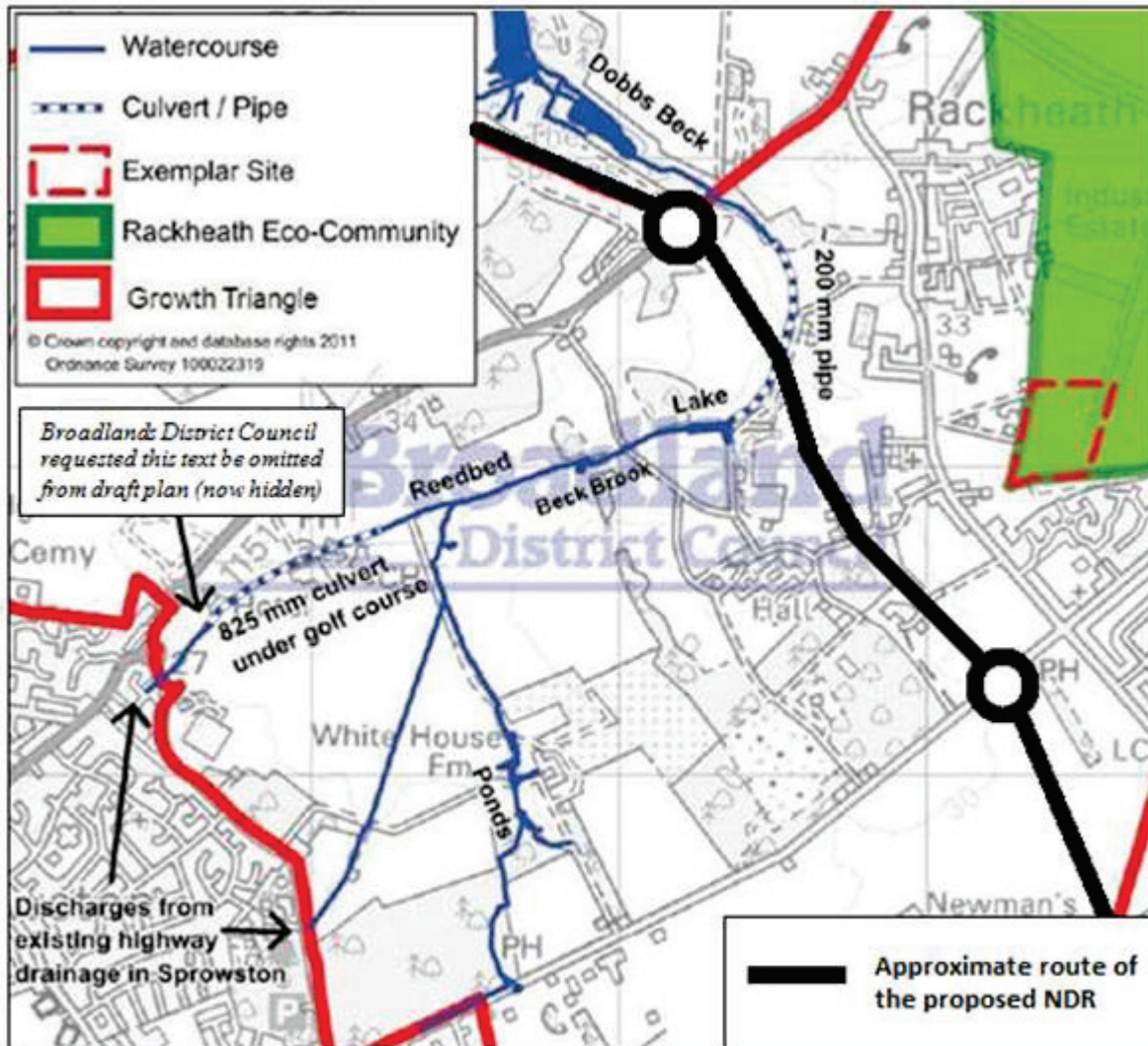
Table 3 of the NPPF Technical Guidance, developments within this classification are appropriate within Flood Zones 1 and 2 but are required to pass the Exception Test and remain operational during times of flood if they are to be located within Flood Zone 3. All development is still subject to the Sequential Test (refer to Section 4.1.2 for further information).

3.2 Existing site conditions and features

Surface water

- 3.2.1 The proposed NDR will cross three river catchments: the River Wensum; the River Yare; and the River Bure. However, at no point would the NDR route cross any active watercourse. The River Wensum to the west of the NDR study area flows southwards through Norwich to meet the River Yare. The River Yare is located over 500m away from the Postwick Hub Junction at the eastern end of the route. The River Bure is located to the North of the NDR, but several tributaries in the vicinity of the NDR drain to the River Bure including Horsford Brook and Spixworth Beck.
- 3.2.2 The junction improvement at Crostwick Lane is approximately 850m south of Spixworth Brook and 1.35km west of Spixworth Beck. The improvements at the Green Lane West junction are located approximately 490m north-east of Dobbs Beck. Plumstead Road East junction improvements are within 1.8km of Witton Run, which is a tributary of the River Yare.
- 3.2.3 The NDR crosses the catchment of Beck Brook which continues as Dobbs Beck immediately south of Wroxham Road. This is a tributary of Spixworth Beck. Figure 3.1 shows the location of Beck Brook and associated drainage features. According to the draft North East Norwich WCS, the NDR crosses the catchment of Beck Brook at the point where it flows underground through a 200mm (approx.) diameter pipe connecting the 'Lake' (also known as the 'Dry Lake') to a ditch south of Wroxham Road. Water primarily leaves the Lake via infiltration to ground, and any overflow is via this buried pipe outfalling to the ditch. Flows in this ditch then pass through a 200 mm (approx.) diameter pipe, under Wroxham Road to the Dobbs Beck watercourse. Dobbs Beck is fed by a number of springs and surrounding field drains in the area.

Figure 3.1: Dobbs Beck and associated drainage features (Source: Figure 4-6 extracted from the draft North East Norwich WCS provided by Broadland District Council (June 2013))



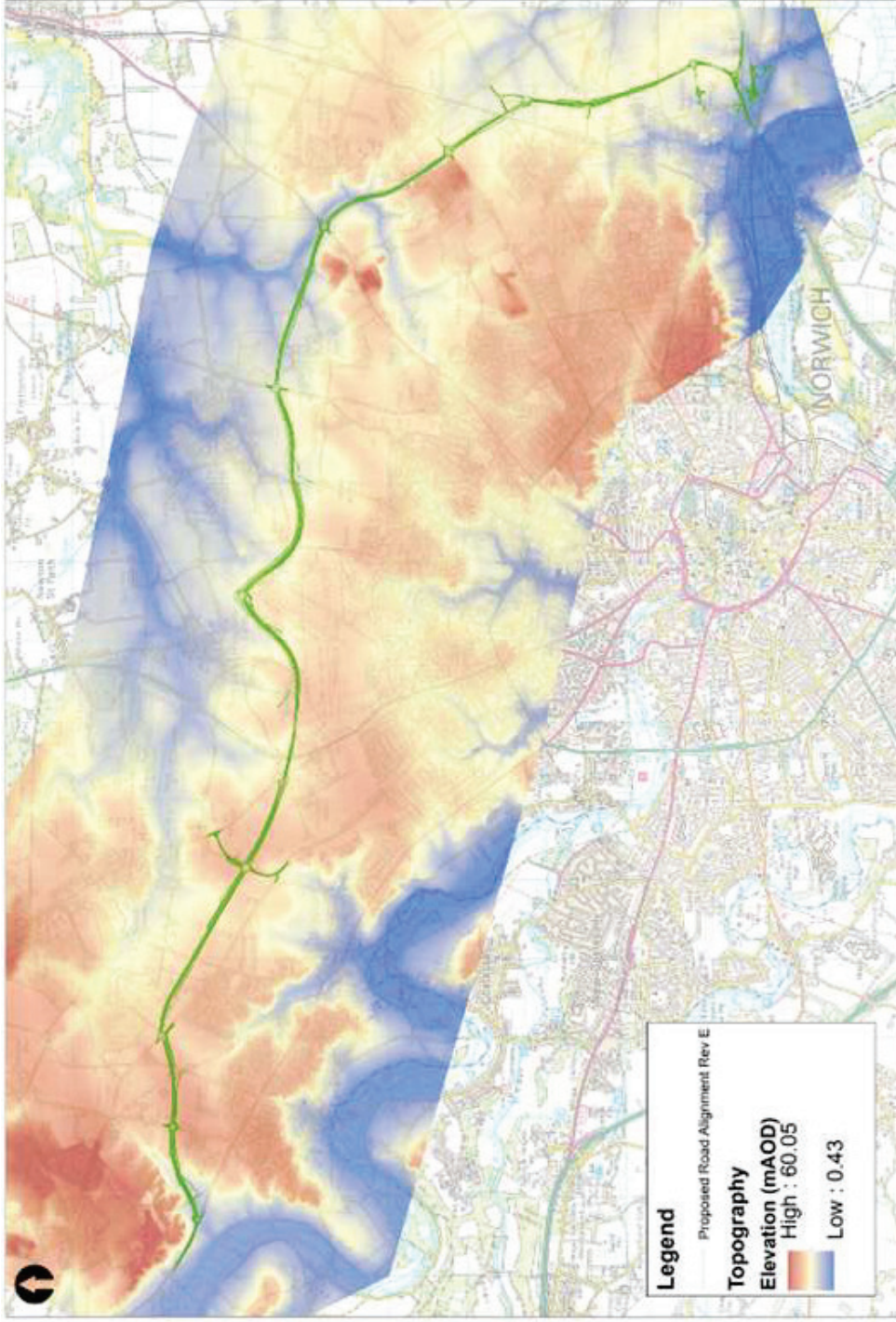
3.2.4 A drainage survey of this area was undertaken by Birse in November 2012. A survey of the 200mm pipe between the Lake and Dobbs Beck showed it to be redundant, with sections no longer functioning to convey surface water between these locations.

3.3 Groundwater

- 3.3.1 The ground along the proposed alignment of the NDR is largely underlain by highly permeable glacial sands and tills draining to the Upper Chalk and Norwich Crag formation. These aquifers support the base flow of the River Wensum, River Yare and River Bure, and their tributaries the River Tud and Horsford Brook. Borehole monitoring since 2007 has assessed groundwater levels on a quarterly basis. This data has been used to inform the assessment of groundwater flood risk in Section 4.1.5. The results of these investigations suggest that the road level is above the maximum groundwater levels along its entire length. However, there is evidence to suggest some minor perched water in lower permeability formations in the higher ground away from the valley near Rackheath.
- 3.3.2 The proposed alignment of the NDR is located on the relatively higher ground of the glacial Norwich Plateau. This is demonstrated in Figure 3.2 which shows a Digital Terrain Model (DTM) for the area. This DTM was constructed using NextMap Data for the purposes of this assessment. In the vicinity of the proposed NDR, the maximum terrain elevation is 62.5 metres above ordnance datum (mAOD) near the Sand and Gravel Pits in Deighton Hills to the far western extent of the proposed route (road chainage 0 as per the latest design drawing shown in Appendix A). The lowest terrain elevation is 9.5mAOD in the vicinity of The Springs to the west of Rackheath (road chainage 13,200 to 14,100).
- 3.3.3 The vertical alignment of the proposed Scheme varies along its route. The maximum elevation which the road will cross is approximately 43 mAOD north of Taverham (road chainage 1,400 to 3,000). The lowest elevation crossed by the road will be 17.9 mAOD near The Springs at chainage 13,300.
- 3.3.4 The regional hydrogeological map, produced by the British Geological Survey (BGS, 1976) provides groundwater level contours for the areas of the three offline junction improvements. Ground elevation at Crostwick Lane is approximately 20mAOD, located along a 5 mAOD groundwater level contour. At Green Lane West and Plumstead Road East ground elevation is approximately 30mAOD, with predicted groundwater levels of 5mAOD and 10mAOD respectively.
- 3.3.5 The vertical alignment of the proposed offline junction improvements will be designed to follow the existing road elevation at Crostwick Lane and Plumstead Road East. Road elevation for the new junction at Green Lane

West is likely to be at or above the existing ground elevation, with matching road elevations where it connects to Green Lane West and Wroxham Road. The BGS groundwater level contours above suggest that the proposed road levels would range between 15 and 25m above the groundwater table, therefore there is unlikely to be groundwater flooding issues in this location. Further groundwater level monitoring would be required to inform the final detailed design to ensure there is no risk of groundwater flooding.

Figure 3.2: Topography



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4. Definition of the Flood Hazard and Probability

4.1 The potential sources of flooding

4.1.1 The key potential sources of flooding include:

- Fluvial flooding;
- Surface water;
- Overland flooding; and
- Groundwater flooding.

4.1.2 Overloading of local sewers has been ruled out of this assessment as the proposed route of the NDR follows an alignment which has no significant prior development. Similarly, flooding from artificial sources has been excluded given that there are no known reservoirs, lakes or canals in the vicinity which could impact, or be impacted by the NDR route.

4.1.3 The following outlines the flooding mechanisms for the potential sources of flooding identified above.

Fluvial and tidal flood risk

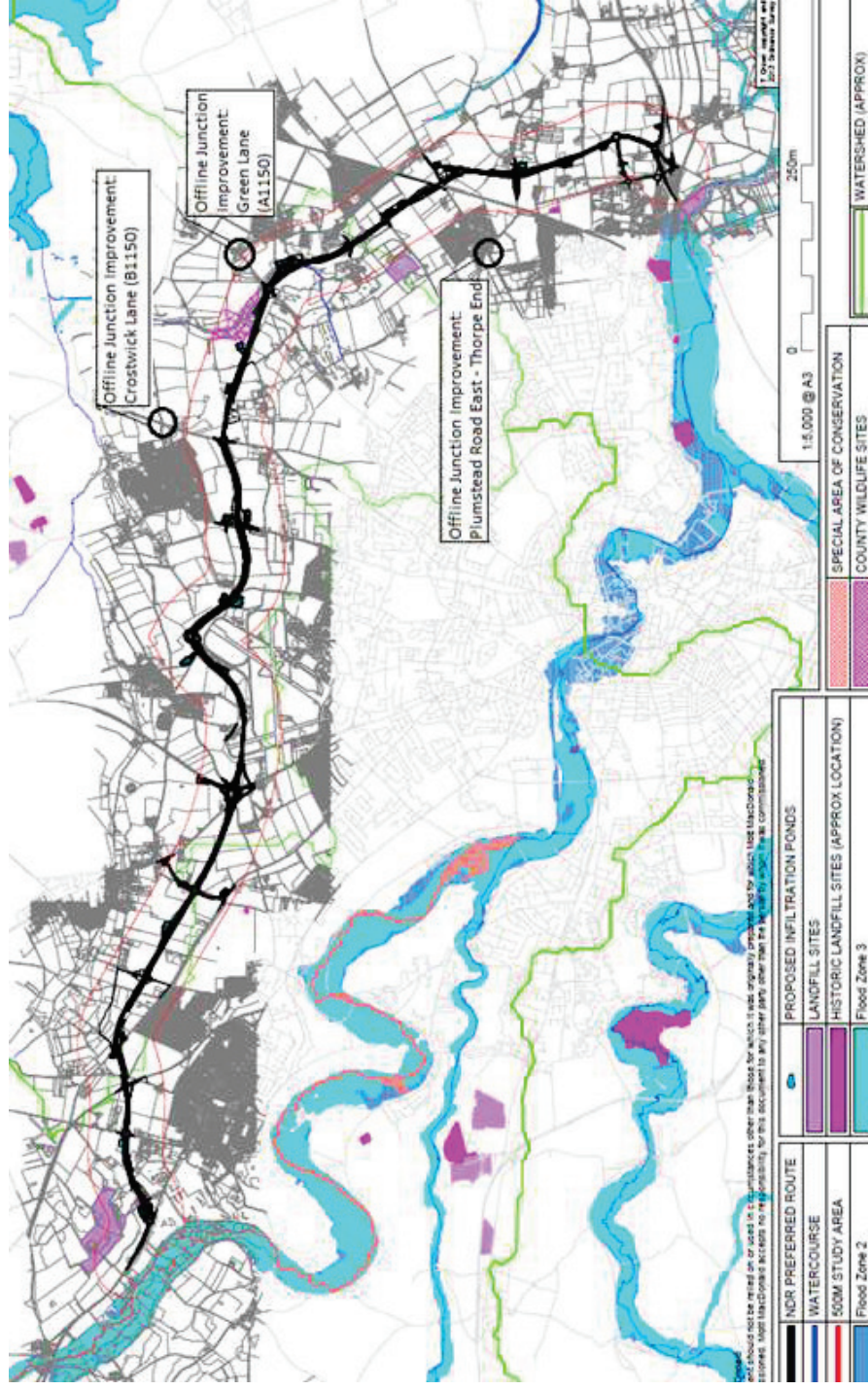
4.1.4 The EA publishes floodplain extents for all significant watercourses throughout England and Wales. These extents are available to the public via the internet and are the primary source of publicly available flood risk information. The Flood Zone Map for the area of interest is shown in Figure 4.1 and in Appendix B. It should be noted that the boundaries given on the flood maps are only indicative and do not take into account any man-made structures such as railway embankments and roads or flood defences. This is an important issue as in many places the influence of man-made structures (particularly flood defences) can substantially reduce the area likely to be affected by flooding.

4.1.5 The EA define three Flood Zones indicating the level of risk from river and tidal flooding.

- Flood Zone 1 (Low Risk): less than 0.1 % annual probability of flooding from rivers or the sea in any given year (less than a 1 in 1000 annual probability of flooding).

- Flood Zone 2 (Medium Risk): greater than 0.1 % but less than 1% annual probability of flooding from rivers or less than 0.5% annual probability of flooding from the sea in any given year (greater than a 1 in 1000 but less than 1 in 100 (1 in 200 from the sea) annual probability of flooding).
- Flood Zone 3 (High Risk): greater than 1 % annual probability of flooding from rivers (a 1 in 100 annual probability of flooding) or 0.5% annual probability of flooding from the sea in any given year (a 1 in 200 annual probability of flooding).

Figure 4.1: Flood Zone Map (Environment Agency 2013).



- 4.1.6 The EA flood map (Figure 4.1) indicates that the entire Scheme and the offline junction improvements are located in Flood Zone 1 and as such has less than 0.1 per cent annual probability of flooding. The Scheme is not located within an area likely to be affected by coastal flooding. Extreme tidal and surge events may cause some tide-locking of the River Yare raising water levels in the channel inland up to Norwich. However, the eastern end of the NDR (hereafter referred to as 'Postwick Hub') is over 5 m above the predicted levels for the extreme surge events on the River Yare, and therefore is not at risk from tidal flooding.
- 4.1.7 NPPF states that climate change may have a significant impact on peak river flows, peak rainfall intensity and sea levels in the future, increasing by up to 20%, 30% and 1.2m (NPPFTG Table 4) respectively by 2115. The Strategic Flood Risk Assessment (SFRA) for Greater Norwich (2008) indicates that at no point does any part of the Scheme intercept the predicted levels for the future fluvial or tidal 1% Annual Exceedance Probability (AEP) or extreme 0.1% AEP events.
- 4.1.8 Analysis of the flood maps and flood level tables (Figure 4.1 and Appendix B) shows that even with the predicted increase in flows and levels due to future climate change, fluvial and tidal flood risk to the Scheme remains low (Flood Zone 1). Therefore, flood risk to the Scheme from river, coastal and tidal flooding is minimal, both now and in the future.
- 4.1.9 Historic flooding reports from the EA also suggest there is little fluvial or tidal flood risk to the NDR. The nearest area of historic flooding (see Appendix B) is at Attlebridge which was flooded in 1993 along the River Wensum, however the flood extent boundaries are more than 200m from the western end of the Scheme, along Fakenham Road.

Sequential test

- 4.1.10 NPPF requires the application of a risk-based approach to determine land uses that are compatible with the level of flood risk at the proposed scheme. The purpose of the sequential test is to ensure that there are no other reasonably available sites in areas with a lower probability of flooding that would be appropriate to the type of development or land use proposed. Appropriate development should be directed towards Flood Zone 1 where at all possible, and then to Flood Zone 2 and Flood Zone 3 respectively.
- 4.1.11 Table 2 of NPPFTG identifies and classifies the vulnerability of each type of development. under the following five flood risk vulnerability classes;

- Essential Infrastructure
- Highly vulnerable
- More vulnerable
- Less vulnerable
- Water-compatible development

4.1.12 The proposed road and junctions are considered as “Essential Infrastructure” according to NPPF guidance. Table 3 of NPPFTG considers “Essential Infrastructure” as appropriate in Flood Zone 1 (less than 1 in 1000 annual probability of river or sea flooding).

4.1.13 The entire Proposed Development is located in the zone of lowest flood risk (Flood Zone 1) and therefore, is considered to satisfy the sequential test of the NPPF.

Surface water flood risk from the proposed road

4.1.14 The NDR will reduce the permeability of an area of approximately 630 km², of which a large proportion will be tarmac, generating 80-85% surface water runoff. Without mitigation this has the potential to alter the fluvial and groundwater regimes, as well as water quality in the area.

4.1.15 There are no known records of surface water flooding from Norfolk County Council, and no Highways Agency records of any known surface water issues along the proposed route or within its immediate vicinity. However, the SFRA suggests surface water flooding may be a significant issue in some places. The lack of historic evidence may be due to the nature of flooding which typically occurs on agricultural land; often being short and shallow in character which commonly means that it goes unreported.

4.1.16 The EA’s Flood Map for Surface Water (FMfSW) give an indication of the broad areas likely to be at risk of surface water flooding, i.e. areas where surface water would be expected to flow or pond. ‘Surface water’ is defined by the Flood and Water Management Act 2010 as the ‘surface runoff’ generated by rainwater (including snow and other precipitation) which is (a) on the surface of the ground (whether or not it is moving), and (b) has not yet entered a watercourse, drainage system or public sewer (excludes overflowing watercourses, drainage systems or public sewers caused by catchment-wide rainfall events or river flow).

- 4.1.17 The EA have provided the Flood Map for Surface Water for the Rackheath area (see Appendix B). The NDR crosses an area of “deeper surface water flooding” (>0.3m deep) for both the 1 in 30 and 1 in 200 year rainfall events within the catchment of Dobbs Beck. The 0.3m threshold is chosen as it represents a typical value for the onset of significant property damages when property flooding may start (above doorstep level) and because it is at around this depth that moving through floodwater (driving or walking) may become more difficult; both of which may lead users to consider the need to close roads or evacuate areas. The Dobbs Beck catchment area at the intersection with the proposed route of the NDR is 6.77km².
- 4.1.18 Table 4.1 provides an overview of the 31 attenuation lagoons, one large swale and one attenuation ditch which will serve the 20km road and in some cases will intercept a proportion of the overland flow. Four of the designed lagoons serve to contain overland flow only, with no contribution of runoff from the road (Lagoons 1A, 8A and 13A, and the new ditch 18B). The majority of lagoons will drain via infiltration to ground. The exceptions to this are lagoons 17 and 18 which are to be lined to prevent infiltration due to groundwater considerations (refer to Section 4.1.5) and will discharge to surface water. All lagoons have been sized to accommodate a 100-year return period storm event with an additional allowance of 30% for anticipated climate change, plus a minimum 300mm freeboard. Discharges from the lagoons to surface water will be restricted to the Greenfield runoff rate. All of the attenuation lagoons have been designed using the drainage modelling package Micro-Drainage. The Micro-Drainage calculation output files are provided in Appendix C.
- 4.1.19 Existing road drainage along Plumstead Road East is unlikely to change due to the junction improvement works. The capacity of existing kerbs and gullies along Crostwick Lane and the section of North Walsham Road it connects to will be reviewed during the detailed design stage, and will be upgraded if necessary. Road drainage along the new road between Green Lane West and Wroxham Road will be a traditional system based on kerbs, gullies and a soakaway.
- 4.1.20 Given that the drainage proposals have been designed in line with the CIRIA SUDS Manual C697, and are capable of managing the 1 in 100-year storm event plus 30% allowance for climate change, plus a minimum 300mm freeboard, it is considered that the risk of surface water flooding to the majority of the scheme is negligible. Only minor risks are considered to remain due to the sections of the drainage system which rely on gullies and pipe work. These elements of the system are designed to manage the 1 in 30-year event and are more vulnerable to blockage than the SuDS based

elements. However, flow routes for runoff exceeding the 1 in 30-year design standard are to be considered within the detailed design and thus the impact of any potential flooding will be negligible.

4.1.21 In consultation with the EA it has been agreed that the period over which the attenuation lagoons empty by half can be extended beyond the normal EA requirement of 24 hours. However, it is calculated that due to poor infiltration rates, some lagoons will take more than seven days to fully empty; giving rise to the risk of overtopping during a follow-on storm event. This risk is further mitigated by designing these lagoons to have sufficient volume to contain a follow-on 10-year return period storm within the freeboard. This residual risk is considered in Section 6.1.

4.1.22 During the construction phases, it is proposed that overflows will be controlled within the highway, and will be directed toward overflow 'outlets', and toward areas where overflows can pond safely. Safe areas of storage are proposed to be located or constructed away from the highway pavement.

Table 4.1: Surface Water Drainage Arrangements

Lagoon/ Ditch Site Reference	Road Chainage (m)	Overland Catchment Draining to Lagoon	Minimum Infiltration Rate (m/hr)	Max. Control Flow (l/s)	Half drain down time (mins)
1	650	NDR – Single/Dual Carriageway & 1 roundabout & OL01A (32ha)	0.432	N/A	148
1a (OL Only)	600	Overland flow catchment only: OL02 (91.4ha), OL02A (15.220ha) & OL02B (3.72ha)	0.432	N/A	153
2	1625	Fir Covert Road Roundabout	0.072	N/A	560
3	2820	NDR – Dual	0.050	N/A	1078

		Carriageway			
4	3125	NDR Dual Carriageway & 1 Roundabout & OL03A (9.73ha)	0.162	N/A	356
5	4200	NDR – Dual Carriageway & OL04 (23.15ha)	0.036	N/A	1707
6	500 Offline	Drayton Lane Roundabout (South) & OL05B (14.37ha)	0.144	N/A	415
6a	500 Offline	Drayton Lane Roundabout (North)	0.09	N/A	448
8	320 Offline	Cromer Road Roundabout (South)	0.028	N/A	2373
8a (OL only)	340 Offline	Cromer Road Junction (South-west) & OL06 (90ha)	0.028	N/A	3438
9	0 Offline	Cromer Road Roundabout (North)	0.021	N/A	2894
12	8900	NDR - Dual Carriageway and 1 Roundabout & OL09 (11.39ha)	0.119	N/A	544
13	9800	NDR – Dual Carriageway	0.005	N/A	Exceeds 7 days
13a (OL only)	9900	Overland flow catchment only - OL11 (39.02ha)	0.005	N/A	Exceeds 7 days
14	180 Offline	NDR – Dual Carriageway & Buxton Road (North)	0.059	N/A	1124

14a	430 Offline	Buxton Road (South) and OL13 (30.89ha)	0.026	N/A	2525
16	12800	NDR – Dual Carriageway & 1 roundabout	0.162	N/A	338
17	13400	NDR – Dual Carriageway and OL16A (3.98ha) and OL16B (3.63ha)	N/A	5	N/A
18	14600	NDR – Dual Carriageway	N/A	10.7	N/A
18a	14450	NDR - Dual Carriageway & Wroxham Road Roundabout	0.003	N/A	9047
18b ditch (OL only)	14780	Overland flow catchments (OL18 and OL20)	N/A	N/A	N/A
19	16200	Salhouse Road Roundabout & OL22 (12.12ha)	0.068	N/A	614
20	16400	NDR – Dual Carriageway	0.013	N/A	3460
21	140 Offline	Plumstead Road and link road	0.027	N/A	1556
22	160 Offline	NDR Dual Carriageway & 1 Roundabout & Plumstead Road Link Road	0.004	N/A	Exceeds 7 days
23	18160	NDR – Dual Carriageway & Toad	0.018	N/A	Exceeds 7 days

		Lane & OL27 (6.98ha)			
24	18760	NDR – Dual Carriageway	0.001	N/A	Exceeds 7 days
25	19350	NDR – Dual Carriageway & OL29 (4.42ha)	0.001	N/A	Exceeds 7 days
26 (Basin 1)	500 offline	Postwick - Dual Carriageway & 2 roundabouts	0.104	N/A	372
27 (large swale)	19600	Postwick - Dual Carriageway	N/A	N/A	N/A (lined)
28 (Basin 3)	100 offline	Postwick - Dual Carriageway, Slip Roads & Roundabout	N/A	N/A	N/A (lined)
29 (Basin 5)	400 offline	Postwick - P&R Signalised Junction & OL35B (2.022ha)	0.112	N/A	547
30 (Basin 6)	300 offline	Postwick - Dual Carriageway & OL32B (2.12ha)	0.031	N/A	2245

Overland flow flooding and cross-drainage design

4.1.23 As noted in section 4.1.3 above, the FMfSW indicates that the NDR will cross an area of “deeper surface water flooding” within the catchment of Dobbs Beck. This is supported by the EA maps of Areas Susceptible to Surface Water Flooding (ASSwF). These maps shows areas that are susceptible to surface water flooding, with three bandings, indicating ‘Less’ to ‘More’ susceptible to surface water flooding. The maps show the NDR crosses just one area ‘more’ susceptible to surface water flooding (see Appendix B). This is where it crosses the catchment of Beck Brook and Dobbs Beck, and the ASSwF therefore indicates similar risk to the FMfSW.

- 4.1.24 Analysis of the DTM constructed as part of this assessment indicates that the NDR bisects 43 natural catchments over its proposed 20km route. Figure 4.2 illustrates the location of each of these catchments and Table 4.2 summarises their characteristics. Whilst none of the catchments possess an active watercourse at the NDR crossing location, all pose a potential flood risk to the route as a result of overland flow during a storm event. Moreover, topographical changes as part of the proposals have the potential to increase flood risk elsewhere within the catchment if, for example, overland flow were to gather upstream of an embankment.
- 4.1.25 To reduce this potential increase in flood risk, culverts are proposed at the low points of the overland flow catchments, where flow is not directed and stored within the proposed infiltration lagoons. The culverts convey the overland flow to the other (down gradient) side of the road. In most catchments spreader ditches are also proposed along the road edge or embankment toe to direct flow to these culverts and promote infiltration. No culverts are proposed or considered necessary at the offline road sections (beyond chainage 20,000) at Postwick. No culverts are likely to be required at the three offline junction improvement sites; however the potential need to use culverts will be reviewed during the detailed design stage.
- 4.1.26 Using the DTM in GIS, catchment areas for overland flow have been defined. Hydrological catchment descriptors were obtained from the Flood Estimation Handbook (FEH). The revitalised method for estimating design-flood hydrographs (ReFH) was utilised, with outputs from FEH and GIS, to generate the rainfall and thence flood hydrographs for each catchment for a 1 in 100-year event, 24 hour storm duration. The level of infiltration was based on the FEH catchment descriptors. A hydrograph for each catchment for the climate change scenario (+30% rainfall depth) was calculated and utilised to estimate the 'critical volume' of overland flow which would be generated by each catchment upstream of the road crossings. This was used as the inflow volume to the culvert.
- 4.1.27 Two scenarios were applied to these calculations; a Blockage Scenario and an Operational Scenario (functioning culvert or where no culvert is proposed). The Blockage Scenario assumes that the proposed culverts are completely blocked and remain so for 24 hours, thus producing a worst-case flood extent. The flood level and flood extent upstream of the culvert was mapped in GIS based on the 'critical volume' and levels in the DTM.
- 4.1.28 The Operational Scenario assumes that the proposed culverts are operating as intended during a 1 in 100-year flood event + 30% for climate change. The

peak value of runoff during any half hour period during the design storm was determined using the ReFH output. The required headloss across the culvert to pass this discharge was identified based on the culvert diameter. The maximum upstream water level during the storm was then taken as the headloss height above the culvert at the upstream inlet. The flood extent upstream of the culvert was mapped in GIS based on this water level and levels in the DTM. The calculation summary sheets are provided in Appendix D and a summary provided in Table 4.2 . The culvert Blockage Scenario is 'not applicable' (N/A) for those catchments where overland flow is directed to and stored within proposed infiltration ponds. The Operation Scenario is not applicable for a catchment where no culvert is proposed. Due to the size of the box culvert for catchment OL20 (2500mm), no blockage scenario is considered.

Table 4.2: Overland Flow Catchments, Volumes and Flood Levels

Catchment Reference	Road Chainage of Catchment Low Point (m)	Catchment Area (km ²)	Receiving Drainage Structure	Culvert Blockage or No Culvert Scenario		Culvert Operational Scenario (1:100 yr+30%CC)	
				Flooded Volume (m ³)	Maximum Flood Level (mAOD)	Flooded Volume (m ³)	Maximum Flood Level (mAOD)
OL01A	600	0.48	Lagoon 1 (32ha) & spreader ditch	N/A	N/A	N/A	N/A
OL01B	1800	0.05	Spreader ditch	2928	15.83	N/A	N/A
OL01C	2250	0.04	Spreader ditch	238	40.21	N/A	N/A
OL02C	1050	0.91	Lagoon 1A	N/A	N/A	N/A	N/A
OL02A	600	0.15	Lagoon 1A	N/A	N/A	N/A	N/A
OL02B	300	0.04	Lagoon 1A	N/A	N/A	N/A	N/A
OL03A	3200	0.10	Lagoon 4	N/A	N/A	N/A	N/A
OL03B	3800	0.09	Spreader ditch & 450mm culvert	1421	33.65	219	33.28

Catchment Reference	Road Chainage of Catchment Low Point (m)	Catchment Area (km ²)	Receiving Drainage Structure	Culvert Blockage or No Culvert Scenario		Culvert Operational Scenario (1:100 yr+30%CC)	
				Flooded Volume (m ³)	Maximum Flood Level (mAOD)	Flooded Volume (m ³)	Maximum Flood Level (mAOD)
OL03C	4100	0.03	Spreader ditch & 450mm culvert	425	33.73	186	33.59
OL04	4650	0.23	Lagoon 5 & 450mm culvert	5300	30.35	1276	29.92
OL05A	600 offline	0.04	Lagoon 6 & 450mm culvert	641	34.91	41	34.31
OL06	300 offline	1.15	Lagoon 8A (90ha) & spreader ditch	6582	28.43	N/A	N/A
OL07B	400 offline	0.11	Spreader ditch	666	24.35	N/A	N/A
OL08	7100	0.18	450mm culvert	1044	30.27	122	29.79
OL09	8400	0.11	Lagoon 12	815	26.46	N/A	N/A
OL10	9200	0.03	450mm culvert	186	28.36	36	28.07

Catchment Reference	Road Chainage of Catchment Low Point (m)	Catchment Area (km ²)	Receiving Drainage Structure	Culvert Blockage or No Culvert Scenario		Culvert Operational Scenario (1:100 yr+30%CC)	
				Flooded Volume (m ³)	Maximum Flood Level (mAOD)	Flooded Volume (m ³)	Maximum Flood Level (mAOD)
OL11	9800	0.39	Lagoon 13A	N/A	N/A	N/A	N/A
OL12	10850	0.55	450mm culvert	5268	23.61	292	22.68
OL13	10950	0.62	Lagoon 14A (30.89ha) & spreader ditch	N/A	N/A	N/A	N/A
OL14	11600	0.06	Spreader ditch	572	26.01	N/A	N/A
OL15A	12050	0.15	450mm culvert	797	25.46	422	25.32
OL15B	12500	0.33	450mm culvert	1781	18.86	211	18.30
OL16	12800	1.05	525mm culvert	5449	16.37	199	14.51
OL16A	13000	0.04	Lagoon 17	N/A	N/A	N/A	N/A
OL16B	13350	0.04	Lagoon 17	N/A	N/A	N/A	N/A

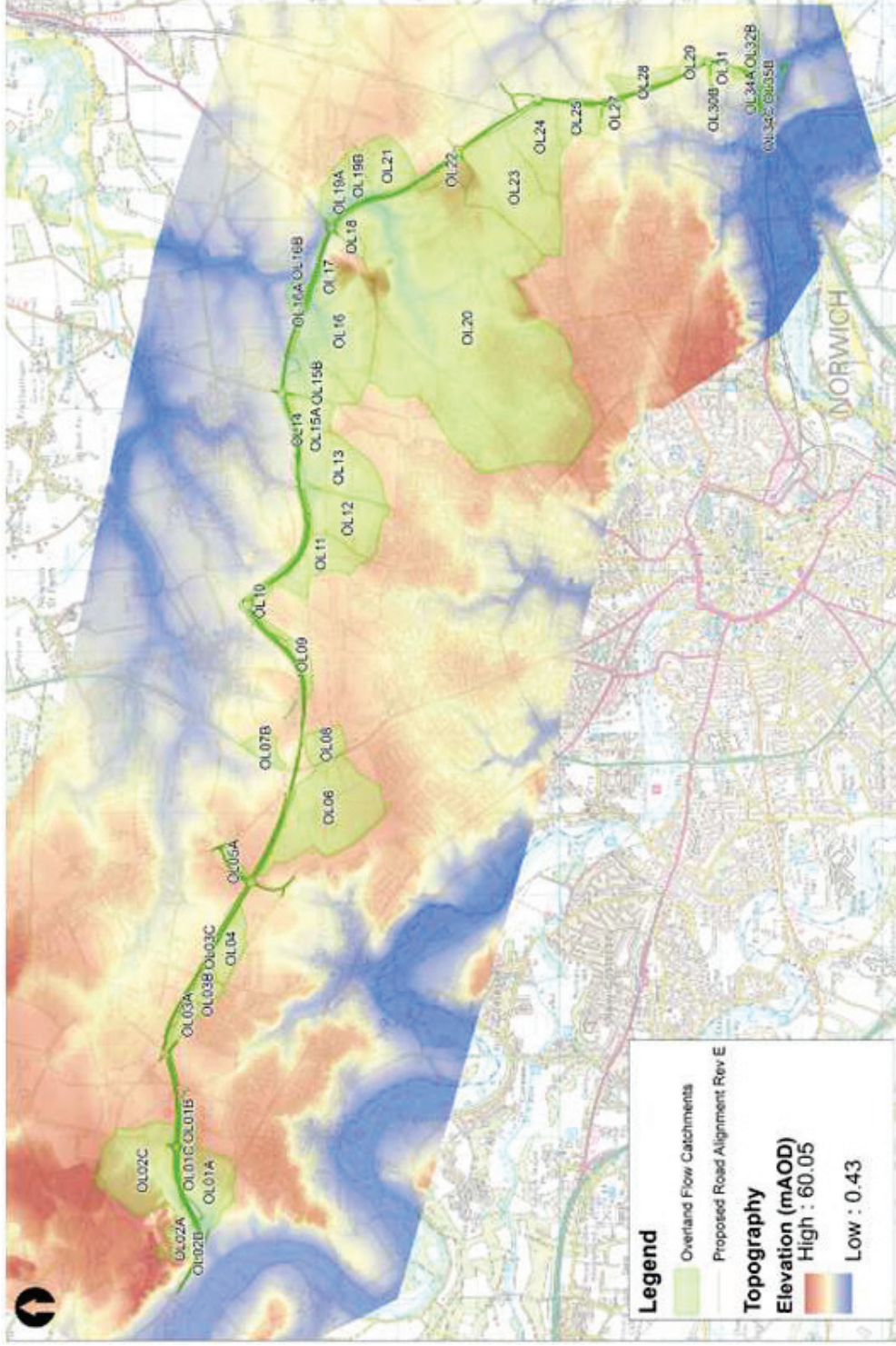
Catchment Reference	Road Chainage of Catchment Low Point (m)	Catchment Area (km ²)	Receiving Drainage Structure	Culvert Blockage or No Culvert Scenario		Culvert Operational Scenario (1:100 yr+30%CC)	
				Flooded Volume (m ³)	Maximum Flood Level (mAOD)	Flooded Volume (m ³)	Maximum Flood Level (mAOD)
OL17	13650	0.08	450mm culvert	470	17.92	47	17.26
OL18	14450	0.09	Draining to OL20 via filter drain	N/A	N/A	N/A	N/A
OL19A	14300	0.22	600mm culvert	1171	16.19	481	13.70
OL19B (& OL21)	14300	0.11	600mm culvert	921	20.27	481	16.24
OL20 (& OL18)	14700	6.77	2500mm culvert	37,819	17.91	N/A	N/A
OL22	16000	0.12	Lagoon 20	N/A	N/A	N/A	N/A
OL23	16400	1.05	450mm culvert	5708	26.09	630	25.63
OL24	16650	0.49	450mm culvert	2693	24.45	153	23.79

Catchment Reference	Road Chainage of Catchment Low Point (m)	Catchment Area (km ²)	Receiving Drainage Structure	Culvert Blockage or No Culvert Scenario		Culvert Operational Scenario (1:100 yr+30%CC)	
				Flooded Volume (m ³)	Maximum Flood Level (mAOD)	Flooded Volume (m ³)	Maximum Flood Level (mAOD)
OL25	17600	0.21	450mm culvert	1185	26.96	26	26.50
OL27	18100	0.07	Lagoon 23 via 450mm culvert	372	25.78	0	25.82
OL28	19300	0.14	450mm culvert	825	25.32	185	25.10
OL29	19375	0.04	Lagoon 25	N/A	N/A	N/A	N/A
OL30	Offline at 20000	0.022	Lagoon 26	N/A	N/A	N/A	N/A
OL31	Offline at 20000	0.022	Swale (27)	N/A	N/A	N/A	N/A
OL32	Offline at 20000	0.016	Lagoon 30 (0.012km ²)	N/A	N/A	N/A	N/A
OL33	Offline at 20000	0.003	Lagoon 28	N/A	N/A	N/A	N/A
OL34	Offline at 20000	0.036	A47 Eastbound Offslip drainage	N/A	N/A	N/A	N/A

Catchment Reference	Road Chainage of Catchment Low Point (m)	Catchment Area (km ²)	Culvert Blockage or No Culvert Scenario		Culvert Operational Scenario (1:100 yr+30%CC)		
			Receiving Drainage Structure	Flooded Volume (m ³)	Maximum Flood Level (mAOD)	Flooded Volume (m ³)	Maximum Flood Level (mAOD)
OL35	Offline at 20000	0.02	system	N/A	N/A	N/A	N/A

4.1.29 The potential lowering of the carriageway elevation by up to 0.25m (0.5m at roundabouts) has been assessed in relation to the design of the cross drainage structures. For structural reasons there is a requirement for a minimum cover distance from the carriageway surface to the top of each culvert. If this were to require any of the culverts to be depressed significantly below natural ground level at the crossing points, then their effectiveness would be reduced. Provided that this condition can be avoided, then reduction in carriageway design level would cause no increase in flood risk to others from the development. With lowering of the carriageway there may be some increase in the risk of flood water getting on to the road in a culvert blockage scenario (likely at OL01C), but this should be manageable with the proposed road drainage arrangements.

Figure 4.2: Overland Flow Catchments



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- 4.1.30 The flood extents generated by both scenarios have been mapped and are shown in Appendix E. For the Operational Scenario there was shown to be no significant backing up behind the culverts. For the Blockage Scenario the upstream flood extents produced were in some cases significant, as would be expected for a total blockage. In producing these maps it has been assumed that the flood extents stop at the road edge or embankment toe, the resultant maximum flood levels have then been used to inform the elevation of the road or flood bund.
- 4.1.31 As shown by the maps in Appendix E, no residential properties will be put directly at risk as a result of the worst-case Blockage Scenario flood extents. The extents for catchment OL12 cross a residential property boundary, but do not pose a risk to the house, only to the garden and an outbuilding.
- 4.1.32 An Anglian Water pumping station is located within the low point at chainage 14,750, along the track immediately south of Lagoon 18. The pumping station is considered to be 'water compatible infrastructure' in the NPPF Technical Guidance and should be designed and constructed to remain operational and safe for users in times of flood. Anglian Water has confirmed this pumping station has suffered from pluvial flooding in the past. There is a small wall around the wet well and sand bags have been used in the past to prevent the building from flooding but there is no other protection in place.
- 4.1.33 Three culverts are proposed in this area: (i) 2500mm wide and 2000mm high box culvert beneath the NDR (oversized for ecological mitigation), (ii) 600mm diameter pipe beneath the track connecting the new ditch 18B to Dobbs Beck, and (iii) an approx. 600mm diameter pipe under Wroxham Road. An existing culvert is present under the track leading to the pumping station but has been filled in. No blockage of the 2500mm culvert is expected due to its size, however blockages of all other culverts have been considered (see Appendix E, Drawing numbers MMD-233906-DT-0828 to 0858). During the design flood event 'Culvert for OL19B' (600mm) receives significant volumes of overland flow from catchments OL18, OL20, OL21 and OL19B. The flood extents and levels under the Operational Scenario pose no risk of flooding to the pumping station. Under the Blockage Scenario the elevation of the track was not considered, which will be raised to 15mAOD where the new culvert is proposed as part of the Scheme. As the ground to the north of the track is at a lower elevation than the track itself, it is assumed the track would act as a weir, allowing flood waters to flow over the track and into Dobbs Beck. The depth of water on the track is expected to be ~0.1m, and is therefore unlikely to prevent access to and from the pumping station even for the occurrence of a total culvert blockage during a severe flood event.

4.1.34 The creation of this new above ground flow path under the NDR and along the new ditch is likely to reduce the overall risk of pluvial flooding in the area by improving the conveyance of flood waters towards Dobbs Beck and into 'The Springs' lakes.

Groundwater flooding

4.1.35 Groundwater flooding occurs in areas underlain by significant aquifers where the groundwater levels rise above surface elevations. Groundwater flooding differs to river flooding as it is not necessarily linked to specific rainfall events, is difficult to predict and may persist for a much longer duration.

4.1.36 As part of the design process, a ground investigation has been undertaken by Norfolk Partnership Laboratory on behalf of Norfolk County Council. This work included the drilling of a series of boreholes along the proposed route of the NDR in order to determine the ground conditions; piezometers have subsequently been installed in a number of these boreholes to monitor the groundwater table.

4.1.37 Table 3.3 provides a summary of the groundwater level data collected since monitoring began in March 2007. As shown, the maximum groundwater level varies from 2.05m to 19.64m below ground level (mbgl) (12.39mAOD to 1.44mAOD) within the vicinity of the proposed route. Annual variations in groundwater are typically in the order of one to two metres a year. Increased infiltration from the road runoff could potentially surcharge the local groundwater level and groundwater flows in the immediate vicinity of the infiltration lagoons. However, the use of grass swales, filter drains and spreader ditches will ensure that this risk is minimised by enabling rainfall from the road to infiltrate over a wider area. Thus, it is predicted that there will not be any significant risk of groundwater flooding affecting the road or local area.

4.1.38 In consultation with the EA, it has been specified that the invert levels of the infiltration basins are to be at least 1.2 m above the groundwater table to allow sufficient unsaturated zone to mitigate the risk of groundwater contamination. As shown in Table 4.3, all lagoons satisfy this requirement except Lagoon 17 where the base is 0.6m above the highest GW level and Lagoon 18 with a 0.8m unsaturated zone, both of which are intended to be lined and outfall to nearby watercourses. Further ground investigations are proposed at Lagoon 17 to inform the detailed design stage, as the groundwater levels used are from a borehole more than 500m away.

- 4.1.39 The 1.2m unsaturated zone is also not met at Lagoon 4 (0.4m unsaturated zone), Lagoon 8 (1.1 m unsaturated zone) and Lagoon 9 (1.12m unsaturated zone) requiring deepening due to the fall required on the outfall. It is not possible to line the infiltration pond at Lagoons 4, 8 and 9 as there is no watercourse to receive a positive outfall. The detailed design will be agreed with the Environment Agency, including the potential need to raise lagoon invert levels.
- 4.1.40 In exceptionally wet winters the groundwater level may rise to cause inundation of the normally dry valley between the lake and Dobbs Beck, although the extent of flooding would be restricted by the valley topography. Ground investigations in the higher ground away from the Dobbs Beck valley floor suggest there may be some minor perched water in the less permeable geological formations. This may cause additional volumes of water requiring storage in this area. However, flows are likely to be minimal and would be routed away from the road to storage locations by the proposed drainage system.
- 4.1.41 Taking into consideration the data shown in Table 4.3, it can be concluded that flood risk to the NDR arising from groundwater is likely to be minimal since the proposed road level would be above the maximum groundwater level and any seepage from perched water would be managed. Any potential influences on groundwater flood risk in the local area are also considered to be negligible.

Table 4.3: Groundwater Table Levels

Piezometer Reference	Road Chainage (m)	Preliminary Road Level (mAOD)	Borehole Cover Level (mAOD)	Maximum Groundwater Level		Average Groundwater Level		Invert Level of Nearest Lagoon (mAOD)	Unsaturated Zone Thickness (m)
				mBGL	mAOD	mBGL	mAOD		
PW1A (UC)	137	20.94	22.35	13.5	10.0	12.9	9.4		
PW3 (UC)	328	20.49	21.25	13.0	9.9	11.9	9.3		
P0 (UC)	497	16.5	16.51	7.7	9.9	7.1	9.4	13.4 (Lagoon 1)	3.5 (Lagoon 1)
P12 (GSG)	1,739	38.65	37.51	DRY	DRY	DRY	DRY	15.0 (Lagoon 1A) 32.8 (Lagoon 2)	5.1 (Lagoon 1A) 22.9 (Lagoon 2)
P16 (GSG)	2064	38.37	39.73	DRY	DRY	DRY	DRY		
6P (GSG)	2,402	36.62	39.54	10.6	30.9*	8.8	29.1	32.4 (Lagoon 3)	1.5 (Lagoon 3)
								31.3 (Lagoon 3)	0.4 (Lagoon 3)

												4)		4)
6B (UC)	2,412	36.62	39.54	9.4	31.3	8.7	30.8							
P47 (CT)	5,143	32.38	35.88	DRY	DRY	DRY	DRY	26.8 (Lagoon 5)						
P49 (CT)	5,359	33.68	37.49	DRY	DRY	DRY	DRY	26.0 (Lagoon 6)						
P57 (GSG)	6,155	31.83	33.07	5.7	29.2	4.7	28.4							
15P5 (CG/UC)	6,804	24.70	28.57	8.8	21.0	8.2	20.2	22.1 (Lagoon 8)					1.11 (Lagoon 8)	
								24.6 (Lagoon 8A)					3.6 (Lagoon 8A)	
								21.2 (Lagoon 9)					1.12 (Lagoon 9)	
P87 (UC)	9,126	26.85	27.34	13.0	15.3	12.6	14.7	19.4 (Lagoon 12)					4.1 (Lagoon 12)	
P97 (CT)	10,237	28.00	30.93	DRY	DRY	DRY	DRY	20.5 (Lagoon)						

										13)	
P101 (CT)	10,611	25.2	26.59	5.3	21.3	5.3	21.3			21.2 (Lagoon 13A)	
22P4 (UC)	10,923	20.0	22.47	9.8	13.3	9.5	13.0				
P8A (UC)	11,010	18.87	18.39	9.6	13.2	5.8	12.6			16.6 (Lagoon 14)	3.4 (Lagoon 14)
P124 (CG)	12,904	18.47	20.77	DRY	DRY	DRY	DRY			14.1 (Lagoon 16)	
GW3A (UC)	13,254	15.69	14.80	2.9	12.6	2.5	12.3			12.0 (Lagoon 17)	-0.6 (Lagoon 17)
GW6 (UC)	14,204	17.90	15.28	3.4	12.4	3.1	12.2				
GW11A (UC)	14,711	16.43	14.44	2.6	12.4	2.3	12.2			13.2 (Lagoon 18)	0.8 (Lagoon 18)
BH147A	15,150	24.96	29.95	18.1	12.4	17.5	12.2			14.00 (Lagoon 18A)	1.6 (Lagoon 18A)

(CG)																				
BH147B (CG)	15,150	25.09		29.91	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY					
P153(GSG)	15,769	28.98		31.31	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	25.1 (Lagoon 19)				
BH1 (GSG / CTCG)	16,490	24.24		25.86	8.5	18.2	7.6	17.1	17.1	18.2	7.6	17.1	17.1	18.2	7.6	25.1 (Lagoon 19)	6.9 (Lagoon 19)			
BH14 (CT/CG)	16,868	33.95		24.22	8.3	18.5	6.8	17.7	17.7	18.5	6.8	17.7	17.7	18.5	6.8					
BH234(CG)	16,917	33.0		24.32	8.7	18.3	6.8	16.4	16.4	18.3	6.8	16.4	16.4	18.3	6.8					
BH13 (CG/UC)	16,948	33.46		24.46	7.4	19.7	6.8	17.7	17.7	19.7	6.8	17.7	17.7	19.7	6.8					
BH235 (CG)	17,035	31.0		24.98	7.5	18.3	7.0	18.0	18.0	18.3	7.0	18.0	18.0	18.3	7.0					
BH18 (CG/UC)	17,035	30.85		24.43	13.9	18.0	8.2	17.3	17.3	18.0	8.2	17.3	17.3	18.0	8.2	22.2 (Lagoon 21)	4.2 (Lagoon 21)			
																21.6 (Lagoon 21)	3.6 (Lagoon 21)			

BH17 (CT/CG)	17,045	30.85	25.02	7.8	18.6	7.3	17.8	22) 23.4 (Lagoon 23)	22) 5.4 23)
P190 (CG)	19,469	26.43	26.54	18.2	9.1	17.9	8.8	21.8 (Lagoon 24) 22.8 (Lagoon 25)	12.7 (Lagoon 24) 13.7 (Lagoon 25)
P196 (UC)	20,127	24.22	21.08	20.3	1.4	20.0	1.1	9.4 (Lagoon 29) 15.4 (Lagoon 30)	8.0 (Lagoon 29) 14.0 (Lagoon 30)

** The nearest trial pit to piezometer 15P5 was TP26, with a water strike of 29.6mAOD. Boreholes 227 and 228 have observed similar groundwater levels. The variation observed at P6 has been applied to the water strike of 29.6mAOD due to its closer proximity to Lagoons 3 and 4; giving a more representative maximum groundwater level.*

4.1.42 The potential lowering of the carriageway elevation by 0.25m (0.5m at roundabouts) has been assessed against the maximum groundwater levels observed along the NDR. Provided the distance between the base of the road and the maximum levels is maintained at or more than 1.2m, no change to the risk of groundwater flooding is expected.

4.2 Climate Change Impacts

4.2.1 Given the potential sources of flooding outlined previously, the only aspect of climate change likely to impact the proposed route of the NDR is the variation in rainfall patterns. DEFRA/NPPF guidance suggests an increase of 30% should be expected in peak rainfall intensity by the year 2115. As outlined within Sections 4.1.3 and 4.1.4, this precautionary increase of 30% has been applied to calculations of surface water runoff from the road and adjacent natural catchments. As a result, the attenuation lagoons have been designed to contain a 100-year event plus 30% allowance for climate change. Where the half drain-down time exceeds 7 days, lagoons have been designed to have the capacity for a follow on 1 in 10 year event within the freeboard. In addition, capacity and flow routing for extreme events (up to the 1 in 1000-year event) have also been incorporated within the system. The capacities and consideration of climate change are shown in the micro drainage calculations for each lagoon in Appendix C.

4.2.2 The proposed Scheme would reduce the permeability within its footprint, due to areas of impermeable concrete and tarmac being constructed.

4.2.3 Considering the increase in rainfall due to climate change there may be a significant increase in surface water runoff. Without mitigation this may alter the fluvial and groundwater regimes and water quality both along the Scheme and in the surrounding area.

4.2.4 The drainage design, outlined in Section 4, has been developed to mitigate this increased runoff as a result of the proposed Scheme and climate change in order to comply with the NPPF.

5. Flood Risk Management Recommendations

5.1.1 This section outlines recommendations for the management of both on- and off-site flood risk identified as part of this FRA. It is intended for these recommendations to inform the ongoing design process for the Scheme. Also identified are areas requiring further assessment once these proposals have been prepared.

5.2 On-site flood management

5.2.1 As discussed within Section 4.1.4, the overland flow from catchments which will be bisected by the proposed route of the NDR will be managed through the use of appropriately sized attenuation lagoons, cross-drainage structures such as spreader ditches and culverts where feasible. Table 4.2 in Section 4.1.4 shows the calculated runoff volumes from these catchments and also estimates the water level to which these volumes would accumulate upstream of the road.

5.2.2 As described in Section 3.1, there is the potential for the NDR works to deviate from the current proposed elevation by +/- 0.5m during the detailed design stage. As described in Sections 4.1.4 and 4.1.5, any variation should maintain road surface elevations at above the estimated maximum flood levels calculated in Table 4.2 and above the maximum groundwater levels in Table 4.3. This assessment assumes there will be no variation to the high and low points of the road, therefore the associated road drainage arrangements remain the same.

5.2.3 A retention bund is required at OL02C (chainage 1,000) the crest level of the bunds is to be specified with reference to the maximum flood levels calculated in Table 3.2 plus a 300mm freeboard. The flood bund will protect the bridleway from the overland flow volume produced during a storm event, maintaining pedestrian access during a flood event.

5.2.4 Where cross-drainage structures are proposed, it will be necessary to consider the erosive potential of flow at the outfall of these pipes given the absence of natural channels to which discharge can be directed. Such calculations should be made with reference to CIRIA C551. In the case of smaller pipes, it may be sufficient to specify stone blankets or gabion baskets to reduce the velocity (and thus erosive potential) of discharge. However for larger pipes and culverts, more substantial structures may be required such

as simple stilling basins or level spreaders; refer to CIRIA C697 for typical design specifications.

5.3 Maintenance

5.3.1 The culverts, spreader ditches, swales and attenuation lagoons proposed by the drainage design will be maintained in accordance with policies, standards and practices of Norfolk County Council’s Transport Asset Management Plan and The SuDS Manual (CIRIA, 2007). Table 5.1 details the maintenance programme proposed.

5.3.2 In order to maintain the efficiency of the SuDS elements of the proposed drainage design, regular maintenance will be required. It is anticipated that swales, filter trenches and detention ponds will require regular inspection, litter and debris removal, and grass cutting, as well as occasional maintenance such as sediment management and vegetation replacement to retain design capacities and functionality. As outlined in the Norfolk’s Transport Asset Management Plan, the maintenance of the NDR and its associated drainage is proposed to be the responsibility of Norfolk County Council including the actions outlined in Table 5.1.

Table 5.1: Proposed Drainage Maintenance Plan

Inspection	Safety inspections of carriageway, attention to known problems or specific areas after heavy rainfall as opportunity allows.
Do Minimum	<p>The do minimum activities are the routine activities we carry out in order to ensure the safe passage of highway users.</p> <p>Cleansing activities (inc. gullies, outlets, grips annually. Use individual maintenance plan for systems if available)</p> <p>Drainage Investigation</p> <p>Add new provision grips, ditches, gullies and outlets</p>
Medium Life	<p>Reinforcement of existing system with additional capacity</p> <p>Pipeline repair to return capacity</p> <p>Partial pipeline upgrade</p> <p>Additional gullies</p>

	Additional soakage capacity
Long Life	Significant renewal or enhancement New area provision Pipeline upgrade

6. Residual Risks

6.1 Residual risk of overtopping

6.1.1 As outlined in Section 4.1.3, due to poor infiltration rates, it is calculated that some of the attenuation lagoons will take over seven days to drain down from the design 1 in 100-year plus climate change storm. This could give rise to a residual risk of flooding should a follow-on storm event occur whilst the water level in the lagoon is still of sufficient height to cause overtopping. The magnitude and probability of combinations of storm events cannot be readily quantified, but the probability of a further significant storm event occurring within seven days of another will be extremely small. However, in order to mitigate against such an occurrence, these lagoons have been designed with additional capacity to allow for runoff from a follow-on 1 in 10 year storm event to be accommodated within the freeboard. This allowance has been agreed with the EA.

6.1.2 Taking into consideration the very small probabilities involved, it can be concluded that the residual risk of overtopping due to a follow-on event is negligible.

6.2 Residual risk of flooding from overland flow

6.2.1 The creation of the new above ground flow path under the NDR and along the new ditch in the Rackheath Springs area is likely to reduce the risk of pluvial flooding locally by improving the conveyance of flood waters towards Dobbs Beck and into 'The Springs' lakes. There remains a residual risk of pluvial flooding to the AWS pumping station. However, this risk will have been reduced from the existing situation by the NDR proposals.

6.3 Risk management by design

6.3.1 As the surface water storage is to be provided in the form of open basins, consideration for public safety is paramount. Therefore where the storage depth exceeds 1.2m, prohibitive planting will be provided to discourage access to the water. For those basins close to public access, perimeter fencing and lifesaving equipment will also be provided. Moreover, for reasons of maintenance ease as well as safety, all side slopes within the system, including those within the storage basin and swales, have been limited to 1 in 4.

7. Conclusions

- 7.1.1 As a part of the on-going consultation process with the Environment Agency, comments on the draft FRA were provided to Mott MacDonald on 28 November 2013. Responses to the issues raised can be found in Appendix F; along with supporting data and figures.
- 7.1.2 In accordance with the requirements of NPPF, the proposals for the development of the NDR have been assessed for flood risk, and consideration has been given both to risk to the proposed development, and to risk elsewhere as a result of the development.
- 7.1.3 The proposed Scheme and three offline junction improvements are entirely located within Flood Zone 1 where there is little or no annual probability of fluvial or tidal flooding. Table 3 of the NPPF Technical Guidance states all uses of land are appropriate in Flood Zone 1. As such, the proposed Scheme would be permitted within this zone.
- 7.1.4 The development of the NDR will introduce a significant amount of impermeable area to a previously undeveloped site. In compliance with NPPF, the highway drainage for the NDR has been designed in line with SuDS principals to restrict runoff to Greenfield discharge rates. Therefore flood risk due to surface water runoff will be mitigated to acceptable levels.
- 7.1.5 The proposed route will bisect 43 natural catchments and an assessment has been made of the potential runoff from these catchments. The resultant flood extents have been mapped upstream of the road where natural drainage paths will be severed within these catchments. Two scenarios were considered, culvert operational, and culverts fully blocked, and the flood extents from both will, at no point, affect any existing property or infrastructure. The exception is the Anglian Water pumping station near Lagoon 18, where there remains a residual risk from pluvial flooding. However, due to the lower elevation of ground upstream of the access track, the track would act as a weir and flood waters will flow towards Dobbs Beck. This, and the creation of a new above ground flow path, will improve the conveyance of pluvial flood flows in this area compared to the existing situation.
- 7.1.6 Given the depth of the groundwater table beneath the preliminary road levels, flood risk to the NDR and offline junction improvements arising from groundwater is likely to be minimal. Any residual risks, due to climate change

for example, would be easily managed by the proposed surface water drainage system.

- 7.1.7 With the implementation of the recommended flood risk management and drainage proposals within Section 5, the NDR and associated offline junction improvement proposals are considered to be acceptable in terms of flood risk and meet the requirements of NPPF.

8. References

JBA Consulting. 2006. Broadland, North Norfolk, and South Norfolk District Councils, Norwich City Council and the Broads Authority Strategic Flood Risk Assessment. http://www.northnorfolk.org/files/Flood_Risk_Assessment_Stage_1.pdf

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Hyder Consulting, 2013. Broadland District Council North East Norwich Water Cycle Study: Detailed Report. DRAFT June 2013.

Communities and Local Government. 2012. National Planning Policy Framework, Technical Guidance, Table 5.

CIRIA. 2002. Manual on scour at bridges and other hydraulic structures.

The Norfolk County Council (Norwich Northern Distributor Road (A1067 to A47(T))) Order

5.3 Environmental Protection Act Statement

Planning Act 2008

Infrastructure Planning (Applications: Prescribed Forms and Procedures)
Regulations 2009

PINS Reference Number: TR010015

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INTRODUCTION

This document is submitted in relation to the application for a Development Consent Order by Norfolk County Council to the Secretary of State, under the Planning Act 2008.

The application is for the Norfolk County Council (Norwich Northern Distributor Road (A1067 to A47(T))) Order, to grant development consent for the construction of a new highway running west to east, to south, between the A1067 Fakenham Road and the A47 Trunk Road at Postwick, including improvements to the existing highway network, to the north and north east of Norwich.

This document is the Explanatory Memorandum, comprises part of the application documents and is provided as required under Regulation 5(2)(f) of the Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009.

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1 Summary

- 1.1 This Statement identifies whether the proposals for the Norwich Northern Distributor Road engage one or more of the matters in respect of statutory nuisance set out in section 79(1) of the Environmental Protection Act 1990 (the 1990 Act). Where any such matters could be engaged, the Statement explains how the applicant proposes to mitigate or limit them.
- 1.2 This Statement concludes that the only matters comprised in section 79(1) of the 1990 Act which may, potentially, be engaged as a consequence of the Scheme proposals are:
- 1.2.1 dust impacts arising from construction activities (s. 79(1)(d));
 - 1.2.2 impacts arising from lighting during construction (s. 79(1)(fb)); and,
 - 1.2.3 noise impacts from construction activities (s. 79(1)(g) and (ga)).
- 1.3 The Statement concludes that, with the implementation of mitigation and control measures included in the Environmental Statement (Document 6.1), the Construction Environmental Management Plan (Document 6.2 - Environmental Statement, Volume II, Chapter 23) and the construction methodology (Document 6.2 - Environmental Statement, Volume II, Chapter 2), the project would not give rise to a nuisance or be prejudicial to health.

2 Introduction

- 2.1 This Statement in Respect of Statutory Nuisance (the Statement) accompanies an application by Norfolk County Council (NCC) for development consent under section 37 of the Planning Act 2008 for the Norwich Northern Distributor Road (NDR).
- 2.2 The project, known as the NDR, comprises a predominantly dual carriageway all-purpose strategic distributor road which would link the A1067 Fakenham Road, near Attlebridge, to the A47 Trunk Road at Postwick. On 9 August 2013 the Secretary of State for Transport directed that the NDR and associated matters be treated as development for which development consent is required.
- 2.3 This Statement has been prepared pursuant to regulation 5(2)(f) of the Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009. In accordance with that regulation, it identifies whether the NDR engages one or more of the matters listed as statutory nuisances in section 79(1) of the Environmental Protection Act 1990 and, if so, how NCC proposes to mitigate or limit those effects.
- 2.4 The Statement has been prepared having regard to the Planning Act *Application Form Guidance* published by the Department for Communities and Local Government in June 2013.
- 2.5 Where relevant, this Statement refers to the Environmental Statement (ES) (Documents 6.1 and 6.2), the Construction Environmental Management Plan (CEMP) (Document 6.2 – ES, Volume II, Chapter 23) and the Construction Methodology (Document 6.2 – ES, Volume II, Chapter 2).

3 Statutory Context

3.1 The requirement for this Statement

3.1.1 Section 37(3)(d) of the Planning Act 2008 requires applications for development consent to be accompanied by documents and information of a prescribed description.

3.1.2 The documents and information are prescribed by the Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009. Regulation 5(2)(f) provides that an application must be accompanied by:

a statement whether the proposal engages one or more of the matters set out in section 79(1) (statutory nuisances and inspections therefor) of the Environmental Protection Act 1990, and if so how the applicant proposes to mitigate or limit them.

3.2 Categories of statutory nuisance

3.2.1 Section 79(1) of the Environmental Protection Act 1990, as it applies in England and Wales, provides that each of the following matters constitutes a statutory nuisance:

- (a) *any premises in such a state as to be prejudicial to health or a nuisance;*
- (b) *smoke emitted from premises so as to be prejudicial to health or a nuisance;*
- (c) *fumes or gases emitted from premises so as to be prejudicial to health or a nuisance;*
- (d) *any dust, steam, smell or other effluvia arising on industrial, trade or business premises and being prejudicial to health or a nuisance;*
- (e) *any accumulation or deposit which is prejudicial to health or a nuisance;*
- (f) *any animal kept in such a place or manner as to be prejudicial to health or a nuisance;*

- (fa) *any insects emanating from relevant industrial, trade or business premises and being prejudicial to health or a nuisance;*
- (fb) *artificial light emitted from premises so as to be prejudicial to health or a nuisance;*
- (g) *noise emitted from premises so as to be prejudicial to health or a nuisance;*
- (ga) *noise that is prejudicial to health or a nuisance and is emitted from or caused by a vehicle, machinery or equipment in a street or in Scotland, road;*
- (h) *any other matter declared by any enactment to be a statutory nuisance.*

3.2.2 Paragraph (h) of section 79(1) incorporates any statutory nuisances contained in other legislation. The Public Health Act 1936 provides that various other matters are statutory nuisances for the purposes of the Environmental Protection Act 1990. However, none of these matters are considered relevant to the NDR scheme.

3.2.3 The remaining sub-sections in section 79 contain exceptions and definitions. The following exceptions are relevant to the NDR:

- (a) subsection 1(c) (fumes or gases emitted from premises) does not apply in relation to premises other than private dwellings (s. 79(4)); and
- (b) subsection 1(ga) (noise caused by a vehicle, machinery or equipment in a street) does not apply to noise made by, amongst other matters, traffic (s. 79(6A)).

3.2.4 The definitions that are relevant to the NDR are:

- (a) “dust” does not include dust emitted from a chimney as an ingredient of smoke;
- (b) “fumes” means any airborne solid matter smaller than dust;
- (c) “gas” includes vapour and moisture precipitated from vapour;
- (d) “industrial, trade or business premises” means premises used for any industrial, trade or business purposes or premises not so used on which matter is burnt in connection with any industrial, trade or

business process, and premises are used for industrial purposes where they are used for the purposes of any treatment or process as well as where they are used for the purposes of manufacturing;

- (e) “noise” includes vibration;
- (f) “prejudicial to health” means injurious, or likely to cause injury, to health;
- (g) “premises” includes land and ... any vessel;
- (h) “private dwelling” means any building, or part of a building, used or intended to be used, as a dwelling;
- (i) “road” has the same meaning as in Part IV of the New Roads and Street Works Act 1991;
- (j) “smoke” includes soot, ash, grit and gritty particles emitted in smoke; and
- (k) “street” means a highway and any other road, footway, square or court that is for the time being open to the public.

4 Assessment of matters potentially engaged

4.1 Introduction

4.1.1 The following matters set out in section 79(1) of the Environmental Protection Act 1990 are potentially engaged by the NDR:

- (a) dust impacts that could engage paragraph (d) of section 79(1);
- (b) impacts from artificial light which could engage paragraph (fb) of section 79(1); and
- (c) noise impacts which could engage paragraphs (g) and (ga) of section 79(1).

4.1.2 Each of these impacts is discussed below.

4.2 Dust (section 79(1)(d))

4.2.1 Construction activities can result in temporary effects from dust. 'Dust' is a generic term which usually refers to particulate matter in the size range 1-75 microns in diameter; the most common impacts from dust emissions are soiling and increased ambient PM10 concentrations (Building Research Establishment, 2003).

4.2.2 The distances from the emission source at which significant construction dust effects are likely to occur are dependent on the extent and nature of mitigation measures, the prevailing wind conditions, rainfall and the presence of natural screening by, for example, vegetation or existing physical screening. However, research indicates that effects from construction activities that generate dust are generally limited to within 150-200m of the construction site boundary (Highways Agency, 2007), although guidance issued by the Institute of Air Quality Management requires consideration of effects up to 350m from the construction area boundary (Institute of Air Quality Management, 2011).

Construction phase

4.2.3 Construction work requires the use of a range of site plant, such as excavators, piling equipment, cranes and on site generators. All of these plant have an energy demand and some may result in direct emissions to air from exhausts. The key effects during the construction phase are associated with dust-raising activities related to earthworks, construction and vehicles

tracking. This includes the handling of spoil, loading and unloading of trucks and the movement of the trucks around the construction site and onto the local road network.

- 4.2.4 ES Volume 1, Chapter 4, Section 1.6 (Document 6.1) details the assessment of construction phase activities. There are 63 sensitive receptors located within 20m of the DCO boundary. The significance of dust soiling effects is assessed as slight adverse because all human receptors are considered high risk.

Mitigation

- 4.2.5 The NDR has a number of incorporated mitigation measures for the construction phase which are principally aimed at reducing dust effects from the construction activities and will be included within the Construction Environmental Management Plan (CEMP) (Document 6.2 - ES, Volume 2, Chapter 23). The construction phase will include the mitigation measures presented in Volume 1 Chapter 4 of the ES (Document 6.1) which will reduce the dust risk from each of the sources assessed. The overall significance of effects from construction dust has been determined taking this mitigation into account.

Conclusion

- 4.2.6 Taking into account the mitigation measures described above, the dust impacts arising during the construction phase are not predicted to cause a nuisance or to be prejudicial to health.

Operational phase

- 4.2.7 There are no predicted dust generating activities during operation. There may be routine maintenance to the road which could have the potential to generate dust but these will be small scale and intermittent. The maintenance teams will manage dust using methods similar to those outlined within the CEMP (Document 6.2 - ES, Volume 2, Chapter 23).

Conclusion

- 4.2.8 Taking into account the mitigation measures described above, the dust impacts arising during the operational phase are not predicted to cause a nuisance or be prejudicial to health.

4.3 Artificial light (section 79(1) (fb))

- 4.3.1 During construction there may be a requirement to light site compounds and construction areas at some times of the day, based on a standard 12 hour working day which in winter will include some hours of darkness.
- 4.3.2 Prior to construction, a lighting management plan will be submitted to the local authority to approve acceptable lighting regimes taking account of potential effects on local people. This will be managed through the CEMP and lighting scheme (to be approved by the local authority pursuant to requirements 18 and 19 (Schedule 2 to the Draft Development Consent Order, Document 3.1).
- 4.3.3 During operation, the NDR will not be lit with the exception of the Postwick Hub which already has established lighting.
- 4.3.4 Taking into account the mitigation measures that are set out in the DCO application (the ES in particular), and the management of these through the CEMP, it is considered there the impacts from artificial lighting arising during both the construction and the operational phase will not cause a nuisance or be prejudicial to health.

4.4 Noise (section 79(1)(g) and (ga))

- 4.4.1 This section addresses the potential of noise during construction activities. Noise impacts due to operational traffic would not constitute a statutory nuisance for the purposes of the Environmental Protection Act (see section 79(6A)).
- 4.4.2 Noise levels generated by construction activities are only deemed to be significant if the total noise (pre-construction baseline noise plus construction noise) exceeds the pre-construction baseline noise by 5 dB or more, subject to lower cut-off values of 65 dB (daytime), 55 dB (evening) and 45 dB LAeq (night-time) from construction noise alone; and have a duration of one month or more, unless works of a shorter duration are likely to result in significant impact.
- 4.4.3 The day-time period is defined as 07:00 to 19:00; the evening period as 19:00 to 23:00 and the night-time period as 23:00 to 07:00.
- 4.4.4 Construction noise is predicted in the ES (Document 6.1, Volume I, Chapter 11) to generate temporary significant effects at some locations. Further construction noise calculations will be carried out as further construction-related information becomes available, and the Contractor will be required to

apply for consent under section 61 of the Control of Pollution Act 1974 prior to the commencement of noisy construction activities.

4.4.5 Mitigation methods to reduce the impacts from noise can be found in the CEMP (Document 6.2 - ES, Volume 2, Chapter 23).

4.4.6 Taking into account the mitigation measures described above, it is considered that the noise impacts during both the construction phase will not cause a nuisance or be prejudicial to health.

4.5 Matters not potentially engaged

4.5.1 It is considered that the following matters set out in section 79(1) of the Environmental Protection Act 1990 will not be engaged by the NDR project. Consequently, they have not been discussed further in this Statement:

- (a) *any premises in such a state as to be prejudicial to health or a nuisance;*
- (b) *smoke emitted from premises so as to be prejudicial to health or a nuisance;*
- (c) *fumes or gases emitted from premises so as to be prejudicial to health or a nuisance;*
- (e) *any accumulation or deposit which is prejudicial to health or a nuisance;*
- (f) *any animal kept in such a place or manner as to be prejudicial to health or a nuisance;*
- (fa) *any insects emanating from relevant industrial, trade or business premises and being prejudicial to health or a nuisance;*
- (h) *any other matter declared by any enactment to be a statutory nuisance.*

5 CONCLUSION

5.1.1 This Statement identifies whether the matters in respect of statutory nuisance set out in section 79(1) of the Environmental Protection Act 1990 would be engaged by the proposed NDR. Where such matters would be engaged, the Statement sets out how it is proposed to mitigate or limit the nuisance caused.

5.1.2 The Statement concludes that the following matters set out in section 79(1) could potentially be engaged by the NDR project:

- (d) *any dust, steam, smell or other effluvia arising on industrial, trade or business premises and being prejudicial to health or a nuisance;*
- (fb) *artificial light emitted from premises so as to be prejudicial to health or a nuisance;*
- (g) *noise emitted from premises so as to be prejudicial to health or a nuisance;*
- (ga) *noise that is prejudicial to health or a nuisance and is emitted from or caused by a vehicle, machinery or equipment in a street or in Scotland, road;*

5.1.3 For all of the above matters, the Statement concludes that, with the implementation of mitigation and control measures set out in the ES, the CEMP and the Construction Methodology, the Scheme would not give rise to a nuisance or be prejudicial to health.

6 Glossary

Term	Meaning/Definition
The Application	The Application for the DCO for the NDR
DCO	Development consent order, the type of consent that can be granted by the Secretary of State pursuant to the Planning Act 2008 and for which NCC has applied pursuant to the Application
CEMP	The Construction Environmental Management Plan, a draft of which is provided at Chapter 23 of Volume 2 to the Environmental Statement, Document 6.2
The Order	The Norfolk County Council (Norwich Northern Distributor Road (A47 to A1067(T))) Order, being a Development Consent Order required for the NDR
NCC	Norfolk County Council
NDR	Norwich Northern Distributor Road, the main development for which consent is sought in the Order

The Norfolk County Council (Norwich Northern Distributor Road (A1067 to A47(T))) Order

5.4 Details of other consents, licences and permits

Planning Act 2008

Infrastructure Planning (Applications: Prescribed Forms and Procedures)
Regulations 2009

PINS Reference Number: TR010015

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Introduction

This document is submitted in relation to the application for a Development Consent Order by Norfolk County Council to the Secretary of State, under the Planning Act 2008.

The application is for the Norfolk County Council (Norwich Northern Distributor Road (A1067 to A47(T))) Order, to grant development consent for the construction of a new highway running west to east, to south, between the A1067 Fakenham Road and the A47 Trunk Road at Postwick, including improvements to the existing highway network to the north and north east of Norwich.

This document comprises part of the application documents and relates to Regulation 5(2)(q) of the Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009.

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1 Summary

- 1.1.1 This document describes the consents, licences and permits that will be required for the construction or operation of the NDR but which are not included in the Draft Development Consent Order (Document 3.1).
- 1.1.2 Such licences and permits will be the subject of separate applications to other bodies such as the Environment Agency, Natural England or the local planning authority. The consents relate to discharge of water during construction, works affecting protected species (bats and great crested newts), drainage, and noise and traffic controls during construction.
- 1.1.3 Norfolk County Council (NCC) is not aware of any reason why any of the consents are not likely to be granted.

2 Other Consents, Licences and Permits

2.1 Introduction

- 2.1.1 This document is submitted as part of the application by Norfolk County Council (NCC) for development consent for the Norwich Northern Distributor Road (NDR).
- 2.1.2 This document describes the consents, licences and permits that will be required for the construction, operation and maintenance of the NDR but which are not included in the Draft Development Consent Order (Document 3.1) submitted with this application. Such licences and permits will therefore be the subject of separate applications to other bodies such as the Environment Agency, Natural England or the local planning authority.
- 2.1.3 This document is not required by the Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 but is recommended in Planning Inspectorate Advice Note 6 (Preparation and Submission of application documents, June 2012), at Appendix 1.

2.2 Discharge Consents

- 2.2.1 Consent for discharge of water to the aquifer may be required under the Environmental Permitting (England and Wales) Regulations 2010.
- 2.2.2 Piling work will take place at bridge locations, and the piles may penetrate the water table. If so, some water may have to be pumped out and placed back in the aquifer. Before it is returned to the aquifer it would be treated in a settlement system.
- 2.2.3 Any discharge consents required will be sought from the Environment Agency prior to any such works being carried out.

2.3 Protected Species Licences

- 2.3.1 Protected species licences will be required under regulation 53 of the Conservation of Habitats and Species Regulations 2010 in relation to the species identified below.
- 2.3.2 Great crested newts: a breeding pond and an associated area of terrestrial habitat for great crested newts will be removed as part of the construction of

the Scheme. The pond that will be removed is part of a series currently in place – the others in this series are not being removed. As part of the Scheme four new ponds are being created in the immediate vicinity, and areas of remaining terrestrial habitat will be maintained along with the new ponds. Newt fencing will be erected before construction works begin, and trapping and re-location of newts will be carried out.

- 2.3.3 Bats: the construction works will result in the removal of a number of bat roosts in buildings and in trees. The NDR will intersect flight paths and other features of bat activity. New roosts will be provided, including two bat houses and a number of bat boxes. Severance of significant flight paths will be addressed by the installation of crossing points over/under the NDR of various types, such as bat gantries, green bridges, underpasses and modified highway bridges to provide dark corridors.
- 2.3.4 Protected species licences will be sought from Natural England following the making of the development consent order sought by this application. Mitigation measures have been discussed with the Natural England Case Officer during the consultation that has been on-going throughout the design and evolution of the Scheme. Draft licence applications were submitted to Natural England in November 2013, with a view to a letter of comfort being obtained confirming that Natural England consider that it is likely that it would be in a position to grant protected species licences when formally sought.

2.4 Land Drainage Consents

- 2.4.1 Consent to obstruct watercourses may be sought from the relevant local drainage board under the Land Drainage Act 1991 (section 23).
- 2.4.2 These consents will be required if the dry watercourses will require culverting, and they are in an area administered by the Broads Internal Drainage Board, from whom any consent required will be sought. Discussions between NCC, the Environment Agency and the Internal Drainage Board regarding this and other relevant aspects of the Scheme have already taken.

2.5 Noise Controls

- 2.5.1 Prior consent for works on construction sites may be sought from the relevant local authority under section 61 of the Control of Pollution Act 1974.
- 2.5.2 If applied for (the consent is not a requirement), then it would be sought by the construction contractor prior to relevant works commencing.

2.6 Traffic Controls

- 2.6.1 The Draft Development Consent Order (Document 3.1) provides powers for specific temporary restrictions as well as general powers for NCC to control traffic for the purposes of the construction of the NDR. In the event that any traffic controls are required that are outside the scope of the development consent order then they would be applied for by the contractor at the appropriate time.

3 Glossary

Term	Meaning/Definition
The Application	The Application for the DCO for the NDR Scheme
Draft DCO / Draft Development Consent Order	The Norfolk County Council (Norwich Northern Distributor Road (A47 to A1067(T))) Order (Document 3.1) – the draft development consent order submitted with the Application. A DCO is required for the NDR Scheme
NCC	Norfolk County Council
NDR	Norwich Northern Distributor Road

The Norfolk County Council (Norwich Northern Distributor Road (A1067 to A47(T))) Order

5.5 Transport Assessment

Planning Act 2008

Infrastructure Planning

The Infrastructure Planning (Applications: Prescribed Forms and Procedure)
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1 Key Summary

1.1 Summary

1.1.1 This TA contains the following chapters:

- **Chapter 2:** objectives for the NDR scheme, description of the discussions with the Highway Authorities to agree the scope and extent (in terms of number of junctions to be assessed) of this TA.
- **Chapter 3:** scheme description
- **Chapter 4:** national and local policy context
- **Chapter 5:** existing network conditions
- **Chapter 6:** sustainable transport considering the following modes: bus, Park & Ride, coaches, rail, non-motorised users
- **Chapter 7:** transport modelling outputs and how they are used in this TA
- **Chapter 8:** traffic impact assessment for on-line, other junctions with NDR at Postwick and off-line junctions
- **Chapter 9:** wider impacts including impacts on strategic movements, suburban and City Centre impacts, journey times and effects on people
- **Chapter 10:** high level analysis of Personal Injury Collisions (PIC) and analysis of cluster sites for the principal route network
- **Chapter 11:** assessment of construction traffic impact
- **Chapter 12:** how NDR mitigates against existing problems and future problems arising and any mitigation required for NDR

1.2 Conclusions

1.2.1 The transport modelling and appraisal work has demonstrated that the Do Minimum network would be inadequate to accommodate traffic generation produced by the high levels of employment and residential growth planned for greater Norwich and lead to a substantial deterioration in operational

performance, transport journey times and reliability, thus reducing the economic competitiveness of the City. This would be accompanied by a further deterioration in traffic conditions on inappropriate routes, reductions in operational performance for bus services and worsening conditions for walking and cycling. There would be an increasing risk of worsening road safety as traffic would continue to grow on inappropriate routes and queues may extend onto the high speed A47(T) dual carriageway.

1.2.2 The following junctions were assessed in detail in this TA:

- All 14 on-line junctions along the NDR;
- Six other junctions with NDR at Postwick; and
- Five off-line junctions: A47(T) Trowse, A146 / Martineau Lane, Bracondale / King Street, Crostwick Junction (North Walsham Road / Crostwick Lane / Rackheath Lane), Rackheath Junction (Wroxham Road / Green Lane West)

1.2.3 The policy chapter concludes that the NDR scheme is considered complementary to the relevant key policies and guidance and is aligned with national and local policy.

1.2.4 The conclusions on sustainable transport are as follows:

- Bus: the NDR and its associated complementary measures are predicted to reduce congestion on the core network, thereby reducing bus journey times as demonstrated in this report. The complementary measures in the City Centre include road closures therefore giving priority to buses. These should lead to more reliable public transport and encourage greater usage.
- 18 of the current bus services would cross the route of the proposed NDR. The majority of these would be unaffected by the scheme with any minor impacts being mitigated against by benefitting from reduced traffic levels on radial routes and the Outer Ring Road.
- Park & Ride: the six Park & Ride sites and their bus services are likely to benefit from reductions in congestion along key corridors by the introduction of the NDR. Furthermore, the introduction of signals at the

Postwick Park & Ride junction allows prioritisation of Park & Ride bus services.

- Rail: rail services will not be directly affected by the NDR. The NDR is likely to however have a beneficial impact on journey times to and from the main rail station.
- Non-motorised users (NMU): one of the main aims of the NDR is to enable the removal of through traffic from the city centre and the introduction of walking and cycling improvements.
- There are a number of rights of way that are affected by the NDR. Detailed mitigation measures are set out for each of them.
- The NDR scheme also includes approximately 25km of new pedestrian / cycle links along the route within the landscape strip. These would link to existing facilities and enhance the walking and cycling networks.

1.2.5 The results presented in this TA are based on a number of iterations, with detailed junction modelling being carried out and the results then fed back into the strategic model with traffic being re-assigned. The testing has shown that with increasing capacity provided at the NDR junctions, the demand along the NDR also grew. Therefore, it is apparent that a careful balance needs to be struck between providing sufficient capacity to meet the objectives of the scheme without encouraging unnecessary or longer motorised journeys.

1.2.6 The junction assessments presented in this TA demonstrate that the NDR approach arms have capacity levels below the desirable maximum level of 85% capacity in 2017 except for the southbound approach to the Postwick NE roundabout and the New Link Bridge approaching the Park & Ride signalised junction. In 2032, a number of the approaches show capacity levels that are above the 85% level but below their theoretical maximum threshold of 100% except for the southbound approach to the Postwick NE roundabout and the New Link Bridge approaching the Park & Ride signalised junction. There is a small number of side roads and non-NDR links that are above the desirable level in 2017 and above the theoretical level in 2032. The resulting queues are deemed to be acceptable.

1.2.7 The junction layouts presented in this TA are considered to be the best possible balance between relieving the existing network whilst ensuring acceptable conditions on this new part of the network. It does however mean that there are likely to be some very limited queues and delays on

some approaches to a small number of the on-line junctions during the morning and evening peak periods in 2017 when the road would be opened to traffic.

- 1.2.8 The existing Postwick Park & Ride roundabout junction is forecast to experience substantial queues and delays on Yarmouth Road in both peak periods in both 2017 and 2032. With NDR and the signal junction improvement, the theoretical capacity limit is exceeded in 2032 PM peak, but the queues and delays on Yarmouth Road reduce significantly in the DS scenario with the introduction of signals. Furthermore, the proposed signal junction allows Park & Ride bus services being prioritised via dedicated signal control.
- 1.2.9 Theoretical capacity is also exceeded at Martineau Lane / A146 and Bracondale / King Street junctions. The results demonstrate that this is not due to the NDR but background traffic growth with over-capacity levels similar in the DM and DS scenarios. Thus the NDR scheme itself does not significantly affect these junctions.
- 1.2.10 The wider effects of the NDR are considered. The results demonstrate that the NDR reduces traffic levels and congestion on orbital roads, the Outer Ring Road and the radial routes in the north and northeast of Norwich. Journey times along key highway and public transport routes would be significantly reduced through the introduction of NDR. City Centre through traffic would be reduced by the NDR and its complementary measures, leading to lower traffic levels inside the Inner Ring Road than in the 2012 base.
- 1.2.11 The high level safety review that was undertaken demonstrates that 62 (70%) out of the identified 89 accident cluster sites are predicted to experience lower flows due to NDR, which is considered likely to have an overall beneficial effect given the established relationship between traffic flow levels and accident risk.
- 1.2.12 Construction traffic impacts are unlikely to be severe and a range of mitigation measures will assist in reducing any temporary impacts to acceptable levels.
- 1.2.13 Overall, the NDR scheme would deliver benefits in terms of materially improving highway conditions in Norwich overall and meet the relevant policy objectives without creating any unacceptable effects.

2 Introduction

2.1 Scheme Background

- 2.1.1 Mott MacDonald (MM) has been appointed by Norfolk County Council (NCC) to assist with the development and appraisal of the Norwich Northern Distributor Road, known as the NDR or referred to as the Scheme.
- 2.1.2 The Scheme would be a dual carriageway all-purpose strategic distributor road, to be classified as the A1270 Principal Road, which would link the A1067 Fakenham Road near Attlebridge, to the A47 Trunk Road (T) at Postwick. This will be over a length of approximately 20.4km.
- 2.1.3 The NDR is a project of national significance which requires a Development Consent Order (DCO) under the Planning Act 2008 and this formal planning process began in early 2013. It is currently anticipated that the process will be completed in time for the NDR scheme to start construction in 2015 and to be opened in 2017.
- 2.1.4 This document is one of a number that support the DCO, each of which has its own unique document number, and should therefore be read in conjunction with the other documentation. The proposed layout of the NDR is shown in the General Arrangement Plans contained in document number 2.6, whilst the full needs case for the NDR is explained in the **Statement of Reasons** (document 4.1) and the **Environmental Statement** (document 6.1).
- 2.1.5 This report uses traffic data and results from forecasts of NATS transport model. These are contained in the **Traffic Forecasting Report** (document reference 5.6).

2.2 Structure of Report

- 2.2.1 The structure of this Transport Assessment is as follows:
- **Chapter 1:** Key Summary
 - **Chapter 2:** Introduction

- **Chapter 3:** Scheme Description
- **Chapter 4:** Policy Context
- **Chapter 5:** Existing Network Description
- **Chapter 6:** Sustainable Transport
- **Chapter 7:** Transport Modelling Inputs and DM Appraisal
- **Chapter 8:** Traffic Impact Assessment
- **Chapter 9:** Wider Effects of NDR
- **Chapter 10:** Road Safety Review
- **Chapter 11:** Construction Traffic Assessment
- **Chapter 12:** Mitigation
- **Chapter 13:** Conclusions

2.3 Objectives

2.3.1 The objectives for the NDR scheme are as follows.

- reduce traffic levels and congestion on the existing road network both within the urban area and beyond to the north;
- facilitate journeys that are currently difficult and require traffic to use roads that are unsuitable for the type and volume of traffic that is currently accommodated;
- provide access to and help to deliver, planned and potential areas of growth, and enable those areas to be free of the need to incorporate provision for extraneous traffic;
- provide improved transport connectivity, including with the national strategic road network, for existing and future areas of residential and employment development, Norwich International Airport and the wider area of North and North East Norfolk;

- increase the opportunities for improving provision for public transport and other sustainable forms of transport and for improving traffic management within the City Centre, thereby encouraging modal shift, and
- improve traffic related environmental conditions for residents in the northern suburbs of Norwich and outlying villages, whilst minimising the adverse environmental impacts of the NDR.

2.4 Discussions with Highway Authorities / Agreement on Scope

- 2.4.1 A first draft of the TA scoping report was issued in April 2013. Following this, a meeting was held with NCC Highway officers on 1 May 2013 during which the report was discussed. A revised TA scoping report was issued in June 2013 which is included in **Appendix A**.
- 2.4.2 At the time of writing the TA scoping report, the Norwich Area Transportation Strategy (NATS) transport model which has been developed since 2002, was being updated for the purposes of this NDR submission using fresh survey data collected in 2012. This was done to strengthen the model with up to date data and for the model data to be used in this TA.
- 2.4.3 The NATS model was updated in accordance with WebTAG 3.19 guidance. It is considered adequate to use this model for high level assessment, to understand where network problems exist, to give a general understanding of the nature and scale of these problems, and to consider impacts on junctions when comparing scenarios (existing, Do Minimum (DM) and Do Something (DS)).
- 2.4.4 In addition to the above information that can be obtained from the NATS model, detailed junction assessments are used in this TA to understand the performance of individual junctions during peak hours.
- 2.4.5 The discussions with the Highway Authority centred around the suitability of the NATS model results and where more detailed junction assessments would be required. The first draft of the scoping report contained a “list of junctions that potentially require assessment”. Further to consideration of preliminary model outputs and looking at which junctions would be adversely impacted upon by the introduction of NDR, and further discussions with NCC, the number of junctions was reduced to those presented in the revised

scoping report. Subsequently, this was further reviewed by NCC officers based on updated traffic flows obtained from the NATS model and agreement was reached on testing the following junctions:

- All 14 On-line junctions along the NDR;
- Six other junctions with NDR at Postwick; and
- Five off-line junctions: A47(T) / A146 Trowse, A146 / Martineau Lane, Bracondale / King Street, Crostwick junction (B1150 North Walsham Road / Crostwick Lane / Rackheath Lane), Rackheath junction (A1151 Wroxham Road / Green Lane West)

2.4.6 The table below contains the off-line junctions presented in the scoping report (revision B) including NCC officers' comments regarding the need for detailed assessment. These comments are based on discussions held on 12 June 2013, a subsequent email dated 14 June 2013 and further considerations dated 25 June 2013 that are summarised in a note contained in **Appendix B**.

Table 2.1 Off-line Junctions

Junction	Detailed assessment required / NCC comments
A140 Boundary Road / Reepham Road / Cromer Road / A1042, A1042 Mile Cross Lane / St Faith Road / Catton Grove Road, A1042 Salhouse Road / Gurney Road	NO: The Outer Ring Road junctions are considered to immediately benefit from the NDR with model data demonstrating reduced flows at all those junctions.
A1067 Fakenham Rd / Fir Covert Road	NO: This junction is likely to be converted to signals by a supermarket proposal and possibly before the NDR is built. In addition, model data shows that NDR would reduce traffic levels through this junction.
B1150 North Walsham Road / Crostwick (Crostwick Junction)	YES: An improvement is proposed at this junction in connection with NDR. This should be assessed in detail.
B1150 North Walsham Road / White Woman Lane	NO: Model data demonstrates that NDR would reduce traffic levels at this junction.

Junction	Detailed assessment required / NCC comments
A1151 Wroxham Road / Muck Lane	NO: It is likely that Muck Lane will be a key access point for the Rackheath development but this is currently not reflected in the model as access details will not be fully known for many years. If Muck Lane does become a key access point, an improvement at this junction is likely to be required in the future but essentially as a consequence of the large development traffic levels predicted by 2032, not due to the NDR. Further assessment in this TA which examines NDR impacts is therefore not required.
A1151 Wroxham Road / Green Lane West (Rackheath Junction)	YES: similar to the above junction, exact access points for the Rackheath development are not yet known. A safety improvement is however proposed for this junction in connection with NDR and detailed assessment should therefore be included in the TA.
Salhouse Road / Green Lane West	NO: similar to the above two junctions, improvements are likely to be required in the future as a consequence of large traffic flow increases due to development, not NDR.
Plumstead Road / Woodside Road	NO: Model data demonstrates that NDR would reduce traffic levels at this junction.
A146 / Martineau Lane	YES: despite the moderate increases in flows shown at this junction, it was ultimately agreed to carry out detailed modelling for this junction.
Bracondale / King Street	YES: despite the moderate increases in flows shown at this junction, it was ultimately agreed to carry out detailed modelling for this junction.
A47(T) / A146 Trowse	YES: despite the moderate increases in flows shown at this junction, it was ultimately agreed to carry out detailed modelling for this junction.
A47(T) / A140 Harford	NO: Model data demonstrates that NDR would reduce traffic levels at this junction.
A47(T) / A11(T) Thickthorn	NO: Model data demonstrates that NDR would reduce traffic levels at this junction.
A47(T) / B1108 Watton Road	NO: Model data demonstrates that NDR would reduce traffic levels at this junction.

Junction	Detailed assessment required / NCC comments
A47(T) / A1074 Longwater	NO: Model data demonstrates that NDR would reduce traffic levels at this junction.

2.4.7 Confirmation was subsequently received from HA by email dated 17 July 2013 that out of the five junctions with the A47(T) for which the HA is responsible, only Postwick and Trowse junctions would have to be assessed in detail in this TA.

2.4.8 The agreed total number of off-line junctions is therefore the five junctions as referred to in paragraph 2.4.2, two of which are strategic junctions and the remaining three are within the control of NCC, the local highway authority.

2.5 Study Area

2.5.1 The study area is in line with the fully modelled area as per the NATS model, a figure of which is included in **Appendix C.1** of this TA.

2.5.2 The **Highway Local Model Validation Report (Highway LMVR)** provides a definition of the modelled areas as below.

2.5.3 Two main areas have been defined within the model in line with WebTAG guidance. The areas are as follows:

- **Fully Modelled Area** – this is the area over which proposed interventions have influence, subdivided into:
 - *Area of Detailed Modelling* – the area in which significant impacts of interventions are certain. Modelling in this area is characterised by representation of all trip movements, small zones and, detailed network representation with junction modelling (including flow metering and blocking back)
 - *Rest of Fully Modelled Area* – this is the area over which the impacts of interventions are considered to be quite likely, but relatively weak in magnitude. This area is characterised by representation of all trip movements, somewhat larger zones and less network detail than the area of detailed modelling with speed/flow modelling.

- **External Area** – the impacts of interventions can be assumed to be negligible here. In terms of detail it would be expected that the network represents a large proportion of the rest of Great Britain, with only a partial representation of demand – i.e. external to external movements through the FMA; large zones; skeletal network and fixed speed modelling.

3 Scheme Description

3.1 Introduction

- 3.1.1 The Norwich Northern Distributor Road, known as the NDR or referred to as the Scheme, is a dual carriageway all-purpose strategic distributor road, to be classified as the A1270 Principal Road, which would link the A1067 Fakenham Road, near Attlebridge, to the A47 Trunk Road (T) at Postwick. This will be over a length of approximately 20.4km. Refer to the General Arrangement Plans in document number 2.6.
- 3.1.2 A detailed scheme description is provided in the **Environmental Statement** (document 6.1) in Chapter 2.

4 Policy Context

4.1 Policy Fit

- 4.1.1 In the following sections the national, local planning and local transport policy and guidance that are relevant to the NDR scheme application are presented and summarised.
- 4.1.2 The NDR is key to the Norwich Area Transportation Strategy (NATS – see **Section 4.5** below for more detail), allowing the development of a modern, sustainable transport system for Norwich, including Bus Rapid Transit and facilities for cyclists and pedestrians. Government support for the road is conditional up progress of City Centre measures.
- 4.1.3 The purpose of the NDR is explained in the Needs Case which is included in the **Environmental Statement** (doc ref 6.1). It also sets out the reasoning and justification as to why the NDR scheme is needed. This TA chapter should be read in conjunction with the Needs Case.

4.2 Norwich's City Deal

- 4.2.1 It was agreed in February 2013 that work should start on negotiating a City Deal for Greater Norwich as part of the Cabinet Office's programme to work with 20 towns and cities as a second wave of City Deals. Since this time, a great deal of work has been done with Broadland, Norfolk County and South Norfolk Council partners on a plan to develop a greater Norwich approach. It is anticipated that the Deal will be announced on 12 December 2013.
- 4.2.2 The Greater Norwich City Deal has three strands: Skill, Business support and Infrastructure. Through a coordinated approach to the 3 strands the City Deal promotes increased economic growth.
- 4.2.3 The infrastructure strand identifies the timely delivery of NDR and NATS as important key to achieving our economic growth Aspirations. The City Deal governance will focus the partners' combined efforts to ensure the required infrastructure including the NDR is delivered.

4.3 National Policy Context

National Planning Policy Framework

- 4.3.1 National Planning Policy Framework (NPPF) was published on 27th March 2012 setting out the Government's planning policies, how these are expected to be applied, and which must be taken into account as material planning considerations in planning decisions. It is of note that the NPPF supersedes the majority of previous National Planning Guidance including (but not limited to) PPG13: Transport, PPS4: Planning for Sustainable Economic Growth, PPG24: Planning and Noise, PPS25: Development and Flood Risk.
- 4.3.2 The need to deliver sustainable development underlies the NPPF through the mutually dependent economic, social and environmental roles. Within the Core Planning Principles (para 17) planning decisions should be generally plan-led, empowering local people to shape their surroundings with succinct local and neighbourhood plans setting out a positive vision for the future of the area. The need to proactively drive and support sustainable economic development and to objectively identify and then meet the housing, business and other development needs for an area are stressed.
- 4.3.3 Sustainability also involves:
- Securing high quality design;
 - Ensuring a good standard of amenity supporting the transition to a low carbon future in a changing climate taking full account of flood risk;
 - Promoting mixed use developments;
 - Recognising that some open land can perform many functions (such as for wildlife, recreation and flood risk mitigation).
- 4.3.4 Importantly the last 2 bullet points in paragraph 17 require developments to influence patterns of growth to make the fullest possible use of public transport, walking and cycling, and take account of and support local strategies to improve health, social and cultural well-being, and to deliver sufficient community and cultural facilities and services to meet local needs. A key tool to facilitate sustainable transport is via a Travel Plan. Paragraph 29 of NPPF states that: *“Transport policies have an important role to play in facilitating sustainable development but also in contributing to wider sustainability and health objectives. Smarter use of technologies can reduce the need to travel. The transport system needs to be balanced in favour of sustainable transport modes, giving people a real choice about how they*

travel. However, the Government recognises that different policies and measures will be required in different communities and opportunities to maximise sustainable transport solutions will vary from urban to rural areas.”

- 4.3.5 NPPF Paragraph 31 also identifies that: “Local authorities should work with neighbouring authorities and transport providers to develop strategies for the provision of viable infrastructure necessary to support sustainable development, including large scale facilities such as rail freight interchanges, roadside facilities for motorists or transport investment necessary to support strategies for the growth of ports, airports or other major generators of travel demand in their areas.”
- 4.3.6 NPPF Paragraph 32 requires all developments that generate significant amounts of movement to be supported by a Transport Statement or Transport Assessment. It continues that plans and decisions should take account of whether:
- “the opportunities for sustainable transport modes have been taken up depending on the nature and location of the site, to reduce the need for major transport infrastructure”;
 - “safe and suitable access to the site can be achieved for all people”; and
 - “improvements can be undertaken within the transport network that cost effectively limit the significant impacts of the development. Development should only be prevented or refused on transport grounds where the residual cumulative impacts of development are severe.”
- 4.3.7 NPPF Paragraph 37 seeks to achieve a balance of land uses within the area so that people can be encouraged to minimise journey lengths for: employment, shopping, education and other activities.
- 4.3.8 Based on the above review of NPPF, it is considered that the implementation of NDR is in line with the policies set out in this document.

The Future of Transport - A Network for 2030

- 4.3.9 The ‘Future of Transport - A Network for 2030’ White Paper published in July 2004 sets out the Government’s aspirations to meet the shared priority for transport. It recognises that a transport network is needed that can meet the challenges of a growing economy and the increasing demand for travel, but can also achieve its environmental objectives. This means providing a coherent transport network with:

- The road network providing a more reliable and freer flowing service for both personal and freight travel, with people able to make informed choices about how and when they travel.
- The rail network providing a fast, reliable and efficient service, particularly for inter-urban journeys and commuting into large urban areas.
- Bus services which are reliable, flexible, convenient and tailored to local needs.
- Making walking and cycling a real alternative for local trips.
- Ports and Airports providing improved international and domestic links.

4.3.10 Paragraph 10 of the white paper refers to the strategy of improving and enhancing road networks by:

- Providing new capacity where it is needed, assuming that any environmental and social costs are justified;
- Locking in the benefits of new capacity through various measures
- Government leading the debate on road pricing and its capacity to lead to better choices for motorists;
- Better management, exploiting the potential of new technology to avoid problems and deal with them rapidly if they occur; and
- Use of new technology to keep people informed both before and during their journey.

4.3.11 Based on the above review of the White Paper, it is considered that the implementation of NDR is in line with the aims set out in this document.

Local Transport White Paper 2011

4.3.12 The Local Transport White Paper titled Creating Growth, Cutting Carbon – Making Sustainable Local Transport Happen was published by DfT in January 2011. It contains the following four key statements in its executive summary:

- “Our vision is for a transport system that is an engine for economic growth, but one that is also greener and safer and improves quality of life in our communities.”
- “Encouraging sustainable local transport choices depends on local solutions”
- “The Government has already taken significant steps to hand back responsibility for developing local solutions in planning and the economy to the local level”
- “In addition, we also recognise that there are some initiatives that benefit from a single national approach”

- 4.3.13 The government considers that investment in transport is not enough in itself but that measures need to be put in place enabling people to make the right transport choices.
- 4.3.14 The paper also advocates the decentralisation of power to the more local level and to enable local delivery of schemes and measures. A number of funding options for transport schemes have been put in place such as the Local Sustainable Transport Fund (LSTF).
- 4.3.15 Within the paper, the government is making a number of specific national commitments to enhance the sustainability of local transport. These include amongst others: commitment to active travel, making public transport more attractive, to enable sustainable transport options, to base investment decisions on carbon implications and to tackle congestion.
- 4.3.16 Based on the above review of the White Paper, it is considered that the implementation of NDR is in line with the key statements and national commitments set out in this document.

Action for Roads 2013

- 4.3.17 The Action for Roads – A Network for the 21st Century was published by DfT in July 2013. It contains the following four key headings in its executive summary:
- “The growing challenge” referring to the vital importance of the road network and its importance in providing economic benefits. It goes on to underline the importance of making “best use of the network we have” and “to plan ahead to help the economy grow”.
 - “Transforming strategic roads” where the document refers to the upgrade and maintenance of the strategic road network.
 - “Managing our roads” referring to the key conclusions of the Cook Review which provides funding certainty and a reorganisation of the Highways Agency.
 - “Supporting local roads” referring to the decentralisation of decision making.
- 4.3.18 Based on the review of the above paper, it is considered that the implementation of NDR is in line with the four key headings set out in this document.

National Policy Statement for the National Road and Rail Networks (NPS) – Consultation Draft

- 4.3.19 A draft version of the NPS was presented for consultation in December 2013. The document sets out “the Government’s vision and policy for the future development of nationally significant infrastructure projects on the national road and rail networks.” (paragraph 1.1, page 5). With five key chapters, the document sets out the importance of road and rail infrastructure in terms of economic growth, sustainability, accessibility and assessment principals.
- 4.3.20 The NPS makes reference to the National Strategy Framework for Road Safety (Department for Transport, May 2011). This document “sets out the strategic framework for road safety and the package of policies ... to reduce deaths and injuries ...” (paragraph 1.3, page 13). Across six chapters, trends, empowering local citizens, education, targeted enforcement and sanctions and casualty forecasts are detailed. The document does not provide any guidance on how to undertake safety reviews.
- 4.3.21 Based on the review of the above paper which is still a consultation draft, it is considered that the implementation of NDR is in line with the vision and policy set out in this document.

4.4 Local Planning Policy context

Joint Core Strategy

- 4.4.1 Following the Joint Core Strategy’s (JCS) adoption in March 2011, it was subject to a legal challenge which resulted in certain parts of the JCS being remitted and treated as not having been adopted. Norfolk County Council with Broadland District Council, Norwich City Council and South Norfolk Council, working as the Greater Norwich Development Partnership (GNDP), submitted the remitted parts of the JCS to the Secretary of State for independent examination in February 2013. The Inspector reported in November 2013 that the remitted JCS (with some further modifications) was sound. The Councils have indicated that the remitted JCS is likely to be adopted in January 2014.
- 4.4.2 The JCS sets out the long-term vision and objectives for the area, including strategic policies for steering and shaping development. It identifies broad

locations for new housing and employment growth and changes to transport infrastructure and other supporting community facilities, as well as defining areas where development should be limited. It helps co-ordinate and deliver other services and related strategies.

- 4.4.3 The JCS forms part of each council's Local Plan. Subsequent documents will be produced by the individual authorities that will provide more detailed development management policies and will also allocate sites for new developments.
- 4.4.4 Based on the review of the above strategy, it is considered that the implementation of NDR is in line with the vision and objectives set out in this document.

Norwich Northern City Centre Area Action Plan

- 4.4.5 On 30 March 2010 Norwich City Council adopted the Northern City Centre Area Action Plan (NCCAAP). This document now forms part of the planning policy framework for the council and will be used when determining planning applications in this part of the city.
- 4.4.6 The NCCAAP contains policies and proposals for the regeneration of the area and redevelopment of specific sites over the period 2008-16. The NCCAAP area is that bounded by the River Wensum, Bakers Road, Magpie Road, Bull Close Road, and Whitefriars.
- 4.4.7 The northern city centre area is Norwich City Council's priority area for regeneration. The area is likely to see significant change as several new developments come forward in the next few years. This area action plan sets out proposals and policies to bring about the regeneration of the area up to 2016. The largest new development is the prospective redevelopment of the Anglia Square complex and the adjoining vacant sites.
- 4.4.8 The NCCAAP sets out the vision and objectives for the area. It emphasises that the plan has been developed consistently with existing adopted local plan policies (the City of Norwich replacement local plan) and the Joint core strategy.
- 4.4.9 The plan aims to encourage a mix of development, cultural & leisure activities, promoting a mix of development, specifically:
- Encourage a balance of housing, with family housing included in the redevelopment schemes brought forward

- Promote mixed use development in the core of the northern city centre area, reinvigorating its economy by providing jobs as well as housing
 - Encourage cultural and leisure activities in the area
 - Strengthen its local distinctiveness from the rest of the city centre
 - Improve the area's shopping offer, including the range of small independent shops
- 4.4.10 To help inform and shape the plan, consultation and sustainability appraisal were carried out throughout the plan's production. Two stages of formal consultation on the content of the plan were held; the issues and options stage in summer 2006 and the referred options in winter 2007-08.
- 4.4.11 In winter 2008-09 the regulation 27 consultation on soundness took place and to address issues raised a further consultation was held on the focused changes in late spring 2009. The area action plan is scheduled to be regularly reviewed to ensure that it remains consistent with the Joint Core Strategy as the JCS evolves.
- 4.4.12 Whilst the NCCAAP is predominantly a development focused planning framework, it does make reference to specific infrastructure and transport related measures, namely:
- Improvements to traffic circulation to address air quality issues in the St Augustine's Street area;
 - Make major improvements to the public realm in the NCCAAP area;
 - Enhance pedestrian and cycle movement by provision of new pedestrian crossing facilities, and
 - Creation of new pedestrian and cycle links throughout the area.
- 4.4.13 Improvements to traffic circulation and reduction in air pollution are required in order to implement the air quality strategy and address the reasons for the designation of an air quality management area in St Augustine's Street.
- 4.4.14 The area action plan's proposals relating to traffic circulation are in accordance with the Norwich area transportation strategy (NATS)⁷ action plan and the Local transport plan (LTP), and as such, whilst not directly part of the NDR scheme, will play a part in the overall transportation strategy for the area.

4.5 Local Transport Policy Context

Norfolk's Third Local Transport Plan (2011 to 2026)

- 4.5.1 Norfolk's Third Local Transport Plan (LTP) was adopted in March 2011. Known as 'Connecting Norfolk', LTP3 sets out the County's strategy and policy framework for delivery of transportation schemes up to 2026. It will be used as a guide for transport investment and considered by other agencies when determining planning or delivery decisions.
- 4.5.2 Connecting Norfolk's vision is to develop a transport system that allows residents and visitors a range of low carbon options to meet their transport needs and attracts and retains business investment in the county. Six strategic aims underpin this vision:
- Maintaining and managing the highway network
 - Delivering sustainable growth
 - Enhancing strategic connections
 - Reducing emissions
 - Improving road safety
 - Improving accessibility
- 4.5.3 This will be done by:
- Making the best use of what Norfolk has to facilitate reliable journeys
 - Reducing the need to travel
 - Influencing others and ensuring transport is integrated into development plans
 - Working with communities and Norfolk's partners to seek new solutions and new ways of delivering
 - Lobbying for and pursuing improvements to Norfolk's strategic transport network.
- 4.5.4 Connecting Norfolk identifies the Norwich Northern Distributor Road as a key tool to facilitate and deliver the above objectives and aims, noting specifically that it will:
- Play a significant role in delivering the significant growth in Norfolk during the life of Connecting Norfolk
 - Enhance strategic connections by facilitating strategic access to north-east Norfolk and Norwich Airport
- 4.5.5 Based on the above review of the LTP, it is considered that the implementation of NDR is in line with the aims and objectives set out in this document.

Norwich Area Transportation Strategy (NATS)

- 4.5.6 The most recent iteration of the Norwich Area Transportation Strategy (NATS) was adopted by the local authorities in 2004. The transport strategy was designed to help deliver the growth that will happen within the Norwich Area and address the problems, such as congestion. The strategy should ensure that Norwich develops as a sustainable urban community, with a transport system that meets its needs. The strategy promotes travel choice, recognising the need to maintain the economic health of the Norwich Area, and does not propose radical restrictions on vehicular access. It carries forward the previous policy of accommodating the growth in number of trips by means other than the car. NATS4 will achieve this through promotion and improvements of other modes, including public transport.
- 4.5.7 A Northern Distributor Road is identified as an important element to enable growth within and around Norwich. The strategy states that a new road will be delivered in conjunction with other measures, to lock in the benefits, and that the road will allow the full package of NATS interventions to be delivered.
- 4.5.8 NATS has been successful to date in controlling the way Norwich has developed its transport infrastructure and this has included provision of the nationally recognised Park & Ride facilities and the award winning bus station. However the success of NATS is likely to be compromised in the future if significant efforts are not made to continue to deliver its objectives.
- 4.5.9 The main aims of NATS4 are to:
- Promote a vibrant city centre, and other commercial centres, by improving accessibility for people and goods;
 - Cater for the travel consequences arising from growth aspirations. In particular, accommodate transport needs arising from future growth of the airport and the cluster of the Norwich Research Park, University and hospitals at Colney;
 - Maximise transport choice for all travellers;
 - Reduce social exclusion through transport solutions and promote equal access to jobs, goods and services;
 - Enhance access for non-car modes, promote sustainable means of travel, minimise the length of trips and encourage reduced car-use through land use policies, layout of development and promotion of travel plans;
 - Improve integration and interchange;
 - Reduce the need to travel;
 - Minimise congestion and delays for all modes of transport by improving the efficiency of the transport network;

- Reduce CO2 emissions from transport by encouraging sustainable modes of travel and vehicles using fuels derived from renewable sources or waste;
- Promote the use of alternative modes of transport and less polluting fuels, particularly within Air Quality Management Areas;
- Minimise noise, vibration and visual intrusion from transport, particularly in the public, urban open spaces in the historic city centre;
- Implement transport solutions that protect open space, wildlife habitats and water resources;
- Maximise safety and security for everyone;
- Minimise the number and severity of road traffic accidents.

- 4.5.10 In March 2010, NCC agreed a NATS Implementation Plan (NATSIP) for the future vision of NATS and what that would consist of, in particular in respect of delivering improvements for public transport, walking and cycling. The NATSIP was agreed following extensive consultation in 2009, whereby 160,000 booklets were distributed showing the most significant proposals for improving transport within the Norwich area and a series of exhibitions were held.
- 4.5.11 In addition to the NDR, the proposals considered in the NATSIP included public transport Bus Rapid Transit Corridors, Core Bus Route improvements, bus ticketing and bus facility improvements, measures to reduce the dominance of traffic in certain areas of the City Centre and improvements to the walking and cycling network and facilities.
- 4.5.12 More recently, in November 2013, an updated Implementation Plan was adopted taking into account progress with scheme delivery. The update outlined the relationship between NATS schemes and the wider growth and development agenda taking account of the implications of emerging funding opportunities including the Community Infrastructure Levy. The major difference between the NATSIP adopted in 2010 and the update was in the phasing of delivery of the schemes.
- 4.5.13 The implementation of NDR being an intrinsic part of the above strategy, it is considered that the scheme is entirely in line with the aims set out in this document.

4.6 Alignment with National and Local Policy

- 4.6.1 The implementation of the NDR scheme as part of the NATS strategy have been considered for their alignment with National and Local policies. The NDR scheme is considered to be fully in line with the key policies and guidance set out earlier in this section.

5 Existing Network Description

5.1 Route Network Hierarchy

5.1.1 A route Hierarchy exists for the whole of Norfolk. This identifies roads according to their function and level of use. It was developed by NCC to manage the highway network and to enable measures to be implemented to encourage road users to use the most appropriate routes. The hierarchy consists of:

- Trunk Roads;
- Principal Routes – used to carry the majority of through traffic;
- Main Distributor Routes– used for the distribution of more local traffic, particularly between Principal Routes;
- HGV Routes – used to distribute traffic to specific areas associated with freight delivery (generally industrial estates) from Principal Routes and Main Distributor Routes;
- Local Access Routes – linking the more significant communities with Trunk and Principal Routes, Main Distributor Routes and HGV routes; and
- Tourist Routes – links the recognised tourist attractions with all other types of routes.

5.1.2 NCC’s existing route Hierarchy is shown in **Appendix C.2** of this TA. It will need to be updated to reflect the provision of the NDR and the resulting changes to the highway network.

5.2 Description of Key Routes

5.2.1 The key routes described below are shown in **Appendix C.2** and **C.3**.

5.2.2 The **A47(T)** is a trunk road within Norfolk County Council’s Route Hierarchy. It is the main east west route across northern East Anglia connecting Great Yarmouth on the eastern coastline via the southern side of Norwich to the A1 at Peterborough for onward journeys to the north. The A47(T) is a trunk road as far as the A1. Within the study area the A47(T) is largely dual carriageway with grade separated junctions.

5.2.3 The main route that spans across the radial routes is the Norwich **Outer Ring Road** (A1042/A140/A146). This road is predominantly single carriageway, comprising many signalised junctions.

5.2.4 The **A147 Inner Ring Road** is classed as a Principal Route within NCC’s Route Hierarchy. Generally, the western side of the ring road between

A1151 and Finklegate is dual carriageway with 2 traffic lanes in each direction. The eastern side is mainly single carriageway.

- 5.2.5 Norwich has 12 radial routes which provide access from all directions to the city. Most of them are single carriageway with few sections of dual carriageway; some sections comprise a total of three lanes, for example to provide a bus only lane in a single direction. These are also shared with taxis and cyclists. On approaches to the city via the A11 radial route, the bus lanes are also used by freight operators as part of the freight consolidation delivery service.
- 5.2.6 The paragraphs below provide an overview of the radial routes.
- 5.2.7 The **A1067** Drayton High Road / Fakenham Road is classified as a Principal Route within NCC's Route Hierarchy. It links the A147 Inner Ring Road on the north-western side of Norwich with the A148 near Fakenham.
- 5.2.8 **Reepham Road** is a Local Access Route within NCC's Route Hierarchy from the Outer Ring Road to Hellesdon. Within the study area of this TA the route is single carriageway.
- 5.2.9 The **A140** Aylsham Road / Cromer Road / Holt Road is classified as a Principal Route within NCC's Route Hierarchy. The A140 runs between the A14 north of Ipswich to Cromer on the coastline via the western side of Norwich. Within the study area, the route is predominantly single carriageway with at-grade junctions. Additional traffic lanes are present on approach to the main junctions on the route.
- 5.2.10 The **B1149** Holt Road is classified as a Main Distributor Route within the NCC's Route Hierarchy. The route runs from its junction with the A140 and continues until it meets the A148 at Holt. Within the study area of this TA the route is single carriageway.
- 5.2.11 The **B1150** Constitution Hill / North Walsham Road is classified as a Main Distributor Route within the NCC's Route Hierarchy. The route starts at the junction with the A1151 on the north side of the City Centre and continues in a generally northbound direction until it meets the A149 in North Walsham. Within the study area of this TA, the route is single carriageway.
- 5.2.12 The **A1151** Wroxham Road / Sprowston Road is classified as a Principal Route within NCC's Route Hierarchy. The route starts at the junction with the A147 (Inner Ring Road) on the northern side of Norwich City Centre and continues in a generally north-eastbound direction until it becomes the A149.

Within the study area of this TA the route is single carriageway. There is an inbound bus lane from Recreation Ground Road to the approach of its junction with the ORR.

- 5.2.13 **Salhouse Road** is classified as a Local Access Route within NCC's Route Hierarchy between the A1042 Outer Ring Road and Rackheath. Within the study area of this TA the route is single carriageway.
- 5.2.14 The **B1140** Plumstead Road is classified as a Local Access Route within NCC's Route Hierarchy between the Inner Ring Road and Outer Ring Road. Beyond the Outer Ring Road it is classified as a Local Access Route to Thorpe End. Within the study area of this TA the route is single carriageway.
- 5.2.15 The **A1242** Thorpe Road / Yarmouth Road is classified as a Principal Route within NCC's Route Hierarchy. The route commences at the Inner Ring Road and continues in an easterly direction. At its junction with the Outer Ring Road it becomes the **A1042** from where it continues to the A47(T) at Postwick. Between the City Centre and Postwick, Yarmouth Road is single carriageway except for a short section of dual carriageway south of the Postwick junction with the A47(T).
- 5.2.16 The **A146** Loddon Road is classified as a Principal Route within NCC's Route Hierarchy. The route commences at Norwich's Outer Ring Road and continues in a south easterly direction to form a junction with the A47(T) and continues to Lowestoft. To the north of the A47(T), the A146 is dual carriageway, while to the south it is single carriageway.
- 5.2.17 The **A140** Ipswich Road is classified as a Principal Route within NCC's Route Hierarchy. The route commences at Norwich's Outer Ring Road and continues in a southerly direction to form a junction with the A47(T) and continues to the A14 and Ipswich. Within the study area of this TA the route is single carriageway.
- 5.2.18 The **A11** Newmarket Road / St Stephens Road is classified as a Principal Route within NCC's Route Hierarchy. The route commences at Norwich's Inner Ring Road and continues in a south westerly direction to form a junction with the A47(T). Beyond this, the A11(T) extends via Newmarket to the M11. Within the study area of this TA the route is largely single carriageway. However, from a point approximately half way between the Outer Ring Road and the A47(T), the A11 to the west is dual carriageway. Along the A11, there are two inbound bus lanes (Unthank Road to approach

with ORR junction, Mt Pleasant to approach with IRR junction) and one outbound bus lane (Mt Pleasant to approach with ORR junction).

- 5.2.19 The **B1108** Earlham Road / Watton Road is classified as a Main Distributor Route within NCC's Route Hierarchy. The route commences at Norwich's Inner Ring Road and continues in a westerly direction to form a junction with the A47(T). To the west of this, Watton Road extends via Hingham and Watton. Within the study area of this TA the route is predominantly single carriageway. There is an inbound bus lane between Heigham Grove and the approach to IRR.
- 5.2.20 The **A1074** Dereham Road is classified as a Principal Route within NCC's Route Hierarchy. The route commences at Norwich's Inner Ring Road and extends to the north west to form a junction with the A47(T) at Longwater. Within the study area of this TA the route is predominantly single carriageway. There is an inbound bus lane between Gurney Road and the approach to the Outer Ring Road and an inbound bus lane between Orchard Street and the approach to the Inner Ring Road.
- 5.2.21 The Inner Ring Road is limited to 30mph for its entire length, while the speed limit along the Outer Ring Road comprises a mixture of 30mph and 40mph sections. All sections of the Inner Ring Road are within built-up areas of the city; the Outer Ring Road passes through a mix of housing, employment and retail areas.
- 5.2.22 Routes across the city centre within the Inner Ring Road are all single carriageway comprising one-way sections.

5.3 Description of Key Junctions

- 5.3.1 Along the dual carriageway sections of the A47(T), junctions are generally grade separated or of good standard and provide adequate visibility for traffic turning from the minor arms onto the mainline. They provide acceptable levels of capacity for current levels of traffic at all but the Postwick interchange.
- 5.3.2 The single carriageway roads are characterised by many small junctions and minor turnings.
- 5.3.3 The County and City roads associated with the main road network reflect the medieval street pattern that forms a large part of the network in the centre of Norwich, with the majority of junctions being significantly constrained by ancient buildings thereby removing any opportunity for capacity to be

increased through enlarging the junction geometry or adding additional lanes on congested roads. Such junctions do not have the scope to be radically altered to meet increased demand and hence only minor improvements have been possible. Within Norwich, the constraint on land in the vicinity of junctions has led to many becoming signal controlled, comprising layouts which have been adapted as far as possible to cope with traffic volumes and vehicle sizes. Many of the junctions have been upgraded to include pedestrian and cycle crossing facilities in order to provide coherent routes for vulnerable road users wherever possible.

5.3.4 The existing junctions that are assessed within **Chapter 8** of this TA are:

- A47(T) / A146 Trowse Junction
- A146 / Martineau Lane
- A147 Bracondale / King Street
- N1150 North Walsham Road / Rackheath Lane (Crosthwick Junction)
- A1151 Wroxham Road / Green Lane West (Rackheath Junction)

A47(T) / A146 Trowse

Photo 5.1 Existing Junction Layout – A47(T) / A146 South-Eastern Junction



Source: Mott MacDonald Ltd, 24 October 2013, for location see Appendix C.3

5.3.5 The intersection of the A47(T) / A146 Loddon Road is a four arm grade separated traffic signal controlled junction. The A47(T) runs north-east to south-west; the A146 runs north-west to south-east and is dual carriageway in the vicinity of this junction. To the north-west and south-east of the A47(T), its slip roads form two signal controlled junctions with the A146. The two arms of the A146 comprise three lanes, but on approach to each junction, vehicles turning left to the A47(T) are provided with a short flared left turning

lane, which bypasses the traffic signals and is priority controlled. Vehicles turning right to the A47(T) are provided with a two lane flared right turning facility, which is signal controlled. The A47(T) off-slips each comprise two lanes, which widen on approach to the junction to provide a total of four lanes, including two for the left turn. All arms of the junction are subject to national speed limit. The eastern arm of the A47(T) and both arms of the A146 form a bus route.

- 5.3.6 The junction model results for the existing scenario, detailed within **Chapter 8** of this TA, show that this junction currently operates within capacity limits during the AM and PM peak hours. During the AM peak hour, the heaviest queuing occurs at the junction of the A146 (northbound approach) and A47(T) westbound off-slip, for inbound movements to the City. During the PM peak hour, the heaviest queuing occurs at the junction of the A146 (southbound approach) and the A47(T) eastbound off-slip, for outbound movements from the City.

A1054 Martineau Lane / A146 Trowse Bypass

Photo 5.2 Existing Junction Layout – Martineau Lane / Trowse Bypass



Source: Mott MacDonald Ltd, 23 October 2013, for location see Appendix C.3

- 5.3.7 The intersection of the A1054 / A146 is a three arm traffic signal controlled junction. The A1054 Martineau Lane forms the north-eastern arm, the A146 (link to the A47(T)) forms the south-eastern arm and A146 Martineau Lane forms the western arm. A short distance to the west of the junction, the A146 Martineau Lane becomes Barrett Road. The A1054 Martineau Lane provides a single lane in the southbound direction, which on approach to the junction widens to form two lanes for the left turn to the A146 and two lanes for the

ahead movement to the A146 Barrett Road. The A146 (link to the A47(T)) is a dual carriageway, comprising two lanes in each direction and is subject to a 40mph speed limit on the approach to the junction where the highway flares to provide two lanes for the left turn towards the A146 Barrett Road and the two lanes on the main carriageway form the right turn towards the A1054 Martineau Lane. The A146 Barrett Road comprises a single lane in each direction, which on approach to the junction flares locally to provide a single lane for the ahead movement to the A1054 Martineau Lane and two lanes for the right turn towards the A146 (link to the A47(T)). The links forming the junction are subject to a 40mph speed limit, however a signed change of speed limit from 30mph is located a short distance to the south-west of the junction along A146 Barrett Road. Traffic signal controlled pedestrian crossing facilities are provided on the A146 (link to the A47(T)) approach and the A146 Barrett Road approach. The A146 (link to A47(T)) and A1054 Martineau Lane form a bus route.

- 5.3.8 The junction model results for the existing scenario, detailed within **Chapter 8** of this TA, show that this junction currently operates within capacity limits during the AM peak hour, but at capacity limits during the PM peak hour, which results in a significant queue occurring on the left turn from Martineau Lane (westbound) during the PM peak hour.

A147 Bracondale / King Street

Photo 5.3 Existing Junction Layout – Bracondale / King Steet



Source: Mott MacDonald Ltd, 23 October 2013, for location see Appendix C.3

- 5.3.9 The intersection of A147 King Street / A147 Bracondale is a three arm traffic signal controlled junction. Bracondale runs east-west, while King Street

extends north-south. The A147 Bracondale is a bus route and all three arms of the junction form cycle routes, namely the Outer Circuit and NCN Route 1. No signal controlled pedestrian facilities are provided at this junction despite this being a main route out of the city centre to County Hall.

- 5.3.10 The junction model results for the existing scenario, detailed within **Chapter 8** of this TA, show that this junction currently operates well above capacity limits during the AM peak hour, but within capacity limits during the PM peak hour, though regular observation shows that it also frequently overcapacity in the PM peak. Significant queuing occurs on the right turn approach from Bracondale (East) in both peak hours. This is most problematic during the AM peak hour, when the inbound queue can extend back as far as the County Hall roundabout to the south. King Street nears capacity during the AM peak and hence significant queuing occurs on this approach. Substantial queuing also occurs on the Bracondale (West) approach in the AM peak hour, because the junction as a whole is over capacity.

North Walsham Road / Rackheath Lane (Crostick Junction)

Photo 5.4 Existing Junction Layout – North Walsham Road / Rackheath Lane



Source: Mott MacDonald Ltd, 22 October 2013, for location see Appendix C.3

- 5.3.11 The intersection of the B1150 North Walsham Road / Crostick Lane / Rackheath Lane is a four arm staggered priority controlled ghost island junction. North Walsham Road forms the northern and southern arms of the junction. Crostick Lane forms the western arm and Rackheath Lane forms the eastern arm, separated by approximately 20m. Each of the arms of the junction comprises a single lane approach; however the ghost island along North Walsham Road accommodates short storage lanes in each direction

for right turning vehicles. North Walsham Road is subject to a 50mph speed limit and Rackheath Lane a 60mph speed limit. Crostwick Lane is subject to a 30mph speed limit and vehicles greater than 7.5 tonnes in weight are prohibited from using this road, except for loading.

- 5.3.12 The junction model results for the existing scenario, detailed within **Chapter 8** of this TA, show that this junction currently operates well within capacity limits during the AM and PM peak hours and hence there are no operational issues.

A1151 Wroxham Road / Green Lane West (Rackheath Junction)

Photo 5.5 Existing Junction Layout – Wroxham Road / Green Lane West



Source: Mott MacDonald Ltd, 22 October 2013, for location see Appendix C.3

- 5.3.13 The intersection of the A1151 Wroxham Road / Green Lane West is a three arm priority controlled junction. Wroxham Road forms the north-eastern and south-western arms of the junction, while Green Lane West extends to the south east and forms the minor arm. Each arm of the junction comprises a single lane approach. Wroxham Road is subject to a 50mph speed limit, while Green Lane West is subject to a 40mph speed limit. The required 2.4m x 160m visibility to the left from Green Lane West is obscured by the presence of vegetation along the north side of Wroxham Road. In mitigation, road signage is present warning eastbound motorists of the likelihood of traffic turning ahead. The provision of adequate visibility at this junction is reliant upon the vegetation being regularly maintained. Green Lane West and the northern arm of Wroxham Road form a bus route.
- 5.3.14 The junction model results for the existing scenario, detailed within **Chapter 8** of this TA, show that this junction currently operates within capacity limits

during the AM and PM peak hours and hence there are no operational issues. However, the right turn out from Green Lane West approaches limits of capacity during the PM peak hour, which results in a small queue developing.

5.4 Airport Surface Access

- 5.4.1 Norwich International Airport is located 4 miles to the north of Norwich city centre with access provided by the **A140** Aylsham Road / Cromer Road / Holt Road and via the Outer Ring Road. There is presently no direct connection to the Strategic Road Network linking the airport to the A47(T).
- 5.4.2 A Park and Ride facility located at the airport provides a link to Norwich City Centre; bus service 603 provides a regular service. First Eastern and National coach services also serve the airport.
- 5.4.3 The airport currently has a throughput of over 400,000 passengers per year. 70% of passengers originate from the Norfolk area, 25% originate from Norwich itself. Currently 73% of passengers arrive by car, 20% by taxi and with the remainder using other public transport. Forecast for passenger growth is 6% per annum over the next 10 years.
- 5.4.4 Airlines operating from the airport include Flybe, KLM, Eastern Airways and bmi regional. These airlines offer flights to UK airports including the Channel Islands and to European destinations such as the Balearics and Canaries with several of the destinations being seasonal.
- 5.4.5 The airport is also an important location in connection with the off-shore industry with helicopter flights having increased significantly (Norwich Airport website stating “some 40 departures on a daily basis to the platforms offshore”, as of May 2012). On the same page it is stated that total passenger numbers have increased from just over 29,000 in 2002/03 to over 77,000 in 2011/12.
- 5.4.6 Norwich Airport is also an increasingly important business location with the first phase of the Norwich Aeropark having been permitted in July 2013 providing employment and industrial facilities for Air Livery aircraft painting firm including the company’s headoffice.

6 Sustainable Transport

6.1 Bus

- 6.1.1 Norwich is comparatively well served by bus services with a range of service providers including Anglianbus, First Norfolk & Suffolk, Konectbus, Norfolk Green and Sanders.
- 6.1.2 Most bus and coach services run from Norwich bus station and/or from Castle Meadow as shown in the key bus route map which is included in **Appendix C.4**. In addition, Norwich has six Park & Ride sites run by Norfolk County Council using colour-coded buses, making Norwich's Park & Ride scheme one of the largest bus-based UK operations, providing over 5000 parking spaces.
- 6.1.3 The majority of public bus services operate in the urban areas and run mainly on radial routes into / out of the city centre, with many routes providing cross-city links. These offer good frequency services within the built-up areas during the day and in the evenings, although these can be hampered by traffic congestion in peak periods. The bus route linking the Norfolk and Norwich University Hospital and the University of East Anglia (UEA) to the railway station via Norwich city centre operates 24 hours a day.
- 6.1.4 Most services operate on radial routes. This may result in passengers having to change buses within the centre for journeys around the city, making trips more time consuming and potentially costly. Outside of the built-up area there are services to the surrounding market towns, but these tend to run on much lower frequencies.
- 6.1.5 There are a number of interchange points for onward bus or pedestrian journeys with the main ones in the city centre being on-street in Castle Meadow, St Stephens Street and at Anglia Square, and off-street at the bus and railway stations and at Park & Ride sites. Interchange points are also present at the airport, the hospital and UEA. A new bus station in Norwich city centre was opened in 2005 as part of a £10m major project that involved improved public transport links (including a bus priority route) between the bus and railway station.
- 6.1.6 The main bus services on the core network in the NDR corridor are highlighted in the key bus route map which is included in **Appendix C.4**.

The Norfolk County Council (Norwich Northern Distributor Road (A1067 to A47(T))) Order

5.6 Norwich Northern Distributor Road Traffic Forecasting Report: Volume 1

Planning Act 2008

Infrastructure Planning

The Infrastructure Planning (Applications: Prescribed Forms and Procedure)
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1 Key Summary

1.1 Overview

- 1.1.1 This report describes the traffic forecasting work undertaken for the NDR in connection with this Development Consent Order (DCO) application under the Planning Act 2008.
- 1.1.2 The outputs of the forecasting work provide:
- The future year design traffic flows
 - Traffic flows for operational appraisal of the Scheme Junctions;
 - Traffic impacts across the network and in the city centre;
 - Inputs to the environmental appraisal; and
 - Inputs to the economic appraisal.
- 1.1.3 The forecasting for the Scheme used the updated Norwich Area Transport Strategy (NATS) transport model. Separate transport models were produced for the AM peak hour (08:00-09:00), an average hour in the inter-peak (10:00 – 16:00) and the PM peak hour (17:00 – 18:00). This is to ensure the traffic characteristics for different time periods are modelled accurately. The NDR Local Model Validation Reports (document reference nos. 5.9 and 5.10) describe the updating of the transport models and the calibration and validation processes.
- 1.1.4 This report explains the preparation of the future year transport networks. These include modifications to account for changes, comprising the proposed NDR, complementary traffic management measures, city centre measures, developer link roads and other proposed improvements.
- 1.1.5 The development of the demand matrices is also described. It accounts for the Joint Core Strategy (JCS) spatial allocation of development for which trip generation has been assessed using the TRICS database. The growth has been controlled using the Department for Transport's National Trip End Model (NTEM) and Road Transport Forecast (RTF) databases, but reductions have then been applied for the JCS development trip generation to account for travel plans and the trip distribution for large mixed developments. Variable demand model processes have also been applied to account for behavioural changes of trip redistribution, mode choice and frequency responses to changing travel costs. The forecasting has been undertaken in line with the Department for Transport's Web-based Transport Appraisal Guidance WebTAG (unit 3.15.1).

- 1.1.6 Forecasts are presented for the proposed opening year of 2017 and a design year of 2032 and for scenarios with and without the proposed Scheme.
- 1.1.7 The report describes the changes in traffic and network performance that would occur with the implementation of the proposed transport interventions. It sets out the substantial reductions in traffic on existing orbital routes as a result of the reassignment of strategic traffic to the NDR. There would also be substantial reductions on the proposed developer link roads which would not be appropriate routes for carrying strategic traffic. Traffic levels would be reduced on routes in the Thorpe St Andrew, Old Catton and Hellesdon suburbs, including on the Outer Ring Road. Traffic flows in the city centre would also be reduced substantially as a result of the city centre measures that could be implemented with the introduction of the NDR, though there is some displacement to the Inner Ring Road.
- 1.1.8 Traffic flows travelling through the city would be reduced significantly with the NDR. The analysis shows that through the city centre the forecast traffic in 2032 would be almost half of that in the 2012 base year as a result of city centre measures. Traffic forecasts on the Inner Ring Road would be reduced in 2017 and 2032 to levels only just higher than in the base year. On the Outer Ring Road forecast traffic would reduce to levels below those in the base year.
- 1.1.9 Journey times from the strategic road network to the Airport and the proposed development location at Rackheath would be reduced significantly with the NDR implemented. In addition there are journey time reductions on radial bus routes into the city centre with improvements to journey time reliability.
- 1.1.10 Comparison of the overall queues within the transport model shows that there will be large increases without transport improvements, but these would be significantly reduced by the implementation of the scheme.

2 Introduction

2.1 Background

- 2.1.1 Mott MacDonald (MM) has been appointed by Norfolk County Council (NCC) to assist with the development and appraisal of the Norwich Northern Distributor Road, known as the NDR or referred to as the Scheme.
- 2.1.2 The Scheme would be a dual carriageway all-purpose strategic distributor road, to be classified as the A1270 Principal Road, which would link the A1067 Fakenham Road near Attlebridge, to the A47(T) Trunk Road at Postwick. This will be over a length of approximately 20.4km.
- 2.1.3 The NDR is a project of national significance which requires a Development Consent Order (DCO) under the Planning Act 2008 and this formal planning process began in early 2013. It is currently anticipated that the process will be completed in time for the NDR scheme to start construction in 2015 and to be opened in 2017.
- 2.1.4 This document is one of a number that support the DCO, each of which has its own unique document number, and should therefore be read in conjunction with the other documentation. The proposed layout of the NDR is shown in the General Arrangement Plans contained in document number 2.6, whilst the full needs case for the NDR is explained in the Statement of Reasons (document 4.1) and the Environmental Statement (document 6.1).
- 2.1.5 To support the process of scheme appraisal, the Norwich Area Transport Strategy (NATS) transport model has been updated to a 2012 base year. The forecasting has been carried out on a Production Attraction (PA) basis, a requirement of current WebTAG guidance, and the National Trip End Model (NTEM) and Road Transport Forecasts (RTF). The forecast networks were developed on the basis of the WebTAG (unit 3.15.5) uncertainty log principles. Local development assumptions were based on the proposals for the Joint Core Strategy (JCS).
- 2.1.6 A plan of the scheme is shown in Figure B.1 in Appendix B of this Forecasting Report and further details are included in Section 4.4.

2.2 Overview of the forecasts presented

2.2.1 Traffic forecasts accounted for the JCS proposals for residential and employment developments as well as corresponding transport network changes that will provide access to the proposed developments. The forecast scenarios comprise the following:

- A set of transport network changes;
- Assumptions about changes in values of time and vehicle operating costs over time;
- A specific set of development assumptions;
- Application of National Trip End Model (NTEM) growth factors as a constraint on trip growth for private vehicle use; and
- Application of growth of freight traffic from the DfT Road Transport Forecasts (RTF).

2.2.2 The transport supply and development assumptions were arrived at through a process of identifying potential transport improvements and development proposals, and undertaking an assessment of the likelihood of each of these proposals coming forward in the context of the JCS.

2.2.3 The demand forecasting used the DIADEM variable demand modelling software forecasting procedures without and with a scheme intervention (also called Do-Minimum and Do-Something scenarios). It used a specific set of demand model parameters adjusting the sensitivity of destination, mode and frequency choices to changes in generalised cost. In addition, travel planning and distribution for new developments was taken into account.

2.2.4 The following demand forecasts were produced:

- The Reference Case which was a forecast of what is likely to happen if the travel costs remain the same in the future as in the base year i.e. it takes no account of changes in travel costs that would arise from the increased demand, or changes in fuel costs or the value of time.
- The Do-Minimum forecast which used variable demand modelling to account for changes in travel costs and the future transport network that excludes the Scheme.
- The Do-Something network which included all highway changes associated with the NDR Scheme, as well as Norwich city centre measures, and the forecast used variable demand modelling to account for changes in travel costs with this network.

2.3 Purpose and layout of Report

2.3.1 The report describes the traffic forecasts for the Scheme and sets out the assumptions on which these forecasts have been based.

2.3.2 The structure of this report is as follows:

- Chapter 3 presents an overview of the modelling system developed to assess the NDR;
- Chapter 4 documents the development of future year highway networks;
- Chapter 5 presents future year traffic growth forecasts;
- Chapter 6 provides analysis and discussion in relation to future year forecasts;
- Chapter 7 provides an analysis of effects of the NDR on traffic; and
- Chapter 8 contains a glossary of abbreviations.

3 Overall Modelling Framework

3.1 The Modelling Framework

3.1.1 The NATS transport modelling framework used to assess the NDR consists of three main elements:

- Highway Traffic Model: this is a SATURN model with 413 zones with an extensive detailed simulation area that goes beyond the main Norwich city urban area. The rest of the network is coded as a SATURN buffer network. The model has been validated to a 2012 base year.
- Public Transport Model: this is a VISUM public transport model covering bus and rail modes. The model covers the same area as the highway model plus the key rail routes into Norwich and represents the same base year of 2012.
- Demand Model: this is a DIADEM variable demand model. The model is an incremental model, and is set up in Production-Attraction format as required by WebTAG (unit 3.10.2).

3.1.2 The overall modelling framework has been developed to be consistent with the guidance set out in WebTAG (unit 3.1.1). The individual elements have been developed to be consistent with the guidance set out in WebTAG units 3.10, 3.11 and 3.19.

3.1.3 Full details of the first two model components are set out in the Highway Local Model Validation Report (document reference 5.9) and the Public Transport Local Model Validation Report (document reference 5.10). The demand model is described in this Forecasting Report.

3.2 Model Definition

Forecast Years

3.2.1 Future year traffic forecasts were developed for two years: 2017 and 2032. The future year of 2017 represents the programmed opening year of the proposed NDR, and 2032 represents the design year (15 years after scheme opening).

Time Periods

3.2.2 The highway and public transport assignment models have been developed for three time periods:

- AM Peak Hour (0800-0900hrs);
- Average Inter-Peak Hour (1000-1600hrs); and
- PM Peak Hour (1700-1800hrs).

3.2.3 An Off-Peak model representing an average hour for the period 1900 to 0700 hrs has also been developed for the purposes of demand modelling, where costs are required for all times of the day (it should be noted that this is not a fully validated model).

Demand Segmentation

3.2.4 The development of the 2012 base model produces highway assignments for five vehicle types/ user classes for each model hour at an O-D level. This representation of the demand is not sufficiently detailed to be used as inputs to the demand model for the following reasons:

- The demand model is applied to trips with an origin or destination inside the modelled area. Therefore, purely external-external trips need to be treated as fixed in a separate demand segment; and
- The home-based purposes need be modelled in PA (24 hour) format, not hourly O-D.

3.2.5 The highway demand was therefore split into ten demand segments, with five additional segments being included to model trips for PT users who have no access to a car. These fifteen demand segments are shown in Table 3.1. In addition the home-based demand segments are aggregated to a 24 hour level to be used in PA modelling.

Table 3.1: Demand Segments

User class	Vehicle Type	Description	Demand Model Segment
1	Car/ LGV/ PT	Home Based Work	Variable HBW - Car Available
2			Variable HBW - No Car Available
3	Car/ PT	Home Based Employer's Business	Variable HBEB - Car Available
4			Variable HBEB - No Car Available
5	Car/ LGV/ PT	Home Based Other	Variable HBO - Car Available
6			Variable HBO - No Car Available
7	Car/ PT	Non-Home Based Employer's Business	Variable NHBEB - Car Available
8			Variable NHBEB - No Car Available
9			Fixed NHBEB - (External-External Movements)
10	Car/ LGV/ PT	Non-Home Based Other	Variable NHBO - Car Available
11			Variable NHBO - No Car Available
12&13			Fixed NHBO & HBW - (External-External Movements)
14	LGV	Freight	Freight (LGV)
15	HGV	Freight	Freight (HGV)

3.3 Demand Modelling

3.3.1 The forecasting procedure was undertaken using DIADEM software (version 5.0). DIADEM implements variable demand modelling in line with WebTAG Unit 3.10. DIADEM does not include an assignment module; instead it relies on other software packages to carry out assignments, i.e. SATURN for the highway network and VISUM for the public transport network. The public transport and highway assignment models are external to DIADEM but the software packages exchange trip matrices and cost matrices.

3.3.2 DIADEM was set up to model the following demand responses:

- Frequency choice;
- Mode choice; and
- Re-distribution.

3.3.3 Frequency choice responses represent trip generation and trip suppression that a scheme might produce. Selection of this response is consistent with WebTAG 3.10.3 (Paragraph 1.4.3).

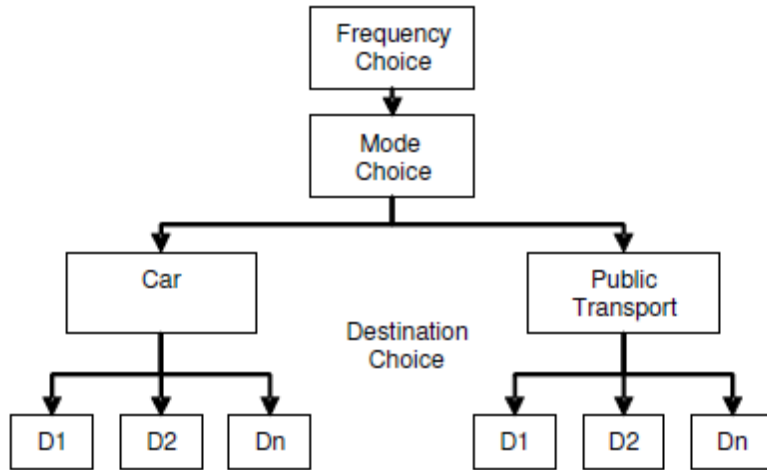
3.3.4 Mode choice represents switching of trips between public transport (PT) and highway modes of travel. This has been set up for car-available PT demand segments only.

3.3.5 Re-distribution (or destination choice) is likely to be the main demand response for the scheme. Travellers might change final destination of trips due to travel cost changes resulting from the Scheme.

3.3.6 Time period response is most relevant where a scheme imposes significant cost differences between travel during the peak period and travel during the inter-peak and off-peak periods. Substantial cost differences may result in drivers changing their period of travel. An example is a tolling regime that applies only to peak periods. It is perceived that journey time savings as a result of the scheme are likely to have a low influence on time-of-day travel. Therefore, macro time-of-day choice responses have not been modelled, in accordance with WebTAG 3.10.3 (Paragraph 1.4.13),

3.3.7 The hierarchy of response is consistent with WebTAG advice which identifies frequency (the least sensitive) at the top of the hierarchy and trip distribution (the most sensitive) at the bottom of the hierarchy. The hierarchy adopted is shown in Figure 3-1.

Figure 3-1: Hierarchy of Demand Responses



3.3.8 Demand model parameter values have been calibrated in line with WebTAG, as explained in section 6. The resultant parameter values are shown in Table 3.2. The frequency response is only applied to discretionary trips of which the 'other' trip purpose is mostly comprised.

Table 3.2: DIADEM Parameters

Journey Purpose	Highway Re-distribution	Public Transport Re-distribution	Mode Choice	Frequency
Home Based Work	-0.113	-0.033	0.68	-
Home Based Employer Business	-0.038	-0.036	0.45	-
Home Based Other	-0.074	-0.036	0.53	0.15
Non Home Based Employer Business	-0.069	-0.042	0.73	-
Non Home Based Other	-0.073	-0.033	0.81	0.15

3.3.9 A summary of the demand model set up is shown in Table 3.3. This was set up to be consistent with WebTAG requirements as set out in Unit 3.10.3 with home-based trips in Production Attraction (PA) format so that outbound and return journeys are made to have consistent destination and mode choice by modelling them as linked trips or tours. Home-Based-Work trips (HBW, also referred to as commuting trips) are doubly constrained while Home-Based-Other (HBO) are singly constrained by origin. In the singly-constrained models the trip ends are fixed for one of the trip ends, with no constraints on the other end. In the doubly-constrained models the total trip ends to and from each zone are fixed. For non-home-based trips it cannot be assumed that there are return trips so these are treated as single direction trips, and in DIADEM these are referred to as Origin Destination (OD) format (which is the same as single direction trips in PA format). Freight demand segments have been modelled as fixed OD-based demand and these are only subject to assignment in the Highway model, and it should be noted that some elements of private vehicle trips are fixed (external-external and development trips).

Table 3.3: Summary of Demand Model Set Up

Demand					Responses					
Mode	Purpose	Car Availability	Format	Time Period	Model Format	Time Period Choice	Frequency	Mode Choice	Distribution	Single/ Double constrained
		Na- not applicable CA – car available NCA non car available	PA OD	24 hour or individual time period	Incremental PA Incremental OD Fixed Excluded	Y – yes N- No	Y – yes N- No	Y – yes N- No	Y – yes N- No	S - Singly (production or origin) D – Doubly constrained Na- not applicable
Private	HBW	Na	PA	24 hr	Inc PA	N	N	Y	Y	D
	HBEB	Na	PA	24 hr	Inc PA	N	N	Y	Y	S
	HBO	Na	PA	24 hr	Inc PA	N	Y	Y	Y	S
	NHBEB	Na	OD	TP	Inc OD	N	N	Y	Y	S
	NHBO	Na	OD	TP	Inc OD	N	Y	Y	Y	S
	LGV (EB)	Na	OD	TP	Fixed	N	N	N	N	Na
	HGV	Na	OD	TP	Fixed	N	N	N	N	Na
Public	HBW	CA	PA	24 hr	Inc PA	N	N	Y	Y	D
	HBEB	CA	PA	24 hr	Inc PA	N	N	Y	Y	S
	HBO	CA	PA	24 hr	Inc PA	N	Y	Y	Y	S
	NHBEB	CA	OD	TP	Inc OD	N	N	Y	Y	S
	NHBO	CA	OD	TP	Inc OD	N	Y	Y	Y	S
	HBW	NCA	PA	24 hr	Exc	N	N	N	N	Na
	HBEB	NCA	PA	24 hr	Exc	N	N	N	N	Na
	HBO	NCA	PA	24 hr	Exc	N	N	N	N	Na
	NHBEB	NCA	OD	TP	Exc	N	N	N	N	Na
	NHBO	NCA	OD	TP	Exc	N	N	N	N	Na

3.4 Forecasting Scenarios

- 3.4.1 Separate DIADEM runs have been carried out for the Do-Minimum and the Do-Something scenarios, for the two forecast years. The demand modelling assesses the changes in travel costs as a result of traffic growth, so it requires reference travel costs which are taken from the 2012 base model and used as a baseline for measuring changes in travel costs in future years.

4 Forecast Year Networks

4.1 Requirements

- 4.1.1 For forecasting purposes transport networks representing the supply and cost of transport in future years were required as a basis to assess the impact of the proposed Scheme. Future year transport supply and costs relate to changes in the transport networks, for example new transport infrastructure or public transport services, and the cost of transport e.g. car parking charges or bus fares.
- 4.1.2 Highway and public transport networks for the JCS scenario (current at April 2013) have been produced for the two forecasting years 2017 and 2032.

4.2 Built Schemes

- 4.2.1 There have been no schemes built and opened since the base model development for October / November 2012 (current at April 2013).

4.3 Do Minimum Network

Approach

- 4.3.1 Information on planned schemes in Norwich City, South Norfolk and Broadland was provided by NCC. Details on future schemes in the remaining districts of Norfolk are not included as the model detail in those outlying districts is relatively coarse, and therefore including schemes would have minimal effect in the Greater Norwich area.
- 4.3.2 Data collated on future transport proposals was tabulated and an assessment of likelihood of them proceeding was carried out in April 2013. This assessment was in line with the definitions of uncertainty contained in WebTAG unit 3.15.5; these are reproduced in Table 4.1.

Table 4.1: Classification of Future Inputs

Probability of the Input	Status
<p>Near Certain: The outcome will happen or there is a certain probability that it will happen</p>	<p>Intent announced by proponent to regulatory agencies.</p> <p>Approved development proposals.</p> <p>Projects under construction.</p>
<p>More than likely: The outcome is likely to happen but there is some uncertainty.</p>	<p>Submission of planning or consent application imminent.</p> <p>Development application within the consent process.</p>
<p>Reasonably foreseeable: The outcome may happen, but there is significant uncertainty</p>	<p>Identified within a development plan.</p> <p>Not directly associated with the transport strategy/scheme, but may occur if the strategy/scheme is implemented.</p> <p>Development conditional upon the transport strategy/scheme proceeding.</p> <p>Or, a committed policy goal, subject to tests (e.g. of deliverability) whose outcomes are subject to significant uncertainty.</p>
<p>Hypothetical: There is considerable uncertainty whether the outcome will ever happen.</p>	<p>Conjecture based upon currently available information.</p> <p>Discussed on a conceptual basis.</p> <p>One of a number of possible inputs in an initial consultation process.</p> <p>Or, a policy aspiration.</p>

4.3.3 Classifications for each input were assessed in consultation with planning and transport officers at NCC, taking into account guidance, and drawing on local knowledge.

4.3.4 All schemes that are “near certain” or “more than likely” were included in the forecast networks.

Highway Network

4.3.5 Table 4.2 shows the highway schemes identified in consultation with NCC and the uncertainty level attributed to each scheme. The year shown is the first model year when it is expected that a scheme will be implemented by (so the scheme opening date could be earlier than the model year). All the near certain or more than likely schemes are expected to be implemented by 2017, so the resultant 2017 and 2032 Do Minimum networks are identical. Locations of all the highway schemes in the uncertainty log are shown in Figure A.1 in Appendix A.

Table 4.2: Uncertainty Log – Factors Affecting Highway Supply

SI number	Input	Uncertainty	Year	Comment	Status
1	Dereham Road/ Old Palace Road and Heigham Road junction improvement	Near certain (under construction)	2017	Improvements to facilitate bus rapid transit on Dereham Road bus corridor	Local authority scheme: programmed under construction
2	A11(T) Fiveways to Thetford improvement scheme	Near certain (under construction)	2017	Dualling of the last section of the trunk road route between the M11 and Norwich	Highways Agency scheme: under construction
3	Southbound bus lane Grapes Hill	Near Certain	2017	Improvements to facilitate bus rapid transit on Dereham Road bus corridor	Local authority scheme
4	Two way on Cleveland Road and a new junction arrangement at Cleveland Road/Chapelfield North	Near Certain	2017	New Junction arrangements to facilitate Chapelfield North scheme	Local Authority scheme: budgeted and Programmed
5	Bus only on Theatre Street and Chapelfield North and removal of general traffic except buses, taxis and cyclists from Rampant Horse Street	Near Certain	2017	Part of city centre measures to reduce through traffic	Local Authority scheme: budgeted and Programmed
6	Little Bethel Street closure	Near Certain	2017	Part of Chapelfield North scheme and city centre measures	Local authority scheme: budgeted and programmed

7	St Stephens Street and Surrey Street bus only	Near Certain	2017	Part of city centre measures	Local authority scheme: budgeted and programmed
8	Traffic signal priority for buses for signals on radial routes outside of Inner Ring Road	Near Certain	2017	General Signal timing upgrades across Norwich's road network	Local authority scheme: being built
9	Development Link Broadland Business Park to Plumstead Road	Near Certain	2017	Link Road to bypass narrow country road and Thorpe End connecting to Plumstead Road	Developer scheme: Planning Approval subject to S106
10	Salhouse Road - Wroxham Road Link Road	Near Certain	2017	New Road through new housing estate Connecting Wroxham Road to Salhouse Road	Developer scheme: approved planning permission
11	Tuckswood Roundabout Improvements, Norwich (Harford Place)	Near Certain	2017	Improvements to the approach of the roundabout and improved crossing facilities (Barrett Road)	Developer scheme: approved planning permission
12	Norwich Research Park Transport Infrastructure	Near Certain	2017	Junction Improvement on B1108/Hethersett Lane junction including signalisation	Developer scheme: approved planning permission
13	Westlegate - removal of straight ahead movement	Near certain	2017	Part of city centre measures to reduce through traffic	Local authority scheme: budgeted and programmed

14	Lenwade to Honingham	More than likely	2017	Improvement scheme to widen carriageway for HGV's	Local authority scheme: phased programme agreed and construction
15	Bus only on All Saints Green	More than likely	2017	Closure of All Saints Green to all general traffic except buses	Local authority scheme: feasible, but not programmed
16	Longwater Interchange Improvements – To mitigate impact of Lodge Farm 2 residential development	More than likely	2017	Free flow slip from A1074 westbound onto A47(T) eastbound and part signalisation of the south dumbbell roundabout	Developer scheme: planning application being assessed
17	Westbound bus lane on approach to Larkman Road, Costessey	Reasonably foreseeable		Improvements to facilitate bus rapid transit on Dereham Road bus corridor	Local authority scheme: investigation instigated without conclusion
18	Westbound bus lane on approach to Norwich Road , Costessey	Reasonably foreseeable		Improvements to facilitate bus rapid transit on Dereham Road bus corridor	Local authority scheme: investigation instigated without conclusion
19	John Lewis car park right turn in and out	Reasonably foreseeable		Car Park entrance changes allowing all movements	Local authority scheme: feasible, but not programmed
20	Thickthorn Roundabout Improvements	Reasonably foreseeable		Feasibility work currently under way	Highways Agency scheme: feasible, but not programmed

21	Eastbound bus lane on Dereham Road bypassing Bowthorpe Roundabout	Reasonably foreseeable		Improvements to facilitate bus rapid transit on Dereham Road bus corridor	Local authority scheme: feasible, but not programmed
22	Westbound bus lane on approach to Outer Ring Road/Dereham Road and junction improvement	Reasonably foreseeable		Improvements to facilitate bus rapid transit on Dereham Road bus corridor	Local authority scheme: feasible, but not programmed
23	Longwater Interchange – large scale improvement	Reasonably foreseeable		Feasibility work currently under way	Local authority scheme: feasible, but not programmed
24	Improvements to the A47(T) trunk road including junctions and dualling	Reasonably foreseeable		Road infrastructure improvements	Highways Agency schemes: feasible, but not programmed
25	Eastbound bus lane on Dereham Road on approach to Longwater Lane junction, Costessey	Reasonably foreseeable		Improvements to facilitate bus rapid transit on Dereham Road bus corridor	Local authority scheme: feasible, but not programmed

Public Transport Network

4.3.6 Table 4.3 shows the public transport schemes identified and the uncertainty of the schemes going ahead. Locations of all the public transport schemes in the uncertainty log are shown in Figure A.2 in Appendix A.

Table 4.3: Uncertainty Log – Factors Affecting Public Transport Study

SI number	Input	Uncertainty	Year	Comment	Status
1	Extension of Postwick Park and Ride site	Near certain	2017	Capacity Improvements	Local authority scheme: has planning permission
2	Increase in frequency on the number of bus routes to reflect a minimum level of service	Reasonably Foreseeable/ Hypothetical	N/A	N/A	N/A
3	Increase frequency of rail services	Reasonably foreseeable/ Hypothetical	N/A	N/A	N/A
4	Norwich Bus Strategy	Hypothetical	N/A	N/A	N/A
5	New station to serve Rackheath Eco-community or relocation of existing Salhouse Station.	Hypothetical	N/A	N/A	N/A
6	New rail halt/station at Broadland Business Park/Dussindale Park	Hypothetical	N/A	N/A	N/A
7	New rail halt/station at Postwick Park and Ride	Hypothetical	N/A	N/A	N/A
8	New Park and Ride site at Trowse	Hypothetical	N/A	N/A	N/A

4.3.7 With the exception of extension of Postwick Park and Ride site, all the other public transport schemes as identified in Table 4.3 were given a reasonably foreseeable or hypothetical uncertainty level, and therefore based on this qualitative assessment these public transport schemes were not included in

the Do-Minimum scenario. However, it must be noted that a number of schemes identified in the highway uncertainty log are focussed on providing bus priority and have been reviewed for inclusion based on their uncertainty level. All changes to the highway network that would impact on public transport were reflected in the public transport networks.

- 4.3.8 Rail services remain the same as in the base year as no schemes were identified following consultation that would have a significant impact on level of service.

4.4 Do Something Network

4.4.1 The Do Something networks consist of a number of elements:

- The Norwich Northern Distributor Road;
- Offline improvement measures; and
- City Centre network improvements.

Norwich Northern Distributor Road

4.4.2 The preferred route option for the NDR is shown in Figure B.1 in Appendix B. The NDR is proposed to commence in the west at a new junction on the A1067 north of Taverham and connect to the A47(T) to the east of Norwich at the Postwick junction. The total length of the proposed NDR is approximately 20.4km. It is of dual two lane carriageway standard for the entire length, with grade separated junctions at the Postwick Hub Junction with the A47(T) and at the A140 Cromer Road junction and at-grade roundabouts with other major radial routes.

4.4.3 Link lengths and planned junction layouts have been taken from the current design drawings. The NDR has been assigned a speed flow curve which corresponds to a D2 dual carriageway rural road.

Offline Improvement Measures

4.4.4 The following schemes are included as part of the NDR scheme and shown in Figure B.3 in Appendix B:

- Wroxham Road/ Green Lane junction improvement;
- North Walsham Road/ Crostwick Lane junction improvement; and
- Thorpe End: Traffic Management as per Parish Plan (two mini-roundabouts and a pedestrian crossing).

4.4.5 There are a number of locations in Norwich that currently experience rat running. In the northern suburbs it is anticipated that the NDR will reduce or remove these problems. It is felt by some that there may be increases in other locations. To assuage these fears, traffic levels at these locations will be monitored and traffic management measures implemented if required.

City Centre Network Improvements

4.4.6 In conjunction with the NDR, complementary traffic management measures are proposed for Norwich city centre, with the aim of discouraging through car trips and reducing the dominance of traffic in certain areas. The following schemes are included:

- Golden Ball Street and Farmers Avenue two-way;
- Removal of general traffic except buses, taxis and cyclists from Red Lion Street;
- Full closure of Westlegate;
- Removal of general traffic except buses, taxis and cyclists from Prince of Wales Road (except eastern section);
- Bus only on Prince of Wales Road and Agricultural Hall Plain; and
- Removal of some non-bus, taxi or cycle through traffic from Tombland – occurs as a consequence of the sum of the other measures.

4.4.7 Figure B.2 in Appendix B shows current proposals, and these have been modelled in the Do Something scenario.

4.5 Change in Travel Costs

- 4.5.1 Changes of travel costs in the opening and forecast years are to be expected due to increases in incomes and the value of time, changes in fuel costs and improvements in vehicle efficiency. Therefore, the cost assumptions of the validated base year models have been updated in the future year assignments.
- 4.5.2 Cost changes have been calculated for each forecast year and are applicable to both the Do Minimum and Do Something scenarios.

Highway Generalised Cost Parameters

- 4.5.3 The highway trip costs are made up of time, distance and charge impacts. The Value Of Time (VOT) and Vehicle Operating Cost (VOC) vary by journey purpose and also vary by forecast year to represent changes in fuel costs and income. Changes in fuel costs, vehicle efficiency and values of time included in WebTAG 3.5.6 issued in October 2012 have been used to calculate forecast year values of time and operating costs. Table 4.4 details the highway generalised cost coefficients used for 2012, 2017 and 2032 in pence per minute (PPM) and pence per kilometre (PPK). The values for cars have additionally been adjusted to take account of the proportion of non-freight LGVs which gives slightly different values for each time period.
- 4.5.4 The PPK values are expected to reduce from the 2017 to the 2032 forecasting year due to fuel efficiency improvements for cars and LGVs.

Table 4.4: 2012, 2017 and 2032 Highway Generalised Cost Coefficients (2010 Prices)

	AM		Inter Peak		PM	
	PPM	PPK	PPM	PPK	PPM	PPK
2012						
Work	12.39	7.51	12.29	7.51	12.10	7.51
Employer Business	53.83	13.74	52.61	13.74	51.85	13.74
Other	15.84	7.51	16.47	7.51	16.92	7.51
Light Goods Vehicles	20.66	15.95	20.66	15.95	20.66	15.95
Other Goods Vehicles	35.85	45.63	35.85	45.63	35.85	45.63
2017						
Work	13.41	7.09	13.30	7.09	13.10	7.09
Employer Business	59.45	13.39	58.09	13.39	57.25	13.39
Other	17.14	7.09	17.83	7.09	18.32	7.09
Light Goods Vehicles	22.78	15.52	22.78	15.52	22.78	15.52
Other Goods Vehicles	39.59	47.24	39.59	47.24	39.59	47.24
2032						
Work	16.62	5.38	16.48	5.38	16.24	5.38
Employer Business	77.72	11.97	75.95	11.97	74.85	11.97
Other	21.25	5.38	22.10	5.38	22.70	5.38
Light Goods Vehicles	29.65	14.16	29.65	14.16	29.65	14.16
Other Goods Vehicles	51.76	49.99	51.76	49.99	51.76	49.99

Public Transport Generalised Cost Parameters

4.5.5 As the generalised journey time (GJT) calculation in the public transport model includes fares, appropriate values of time and fare coefficients are required. VISUM operates in units of generalised time, the fare coefficient is the time equivalent (in minutes) of a £1 fare. The future year generalised times were calculated taking into account the assumed real growth in fares

(presented in section 4.5.8), and future year Values of Time (extracted from WebTAG Unit 3.5.6, October 2012). Table 4.5 shows the future year Value of Time and resultant fare coefficients used for public transport in the base and forecast years.

Table 4.5: Values of Time and Fare Coefficients for PT Assignment (2010 Prices)

User Class	Value of Time (£/hour)			Fare Coefficients (minutes/£)		
	2012	2017	2032	2012	2017	2032
EB-(work)	21.7	23.96	31.32	2.77	2.5	1.92
Commute-(non-work)	6.46	6.99	8.67	9.29	8.58	6.92
Other-(non-work)	5.71	6.18	7.66	10.51	9.7	7.83

Car Parking and Park and Ride Charges

- 4.5.6 Future year parking charges for the main car parks in Norwich have been assumed to increase in real terms in line with the Gross Domestic Product (GDP) growth rates shown in WebTAG 3.5.6, October 2012; this amounts to a compound growth rate of 2% pa to 2032.
- 4.5.7 Similar to the parking charges, Park and Ride charges have been assumed to increase with the GDP growth rates as discussed above.

Public Transport Fares

- 4.5.8 In consultation with the Norfolk County Council, the public transport fare growth calculation for the forecast year models assumed real terms increase in fares as follows, based on local experience:
- Bus: 1.8% per annum; and
 - Rail: 1% per annum.

5 Future Year Traffic Growth

5.1 Requirements

5.1.1 For forecasting purposes, future year demand matrices are required by mode and time period reflecting:

- National traffic growth forecasts; and
- Proposed developments spatially allocated according to the JCS, but growth constrained to national forecasts.

5.1.2 Future year matrices are required for the opening year (2017) and design year (2032). For home based trip purposes, demand matrices are required in 24 hour Production and Attraction (PA) format. For non-home based and freight trip purposes matrices are required for the following time periods:

- AM Peak hour (08:00 – 09:00);
- Average Inter Peak Hour (10:00 – 16:00);
- PM Peak hour (17:00 – 18:00); and
- Average Off Peak Hour (19.00 – 7.00).

5.2 Overview of Process

5.2.1 Two methods have been used to produce future trip levels with the method employed being dependent on geographic location.

5.2.2 For the Norwich, Broadland and South Norfolk areas, the trip generation of proposed developments likely to be completed between 2012 and 2032 has been predicted using the TRICS trip rate database. The trip totals for the combined Norwich, Broadland and South Norfolk area have then been controlled to the growth predicted in the NTEM 6.2 dataset for car trips (all purposes) and for LGV trips (commute and other purposes only). These proposed developments were incorporated into all the forecast matrices.

5.2.3 In the remaining areas of the model, including Breckland, Great Yarmouth, North Norfolk, King's Lynn and West Norfolk, and other areas of the model where the model detail is coarser, NTEM 6.2 growth factors were applied directly to the base year matrices for car trips (all purposes) and LGV trips (commute and other purposes only), with no account taken explicitly for completed developments as the remoteness from the Scheme means that the exact locations of development are not important for the purpose of the scheme appraisal.

5.2.4 Growth factors for employers business trips for Other Goods Vehicles (OGV) and Light Goods Vehicles (LGV) have been calculated using data from the Department for Transport's Road Transport Forecasts for 2013 (RTF13).

5.2.5 The reference case matrices developed specifically for the NDR model were identical for the Do-Minimum and Do-Something scenarios, with the same representation of development and the demand for both scenarios controlled to the same growth forecast from NTEM 6.2 and RTF 2013.

5.3 Developments

5.3.1 Proposed developments in the model area were assessed by NCC on the basis of the likelihood of completion and a set of most likely developments were input into the modelling process for explicit representation. The full list of developments that were included is contained in Appendices C and E and a graphical representation of these developments is shown in Appendices D and F.

5.4 Development Trip Generation

Production of TRICS Trip Rates

5.4.1 The TRICS 2012(b) trip rate database was used to derive average trip generation rates for residential, business and retail development land use types. As there are a large number of proposed developments, using average TRICS rates provides a reasonable estimate of the overall increase in trip generation from the developments. Trip rates were extracted for the following TRICS categories as shown in Table 5.1, below.

Table 5.1: Development Land Use Type and TRICS Category

Development Land Use Type	TRICS Category
Residential	03A Residential - Houses Privately Owned
B1 Business	02B Employment - Business Park
B2 Business	02D Employment - Industrial Estate
B8 Business	02F Employment - Warehousing

5.4.2 For all TRICS categories that were interrogated, only sites with multimodal surveys were selected so that multi-modal splits could be derived. Average trip rates were calculated for the following time periods:

- AM peak hour (08:00 – 09:00);
- Average inter-peak hour (Average hourly flow for 10:00 – 16:00);
- PM peak hour (17:00 – 18:00); and
- 12 hour total (07:00 – 19:00).

5.4.3 Selections were based on all available data between 01/01/2004 and 18/11/2011 for all locations in the dataset excluding London and Ireland. Trip rates were calculated for weekdays only, for the 12 hour period 07:00 to 19:00. Modal splits were derived for each land use type for the entire period of the surveys and applied to the trip rates for all vehicles for each time period. Key steps in building the matrices are described below.

Conversion of TRICS Vehicular Trip Rates to Trip Rates by Model Purpose

5.4.4 The TRICS vehicular trip rates, shown in the tables above, required conversion to the purposes used in the demand and assignment models. In addition, for the home-based production attraction purposes, trip rates were required for a 24 hour period. Use of CTripend data facilitated the production of trip rates in the required formats; CTripend is Department for Transport software.

Splitting of Trip Rates by Purpose

5.4.5 CTripend output data, available at zone level, was used to split the calculated vehicular TRICS trip rates into trip rates by purpose. The extracted data contains trip ends by time period, mode and journey purpose. The most appropriate existing zones were selected by land-use type using local knowledge to represent the built development, as follows:

- Residential – Zone 8 (Thorpe Mariott);
- Retail – Zone 8 (Riverside Retail Park); and
- Business – Zone 121 (Sweet Briar Industrial Estate) and Zone 349 (Broadland Business Park).

5.4.6 Trip purpose proportions were then calculated for these areas and used to split the trip rates from TRICS into purposes, so that the development trip generation could be added into the user classes of the model.

Splitting of Trip Rates by Mode

5.4.7 Multimodal surveys for each TRICS category were used to produce modal splits between car, public transport, LGV and HGV for each development land-use type.

5.4.8 An average was calculated for each land-use using all of the surveys available which had full multi-modal splits for the complete survey day.

5.4.9 Further splitting of the public transport trip rates into bus and rail trip rates was achieved using CTripend data for each land use type to find the proportions of trip-ends at zones appropriately matching each land-use type.

Controlling to NTEM and RTF

5.4.10 The forecasts are controlled to NTEM and RTF. This is explained in section 5.9.

Adjustment for Travel Planning and Distribution

5.4.11 It is considered that the impact of travel planning will have the effect of reducing vehicle trip generation at the proposed developments. To model this effect, an 11% reduction to the vehicle trip generation predicted by TRICS has been made to car trips. This is taken from the Department for Transport's documents 'Making Residential Travel Plans Work' (2007) and Making Personal Travel Planning Work: A practitioners' Guide (2008). This reduction is consistent with the reduction accepted by NCC development control for the Beyond Green development at North Spowston and Old Catton, and it is within the range suggested in WebTAG Unit 3.10.6.

5.4.12 For the Rackheath Eco Town and Beyond Green developments a pragmatic approach was adopted to account for the reduced vehicular trip generation that would be likely to occur at these developments when compared with more typical sites found in TRICS. A 30% reduction to the vehicular trip generation was made for these two sites, which represents the 'internalisation'

of the trip generation within each respective site. This is consistent with the assumed reduction that has been accepted by NCC development control for the Beyond Green development at North Spowston and Old Catton.

- 5.4.13 It should be noted that the reductions to development trips to take account of travel planning and for the different nature of the Rackheath Eco Town and of the Beyond Green developments were made after the constraint to NTEM was achieved. Therefore, the growth in reference case highway trips from the base year to the forecast years will be less than that predicted by NTEM.
- 5.4.14 The outturn vehicle trip rates for each time period and land use (see paragraph 5.4.11) are shown below in Table 5.2 to Table 5.9. The car trip rates allow for an 11% reduction to account for travel plans. Full TRICS outputs are attached at Appendix G (these are the trip rates directly from TRICS prior to the adjustment).

Table 5.2: TRICS Residential Trip Rates (Vehicle Trips per Dwelling)

Vehicle type	AM Peak		Inter Peak		PM Peak		12 Hour	
	(8:00-9:00)		(10:00-16:00)		(17:00-18:00)		(07:00-19:00)	
	IN	OUT	IN	OUT	IN	OUT	IN	OUT
Car	0.127	0.327	0.158	0.149	0.307	0.184	2.055	2.117
LGV	0.016	0.041	0.020	0.019	0.038	0.023	0.256	0.264
HGV	0.002	0.005	0.002	0.002	0.005	0.003	0.031	0.032

Table 5.3: TRICS B1 Trip Rates (Vehicle Trips per 100sqm Gross Floor Area)

Vehicle type	AM Peak		Inter Peak		PM Peak		12 Hour	
	(8:00-9:00)		(10:00-16:00)		(17:00-18:00)		(07:00-19:00)	
	IN	OUT	IN	OUT	IN	OUT	IN	OUT
Car	1.159	0.218	0.245	0.272	0.144	0.944	4.093	4.047
LGV	0.128	0.024	0.027	0.030	0.016	0.104	0.452	0.447
HGV	0.026	0.005	0.006	0.006	0.003	0.021	0.093	0.092

Table 5.4: TRICS B2 Rates (Vehicle Trips per 100sqm Gross Floor Area)

Vehicle type	AM Peak		Inter Peak		PM Peak		12 Hour	
	(8:00-9:00)		(10:00-16:00)		(17:00-18:00)		(07:00-19:00)	
	IN	OUT	IN	OUT	IN	OUT	IN	OUT
Car	0.199	0.100	0.118	0.132	0.050	0.160	1.383	1.468
LGV	0.106	0.053	0.063	0.07	0.027	0.086	0.739	0.784
HGV	0.041	0.02	0.024	0.027	0.01	0.033	0.285	0.302

Table 5.5: TRICS B8 Trip Rates (Vehicle Trips per 100sqm Gross Floor Area)

Vehicle type	AM Peak		Inter Peak		PM Peak		12 Hour	
	(8:00-9:00)		(10:00-16:00)		(17:00-18:00)		(07:00-19:00)	
	IN	OUT	IN	OUT	IN	OUT	IN	OUT
Car	0.045	0.024	0.037	0.039	0.018	0.045	0.409	0.438
LGV	0.015	0.008	0.013	0.014	0.006	0.015	0.14	0.15
HGV	0.019	0.01	0.016	0.017	0.008	0.019	0.177	0.19

Table 5.6: TRICS DIY Store Trip Rates (Vehicle Trips per 100sqm Gross Floor Area)

Vehicle type	AM Peak		Inter Peak		PM Peak		12 Hour	
	(8:00-9:00)		(10:00-16:00)		(17:00-18:00)		(07:00-19:00)	
	IN	OUT	IN	OUT	IN	OUT	IN	OUT
Car	0.632	0.391	1.590	1.559	1.131	1.266	15.389	14.649
LGV	0.091	0.056	0.229	0.225	0.163	0.183	2.221	2.114
HGV	0.018	0.011	0.046	0.045	0.033	0.037	0.447	0.426

Table 5.7: TRICS Non Food Superstore Trip Rates (Vehicle Trips per 100sqm Gross Floor Area)

Vehicle type	AM Peak		Inter Peak		PM Peak		12 Hour	
	(8:00-9:00)		(10:00-16:00)		(17:00-18:00)		(07:00-19:00)	
	IN	OUT	IN	OUT	IN	OUT	IN	OUT
Car	0.296	0.152	2.040	1.970	1.299	1.379	17.344	16.703
LGV	0.009	0.005	0.064	0.061	0.04	0.043	0.541	0.521
HGV	0.001	0.001	0.007	0.007	0.004	0.005	0.059	0.057

Table 5.8: TRICS Fast Food Drive through Trip Rates (*Vehicle Trips per 100sqm Gross Floor Area)

Vehicle type	AM Peak		Inter Peak		PM Peak		12 Hour	
	(8:00-9:00)		(10:00-16:00)		(17:00-18:00)		(07:00-19:00)	
	IN	OUT	IN	OUT	IN	OUT	IN	OUT
Car	2.284	1.054	6.600	6.552	6.186	6.533	67.612	64.725
LGV	0.276	0.127	0.797	0.791	0.747	0.789	8.164	7.816
HGV	0	0	0	0	0	0	0	0

Table 5.9: TRICS Private Fitness Club Trip Rates (Vehicle Trips per 100sqm Gross Floor Area)

Vehicle type	AM Peak		Inter Peak		PM Peak		12 Hour	
	(8:00-9:00)		(10:00-16:00)		(17:00-18:00)		(07:00-19:00)	
	IN	OUT	IN	OUT	IN	OUT	IN	OUT
Car	0.452	0.713	0.596	0.602	1.535	0.832	9.082	7.896
LGV	0.015	0.023	0.019	0.019	0.05	0.027	0.294	0.256
HGV	0.002	0.002	0.002	0.002	0.005	0.003	0.03	0.026

5.5 Development at Broadland Gate

- 5.5.1 Due to the location and considerable size of the proposed Broadland Gate development, modelling of this development was carried out using a different methodology to that used for the other proposed developments.
- 5.5.2 As with the other developments, average TRICS trip rates have been used to calculate the trip generation, however, special attention has been afforded to this development to ensure that the inbound and outbound generated trips were consistent between the assignment models and those predicted by TRICS. Due to the 24 hour format of the Home Based Work, Home Base Employers Business and Home Based Other user classes, this was completed by preparing bespoke DIADEM time period factors for this development.
- 5.5.3 The peak hour trip generation for the Broadland Gate development was based upon the following development quantum taken from the Broadland Gate Transport Assessment.

Table 5.10: Broadland Gate Development Quantum

Land Use	Development Quantum	TRICS Category
B1/ B2/ B8	42,000 sqm	02B Employment – Business Park 02D Employment – Industrial Estate 02F Employment – Warehousing
Hotel	120 beds	06A Hotels Food & Drink – Hotels
Leisure Club	1,890 sqm	07K Leisure – Fitness Club (Private)
Residential Apartments	75 no.	03C Residential – Flats Privately Owned
Medical Facility	3,150 sqm	05B Health – General Hospital Without Casualty
Ancillary Retail	2,400 sqm	01G Retail – Other Individual Non-Food Superstore
Car Showroom	1,208 sqm	14A Car Show Rooms – Car Show Rooms
Pub/ Restaurant	1,575 sqm	06C Hotels Food & Drink – Pub/ Restaurant
Nursery	420 sqm	04D Education – Nursery

5.5.4 In consultation with NCC, it has been assumed that 10% of the development will be completed and occupied by 2017 and that it will be fully completed and occupied by 2032.

5.5.5 Average TRICS trip rates have been used for the development with an 11% reduction for travel plans (as described in Paragraph 5.4.11) and are shown in Table 5.11 and Table 5.12. Full TRICS outputs are attached at Appendix G.

Table 5.11: Average TRICS Business Trip Rates (Vehicle Trips per 100sqm)

Land Use	AM Peak (8:00-9:00)		Inter Peak (10:00-16:00)		PM Peak (17:00-18:00)	
	IN	OUT	IN	OUT	IN	OUT
B1	1.313	0.247	0.278	0.309	0.163	1.070
B2	0.347	0.173	0.206	0.229	0.086	0.279
B8	0.079	0.042	0.066	0.070	0.031	0.079

Table 5.12: Average TRICS Residential Trip Rates (Vehicle Trips per Dwelling / 100sqm)

Land Use	AM Peak (8:00-9:00)		Inter Peak (10:00-16:00)		PM Peak (17:00-18:00)	
	IN	OUT	IN	OUT	IN	OUT
Hotel with integrated conference and leisure facilities	0.153	0.194	0.089	0.091	0.153	0.135
Residential	0.070	0.261	0.084	0.082	0.242	0.113
Leisure Club / Swimming Pool	0.468	0.737	0.617	0.622	1.588	0.861
Medical Facility	1.061	0.339	0.633	0.683	0.150	0.470
Ancillary Retail	0.306	0.157	2.108	2.036	1.342	1.425
Car Show room	0.750	0.279	0.505	0.506	0.253	0.628
Pub / Restaurant	0.000	0.000	1.364	1.209	2.522	1.917
Nursery	4.167	3.577	0.908	0.938	2.637	2.935

5.5.6 The trip generation rates shown above were applied to the development quantum for the development shown in Table 5.10 resulting in the trip generation shown in Table 5.13.

Table 5.13: Broadland Gate Generated Trips (Vehicles)

	AM Peak (8:00-9:00)		Inter Peak (10:00-16:00)		PM Peak (17:00-18:00)	
	IN	OUT	IN	OUT	IN	OUT
Trips	644	191	246	256	224	583

5.6 Trip Distribution

5.6.1 The gravity model developed during the construction of the base year model was used to distribute development generated trips. The gravity model was given the following inputs:

- Origin/Production or Destination/Attraction development generated trips by purpose for each zone;
- Row or Column totals from base matrix including development;
- Concentration parameter for appropriate purpose; and
- Trip lengths by mode.

5.6.2 Trip length skims from the base year model were used. Analysis has been carried out using skims from the forecast models to confirm that the forecast trip lengths are broadly consistent with the base year trip lengths.

Concentration Parameters

5.6.3 In the context of trip distribution modelling, concentration defines how spread out (or concentrated) the two ends of a trip are, with a strongly negative concentration parameter indicating a relatively concentrated distance between the two trip ends and therefore trip length and a weakly negative or positive concentration parameter indicating trip ends that relatively spread out with a longer trip length. The concentration parameters were taken from the calibrated trip distribution models. For the home based other and non-home based other purposes the concentration parameters were split into several sub-purposes, namely education, personal business, recreational, shopping and visiting friends.

5.6.4 Weighted average concentration parameters for home based other and non-home based other purposes were calculated using trip-ends split by the named sub-purposes from CTripend as the weightings. A summary of the concentration parameters used in the gravity model is shown in Table 5.14.

Table 5.14: Concentration Parameters (Value relate to trip distance in metres)

Mode	Home Based Work	Home Based Employers Business	Home Based Other	Non-Home Based Employers Business	Non-Home Based Other	LGV	HGV
Highway	-0.00012	-0.00005	-0.00032	-0.00005	-0.00022	-0.00004	-0.00003
Bus	-0.00085	-0.00071	-0.00094	-0.00068	-0.00079	N/A	N/A
Rail	-0.000814	-0.00068	-0.00091	-0.00062	0.00001	N/A	N/A

5.6.5 The concentration parameters shown above in Table 5.14 show that distributed car trips are likely to be more spread out than distributed trips by rail and bus, with LGV and HGV trips being even more spread out.

5.7 NTEM 6.2 Growth

- 5.7.1 NTEM 6.2 growth factors were extracted using TEMPRO by mode, purpose and time period and then applied to existing traffic patterns in order to calculate the overall NTEM 6.2 growth constraints.
- 5.7.2 Growth factors have been extracted using TEMPRO software for all NTEM zones in the study area. Growth factors for key TEMPRO / NTEM zones for home based trips are presented in Table 5.15 to Table 5.17.

Table 5.15: NTEM6 2 Car Driver Growth Factors

Region	2012-2017						2012-2032					
	HB Work		HB EB		HB Other		HB Work		HB EB		HB Other	
	P	A	P	A	P	A	P	A	P	A	P	A
East of England	1.046	1.054	1.050	1.060	1.065	1.074	1.105	1.135	1.114	1.150	1.247	1.279
Norfolk	1.049	1.051	1.052	1.055	1.074	1.077	1.135	1.141	1.146	1.148	1.291	1.310
Broadland	1.047	1.056	1.051	1.062	1.069	1.091	1.169	1.137	1.184	1.151	1.321	1.362
Norwich	1.083	1.064	1.092	1.061	1.087	1.063	1.208	1.163	1.220	1.149	1.298	1.222
South Norfolk	1.049	1.055	1.051	1.058	1.070	1.086	1.167	1.169	1.175	1.175	1.317	1.368

Table 5.16: NTEM6 2 Bus Growth Factors

Region	2012-2017						2012-2032					
	HB Work		HB EB		HB Other		HB Work		HB EB		HB Other	
	P	A	P	A	P	A	P	A	P	A	P	A
East of England	0.998	1.007	1.024	1.031	1.022	1.031	1.002	1.032	1.093	1.117	1.172	1.213
Norfolk	0.998	1.002	1.028	1.030	1.022	1.028	1.016	1.031	1.121	1.130	1.179	1.199
Broadland	1.011	1.002	1.038	1.038	1.032	1.034	1.066	1.018	1.177	1.132	1.251	1.250
Norwich	0.990	1.010	1.018	1.037	1.006	1.030	1.027	1.044	1.101	1.134	1.131	1.159
South Norfolk	1.017	1.001	1.040	1.000	1.036	1.031	1.081	1.048	1.187	1.125	1.254	1.264

Table 5.17: NTEM6 2 Rail Growth Factors

Region	2012-2017						2012-2032					
	HB Work		HB EB		HB Other		HB Work		HB EB		HB Other	
	P	A	P	A	P	A	P	A	P	A	P	A
East of England	1.015	1.026	1.038	1.043	1.028	1.042	1.019	1.057	1.089	1.112	1.189	1.229
Norfolk	1.022	1.028	1.041	1.043	1.032	1.042	1.063	1.076	1.116	1.119	1.216	1.247
Broadland	1.028	1.026	1.041	1.054	1.043	1.053	1.108	1.063	1.159	1.135	1.292	1.302
Norwich	1.028	1.035	1.057	1.050	1.008	1.037	1.092	1.089	1.153	1.121	1.139	1.196
South Norfolk	1.032	1.028	1.043	1.034	1.046	1.053	1.114	1.098	1.157	1.138	1.291	1.311

5.8 Freight Growth

5.8.1 Freight growth factors have been extracted from RTF 2013 as shown in Table 5.18. The values for the East of England were used. As the NATS model has a single OGV matrix, a weighted average of rigid and articulated HGV growth rates were applied based on the RTF 2013 proportional split

Table 5.18: 2013 Road Transport Forecasts – Growth Factors

Vehicle type	East of England	
	2012-2017	2012-2032
LGV	1.096	1.545
OGV - Rigid	0.989	1.075
OGV - Artic	1.057	1.343
OGV (combined)	1.018	1.190

5.9 Derivation of 2017 and 2032 Reference Case Trip Matrices

5.9.1 The methodology is explained in the sections below. This same methodology is used for all modes, journey purposes, time periods, and is applied to both matrix formats i.e. Production and Attraction matrices; and Origin and Destination matrices.

Step 1 - Apply national forecast growth and determine NTEM zone constraints

5.9.2 NTEM 6.2 growth factors were applied to the 2012 base year matrices using a doubly constrained Furness. The Furness takes as input a set of column and row growth factors calculated for each zone in the model. It uses an iterative technique to produce a forecast matrix with each zone displaying a close match between the input tripend growth factor and the implied output tripend growth for both rows and columns. When using this process to growth matrices based on trip end growth factors, it is normal for there to be a very small imbalance between the output growth in the rows and the output growth in the columns when compared to the input growth factors after a number of loops of the furness. It is therefore necessary to adjust the matrix afterwards to match the overall growth factors for the rows, the growth factors for the columns or to for an average of the two. The matrices have been controlled to the average of the rows and the columns.

5.9.3 For LGV and HGV user classes, regional growth factors were calculated using observed and forecast journey distances presented in the Department for Transport's Road Transport Forecast 2013 data. The calculated factors were applied to all trips using a simple matrix factor.

5.9.4 The calculated forecast matrices were then converted to NTEM zone level matrices to obtain their trip end totals so that these can be used as constraints in subsequent steps.

Step 2 - Calculate Trip-ends for Development Zones

5.9.5 For zones with development, development trips were calculated by applying the relevant trip rates to the identified quantum of development.

Step 3: Calculate Trip Distribution for Development Zones

5.9.6 For each development zone, trip distribution by trip purpose was calculated by applying the gravity models developed during the development of the base year model. NTEM growth was not applied to the development generated trips.

Step 4: Create Prior Matrices

5.9.7 The outputs from Step 3 (development matrices) were combined with the 2012 base year matrices to create overall prior matrices. Matrix totals at NTEM zone level were also calculated.

Step 5: Create Constrained Reference Demand Matrices

5.9.8 Trip end totals at NTEM zone level for the prior matrices (Step 4) and NTEM growth only matrices (Step 1) were compared and adjustment factors were calculated. The adjustment factors were applied to the prior matrices but were calculated so as to adjust only the factored base year traffic patterns (Step 1) and not the development trip generation (from Step 3). This results in the production of the final reference case matrices constrained to NTEM.

5.9.9 The above process is applicable to the 2017 and 2032 matrices. Therefore, the 2017 and 2032 matrices contain development trips, but also with the inclusion of a constraint to NTEM 6.2 at NTEM zone level.

5.10 Forecast Reference Demand

5.10.1 The forecast reference demand developed using the above process is presented below.

5.10.2 Future year Reference Case estimates of Home Based (HB) highway trips in 24 hour Production and Attraction (PA) format are presented in Table 5.19. The 24 hour PA trip numbers represent a summation of fixed and variable trips. The growth for HB other trips is higher than for HB work and employers business trips.

5.10.3 Table 5.20 to Table 5.22 present future year Reference Case non-home based trips in Origin to Destination (OD) format, segmented by assignment user class, for the respective AM, IP and PM modelled time periods.

5.10.4 The growth in non-home based trips from base year to the future year of 2017 is estimated to be around 6% to 7%, while 2032 is forecast to be around 16% to 23%.

5.10.5 In terms of freight, OGVs are forecast to grow at 2% up to 2017, and 19% up to 2032. LGV trips are forecast to increase by 10% from base year to 2017 and by 55% from base year to 2032.

Table 5.19: Highway Reference Demand – Home Based Purposes (trips – 24 hour PA format)

Purpose	Base Year	2017 24 Hour			2032 24 Hour		
		Ref	Diff	Growth from Base	Ref	Diff	Growth from Base
HB WORK	64,297	67,980	3,682	6%	75,010	10,713	17%
HB EB	11,666	12,370	435	6%	13,667	2,001	17%
HB OTHER	132,768	142,857	34,920	8%	173,413	40,645	31%

Table 5.20: Highway Reference Demand – Non-Home Based Purposes – AM Peak Hour Trips – OD Format

Purpose	Base Year	2017 AM Peak Hour			2032 AM Peak Hour		
		Ref	Diff	Growth from Base	Ref	Diff	Growth from Base
NHBEB	1,320	1,396	76	6%	1,528	208	16%
NHBO	2,671	2,826	156	6%	3,092	422	16%
LGV	6,533	7,161	628	10%	10,097	3,564	55%
OGV	12,104	12,326	223	2%	14,406	2,302	19%
Total	22,627	23,710	1,083	5%	29,123	6,496	29%

Table 5.21: Highway Reference Demand – Non Home Based Purposes – IP Peak Hour Trips – OD Format

Purpose	Base Year	2017 IP Peak Hour			2032 IP Peak Hour		
		Ref	Diff	Growth from Base	Ref	Diff	Growth from Base
NHBEB	2,670	2,826	156	6%	3,092	422	16%
NHBO	5,786	6,173	387	7%	7,079	1,294	22%
LGV	4,970	5,447	478	10%	7,681	2,711	55%
OGV	12,108	12,331	223	2%	14,411	2,303	19%
Total	25,534	26,778	1,243	5%	32,264	6,729	26%

Table 5.22: Highway Reference Demand – Non-Home Based Purposes – PM Peak Hour Trips – OD Format

Purpose	Base Year	2017 PM Peak Hour			2032 PM Peak Hour		
		Ref	Diff	Growth from Base	Ref	Diff	Growth from Base
NHBEB	2,858	3,024	165	6%	3,310	452	16%
NHBO	7,629	8,143	514	7%	9,364	1,735	23%
LGV	5,301	5,811	509	10%	8,193	2,892	55%
OGV	6,026	6,137	111	2%	7,172	1,146	19%
Total	21,815	23,115	1,300	6%	28,040	6,225	29%

5.11 Constraint to NTEM 6.2

5.11.1 In accordance with Department for Transport guidance set out in WebTAG 3.15.1 demand matrices have been constrained to NTEM 6.2 at NTEM sector level. The use of NTEM allows consistency between different parts of the country when justifying transport proposals. However the reference trip totals have been adjusted due to the assumptions used on travel planning and for the internalisation of trips at the Rackheath Eco Town and Beyond Green sites.

5.11.2 Appendix H provides a summary of demand by geographical sectors for home based purposes. This includes 2012 base demand then future year demand levels which are shown for the application of only NTEM growth, the development trips and then the combined demand in which the NTEM growth is adjusted to make allowance for the development trips. This is shown for the two forecast years 2017 and 2032. For a number of the sectors the forecast growth is taken directly from NTEM but for the more local zones, especially Broadland, Norwich and South Norfolk, there is a contribution derived from development that has been built and spatially allocated.

5.11.3 Taking the Table H.1 in Appendix H as an example it shows that Broadland, Norwich and South Norfolk TEMPRO sector 2012 base year productions of 52,046 grow to 55,192 with the application of NTEM growth to 2017, and to 61,554 by 2032. Development productions are estimated at 5,910, and 22,396 in the two forecast years and these have been added, but then the

total growth is controlled to NTEM as shown in the combined column. The figures in the reference column match exactly the NTEM growth thus showing that the constraint has been correctly applied.

6 Variable Demand Traffic Forecasts

6.1 Overview

6.1.1 The modelling framework has been used to determine variable demand forecasts for the Do Minimum and Do Something scenarios, defined as follows:

- Do-Minimum - without the proposed transport intervention; and
- Do-Something - with the proposed transport intervention and associated improvements as well as city centre transport management measures.

6.1.2 The demand model parameters were adjusted in accordance with WebTAG guidance to make sure that realistic elasticity of demand to cost change is produced by the model. The demand model was run to convergence and the convergence statistics checked against WebTAG targets to make sure that a stable model at equilibrium has been produced. The effects of the demand modelling on the reference forecasts have been assessed. The following sections describe the analyses undertaken.

6.2 Demand Model Realism Testing

6.2.1 Realism testing was undertaken on the base-year demand model in accordance with WebTAG 3.10.4.

6.2.2 Two new sets of variants of the generalised cost coefficient files have been created. These contain the generalised cost with a rise in fuel prices.

Fuel Cost Elasticity

6.2.3 The demand model was run with a 10% fuel cost increases. This increase was reflected in the model by revised assignment generalised costs in the SATURN networks.

6.2.4 The fuel-cost elasticity tests began with WebTAG median parameters and two further tests were run until the final parameters were reached. The final calibrated demand model parameters and outturn elasticities are shown in Table 6.1 and Table 6.2 respectively. The parameters used are within the range suggested in WebTAG 3.10.4 and are thus considered to provide reasonable variable demand response to changes in travel costs.

Table 6.1: Calibrated Demand Model Parameters

Purpose and Mode	WebTAG			NDR Model
	Minimum	Median	Maximum	
Car				
HBW	0.054	0.065	0.113	0.113
HBEB	0.038	0.067	0.106	0.038
HBO	0.074	0.090	0.160	0.074
NHBEB	0.069	0.081	0.107	0.069
NHBO	0.073	0.077	0.105	0.073

Table 6.2: Outturn Elasticities

Purpose	NDR Elasticity	WebTAG Targets
Work	-0.18	-0.30
EB	-0.15	-0.10
Other	-0.53	-0.40
Total	-0.39	-0.30

6.3 Convergence

6.3.1 One requirement for robust forecasting is that iterative demand and assignment models are well converged. The demand and assignment model convergence statistics are shown in Table 6.3.

6.3.2 The demand model convergence ‘gap’ statistics are between 0.06% and 0.10% for the forecast model scenarios which are below the WebTAG target of 0.2% (values lower than this target means that the model is better converged). This shows that the demand model has converged acceptably well.

6.3.3 Similarly, for all time period models, forecasting years and scenarios, the assignment model convergence ‘gap’ is below the recommended WebTAG value of 0.1% by a substantial margin, generally about ten times less than the target (values lower than this target means that the model is better converged). The measurements of flow and cost changes also exceed the

98% target in all cases (in these cases values higher than the target show that the model is better converged).

- 6.3.4 The 'gap' measures the proximity to an equilibrium solution for the iterative assignment process and the flow and cost changes measure the stability of the solution from one iteration to another. The above shows that the demand model and the assignment model compare very well with the WebTAG targets and it is considered that all of the model runs are well converged

Table 6.3: Convergence Parameters

Time Period	2017				2032			
	Demand model Gap (Target = 0.2%)	Assignment model Gap (Target = 0.1%)	Assignment model % Flows (Target = 98%)	Assignment model % Costs (Target = 98%)	Demand model Gap (Target = 0.2%)	Assignment model Gap (Target= 0.1%)	Assignment model % Flows (Target = 98%)	Assignment model % Costs (Target = 98%)
Do-Minimum - Scenario A	0.06	N/A			0.10	N/A		
AM	-	0.036	99.7	99.5	-	0.0018	99.6	99.6
IP	-	0.0014	99.8	99.8	-	0.0014	99.8	99.7
PM	-	0.0043	99.4	99.6	-	0.0030	99.3	99.5
OP	-	0	100	100	-	0	99.6	100
Do-Something - Scenario C	0.10	N/A			0.08	N/A		
AM	-	0.0037	98.4	99.2	-	0.0033	99.8	99.8
IP	-	0.00070	99.7	99.9	-	0.0010	99.8	99.8
PM	-	0.0041	99.6	99.5	-	0.0040	99.6	99.4
OP	-	0	100	100	-	0	99.6	100

6.4 Do-Minimum Demand Forecast

- 6.4.1 The Do-Minimum forecasts of highway demand for home based purposes compared with the reference case are presented in Table 6.4, for the 24 hour PA variable trips. It must be noted that the analysis in Table 6.4 only considers the change in variable HB trips, and does not include the fixed trip element. Therefore a direct comparison cannot be made to Table 5.19, which presents a summation of both fixed and variable trips.
- 6.4.2 The 24 hour PA comparison (variable trips only) shows that there are very small changes in the home-based highway trip numbers between the Reference Case and the Do Minimum scenario for all forecasting years.

Table 6.4: Do Minimum 24 Hour PA Highway Demand (Variable Trips Only)

Purpose	2017				2032			
	Reference Case	Do Minimum	Absolute Change	% Change	Reference Case	Do Minimum	Absolute Change	% Change
HBW	66,863	66,880	17	0.0%	68,373	68,458	85	0.1%
HBEB	12,229	12,233	4	0.0%	12,856	12,869	13	0.1%
HBO	141,323	141,778	455	0.3%	165,782	168,338	2556	1.5%

6.4.3 The demand model uses a fifteen demand segment setup, disaggregating home based and non-home based trips and also trips that are subject to variable demand modelling changes and those that are not. In order to make the modelling process more efficient, these demand segments are converted into seven user classes for assignment purposes. The private vehicle user class demand from the assignment set up compared with the reference case is reported in Table 6.5 to Table 6.7 for the Do Minimum and Table 6.9 to Table 6.11 for the Do Something.

6.4.4 Table 6.5 to Table 6.7 show a comparison between reference case and Do Minimum future year demand trips (both fixed and variable demand in OD format), for the respective AM, IP and PM peak hours. From the comparison of these it is evident that there are minimal changes in the trip numbers in the AM, inter and PM peaks as a results of the application of variable demand.

Table 6.5: Do Minimum Highway Demand – AM Peak Hour Trips – OD Format

Purpose	2017 AM Peak Hour				2032 AM Peak Hour			
	Ref	DM	Diff	% Diff	Ref	DM	Diff	% Diff
Work	21,920	21,925	5	0.0%	22,323	22,350	27	0.1%
EB	3,462	3,463	1	0.0%	3,566	3,568	2	0.1%
Other	21,077	21,141	64	0.3%	24,365	24,725	361	1.5%
Total	46,459	46,530	70	0.2%	50,254	50,643	390	0.8%

Table 6.6: Do Minimum Highway Demand – Average IP Hour Trips – OD Format

Purpose	2017 IP Peak Hour				2032 IP Peak Hour			
	Ref	DM	Diff	% Diff	Ref	DM	Diff	% Diff
Work	2,716	2,717	1	0.0%	2,847	2,851	4	0.1%
EB	4,704	4,704	1	0.0%	4,986	4,988	3	0.1%
Other	26,800	26,884	84	0.3%	31,109	31,600	491	1.6%
Total	34220	34305	85	0.2%	38942	39439	497	1.3%

Table 6.7: Do Minimum Highway Demand – PM Peak Hour Trips – OD Format

Purpose	2017 PM Peak Hour				2032 PM Peak Hour			
	Ref	DM	Diff	% Diff	Ref	DM	Diff	% Diff
Work	18,574	18,578	4	0.0%	18,920	18,942	22	0.1%
EB	4,832	4,832	1	0.0%	5,072	5,074	2	0.0%
Other	27,763	27,837	74	0.3%	31,943	32,367	425	1.3%
Total	51,169	51,248	79	0.2%	55,935	56,383	448	0.8%

6.5 Do Something Demand Forecasts

6.5.1 Forecasts of HB highway trip demand (24 hour PA format) for the Do Something scenario compared with the reference case scenario are shown in Table 6.8. It must be noted that the 24 hour PA comparison only compares the change in variable trips from Reference to Do Something scenario. From comparison to the Reference scenario, it can be noticed that the relative change in HB trips is very small for all forecast years.

Table 6.8: Do Something Highway Demand – 24 Hour PA (Variable Trips Only)

Purpose	2017				2032			
	Reference Case	Do Something	Absolute Change	% Change	Reference Case	Do Something	Absolute Change	% Change
HBW	66,863	66,878	15	0.0%	68,373	68,465	92	0.1%
HBEB	12,229	12,233	4	0.0%	12,856	12,869	14	0.1%
HBO	141,323	142,212	889	0.6%	165,782	168,700	2918	1.8%

6.5.2 Table 6.9 to Table 6.11 show Do Something future year demand trips (both fixed and variable demand in OD format) compared with the reference case, for the respective AM, IP and PM peak hours. From the comparison of these it is evident that there are only very minimal changes in trip numbers across all trip purposes and time periods.

Table 6.9: Do Something Highway Demand – AM Peak Hour Trips – OD Format

Purpose	2017 AM Peak Hour				2032 AM Peak Hour			
	Ref	DS	Diff	% Diff	Ref	DS	Diff	% Diff
Work	21,920	21,925	5	0.0%	22,323	22,354	31	0.1%
EB	3,462	3,463	1	0.0%	3,566	3,568	3	0.1%
Other	21,077	21,216	139	0.7%	24,365	24,828	463	1.9%
Total	46,459	46,604	145	0.3%	50,254	50,750	496	1.0%

Table 6.10: Do Something Highway Demand – Average IP Hour Trips - OD Format

Purpose	2017 IP Peak Hour				2032 IP Peak Hour			
	Ref	DS	Diff	% Diff	Ref	DS	Diff	% Diff
Work	2,716	2,717	1	0.0%	2,847	2,851	4	0.1%
EB	4,704	4,704	1	0.0%	4,986	4,989	3	0.1%
Other	26,800	26,958	158	0.6%	31,109	31,696	587	1.9%
Total	34220	34379	159	0.5%	38942	39536	594	1.5%

Table 6.11: Do Something Highway Demand – PM Peak Hour Trips – OD Format

Purpose	2017 PM Peak Hour				2032 PM Peak Hour			
	Ref	DS	Diff	% Diff	Ref	DS	Diff	% Diff
Work	18,574	18,578	4	0.0%	18,920	18,945	25	0.1%
EB	4,832	4,832	1	0.0%	5,072	5,074	2	0.0%
Other	27,763	27,940	177	0.6%	31,943	32,500	558	1.7%
Total	51,169	51,351	182	0.4%	55,935	56,519	585	1.0%

6.5.3 Table 6.12 to Table 6.14 compares the trip numbers in the Do Something and Do Minimum matrices. It can be seen that the variable demand process makes very little difference to the trip numbers between the two.

Table 6.12: Do Something Compared with Do Minimum Trip Numbers AM

Purpose	2017 AM Peak Hour				2032 AM Peak Hour			
	DM	DS	Diff	% Diff	DM	DS	Diff	% Diff
Work	21,925	21,925	0	0.0%	22,350	22,354	4	0.0%
EB	3,463	3,463	0	0.0%	3,568	3,568	0	0.0%
Other	21,141	21,216	75	0.4%	24,725	24,828	102	0.4%
Total	46,530	46,604	75	0.2%	50,643	50,750	107	0.2%

Table 6.13: Do Something Compared with Do Minimum Trip Numbers Inter-Peak

Purpose	2017 IP Peak Hour				2032 IP Peak Hour			
	DM	DS	Diff	% Diff	DM	DS	Diff	% Diff
Work	2,717	2,717	0	0.0%	2,851	2,851	0	0.0%
EB	4,704	4,704	0	0.0%	4,988	4,989	1	0.0%
Other	26,884	26,958	74	0.3%	31,600	31,696	96	0.3%
Total	34305	34379	74	0.2%	39439	39536	97	0.2%

Table 6.14: Do Something Compared with Do Minimum Trip Numbers PM

Purpose	2017 PM Peak Hour				2032 PM Peak Hour			
	DM	DS	Diff	% Diff	DM	DS	Diff	% Diff
Work	18,578	18,578	0	0.0%	18,942	18,945	3	0.0%
EB	4,832	4,832	0	0.0%	5,074	5,074	0	0.0%
Other	27,837	27,940	103	0.4%	32,367	32,500	133	0.4%
Total	51,248	51,351	103	0.2%	56,383	56,519	136	0.2%

7 Network Performance

7.1 Traffic Impact

7.1.1 The forecast traffic flows on the NDR and the surrounding area are shown in Figures I.1 and I.2 in Appendix I. Traffic flows at Wensum Valley section of the network are shown in Figure I.3. Locations in this area have been selected to indicate traffic movements between the A47(T) and the A1067. These show the AADT traffic flows for the different forecast scenarios. The traffic flows for these scenarios for each time period is shown in Tables I.1 to I.5 in Appendix I. The following sections describe key changes in traffic flows at AADT level on the network.

Strategic traffic movements

7.1.2 A number of the model links that carry strategic traffic flows are outside the fully modelled area and as they are outside this area they are not calibrated or validated to observed data. As a result of this the base year flows on these links may not be fully representative of total traffic levels. However, it is considered that the forecast changes in traffic levels on these links as a result of the scheme are still valid.

7.1.3 In providing better access to northern Norwich suburbs and the proposed new development locations in the North East Growth Triangle from the proposed new junction with the A47(T) at Postwick, the routes from the east become more attractive via the A47(T) east of Norwich (see Figure I.4 in Appendix I). In 2017 there is an estimated switch of 1100 AADT from the A146 and the A149 to the A12(T)/A47(T) (sites 2 and 4 to site 1). In 2032 the corresponding figure is 2500 AADT. This represents a reduction of 4% (site 2) on the A146 between Beccles and Trowse junction with the A47(T) in 2017 and 7% in 2032, and as a result of these reductions there is a reassignment in the peak hours in 2032 that relieves the B1135/B1527/B1332 route between Dereham and Bungay to the south of the southern bypass which amounts to an AADT reduction 300 (4%) in 2032 (site 5). In addition there are reassignments of traffic north of Great Yarmouth on the A149 route from Caister on Sea resulting in reductions of 300 AADT in 2017 and 1000 AADT in 2032 (4% and 11% respectively) (site 4). The increase in traffic using the A47(T) between Great Yarmouth and Acle (the switching of 1100 AADT in 2017 and 2500 AADT in 2032) represents an increase of 4% in 2017 and 8% in 2032 (site 1). On the A47(T) east of Postwick there is an increase of 3800 AADT in 2017

and 4100 AADT in 2032, representing proportional changes of 11% in both years (site 3).

- 7.1.4 To the east of Norwich the NDR results in orbital traffic reducing on the existing routes between the A47(T) and A1151 Wroxham Road via Church Road / Broad Lane / Green Lane West through Great Plumstead and Woodbastwick Road / B1140 Low Road and Bell Lane through Salhouse. The first route via Great Plumstead experiences reductions of 4100 AADT (66%) in 2017 and 7100 AADT (72%) in 2032 (site 11), and the reductions on the second route via Salhouse are 3000 AADT (70%) in 2017 and 3900 AADT (67%) in 2032 (site 6).
- 7.1.5 To the west of Norwich the NDR results in an increase in traffic using Fakenham Road, with some trips reassigning on this route from the direction of Kings Lynn. The reassignment onto Fakenham Road amounts to an increase of 1900 AADT in 2017 and 2900 in 2032 (18% and 22%) (site 9). There is a consequential reduction on the A47(T) west of Dereham Road junction of 800 AADT in 2017 and 400 AADT in 2032 (3% and 1%), and reductions on routes to the north of Norwich, as explained below (site 8).
- 7.1.6 North of Norwich there are existing routes that experience substantial reductions in traffic with the NDR. To the north west the B1145 route between Bawdeswell / Fakenham Road and Aylsham via Reepham experiences reductions of 400 AADT (10%) in 2017 and 1200 AADT (22%) in 2032 (site 10). The route between Reepham and Hoveton on the A1151 Norwich Road via Buxton Road, Cawston Road and B1354 Coltishall Road carries significant orbital traffic movements in absence of NDR, despite its poor standard. With NDR, traffic on this route reduces by 2900 AADT (60%) in 2017 and 4500 AADT (66%) in 2032 (site 7). Another route that carries orbital traffic around northern Norwich is Spixworth Road / Crostwick Lane via Spixworth. Traffic flows reduce by 2400 AADT (35%) in 2017 and by 4900 AADT (52%) in 2032 (site 12).
- 7.1.7 A graphical representation of traffic flow changes on five selected strategic sites is shown in Figure 7-1. Clearly, the inclusion of the NDR results in a reduction of flows.

Wider Impacts to the West of Norwich

7.1.8 The model runs have been analysed to understand the impact of NDR on traffic levels on routes between the A1067 (Fakenham Road) and the A47(T) (see figure I.3 in Appendix I). The NDR runs between the A1067 west of Taverham and extends to the A47(T) at Postwick junction east of Norwich. Concern has been expressed that because the NDR does not extend to the A47(T) in the west, traffic will increase on routes between the A1067 and the A47(T).

7.1.9 To assess this, modelled traffic flows on an imaginary line running between the A1067 and the A47(T) have been investigated. The results are presented in Table 7.1.

Table 7.1: Modelled Daily Traffic Flows on Routes Between the A1067 and the A47(T)

24 hour two-way flows	2012	2017 DM	2017 DS	2032 DM	2032 DS	NDR change 2017	NDR change 2032
Low Road (A81)	4000	4600	4000	4900	4100	-13%	-16%
Costessey Lane (A89)	3300	4000	3800	4800	4900	-5%	2%
Taverham Lane (A25)	5700	5700	4700	6200	4700	-18%	-24%
Ringland Road (A31)	3600	4900	3500	8000	6300	-29%	-21%
C167 Weston Longville (A105)	1400	1700	3300	3100	5500	94%	77%
C173 Lenwade to Hockering (A106)	3000	3400	3500	3300	3600	3%	9%
Total	21000	24300	22800	30300	29100	-6%	-4%

7.1.10 The above shows that the NDR leads to a decrease in daily traffic on the above routes that connect the A1067 with the A47(T) to the west of Norwich of 6% in 2017 and 4% in 2032.

7.1.11 Traffic levels on the three key routes between Taverham and Costessey (Costessey Lane, Taverham Lane and Ringland Road) are predicted to reduce significantly, except for Costessey Lane where the predicted reduction is relatively small in 2032 and traffic levels are predicted to increase by 2% in the DS scenario.

7.1.12 Low Road provides an alternative route into the west of Norwich that avoids the A1067. Traffic levels are predicted to significantly decrease on this route with the NDR in place.

7.1.13 Further out from Norwich however, traffic levels are predicted to increase significantly on the C167 through Weston Longville and slightly on the C173 between Lenwade and Hockering with the NDR in place. Presently the flows on this route are significantly lower than any of the parallel routes compared in Table 7.1 reflecting the character of this route through Weston Longville where it is a single file lane.

7.1.14 To address existing HGV problems on routes between the A1067 and the A47(T), a route is presently being upgraded to accommodate such traffic. This route runs from Lenwade and uses the C173 in the north and the C167 Wood Lane in the south. Additional traffic management and / or signage should be used to encourage all traffic onto this improved HGV route to avoid Weston Longville and Hockering in future years; the HGV improvements thereby also being a solution to any increase in traffic on these two routes due to NDR.

Suburban traffic impacts

Table 7.2: NDR Impact on Suburban Routes and Developer Link Roads

Route / Link Road	2017 AADT change (DS – DM)	2032 AADT change (DS – DM)
Thorpe St Andrew area		
Yarmouth Road (West) (Site A65)	-3700 (-13%)	-2000 (-6%)
Route via Thunder Lane / Woodside Road / Blue Boar Lane between Thorpe St Andrew and Sprowston (Site A20)	-4300 (-33%)	-3300 (-28%)
A1042 Outer Ring Road (north east quadrant, at A1042 Mousehold Lane) (Site A7)	-4000 (-16%)	-4000 (-15%)
C283 Salhouse Road (Site A45)	-1100 (-8%)	-1600 (-10%)
A1151 Wroxham Road Site (A43)	-2900 (-15%)	-3600 (-16%)
Old Catton area		
A1042 Outer Ring Road (Chartwell Road) (Site A26)	-3700 (-13%)	-4700 (-15%)
B1150 North Walsham Road (Site A92)	-2000 (-18%)	-3600 (-27%)
St Faiths Road (Site A37)	-2600 (-17%)	-3000 (-19%)
Hellesdon area		
A140 Boundary Road / Outer Ring Road (Site A5)	-2100 (-9%)	-1500 (-6%)
A140 Cromer Road (Site A35)	-3600 (-21%)	-3300 (-18%)

Route / Link Road	2017 AADT change (DS – DM)	2032 AADT change (DS – DM)
A1067 Drayton Road (Site A32)	-1400 (-7%)	-2000 (-10%)
Reepham Road (Site A33)	1600 (16%)	700 (7%)
Middleton's Lane (between Cromer Road and Reepham Road) (site A83)	-1100 (-11%)	-1300 (-11%)
Drayton area		
School Road (north of Fakenham Road) (site A21)	-2000 (-18%)	-2400 (-19%)
Fakenham Road (through Taverham) (site A54)	-2600 (-26%)	-2600 (-23%)
Link Roads		
Beyond Green (between B1150 N Walsham Road and A1151 Wroxham Road) (site A96)	-3500 (-42%)	-6100 (-45%)
White House Farm (between A1151 Wroxham Road and Salhouse Road) (site A98)	600 (27%)	-3600 (-32%)
Salhouse Road to Plumstead Road (only in place in 2032) (site A100)	n/a	-3400 (-23%)
Brook Farm / Laurel Farm link road (site A104)	-4000 (-78%)	-8700 (-67%)

7.1.15 In the Thorpe St Andrew area (see figure I.2 in Appendix I) traffic is reduced on Yarmouth Road (West) by 3700 AADT (13%) in 2017 and by 2000 AADT (6%) in 2032, refer to Table 7.2 (negative figures indicate reductions with NDR). There is a significant reduction on the north-south suburban route Thunder Lane / Woodside Road / Blue Boar Lane between Thorpe St Andrew and Sprowston of 4300 AADT (33%) in 2017 and 3300 AADT (28%) in 2032. There are significant reductions in traffic on the A1042 Outer Ring Road around the north east quadrant with traffic flows on the A1042 Mousehold Lane reducing by 4000 AADT (16%) in 2017 and 4000 AADT (15%) in 2032. On the radial routes into the city through city's north eastern suburbs in Spowston and Thorpe St Andrew there is a small reduction in forecast traffic on C874 Plumstead Road but larger reductions on C283 Salhouse Road and A1151 Wroxham Road. The Salhouse Road reduction is 1100 AADT (8%) in 2017 and 1600 AADT (10%) in 2032. On Wroxham Road the traffic reduces by 2900 AADT (15%) in 2017 and 3600 AADT (16%) in 2032.

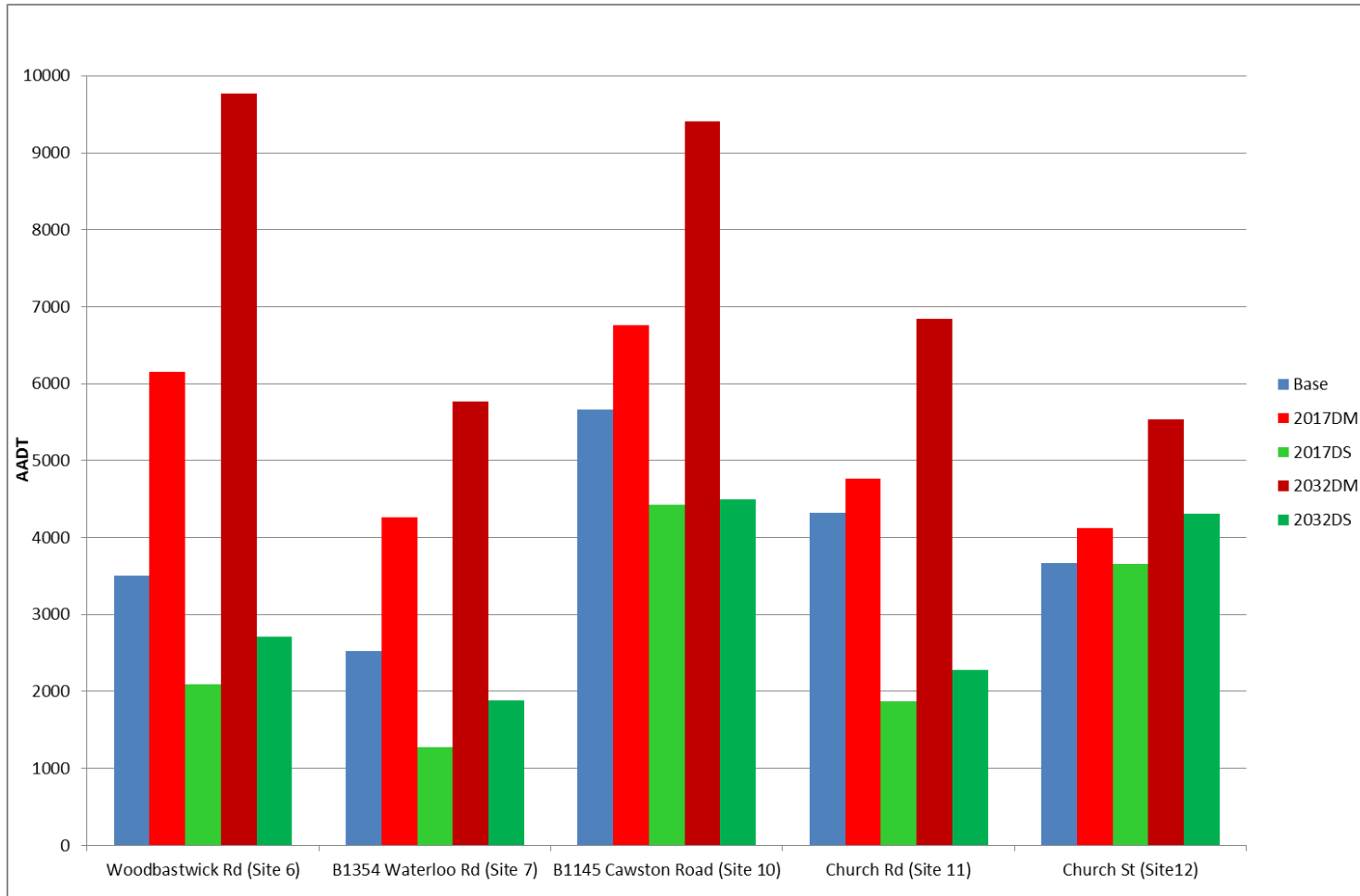
- 7.1.16 In Old Catton the traffic reduces on the A1042 Outer Ring Road (Chartwell Road) by 3700 AADT (13%) in 2017 and 4700 AADT (15%) in 2032. The traffic flows also reduce across the radial routes on B1150 North Walsham Road, C246 Spixworth Road and C251 St Faiths Road. The main reductions are on North Walsham Road of 2000 AADT (18%) in 2017 and 3600 AADT (27%) in 2032, and on St Faiths Road of 2600 AADT (17%) in 2017 and 3000 AADT (19%) in 2032.
- 7.1.17 In Hellesdon (see figure I.1 in Appendix I) the traffic reduces on the A140 Boundary Road Outer Ring Road by 2100 AADT (9%) in 2017 and 1500 AADT (6%) in 2032. On the radial routes traffic is reduced on A140 Cromer Road and A1067 Drayton Road. On the A140 Cromer Road traffic reduces by 3600 AADT (21%) in 2017 and 3300 AADT (18%) in 2032, and on A1067 Drayton Road traffic reduces by 1400 AADT (7%) in 2017 and 2000 AADT (10%) in 2032. However the traffic on Reepham Road increases by 1600 AADT (16%) in 2017 and 700 AADT (7%) in 2032, although on Middleton's Lane between Cromer Road and Reepham Road traffic reduces by 1100 AADT (11%) in 2017 and 1300 AADT (11%) in 2032 (site A83). In Drayton the traffic reduces on the School Road north of A1067 Fakenham Road by 2000 AADT (18%) in 2017 and 2400 AADT (19%) in 2032 (site A21) and on Fakenham Road through Taverham traffic reduces by 2600 AADT (26%) in 2017 and 2600 AADT (23%) in 2032 (site A54).
- 7.1.18 With the implementation of the JCS planned development a number of developer link roads are assumed to be provided as part of the developments. These are designed to act either as urban high streets to serve walking and cycling movement as well as traffic access for the development or as local development distributor roads. In absence of NDR these link roads carry very high traffic flows that is incompatible with their intended purposes, but these traffic flows are relieved substantially by the NDR as shown in Table 7.2.

City centre traffic impacts

- 7.1.19 Traffic impacts in the city centre occur due to a combination of impacts resulting from the NDR and complementary traffic management measures in the city centre that would be introduced should the NDR scheme proceed. The traffic management measures effect restrictions to general traffic crossing the city centre and thus displace traffic movements to the Inner Ring Road.
- 7.1.20 These changes are captured at several locations along the inner ring road and radial routes into the city centre as shown in Figure I.5 in Appendix I.

- Carrow Road (site 13) increased by 200 AADT (1%) in 2017 and increased by 2200 AADT (8%) in 2032;
- A147 Chapelfield Road (site 14) increased by 200 AADT (1%) in 2017 and 1100 AADT (4%) in 2032;
- A147 Grapes Hill Road (site 15) reduced by 400 AADT (1%) in 2017 and increased by 3000 AADT (9%) in 2032;
- A147 St Crispins Road (west) (site 16) decreased by 400 AADT (1%) in 2017 and 2200 AADT (6%) in 2032; and
- A147 St Crispins Road (east) (site 17) stays the same in 2017 and increased by 800 AADT (3%) in 2032.

Figure 7-1: Comparison of Traffic Flows on Inappropriate Routes



7.2 Traffic Queues

7.2.1 The network queues estimated by SATURN have been examined and presented in Table 7.3. These are produced in the detailed model area where traffic queues are simulated by the model. These comprise transient queuing such as produced by traffic signal cycles and overcapacity queuing. The total queues are shown in Figure 7-2 and Figure 7-3 for the base, DM and DS scenarios for the AM and PM peaks respectively. In the AM peak the queues increase from a base of 2831 PCU.hrs to 3372 PCU.hrs in 2017 DM and 4265 PCU.hrs in 2032 DM. These levels are reduced with the scheme by 13% in 2017 to 2948 PCU.hrs and by 8% in 2032 to 3908 PCU.hrs. Changes in the PM peak are from a base of 2353 PCU.hrs to 3116 PCU.hrs in 2017 DM and 4201 PCU.hrs in 2032 DM. These levels are reduced with the scheme by 7% in 2017 to 2889 PCU.hrs and by 5% in 2032 to 3993 PCU.hrs. It should be noted that the queues are representative of the whole of the city network (the detailed model area) so in this context the Scheme would have a significant effect, especially in the AM peak.

Table 7.3: Queue estimated by SATURN (PCU hrs)

Scenario	Transient queues (PCU hrs)				Over-capacity queues (PCU hrs)				Total queues (PCU hrs)			
	AM	IP	PM	OP	AM	IP	PM	OP	AM	IP	PM	OP
2012 Base	2,165	1,248	2,062	267	666	35	290	0	2,831	1,283	2,353	267
2017 Do Minimum	2,466	1,394	2,463	286	906	58	653	0	3,372	1,451	3,116	286
2017 Do Something	2,336	1,339	2,350	282	612	47	539	0	2,948	1,386	2,889	282
2032 Do Minimum	2,910	1,739	2,904	328	1,355	170	1,296	0	4,265	1,909	4,201	328
2032 Do Something	2,743	1,664	2,691	321	1,165	167	1,301	0	3,908	1,832	3,993	321

Figure 7-2: Overall Queue Comparison - AM peak

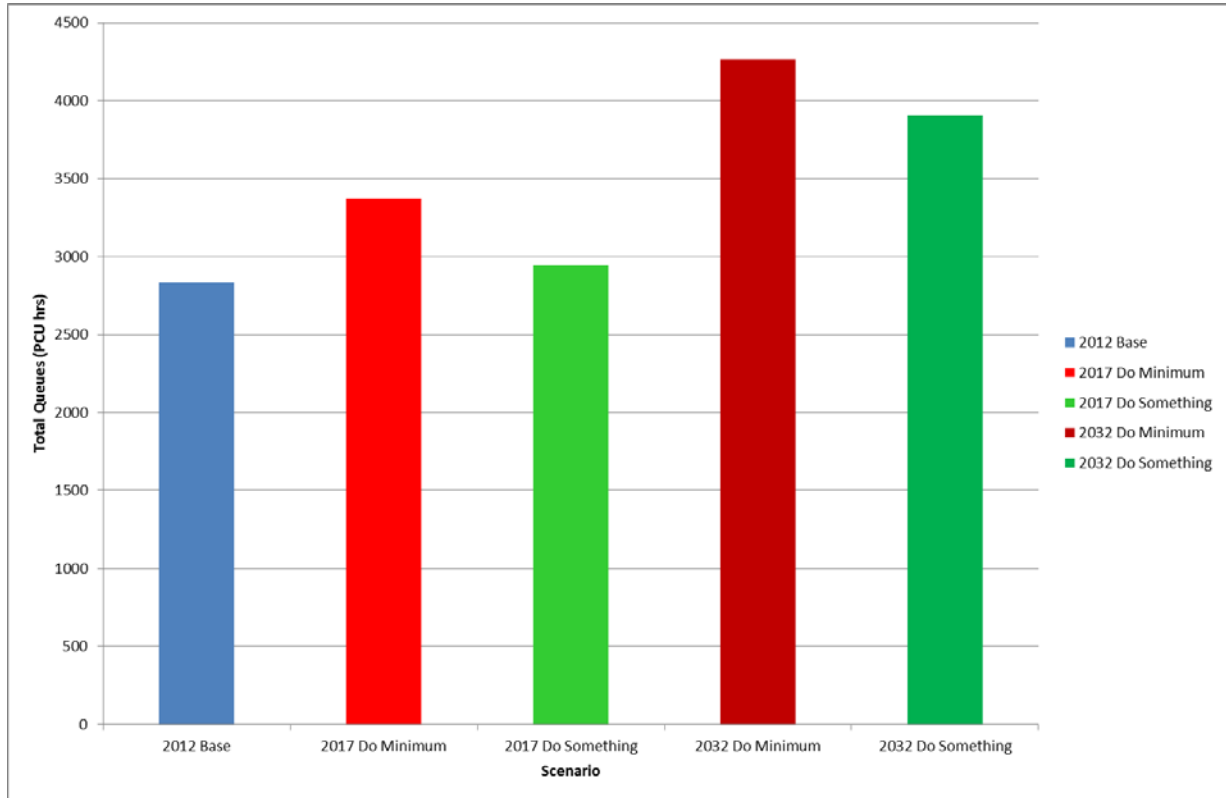
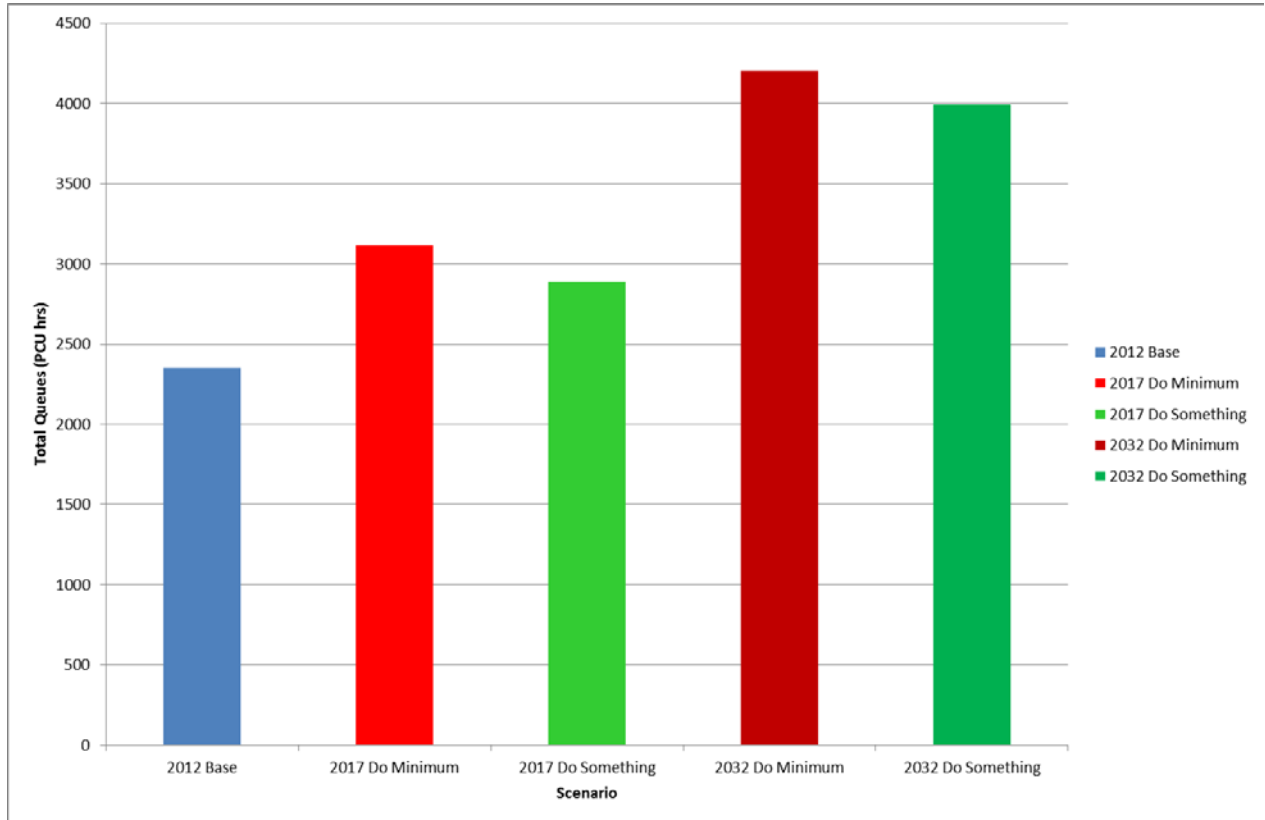


Figure 7-3: Overall Queue Comparison - PM peak



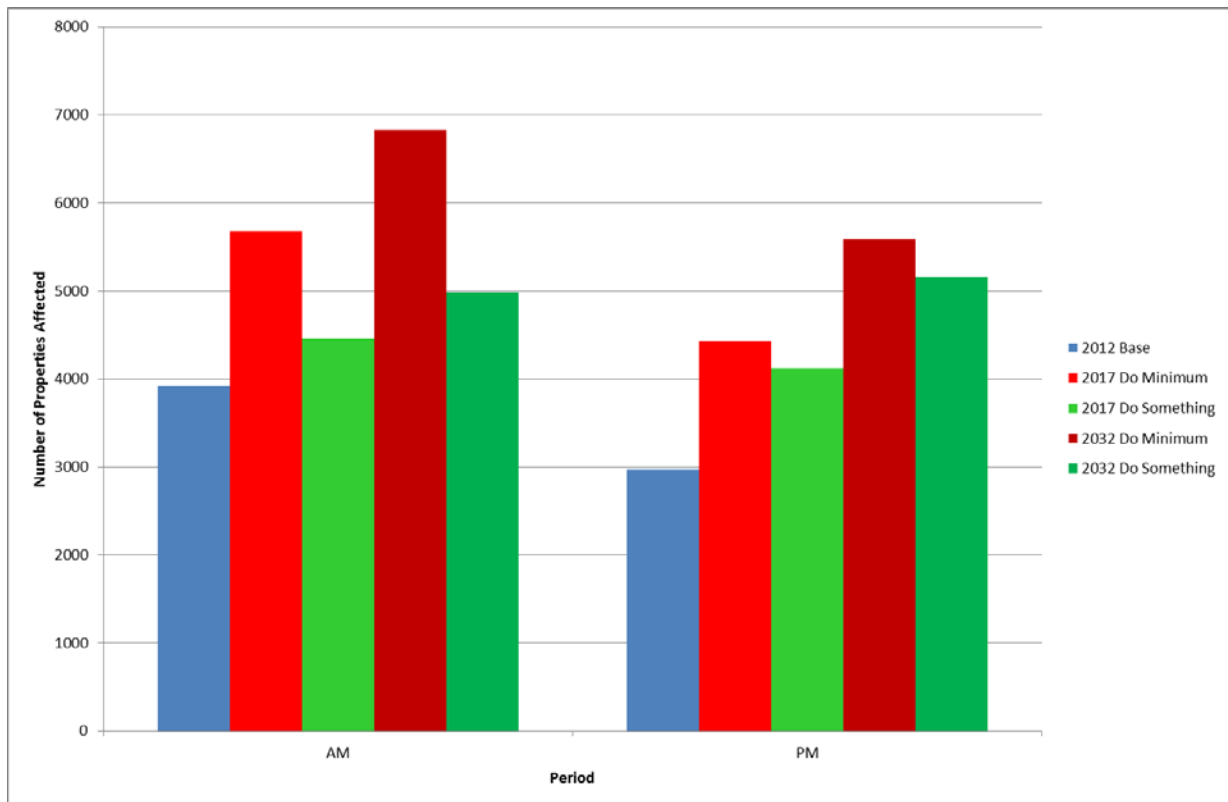
7.3 Effects on People

7.3.1 The Effects on People are evaluated in Table 7.4 by calculating the number of dwellings within 50 metres of roads with a Volume to Capacity ratio of over 90%. This uses existing address point data, so the analysis does not account for proposed new dwellings. A graph representing this data is shown in Figure 7-4.

Table 7.4: Number of Dwellings within 50 metres of roads

	2012	2017		2032	
	Base	Do Minimum	Do Something	Do Minimum	Do Something
AM	3922	5676	4456 (-21%)	6824	4989 (-27%)
PM	2973	4432	4123 (-7%)	5587	5163 (-8%)

Figure 7-4: Effects on People



7.4 City Centre through Traffic

7.4.1 City centre through traffic has been calculated in Table 7.5 by establishing 3 cordons. These cordons are:

- Inner Ring Road Inner – just inside the Inner Ring Road;
- Inner Ring Road Outer – just outside the Inner Ring Road; and
- Outer Ring Road Outer – just outside the Outer Ring Road.

7.4.2 Using these we can show the amount of traffic using the city centre, the inner ring road, and the outer ring road for through trips. One of the aims of the NDR is to decrease the amount of traffic and congestion that in part is due to travel through and across the city. In addition, the complementary city centre traffic management measures will substantially reduce through traffic in the city centre.

Table 7.5: City Centre through Traffic (AADT)

	2012	2017		2032	
	Base	Do Minimum	Do Something	Do Minimum	Do Something
Inner Ring Road Inner Cordon	9477	8159	6787 (-17%)	9236	4726 (-49%)
Inner Ring Road Outer Cordon	77825	82152	78369 (-5%)	88368	80352 (-9%)
Outer Ring Road Outer Cordon	68117	73691	63421 (-14%)	79151	66780 (-16%)

7.4.3 A graphical representation of this is shown in Figure 7-5 to Figure 7-7 which illustrate the reduction of through trips in the Do Something Scenario. Tables showing this information by time period are contained in Appendix J.

7.4.4 With the proposed city centre traffic management measures in the Do Something scenario through traffic in the city centre is reduced from the Base level and almost halved in 2032.

7.4.5 On the Inner Ring Road cross city traffic that uses the Inner Ring Road reduces with the Scheme by 3783 AADT (5%) in 2017 and by 8016 AADT (9%) in 2032 to levels only just higher than those in the base year.

7.4.6 On the Outer Ring Road, cross city traffic is reduced with the scheme by 10270 (14%) in 2017 and by 12371 (16%) in 2032 to levels below those in the base year.

Figure 7-5: Through Trips crossing Inner Ring Road Inner Cordon

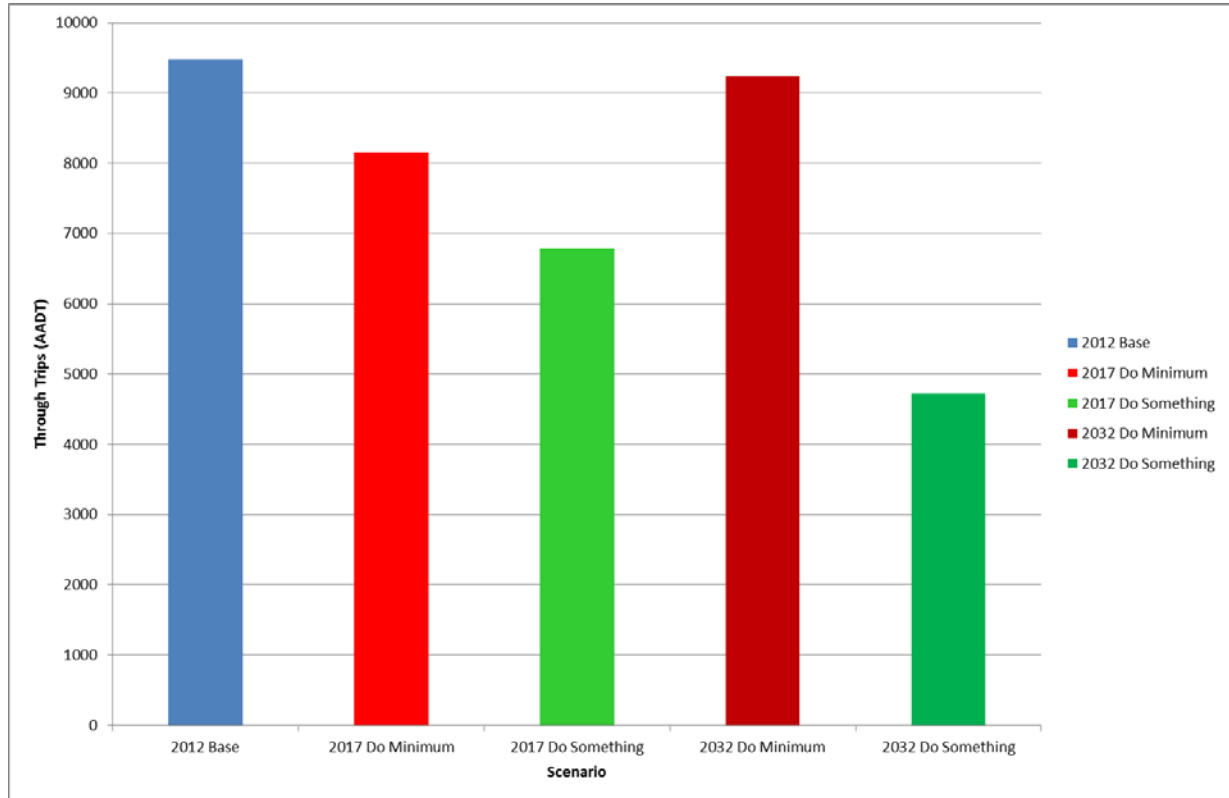


Figure 7-6: Through Trips crossing Inner Ring Road Outer Cordon

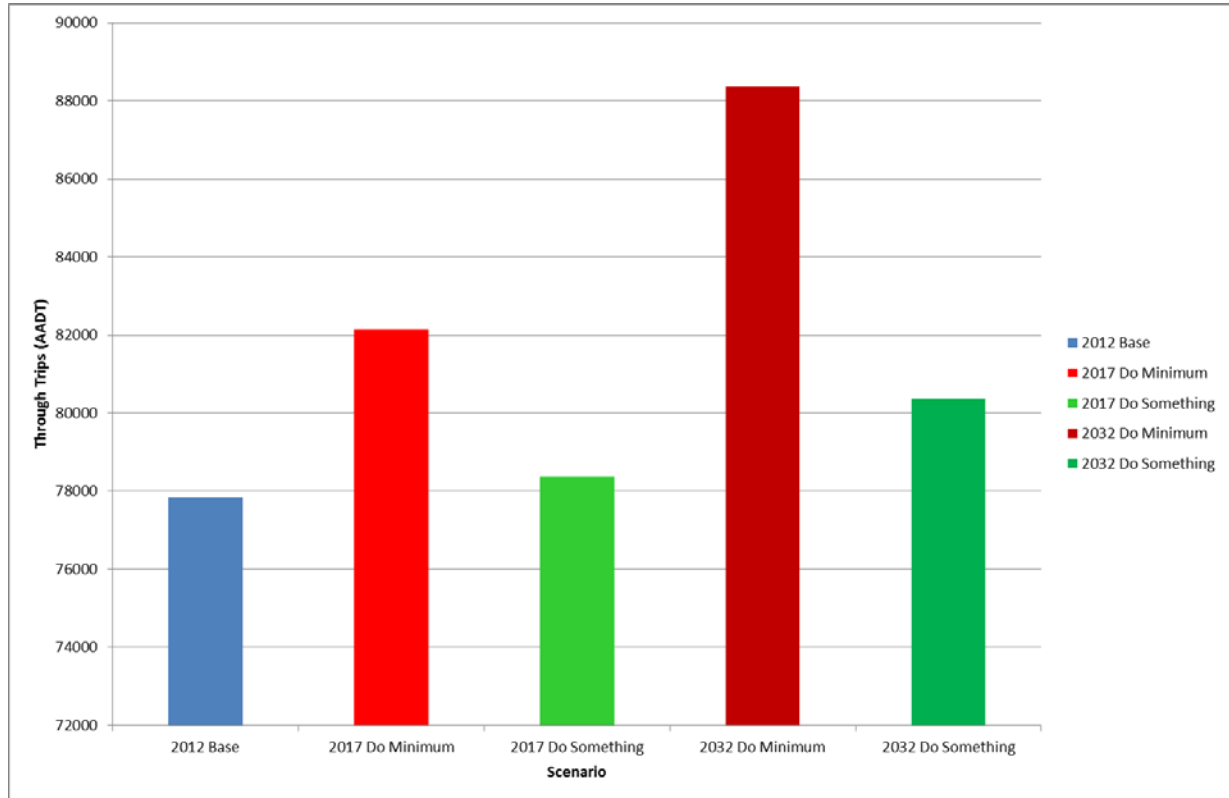
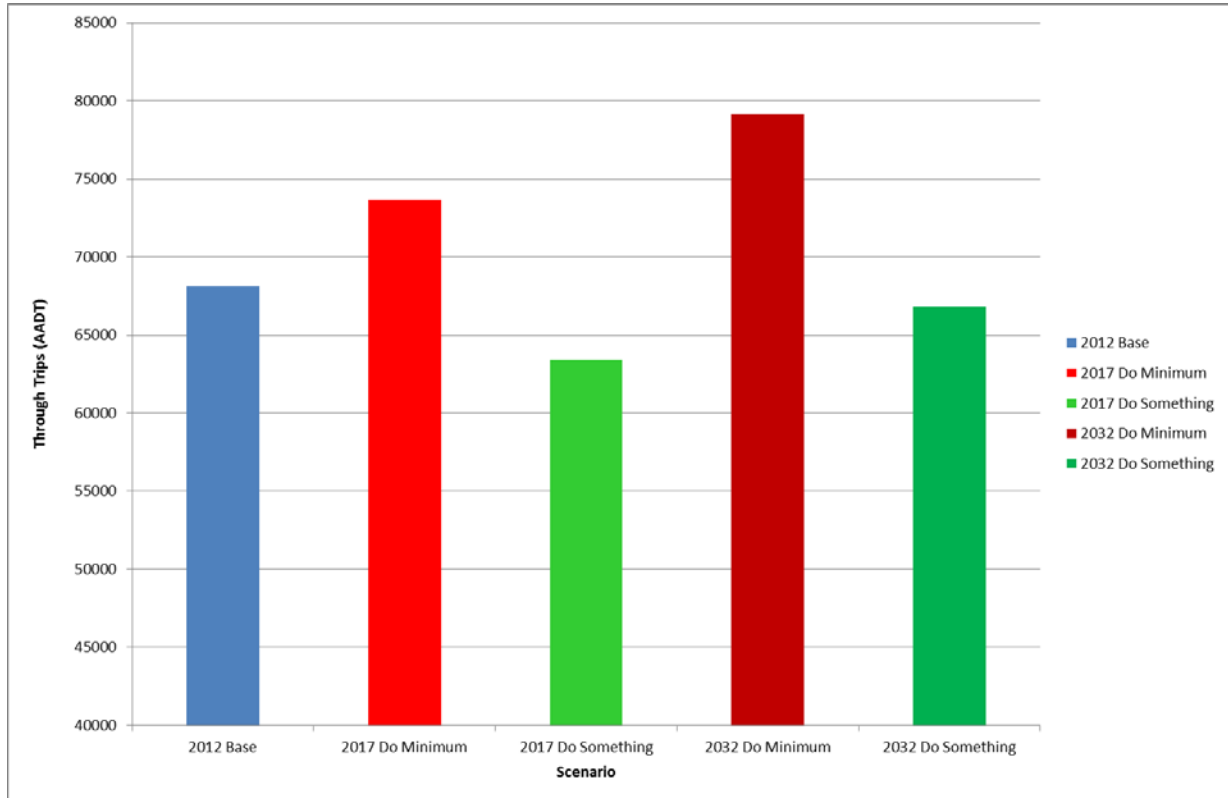


Figure 7-7: Through Trips crossing Outer Ring Road Outer Cordon



7.5 Highway Journey Times

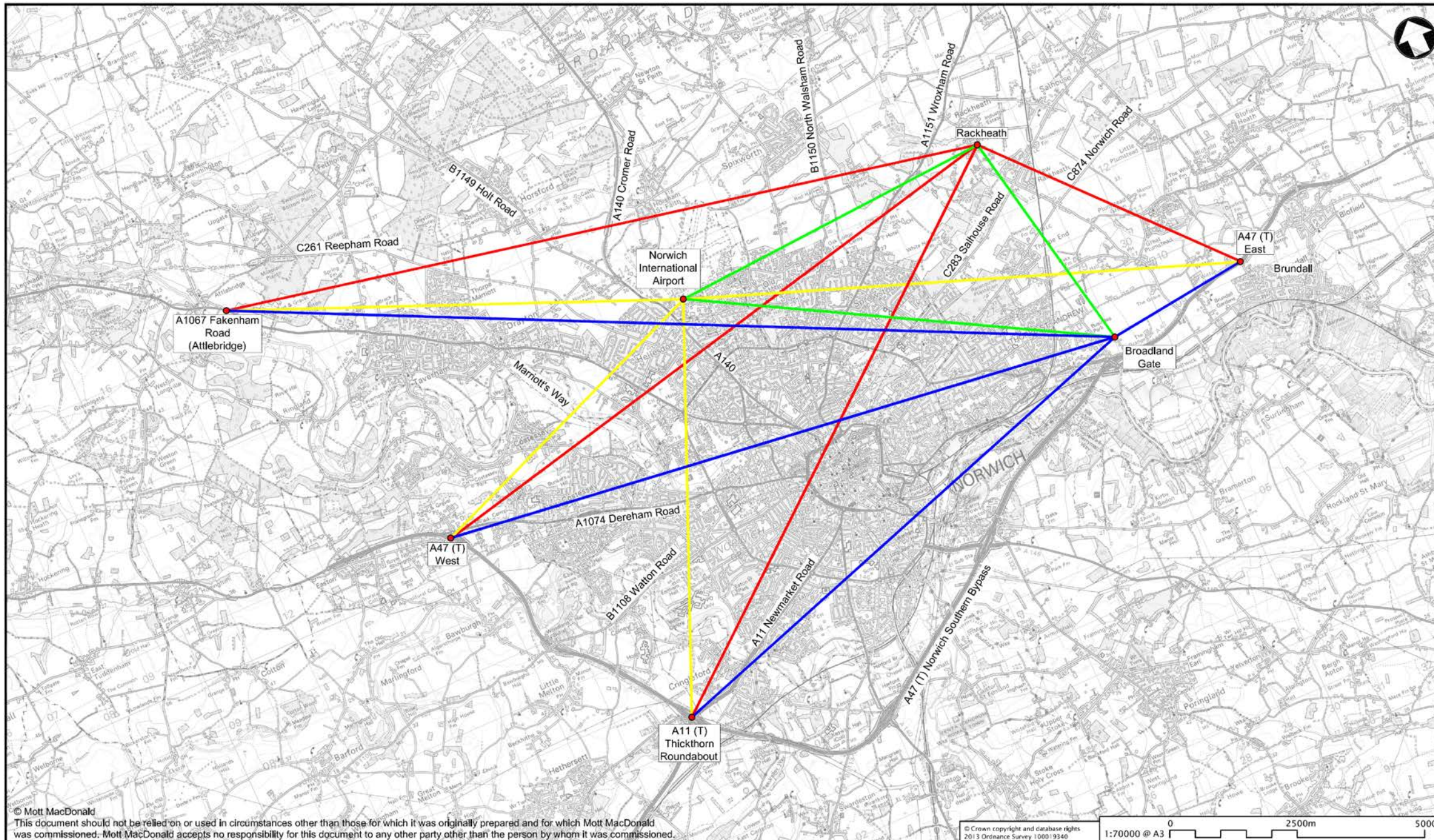
7.5.1 Highway journey times between four locations on strategic routes and three proposed development locations have been compared between scenarios. The locations are shown in Figure 7-8 and stated below:

- A47(T) West;
- A11(T) (Thickthorn Roundabout);
- A47(T) East (Brundall);
- A1067 Fakenham Road (Attlebridge);
- Norwich International Airport;
- Rackheath; and
- Broadland Gate

7.5.2 Figure 7-9 and Figure 7-10 show a comparison of average journey times for the AM peak and PM peak respectively, these are arithmetic means of the journey time for both directions. These Figures show the journey times for the base year and for Do Minimum and Do Something scenarios for the forecast years. The data for these Figures is presented in Table 7.6 and Table 7.7, as well as the percentage changes for the Do Something compared with the Do Minimum scenario.



7.5.3 The Figures and Tables show that with the Scheme there would be substantial reductions in journey times between the trunk road network and the Airport and Rackheath, with journey times from the A47(T) East to the Airport reducing by over eight minutes in 2017 and over ten minutes in 2032, or by over one third. In addition the journey times for orbital movements between Fakenham Road, Airport, Rackheath and Broadland Gate reduce by between 30% and 50% in 2017 and by between 29% and 52% in 2032. This data demonstrates that the Scheme would substantially improve access times between the strategic highway network and the planned development locations in the JCS plan and would provide a significant improvement for orbital movements to the north of the City between the proposed major development locations.

Figure 7-8: Route Locations



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		0	12/13	AW	Revision for Submission	RT	MS		Checked	RT
									Approved	MS
									Scale at A3	1:70,000
									Rev	Status
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Table 7.6: Average Journey Times - AM Peak

Route no	Journey		2012	2017			2032		
			Base (mm:ss)	DM (mm:ss)	DS (mm:ss)	% Change	DM (mm:ss)	DS (mm:ss)	% Change
1	A47(T)W	Airport	22:41	24:43	19:34	-21%	25:03	21:13	-15%
2	A11(T)	Airport	22:10	23:41	22:48	-4%	25:08	24:22	-3%
3	A47(T)E	Airport	23:37	24:37	16:00	-35%	27:14	16:48	-38%
4	Fakenham Rd	Airport	15:31	15:57	11:11	-30%	16:22	11:48	-28%
5	A47(T)W	Rackheath	22:15	23:02	19:44	-14%	26:10	23:44	-9%
6	A11(T)	Rackheath	17:22	18:20	14:28	-21%	22:25	18:52	-16%
7	A47(T)E	Rackheath	09:40	09:42	07:41	-21%	10:08	08:31	-16%
8	Fakenham Rd	Rackheath	26:56	28:13	13:33	-52%	29:37	14:19	-52%
9	Airport	Rackheath	16:26	17:46	11:31	-35%	19:27	12:06	-38%
10	A47W	Broadland Gate	14:30	14:31	14:21	-1%	16:25	16:24	0%
11	A11	Broadland Gate	09:37	09:48	09:42	-1%	12:39	13:04	3%
12	A47E	Broadland Gate	03:13	03:21	03:43	11%	06:20	03:46	-41%
13	Fakenham Rd	Broadland Gate	28:40	26:02	15:28	-41%	29:43	16:23	-45%
14	Rackheath	Broadland Gate	08:22	09:30	05:06	-46%	10:42	05:54	-45%
15	Airport	Broadland Gate	21:21	22:45	13:26	-41%	22:29	14:10	-37%

Table 7.7: Average Journey Times - PM Peak

Route no	Journey		2012	2017			2032		
			Base (mm:ss)	DM (mm:ss)	DS (mm:ss)	% Change	DM (mm:ss)	DS (mm:ss)	% Change
1	A47(T)W	Airport	21:53	23:45	19:06	-20%	24:51	20:15	-19%
2	A11(T)	Airport	23:11	24:17	22:51	-6%	25:50	25:26	-2%
3	A47(T)E	Airport	22:58	24:52	17:10	-31%	26:06	18:26	-29%
4	Fakenham Rd	Airport	16:29	16:53	12:01	-29%	16:18	12:26	-24%
5	A47(T)W	Rackheath	25:07	23:42	20:43	-13%	27:04	21:59	-19%
6	A11(T)	Rackheath	17:56	18:35	14:36	-21%	22:19	19:09	-14%
7	A47(T)E	Rackheath	09:40	09:43	07:55	-19%	09:59	09:04	-9%
8	Fakenham Rd	Rackheath	26:49	27:28	13:38	-50%	29:37	14:09	-52%
9	Airport	Rackheath	17:06	17:55	12:32	-30%	18:02	12:36	-30%
10	A47W	Broadland Gate	14:55	15:11	15:03	-1%	18:20	17:24	-5%
11	A11	Broadland Gate	10:11	10:04	10:00	-1%	13:35	12:57	-5%
12	A47E	Broadland Gate	03:17	03:22	03:32	5%	05:46	04:19	-25%
13	Fakenham Rd	Broadland Gate	27:45	25:25	15:25	-39%	29:26	16:44	-43%
14	Rackheath	Broadland Gate	08:23	09:37	05:03	-47%	10:05	05:48	-42%
15	Airport	Broadland Gate	21:03	23:17	15:36	-33%	23:13	15:10	-35%

Figure 7-9: AM Peak Highway Average Journey Times

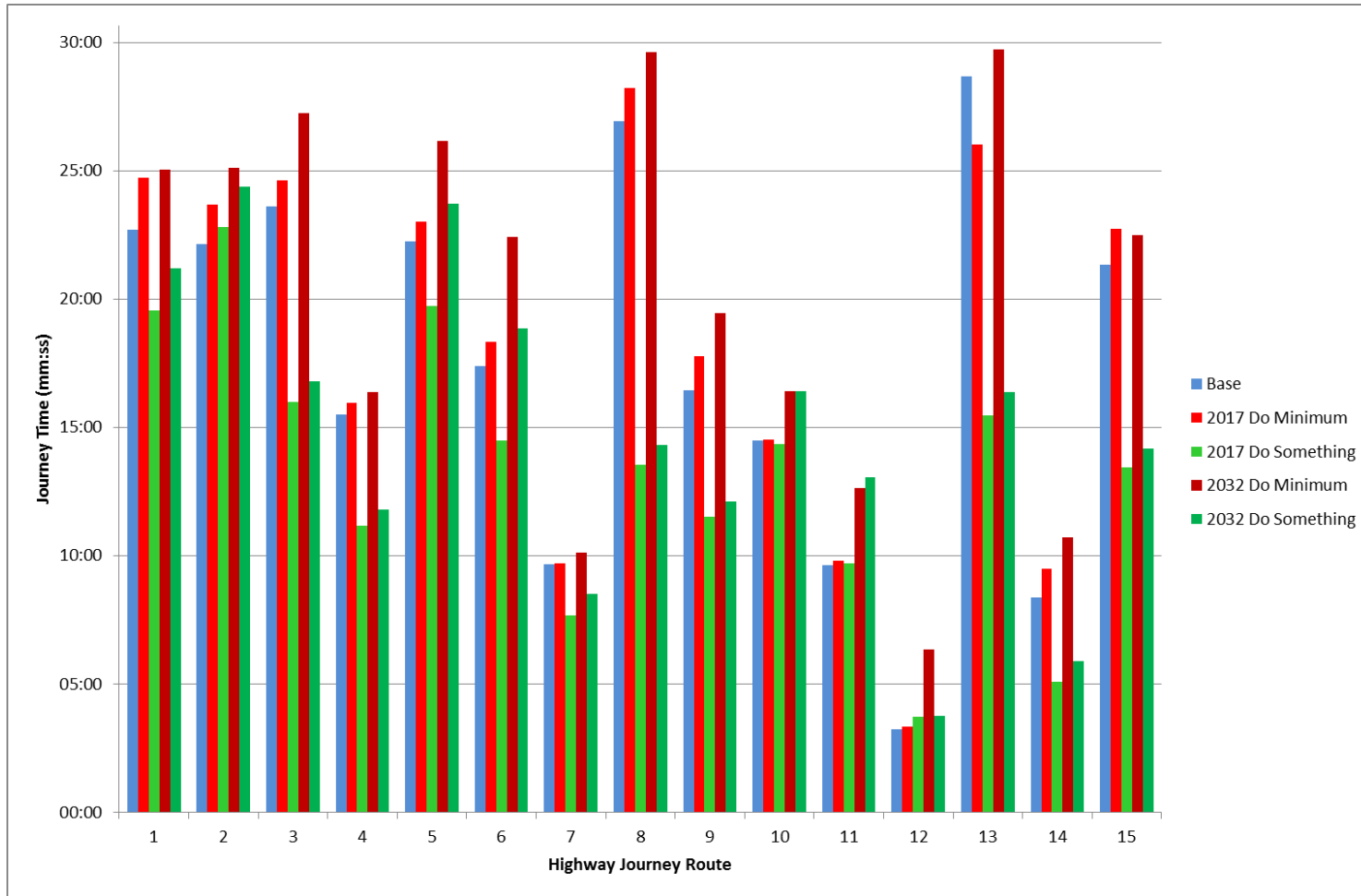
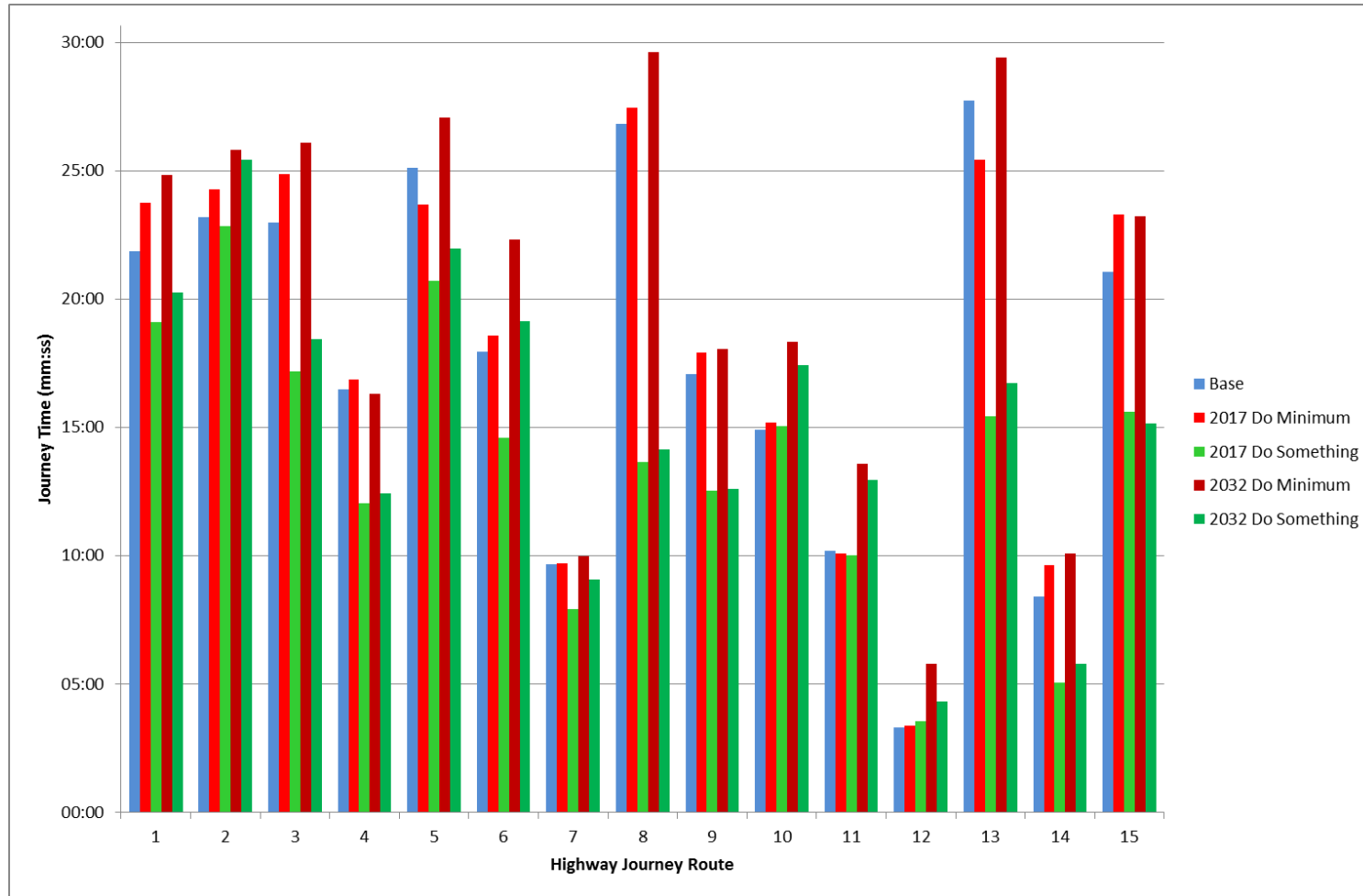


Figure 7-10: PM Peak Highway Average Journey Times



7.6 Journey Times on Public Transport Routes

7.6.1 For the 2017 and 2032 AM and the PM peaks, journey times on five public transport routes carrying high patronage levels into the city have been examined and compared between scenarios. These do not account for stopping times for bus services, but serve to show the changes in running times. The five routes are:

- Fakenham Rd/ Drayton High Rd to Fakenham Rd/Fir Covert Rd Junction;
- Cromer Road to Holt Rd/ Cromer Road Junction;
- Wroxham Road to Wroxham Road/ Green Lane W Junction;
- Plumstead Road to Plumstead Road/ Broad Lane Junction; and
- Yarmouth Road to Postwick NW Roundabout.

7.6.2 Figure K.1 in Appendix K shows the five routes and Figure 7-11 to Figure 7-14 show the graphical representation of journey times for the Do-Minimum and the Do-Something scenarios. Calculated journey time savings are set out in Table 7.8 and Table 7.9 for inbound and outbound directions respectively. In these tables, the journey time variability for each route is shown using the formula in paragraph 3.3.2 in WebTAG Unit 3.5.7.

7.6.3 In 2017 AM peak journey times into the city centre reduce with the Scheme by between 5% and 14%, with a journey time reliability improvement of around half of one minute. In the 2017 PM peak the journey times out of the city centre reduce with the Scheme by between 1 % and 13%, with an average journey time reliability improvement of around one quarter of a minute. Journey time changes in 2032 are more affected by the complementary city centre measures. In 2032 AM peak journey times into the city centre change with the scheme by between a 1% increase and an 11% reduction, with the average journey time reliability improvement of 18 seconds. In the 2032 PM peak the journey times for routes out of the city reduce by between 3% and 24%, with an average journey time reliability improvement of around half of one minute.

Figure 7-11: Inbound Public Transport Journey Times – AM Peak

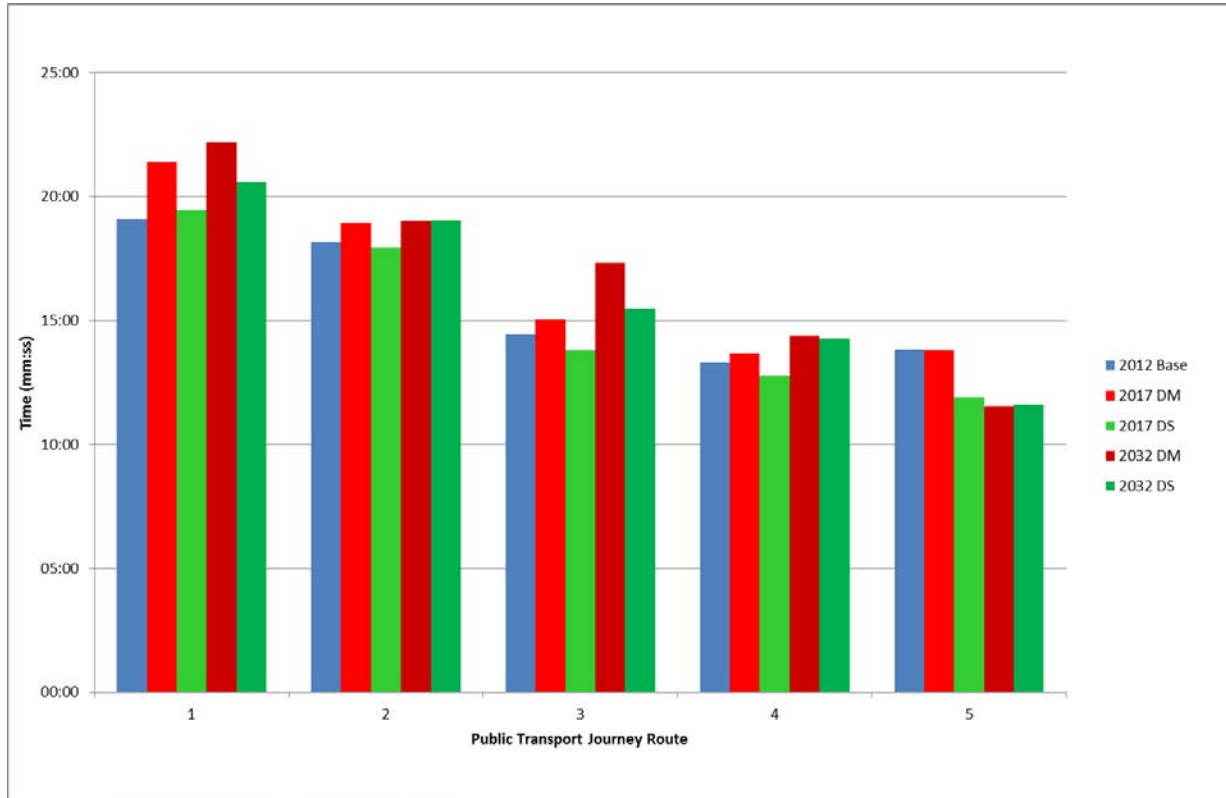


Figure 7-12: Inbound public Transport Journey Times – PM Peak

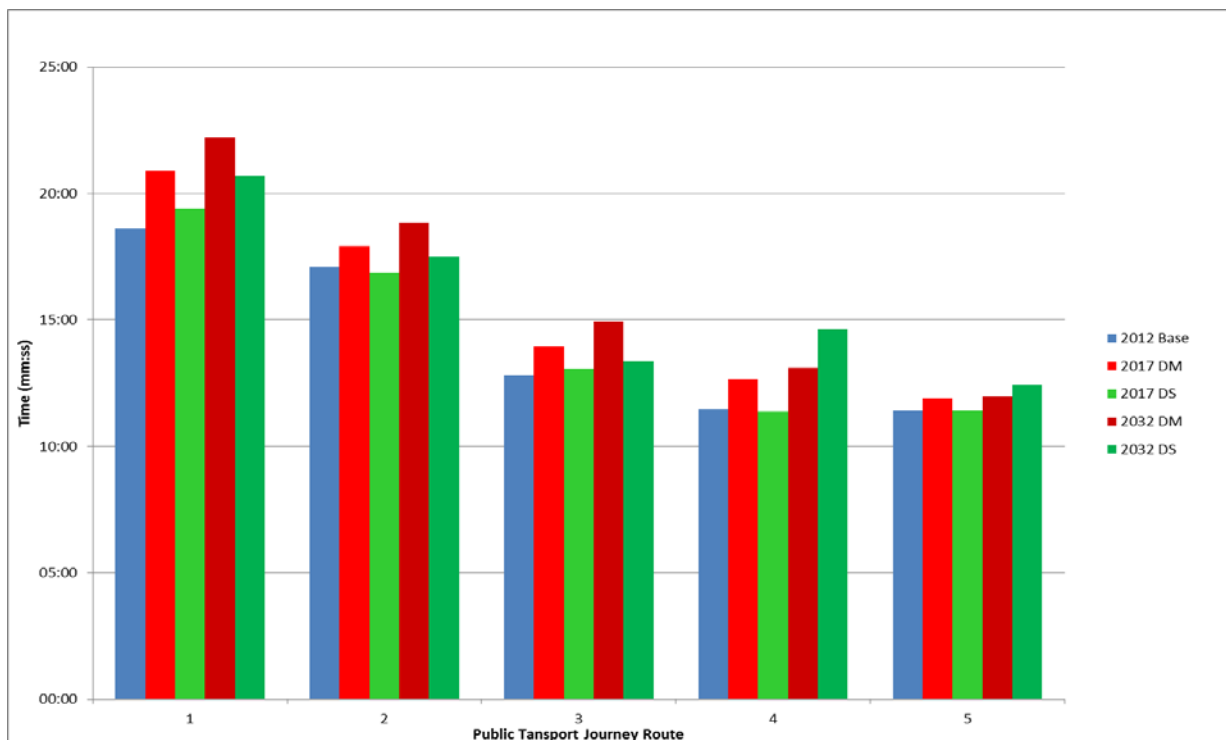


Figure 7-13: Outbound Public Transport Journey Times – AM Peak

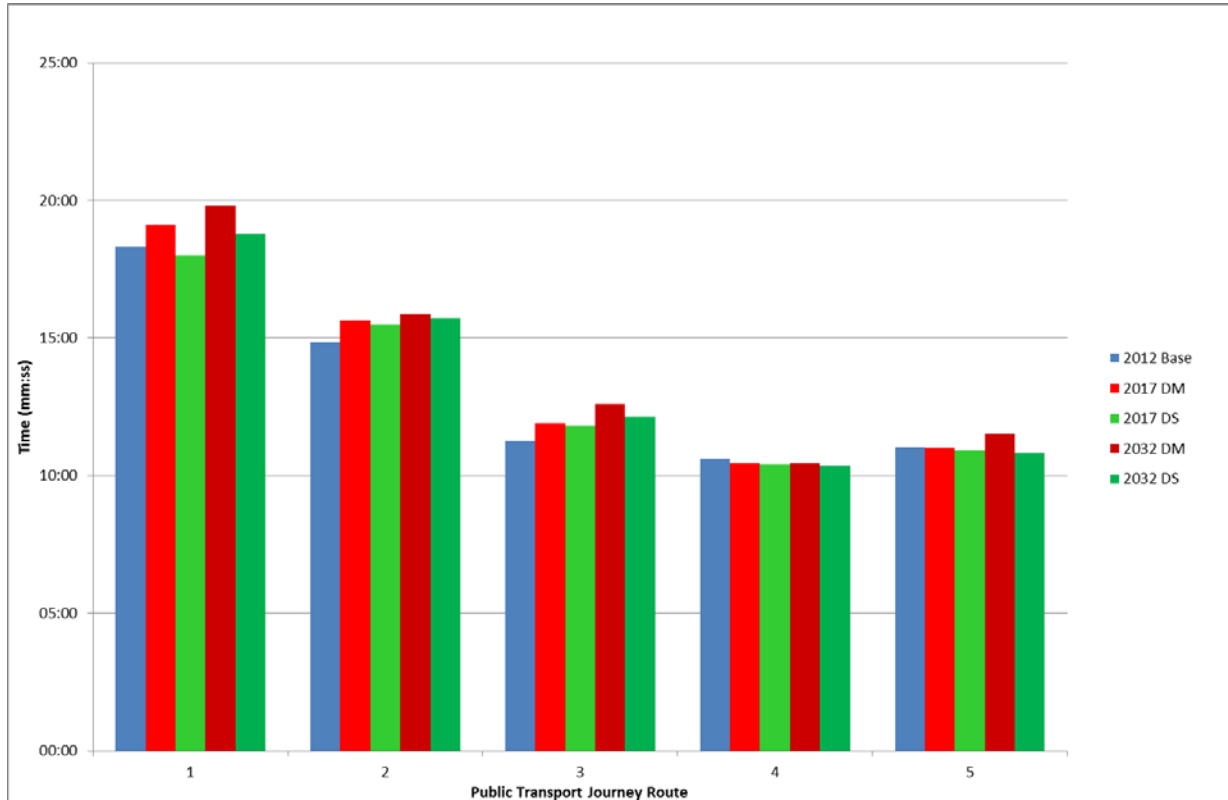


Figure 7-14: Outbound Public Transport Journey Times – PM Peak

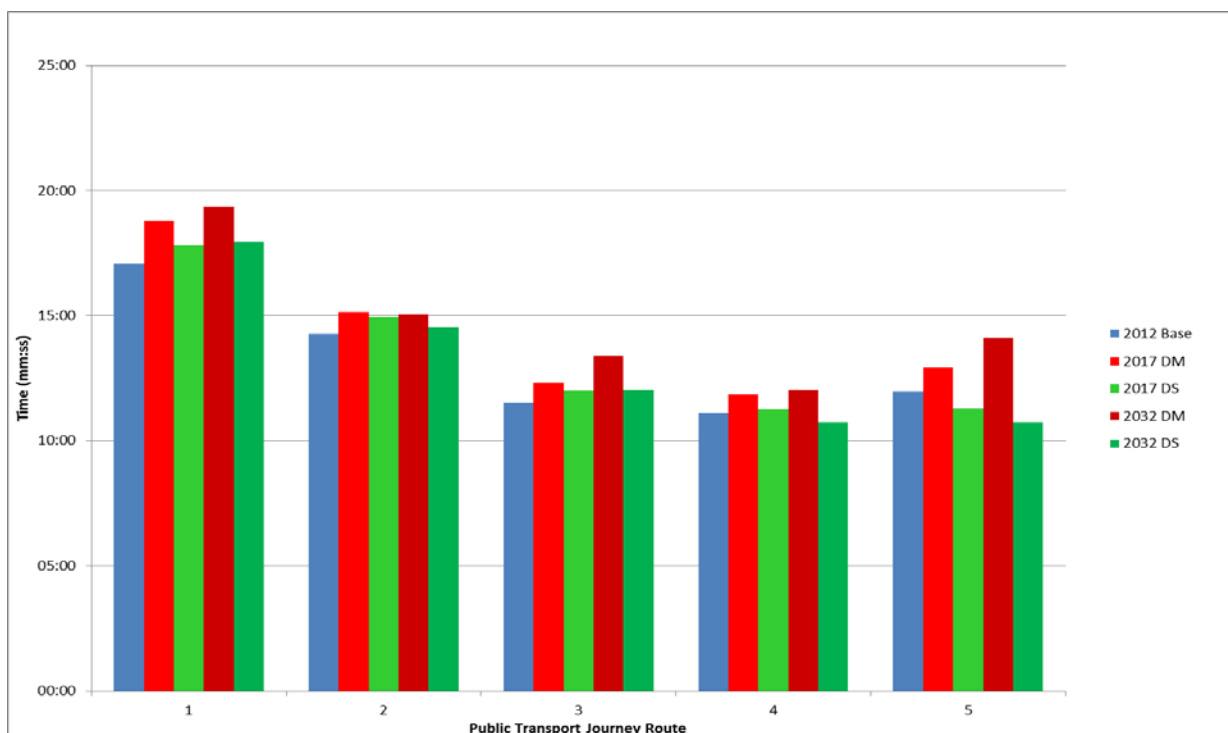


Table 7.8: Inbound Public Transport Journey Times and Journey Time Reliability

Route	Peak	Base		2017				2032				JT savings (%)		Change in standard deviation of journey time	
				Do Minimum		Do Something		Do Minimum		Do Something		2017	2032	2017	2032
		Time (mm:ss)	Distance (m)	Time (mm:ss)	Distance (m)	Time (mm:ss)	Distance (m)	Time (mm:ss)	Distance (m)	Time (mm:ss)	Distance (m)				
1	AM	19:07	9610	21:24	9610	19:28	9610	22:12	9610	20:35	9610	9.0	7.3	-45	-40
	PM	18:37	9610	20:54	9610	19:24	9610	22:13	9610	20:42	9610	7.2	6.8	-35	-37
2	AM	18:10	6943	18:57	6943	17:56	6943	19:00	6943	19:03	6943	5.4	-0.3	-31	2
	PM	17:07	6943	17:56	6943	16:53	6943	18:51	6943	17:30	6943	5.9	7.2	-30	-41
3	AM	14:28	6741	15:03	6742	13:49	6742	17:19	6742	15:29	6742	8.2	10.6	-30	-51
	PM	12:49	6741	13:58	6742	13:04	6742	14:56	6742	13:22	6742	6.4	10.5	-21	-38
4	AM	13:20	5822	13:41	5836	12:46	5836	14:24	5836	14:15	5836	6.7	1.0	-24	-4
	PM	11:28	5822	12:40	5836	11:23	5836	13:07	5836	14:39	5836	10.1	-11.7	-31	43
5	AM	13:51	5872	13:48	5873	11:55	5878	11:32	5873	11:36	5878	13.6	-0.6	-48	1
	PM	11:25	5872	11:54	5873	11:24	5878	11:58	5873	12:26	5878	4.2	-3.9	-12	11

Table 7.9: Outbound Public Transport Journey Times and Journey Time Reliability

Route	Peak	Base		2017				2032				JT savings (%)		Change in standard deviation of journey time	
				Do Minimum		Do Something		Do Minimum		Do Something		2017	2032	2017	2032
				Time (mm:ss)	Distance (m)	Time (mm:ss)	Distance (m)	Time (mm:ss)	Distance (m)	Time (mm:ss)	Distance (m)	Time (mm:ss)	Distance (m)		
1	AM	18:19	9386	19:07	9509	18:01	9386	19:48	9509	18:48	9386	5.8	5.1	-21	-19
	PM	17:05	9386	18:47	9509	17:50	9386	19:20	9509	17:56	9386	5.1	7.2	-17	-27
2	AM	14:52	6757	15:39	6757	15:29	6757	15:53	6757	15:43	6757	1.1	1.0	-4	-4
	PM	14:17	6757	15:09	6757	14:57	6757	15:03	6757	14:32	6757	1.3	3.4	-5	-13
3	AM	11:15	6702	11:55	6702	11:49	6702	12:36	6702	12:09	6702	0.8	3.6	-2	-10
	PM	11:31	6702	12:19	6702	11:59	6702	13:24	6702	12:02	6702	2.7	10.2	-7	-30
4	AM	10:37	5942	10:27	5957	10:25	5957	10:27	5957	10:22	5957	0.3	0.8	-1	-2
	PM	11:07	5942	11:50	5957	11:16	5957	12:01	5957	10:44	5957	4.8	10.7	-13	-28
5	AM	11:01	5857	11:00	5857	10:54	5853	11:32	5857	10:49	5853	0.9	6.2	-2	-16
	PM	11:57	5857	12:55	5857	11:18	5853	14:05	5857	10:44	5853	12.5	23.8	-39	-83

8 Abbreviations

AADT	Average Annual Daily Traffic
ATC	Automatic Traffic Count
DfT	Department for Transport
DIADEM	Dynamic Integrated Assignment and Demand Modelling - software released by the Department for Transport
DM	Do Minimum
DMRB	Design Manual for Roads and Bridges – a Highways Agency publication setting out guidance and good practice for design and appraisal of road schemes
DS	Do Something
COBA	DfT’s Cost-Benefit Analysis tool
EB	East Bound or Employer’s Business
GAP	Minimum gap (in seconds) accepted by a vehicle which gives way at priority junctions or traffic signals. Also a measure of Wardrop equilibrium assignment convergence
GAPR	As GAP above in relation to junctions but for entry onto roundabouts
GEH	Statistical tool to measure closeness of model to observed flows
GIS	Geographic Information System - designed to capture, store, manipulate, analyse, manage, and present all types of geographical data
GPS	Global Positioning System
HA	Highways Agency
HB	Home-based
HBEB	Home-based Employers Business
HBO	Home-based Other
HBW	Home-based Work
HGV	Heavy Goods Vehicle
JT	Journey Time

LGV	Light Goods Vehicle
LMVR	Local Model Validation Report
MCC	Manual Classified Count (for a link)
MCTC	Manual Classified Turning Count
ME	Matrix Estimation
NATS	Norwich Area Transportation Strategy
NB	North Bound
NCC	Norfolk County Council
NDC	Nationwide Data Collection (company specialising in traffic surveys)
NDR	Norwich Northern Distributor Road
NHB	Non-home-based
NHBEB	Non-home based Employer's Business
NHBO	Non-home –based Other
NTEM	National Trip End Model
NTS	National Travel Survey
OD	Origin Destination
OGV	Other Goods Vehicle
OGV1	A sub-category of OGV. Includes all rigid vehicles over 3.5 tonnes gross vehicle weight with two or three axles
OGV2	A sub-category of OGV. Includes all rigid vehicles with four or more axles and all articulated vehicles
OP	Off-peak
PA	Production-Attraction
PCU	Passenger Car Unit
PPK	Pence per Kilometre
PPM	Pence per Minute

RSI	Road Side Interview
SATURN	Simulation – Assignment model of Traffic on Urban Road Networks software
SB	South Bound
SRN	Strategic Road Network
TRADS	Traffic flow Data System – the Highways Agency’s database of traffic count data
TRICS	Trip Rate Information Computer System
VISUM	Transport modelling software used (in this case) for public transport modelling
VOC	Vehicle Operating Cost
VOT	Value of Time
WB	West Bound
WebTAG	Web-based Transport Analysis Guidance produced by the Department for Transport

9 Appendices A to G – See Volume 2 of the Forecasting Report

10 Appendices H to K – See Volume 3 of the Forecasting Report

The Norfolk County Council (Norwich Northern Distributor Road (A1067 to A47(T))) Order

5.7 Economic Appraisal Report

Planning Act 2008

Infrastructure Planning

The Infrastructure Planning (Applications: Prescribed Forms and Procedure)
Regulations 2009

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1 Key Summary

- 1.1.1 Funding approval for the Norwich Northern Distributor Road (NDR) was sought in 2011 through the Department for Transport's (DfT) Development Pool process. A business case was developed and submitted in accordance with the guidance in the Treasury Green Book. Ministerial decisions were made in December 2011 to award funding.
- 1.1.2 The NDR is a project of national significance which requires a Development Consent Order (DCO) under the Planning Act 2008. This report was prepared as part of the submission.
- 1.1.3 The Value for Money (VfM) and Scheme Affordability for the NDR has been re-assessed for the submission based on outputs from an updated transport model using economic parameters published by the DfT in October 2012.
- 1.1.4 The economic appraisal results show that the NDR is likely to deliver present value of benefits (including TUBA transport user benefits and COBA accident benefits) of £773m over a 60 year appraisal period in 2010 prices discounted to 2010. This compares with present value costs of £186m.
- 1.1.5 Additional benefits in relation to wider economic impacts (WEBs) and journey time reliability (JTR) amount to a further £216m in 2010 prices discounted to 2010 which improve the value for money assessment of the Scheme. The table below shows a summary of the economic appraisal results for the NDR.

	Scenario including Accidents	Scenario also including WEBs and JTR
Present Value of Benefits (PVB)	773,317	989,063
Present Value of Costs (PVC)	185,542	185,542
Net Present Value (NPV)	587,775	803,521
Benefit to Cost Ratio (BCR)	4.168	5.331

Notes: Both costs and benefits are in £'000, in 2010 prices discounted to 2010 and for a 60 year appraisal period

- 1.1.6 The scheme delivers a benefit-to-cost ratio (BCR) of 4.17 (inclusive of accident benefits) and a BCR of 5.33 when WEBs and JTR are included. Both of these represent very high value for money (BCR above 4) according to DfT's VfM criteria.

2 Introduction

2.1 Background

- 2.1.1 Mott MacDonald (MM) has been appointed by Norfolk County Council (NCC) to assist with the development and appraisal of the Norwich Northern Distributor Road, known as the NDR or referred to as the Scheme.
- 2.1.2 The Scheme would be a dual carriageway all-purpose strategic distributor road, to be classified as the A1270 Principal Road, which would link the A1067 Fakenham Road near Attlebridge, to the A47(T) Trunk Road at Postwick. This will be over a length of approximately 20.4km.
- 2.1.3 The NDR is a project of national significance which requires a Development Consent Order (DCO) under the Planning Act 2008 and this formal planning process began in early 2013. It is currently anticipated that the process will be completed in time for the NDR scheme to start construction in 2015 and to be opened in 2017.
- 2.1.4 This document is one of a number that support the DCO, each of which has its own unique document number, and should therefore be read in conjunction with the other documentation. The proposed layout of the NDR is shown in the General Arrangement Plans contained in document number 2.6, whilst the full needs case for the NDR is explained in the Statement of Reasons (document 4.1) and the Environmental Statement (document 6.1).
- 2.1.5 Funding approval for the NDR was sought in 2011 through the Department for Transport's (DfT) Development Pool process. A business case was developed and submitted in accordance with the guidance in the Treasury Green Book. Ministerial decisions were made in December 2011 to award funding.
- 2.1.6 For DCO submission the transport model used in 2011 was updated using fresh data collected in 2012 to comply with current DfT guidance.
- 2.1.7 The economic appraisal approach adopted in this work follows existing WebTAG guidance in unit 3.5. The variable demand model (VDM) forecasts, which make allowance for traffic generation, redistribution and mode choice effects arising from introduction of the scheme, have been prepared for the NDR proposed opening year of 2017 and the design year of 2032. It has been assumed in the appraisal that the benefits of the scheme do not change for each year beyond 2032 although traffic will continue to grow.

2.2 Purpose and Layout of Report

2.2.1 This report presents the economic appraisal for the NDR and focuses on the monetised impacts of the scheme. The report sets out to provide:

- An assessment of economic benefits for consumer and business users from the NDR scheme based on the VDM forecasts and the likely expenditure profile during the assessment period.
- An assessment of the scheme Value for Money (VfM) based on the VDM model outputs and the latest available scheme costs. The Guidance on Value for Money describes the criteria used to determine the VfM of various types of schemes.
- Examination of the stability and distribution of the economic assessment results so as to demonstrate that the economic appraisal is robust and reliable as required by WebTAG 3.10.4.

2.2.2 This report describes the methodology used to produce the economic appraisal using the TUBA version 1.9.1 computer program. This undertakes a matrix-based appraisal taking demand and cost matrices (time, distance and charges) from the transport model as inputs. The report describes how transport model issues highlighted by TUBA have been dealt with.

2.2.3 The report also discusses the calculation of accidents benefits, wider economic benefits and journey time reliability benefits. These comply with relevant WebTAG guidance in units 3.4.1, 3.5.14 and 3.5.7 respectively.

2.2.4 This report contains the following sections after the current introductory section:

- Section 3 – discusses the economic appraisal process followed and the assumptions that have been made;
- Section 4 – describes the derivation of scheme costs for inclusion in the economic appraisal;
- Section 5 - presents the results of the economic appraisal and discusses the levels of user benefits that are reported for the scheme;

- Section 6 – demonstrates that the economic results are robust, reliable and stable as required by WebTAG;
- Section 7 – presents results from accident benefit analysis;
- Section 8 – discusses wider economic impacts of the scheme calculated using WITA software;
- Section 9 – presents the journey time reliability assessment of the NDR scheme; and
- Section 10 – presents conclusions from the economic appraisal.

2.2.5 Supporting information is included in a number of appendices in Section 11:

- Appendix A – describes the calculation of annualisation factors adopted for the appraisal;
- Appendix B – describes in detail the TUBA setup; and
- Appendix C – documents the analysis of TUBA and COBA warnings

2.2.6 Sections 12 and 13 contain Abbreviations and Glossary.

3 Economic Appraisal

3.1 Overview

- 3.1.1 The transport economic appraisal has been undertaken using the TUBA (Transport Users Benefit Appraisal) program Version 1.9.1 which carries out an economic appraisal in accordance with published DfT guidance. TUBA implements elements of the Sugden method as described in Unit 3.5.3 of WebTAG and undertakes matrix-based appraisal taking trip, time, distance and toll/charge matrices from the transport model as inputs. Based on these trip and cost matrices from the traffic model, TUBA calculates user benefits discounted to the present value year (2010) and produces results for various degrees of disaggregation and summarises the outputs.
- 3.1.2 Assumptions for the economic appraisal including economic parameters and annualisation factors that form inputs to the TUBA economic appraisal process are discussed in Appendices A, B and C. The key assumptions that have been made in the appraisal are as follows:
- The NDR scheme will be opened in 2017 and is appraised over a 60 year period from the year of opening. User benefits of the scheme after the design year of 2032 are assumed not to grow and are subject to the normal discounting to 2010 present value year and changes to values of time (VOTs) and other economic parameters.
 - The economic benefits of the NDR scheme are accrued over all days of the year (including weekends, bank holidays and overnight) although the transport model does not specifically model weekends and bank holidays. How this is done is discussed in Appendix A.
 - The scheme will be developed and funded by the public sector and investment costs are subject to optimism bias of 15%.
 - The economic appraisal has been carried out for a scenario that assumes the implementation of the Joint Core Strategy (JCS) plan for growth. The land use and development assumptions are consistent in the scenarios with and without the scheme intervention, termed the Do Something and Do Minimum scenarios.

- Changes in journey times and any economic benefits that are calculated are based on differences between the Do Minimum and the Do Something scenarios.

3.1.3 The main economic analysis is based on matrices from VDM assignments which makes allowance for the effects of suppressed and generated trips, destination choice, mode-choice and trip frequency. The impacts of the various demand modelling responses is considered in detail in section 6 of the Forecasting Report (Document Reference Number 5.6).

3.2 Modelling Framework

3.2.1 The Norwich Area Transportation Strategy (NATS) transport modelling framework used to assess the NDR consists of three main elements:

- Highway Traffic Model - This is a SATURN model with 413 zones with a network covering the greater Norwich area. It has a detailed simulation area covering the Norwich city urban area. The model has been validated to a 2012 base year in accordance with WebTAG unit 3.19.
- Public Transport Model - This is a VISUM public transport model covering bus and rail modes which has been developed using the guidance in WebTAG unit 3.11. The model covers the same area as the highway model plus the key rail routes into Norwich and has been calibrated to the same base year of 2012.
- Demand Model - DIADEM was used for demand modelling. The demand model is an incremental model, and is set up in Production-Attraction format as required by WebTAG unit 3.10.

3.2.2 The overall modelling framework and the individual elements of the framework have been developed to be consistent with the guidance set out in WebTAG.

3.2.3 The highway and public transport assignment models have been developed and validated for three time periods:

- AM Peak Hour (0800-0900hrs)
- Average Inter-Peak Hour (1000-1600hrs)
- PM Peak Hour (1700-1800hrs)

- 3.2.4 An Off-Peak model representing an average hour for the period 1900 to 0700hrs, has also been developed for the purposes of demand modelling, where costs are required for all times of the day. It should be noted that the off peak model is not a fully validated model. In terms of demand the overall levels of demand have been derived from observed counts, however there has been no flow validation at an individual link level. In terms of network performance, as the network has been calibrated for the other time periods the representation of network costs should be appropriate.
- 3.2.5 The NATS transport model is described in the Highway Local Model Validation Report (LMVR) of December 2013 (Report Reference Number 5.9) and in the Public Transport Local Model Validation Report, dated December 2013 (Report Reference Number 5.10). The traffic forecasts and demand modelling that form the basis of this economic appraisal are presented in the NDR Forecasting Report dated December 2013 (Report Reference Number 5.6).

3.3 Do Minimum Assumptions

- 3.3.1 A Do Minimum (DM) scenario is required as a reference upon which to assess the economic effects of the proposed scheme intervention. As such it includes schemes and measures that will be implemented between 2012 (the model base year) and 2017 to the existing transport system classified as 'near certain' or 'more than likely' in accordance with TAG Unit 3.15.5. Thus, the DM includes:
- Network changes - junction improvements, pedestrian improvements and traffic management and safety schemes within Norwich.
 - Public transport changes - it is assumed that the public transport network remains as it is in the base year. Assumptions have been made in terms of how bus and rail fares change in the future. Overall, it should be noted that there are no major changes to the public transport network in the Do Minimum.
 - Future housing and business developments
 - Reference traffic growth based on DfT's data contained in TEMPRO using NTEM dataset 6.2 and RTF 2013.
- 3.3.2 A full description of the Do Minimum including location plans of Do Minimum transport schemes is given in the Forecasting Report.

3.4 Do Something Network

3.4.1 The Do Something (DS) scenario represents a scenario with the NDR dual carriageway from the A1067 to the north west of Norwich to the A47(T) east of Norwich at Postwick junction, and associated complementary traffic management measures. More specifically the DS includes:

- The preferred route option for the NDR consisting of a dual carriageway all-purpose strategic distributor road, which would link the A1067 Fakenham Road, near Attlebridge to the junction with the A47 (T) at Postwick. The total length of the NDR is approximately 20.4km.
- Upgrade of the A47(T) Postwick Trunk Road junction and access improvements to Postwick Park and Ride site.
- City Centre changes - complementary traffic management measures proposed for Norwich city centre, with the aim of discouraging through car trips and reducing the dominance of traffic.
- Traffic management measures at three locations to address local transport issues that arise with NDR.
- Public transport – there are no changes proposed between the DM and DS.

3.4.2 These are the measures that, together, are assessed in this economic appraisal. The impact of the NDR is, of course, by far the dominant factor. These measures represent the DS scenario.

3.4.3 A full description of the DS scenario including location plans of DS schemes is given in the Forecasting Report.

3.5 Delays during Construction and Maintenance

3.5.1 Delays during construction have not been calculated as the scheme is off line and therefore its construction would not have a major impact on the operation of the existing highway network. At locations where the scheme ties in to the existing highway network, construction sequences will be planned to minimise disruption to the existing network.

3.5.2 Delays during maintenance have not been assessed as the scheme provides more capacity in the network, and it is considered that the delays would be small.

3.6 NDR Scheme Costs

3.6.1 Base costs for construction, land, preparation, supervision, road maintenance and operation, including an allowance for risk were provided by Norfolk County Council (NCC) together with spend profiles. These costs have been modified for economic appraisal in line with WebTAG guidance, as described later in Chapter 4.

3.7 NDR Scheme Analysis of Monetised Costs and Benefits

3.7.1 The analysis of monetised costs and benefits compares the monetised costs of the scheme against the benefits of the scheme over a 60 year appraisal period. This takes into account the following costs and benefits:

- Construction costs
- Maintenance costs
- Operating costs
- Supervision costs
- Time savings
- Vehicle operating cost savings
- Private sector provider benefits
- Greenhouse gases benefits
- User charges (e.g. parking charges)
- Accidents

3.7.2 A number of metrics are then calculated to demonstrate the value of the scheme. These are the:

- Net Present Value (NPV) – the net set of all benefits and costs
- The Benefit to Cost Ratio (BCR) – The ratio of the Present Value of Benefits (PVB) to the Present Value of Costs (PVC).

3.8 Value for Money Criteria

3.8.1 The DfT Value for Money appraisal includes benefits and costs that can be counted in monetary terms. Under the DfT guidance, a project is generally considered to be:

- Poor VfM if BCR is less than 1
- Low VfM if BCR is between 1 and 1.5
- Medium VfM if BCR is between 1.5 and 2
- High VfM if BCR is between 2 and 4
- Very High VfM if BCR is greater than 4

3.8.2 The Value for Money Assessment includes the transport user appraisal, accident benefits and wider impacts of the scheme that include wider economic benefits and journey time reliability benefits.

3.8.3 We have also assumed in this appraisal that user benefits do not change beyond 2032 due to continued traffic growth beyond the design year – all changes in benefits only relate to discounting, value of time changes and other economic parameter changes. A less conservative approach that allowed for some growth in user benefits (in line with growth between the opening year and design year, for example) would significantly improve the BCR and VfM assessment.

4 Scheme Costs for Economic Appraisal

4.1 Scheme Costs

4.1.1 Total scheme costs sub divided by construction, land, preparation and supervision during construction were provided by the Norfolk County Council (NCC). These consisted of base costs and an allowance for risk calculated from a Quantitative Risk Assessment (QRA). All costs were presented in 2013 Quarter 1 prices.

4.1.2 Preparation costs that have already been incurred are considered to be sunk costs and therefore do not form part of the appraisal.

4.1.3 Land costs from years 2007/08 and 2012/13 are considered to be recoverable and therefore have been included in the economic appraisal. Land costs include an allowance for potential Part 1 claims.

4.1.4 A summary of scheme costs is provided in Table 4.1. For input to the economic appraisal these costs need to be adjusted to:

- Convert from financial year to calendar year
- Take into account construction inflation
- Reflect Optimism Bias

4.1.5 These processes are discussed in further detail below.

4.2 Conversion from Financial Year to Calendar Year

4.2.1 Information provided by NCC is by financial year whereas TUBA requires input by calendar year. Costs have been converted to calendar year by assuming that costs are distributed evenly throughout the year, for example 2015 costs consist of 25% of 2014/2015 costs and 75% of 2015/2016 costs.

4.2.2 The resulting costs in calendar years are shown in Table 4.2.

4.3 Adjustment for Construction Inflation

4.3.1 Construction inflation has been assessed at 2% per annum for the years 2013 to 2018. The use of 2% has been agreed with the County Council's appointed contractor Birse Civils and is considered appropriate for the following reasons:

- Construction inflation has probably peaked;
- Due to overall market conditions Birse Civils are finding it easier to negotiate with their supply chain to obtain discounts;
- Ability to use the buying power of a large organisation to obtain best value supply chain orders will also reduce our exposure to increased costs (Birse Civils is part of Balfour Beatty);
- There are number of inflation related risk allowances already included within the budget.

4.3.2 Building Cost Information Service (BCIS) and other relevant construction inflation indices show forecast construction inflation to be at a lower level than forecast background inflation from RPI over the 2013 to 2017 period. RPI forecasts for above period can be found in Table M3: Medium Term Forecasts for CPI and RPI, HM Treasury Document, Forecasts for the UK economy: a comparison of independent forecasts, August 2013.

4.3.3 As forecast construction inflation is less than the forecast of RPI, scheme costs for input to TUBA need to be adjusted by a constant price adjustment factor. The derivation of the constant price adjustment factor is shown in Table 4.3.

4.3.4 The constant price adjustment factor is applied to Construction costs, (including risk). They are not applied to land, preparation and supervision costs. The resultant scheme costs after the application of the constant price adjustment factor are included in Table 4.4 and Table 4.5.

4.4 Application of Optimism Bias

4.4.1 For the Best and Final Funding Bid submission in September 2011 an Optimism Bias of 20% was employed. For this submission a lower Optimism Bias of 15% has been adopted to reflect the further development that has been completed since September 2011. This is considered to be justified as the level of uncertainty has reduced as a result of the following:

- Detailed design of Postwick A47(T) Junction Improvement has been completed and a corresponding provisional target costing has been received from Birse Civils and this has been reviewed.

- Planning Permission for Postwick A47(T) Junction Improvement has been reconfirmed and the Orders have been the subject of a Public Inquiry in July 2013, though the outcome is still awaited.
- Design development for the remainder of the NDR scheme has since been progressed to a more advanced stage and Birse Civils have revised the budget costing accordingly. This has followed further public consultation in the summer 2013.
- Previous higher value risk items in relation to ground conditions, environmental aspects and utilities have all reduced significantly as a result of the ongoing Early Contractor Involvement (ECI) process and further surveys and investigations.

4.4.2 In addition the scheme is at order publication stage hence an optimism bias of 15% is recommended by Table 9 of WebTAG 3.5.9.

4.4.3 Optimism Bias has not been applied to land costs up to 2013 as these costs have already been expended. Final costs for inclusion in TUBA are presented in Table 4.6.

4.4.4 Central government funding for the scheme is £86.5m while the rest is funded by local government.

4.5 Maintenance Costs

4.5.1 Annual Maintenance Costs were reviewed in detail by the NCC for the DCO submission and assumed a constant profile over the 60 years appraisal period. Road maintenance costs have been assumed to increase in line with retail price inflation and therefore no construction price adjustment factors have been applied. Optimism bias has been applied at 15%, the same rate as applied to construction costs, and is considered to be appropriate following the detailed review of costs that was undertaken. All prices are in 2013 Quarter 1 prices. The assumed maintenance costs are shown in Table 4.7.

4.6 Operating Costs

4.6.1 Operating costs associated with the scheme have been split into:

- Landscaping costs
- Street lighting costs
- Structures Maintenance costs

4.6.2 Annual Operating Costs were provided by the NCC and assumed a constant profile over the 60 years appraisal period. WebTAG 3.5.9 states that there is currently insufficient evidence available to recommend any specific optimism bias uplifts for operating costs. In the absence of such guidance NCC's forecasts reflect the best possible estimate of operating costs. Therefore optimism bias has not been applied to operating costs. All costs have been provided in 2013 Quarter 1 prices. Table 4.8 shows the profile of operating costs received from the Norfolk County Council.

Table 4.1: Scheme Costs (£'s 2013 Q1 Prices)

Cost Item	Cost Expenditure Profile by year (£)										Total Item Cost (£)
	07/08	09/10	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	
Construction											
Base			1,687,135	19,254,233	19,286,914	53,913,587	9,207,016	552,500			103,901,385
Risk			140,028	1,169,030	1,012,073	3,440,812	589,146				6,351,089
Subtotal			1,827,163	20,423,263	20,298,987	57,354,399	9,796,162	552,500			110,252,474
Land											
Base	382,000	473,850	264,848	1,294,000	6,348,536	1,735,214	5,815,000	1,725,000	3,400,000	600,000	22,038,448
Preparation											
Base			5,144,346	2,221,545	297,358	102,000					7,765,249
Supervision											
Base			50,000	531,250	276,250	212,500	212,500				1,282,500
Total											141,338,671

Source: Norfolk County Council

Table 4.2: Scheme Costs by Calendar Year (£'s 2013 Q1 Prices)

Cost Item	Cost Expenditure Profile (£) by year													Total Item Cost (£)
	2007	2008	2009	2010	2013	2014	2015	2016	2017	2018	2019	2020	2021	
Construction														
Base					1,265,351	14,862,459	19,278,744	45,256,919	20,383,659	2,716,129	138,125			103,901,385
Risk					105,021	911,780	1,051,312	2,833,627	1,302,063	147,287				6,351,089
Subtotal					1,370,372	15,774,238	20,330,056	48,090,546	21,685,721	2,863,416	138,125			110,252,474
Land														
Base	286,500	95,500	355,388	118,463	198,636	1,036,712	5,084,902	2,888,545	4,795,054	2,747,500	2,981,250	1,300,000	150,000	22,038,448
Preparation														
Base					3,858,260	2,952,245	778,405	150,840	25,500					7,765,249
Supervision														
Base					37,500	410,938	340,000	228,438	212,500	53,125				1,282,500
Total														141,338,671

Table 4.3: Calculation of Constant Price Adjustment Factor

	2012	2013	2014	2015	2016	2017	2018	2019
Construction cost increase (p.a.)		2%	2%	2%	2%	2%	2%	2%
RPI increase (p.a.)		3.2%	2.8%	3.2%	3.6%	3.9%	4.0%	4.0%
Cumulative adjustment factor (construction cost)		1.020	1.040	1.061	1.082	1.104	1.126	1.149
Cumulative adjustment factor (RPI)		1.032	1.061	1.094	1.133	1.177	1.224	1.273
Constant price adjustment factor		0.988	0.981	0.970	0.955	0.938	0.920	0.902

Table 4.4: Scheme Costs after Adjustment for Construction Inflation (£'s 2013 Q1 Prices)

Cost Item	Cost Expenditure Profile by year (£)													Total Item Cost (£)
	2007	2008	2009	2010	2013	2014	2015	2016	2017	2018	2019	2020	2021	
Construction														
Base					1,250,638	14,575,323	18,695,505	43,230,825	19,115,044	2,498,103	124,595			
Risk					103,800	894,164	1,019,507	2,706,769	1,221,026	135,464				
Subtotal					1,354,438	15,469,487	19,715,012	45,937,594	20,336,070	2,633,567	124,595			105,570,763
Land														
Base	286,500	95,500	355,388	118,463	198,636	1,036,712	5,084,902	2,888,545	4,795,054	2,747,500	2,981,250	1,300,000	150,000	22,038,448
Preparation														
Base					3,858,260	2,952,245	778,405	150,840	25,500					7,765,249
Supervision														
Base					37,500	410,938	340,000	228,438	212,500	53,125				1,282,500
Total														136,656,960

Table 4.5: Summary Scheme Costs after Adjusting for Construction Price Inflation (£'s 2013 Q1 Prices)

	2007	2008	2009	2010	2013	2014	2015	2016	2017	2018	2019	2020	2021	Total
Construction (C)					1,354,438	15,469,487	19,715,012	45,937,594	20,336,070	2,633,567	124,595			105,570,763
Land (L)	286,500	95,500	355,388	118,463	198,636	1,036,712	5,084,902	2,888,545	4,795,054	2,747,500	2,981,250	1,300,000	150,000	22,038,448
Preparation (P)					3,858,260	2,952,245	778,405	150,840	25,500					7,765,249
Supervision (S)					37,500	410,938	340,000	228,438	212,500	53,125				1,282,500
Total														136,656,960

Table 4.6: Summary Scheme Costs after Adjusting for Optimism Bias (£'s 2013 Q1 Prices)

	2007	2008	2009	2010	2013	2014	2015	2016	2017	2018	2019	2020	2021	Total
Construction (C)					1,557,603	17,789,910	22,672,264	52,828,233	23,386,481	3,028,602	143,284			121,406,378
Land (L)	286,500	95,500	355,388	118,463	228,431	1,192,219	5,847,637	3,321,826	5,514,312	3,159,625	3,428,438	1,495,000	172,500	25,215,838
Preparation (P)					4,436,998	3,395,082	895,165	173,465	29,325					8,930,036
Supervision (S)					43,125	472,578	391,000	262,703	244,375	61,094				1,474,875
Total														157,027,127

Notes: For the purpose of entering into TUBA 2007-2010 land costs were included in for year 2013

Table 4.7: Maintenance Costs

	Cost (£'s) 2013 Q1 prices
Annual maintenance cost	452,850
Maintenance cost over appraisal period before optimism bias	27,771,023
Maintenance cost over appraisal period after optimism bias	31,936,677

Source: Norfolk County Council

Table 4.8: Operating Costs

	Cost (£'s) 2013 Q1 prices
Landscaping annual operating cost	180,940
Structures annual operating cost	72,717
Streetlighting annual operating cost	10,982
Total annual operating cost	264,639
Operating cost over appraisal period	15,878,344

Source: Norfolk County Council

5 Economic Appraisal Results

5.1 Overview

5.1.1 The economy objective identified within WebTAG is concerned with improving the economic efficiency of transport and the efficiency of economic activities, with the key aim of supporting sustainable economic activity and returning good value for money. It considers the following three sub-objectives:

- To improve transport economic efficiency for business users and transport providers;
- To improve transport economic efficiency for consumer users;
- To get good value for money in relation to impacts on public accounts;

5.2 Transport Economic Efficiency (TEE)

5.2.1 The results of the assessment of user benefits and user charges are shown in the TEE table of TUBA output file which is presented in Table 5.1. All values quoted are in 2010 prices, discounted to 2010. The TEE table shows that the NDR scheme achieves total transport economic efficiency benefits of about £700m in the 60 year assessment period.

5.2.2 The results of the Transport Economic Efficiency assessment, show significant efficiency benefits for all trip purposes. Business trips, constitute the highest proportion of the reported user benefits.

Table 5.1: Transport Economic Efficiency (TEE)

Item	Benefit (£000s)
Consumer - Commuting user benefits	
Travel Time	61,783
Vehicle operating costs	-13,532
User charges	2,912
During Construction & Maintenance	0
NET CONSUMER - COMMUTING BENEFITS	51,164
Consumer - Other user benefits	
Travel Time	300,588
Vehicle operating costs	-115,467
User charges	195,502
During Construction & Maintenance	0
NET CONSUMER - OTHER BENEFITS	380,623
Business Impacts	
Travel Time	406,852
Vehicle operating costs	-21,768
User charges	2,669
During Construction & Maintenance	0
Sub Total	387,753
Private Sector Provider Impacts	
Revenue	-119,956
Operating costs	0
Investment costs	0
Grant/subsidy	0
Sub Total	-119,956
Other business Impacts	
Developer contributions	0
NET BUSINESS IMPACT	267,797
TOTAL	
Present Value of Transport Economic Efficiency Benefits (TEE)	699,584

Notes: All monetary values are expressed in 2010 prices discounted to 2010

5.3 Public Accounts

5.3.1 Table 5.2 below provides the public accounts summary in 2010 prices discounted to 2010. This shows that the local authority revenues reduce,

which occurs as a result of changes in car parking and P&R revenues. The Scheme results in an increase in road travel and hence there is an increase in indirect tax revenues to central Government. As mentioned before part of the investment costs of the scheme is funded by the central Government and the rest is funded by the NCC.

Table 5.2: Summary of Public Accounts

Item	Cost (£000s)
Local Government Funding	
Revenue	28,834
Operating Costs	17,806
Investment Costs	62,333
Developer Contributions	0
Grant/Subsidy Payments	0
NET IMPACT	108,974
Central Government Funding: Transport	
Revenue	0
Operating costs	0
Investment costs	76,568
Developer Contributions	0
Grant/Subsidy Payments	0
NET IMPACT	76,568
Central Government Funding: Non-Transport	
Indirect Tax Revenues	-55,270
TOTALS	
Broad Transport Budget	185,542
Wider Public Finances	-55,270

Notes: All monetary values are expressed in 2010 prices discounted to 2010.

5.4 Analysis of Monetised Costs and Benefits

5.4.1 Table 5.3 presents the analysis of monetised costs and benefits.

Table 5.3: Analysis of Monetised Costs and Benefits

Item	Accidents included (£000)
Accidents (not assessed by TUBA)*	41,219
Greenhouse Gases**	-22,756
Economic Efficiency: Consumer Users (Commuting)	51,164
Economic Efficiency: Consumer Users (Other)	380,623
Economic Efficiency: Business Users and Providers	267,797
Wider Public Finances (Indirect Taxation Revenues)	55,270
Present Value of Benefits (PVB)	773,317
<hr/>	
Broad Transport Budget Present Value of Costs (PVC)	185,542
<hr/>	
OVERALL IMPACTS	
Net Present Value (NPV)	587,775
Benefit to Cost Ratio (BCR)	4.168

Notes: All monetary values are expressed in 2010 prices discounted to 2010

* The lower conservative accident benefit is included based upon the use of local accident data, as explained in section 7.

**Greenhouse gas impacts were calculated using TUBA1.9.2 since there was a bug in TUBA 1.9.1

5.4.2 The results show that the Present Value of Benefits (PVB) is estimated to be £773m (inclusive of accident benefits), outweighing the £186m Present Value of Costs (PVC).

5.4.3 The Benefit Cost Ratio (BCR) of the scheme is 4.17 including accidents. Under the DfT's value for money criteria, this represents a Very High value for money category.

5.5 Inclusion of Wider Benefits

5.5.1 The BCR is improved further to 5.33 once journey time reliability benefits (£28m) and wider economic benefits (£187m) are included in the appraisal as can be seen from Table 5.4 below. More details on wider economic impacts and journey time reliability can be found in Sections 8 and 9 respectively. These additional benefits amount to £216m (2010 prices discounted to 2010). The inclusion of these benefits increases the BCR to a higher level within the Very High value for money category.

Table 5.4 Summary of Economic Appraisal including Wider Benefits

Item	Scenario including Accidents	Scenario also including WEBS and JTR
Present Value of Benefits (PVB)	773,317	989,063
Present Value of Costs (PVC)	185,542	185,542
Net Present Value (NPV)	587,775	803,521
Benefit to Cost Ratio (BCR)	4.168	5.331

Notes: All monetary values are in £000's and expressed in 2010 prices discounted to 2010

6 Analysis of User Benefits and Robustness of the Economic Appraisal

6.1 Total User Benefits by Time Period

6.1.1 Table 6.1 shows total user benefits by time period. This shows that the NDR scheme has a large impact on all time periods. The NDR will provide significant benefits to traffic movements in the inter peak as well as peak periods. The ratio of benefits per hour is about half in the inter peak compared with the AM peak and in the PM peak (2 hours) the benefits are little lower than the AM peak. Therefore the profile of the benefits matches expectations for a scheme such as NDR. The detailed annualisation is discussed in Appendix A.

Table 6.1: Total User Benefit by Time Period

Time Period	Annualisation	Total User Benefit (£m)
Weekday AM	246	77.8
Weekday PM	481	122.8
Weekday Inter Peak	2,298	333.5
Weekday Off Peak	3,056	80.6
Weekend (all hours)	3,667	204.9

Notes: All monetary values are expressed in 2010 prices discounted to 2010

6.1.2 Weekend benefits are derived from outputs from both the off peak and inter peak models. The allocation of weekend hours to the inter peak and off peak modelled time periods is presented in Appendix A.

6.2 Geographical Sectorisation of User Benefits

6.2.1 In order to confirm that the distribution/location of user benefits for the NDR is sensible and that the economic user benefits of the scheme are reliable and robust, a sector-to-sector analysis of user time benefits has been carried out. In order to do this Norwich and the surrounding areas covered by the transport model were split into 15 geographical sectors as shown in Figure 6.1 below.

6.2.2 Sectors 3, 4, 6, 8 and 11 are in the vicinity of the scheme and would naturally be expected to see significant beneficial impacts resulting from the scheme. In addition to these sectors that are close to the scheme, longer distance movements, would also have significant beneficial impacts on sectors 4, 991, 992, 994 and to a lesser extent sector 993.

- 6.2.3 Table 6.2 below shows the full breakdown of benefits by sector-to-sector movement. This confirms that trips from the key sectors identified above account for the vast proportion of benefits of the NDR scheme. Trips within these key areas account for about 85% of the benefits of the scheme. The other 15% (shaded in grey) is spread fairly evenly over the rest of the sector-sector movements.
- 6.2.4 The centre of Norwich city is subject to traffic management and control measures which are reflected in the totals of time benefits associated with movements from Sector 1.
- 6.2.5 There are no significant user benefits reported for movements that are well away from the scheme. This, together with the set of observations above, would appear to confirm that any impacts of model noise on reported user benefits is minimal and that the economic results presented are both robust and reliable.

Figure 6.1: Sectors for Analysis of Economic Benefits

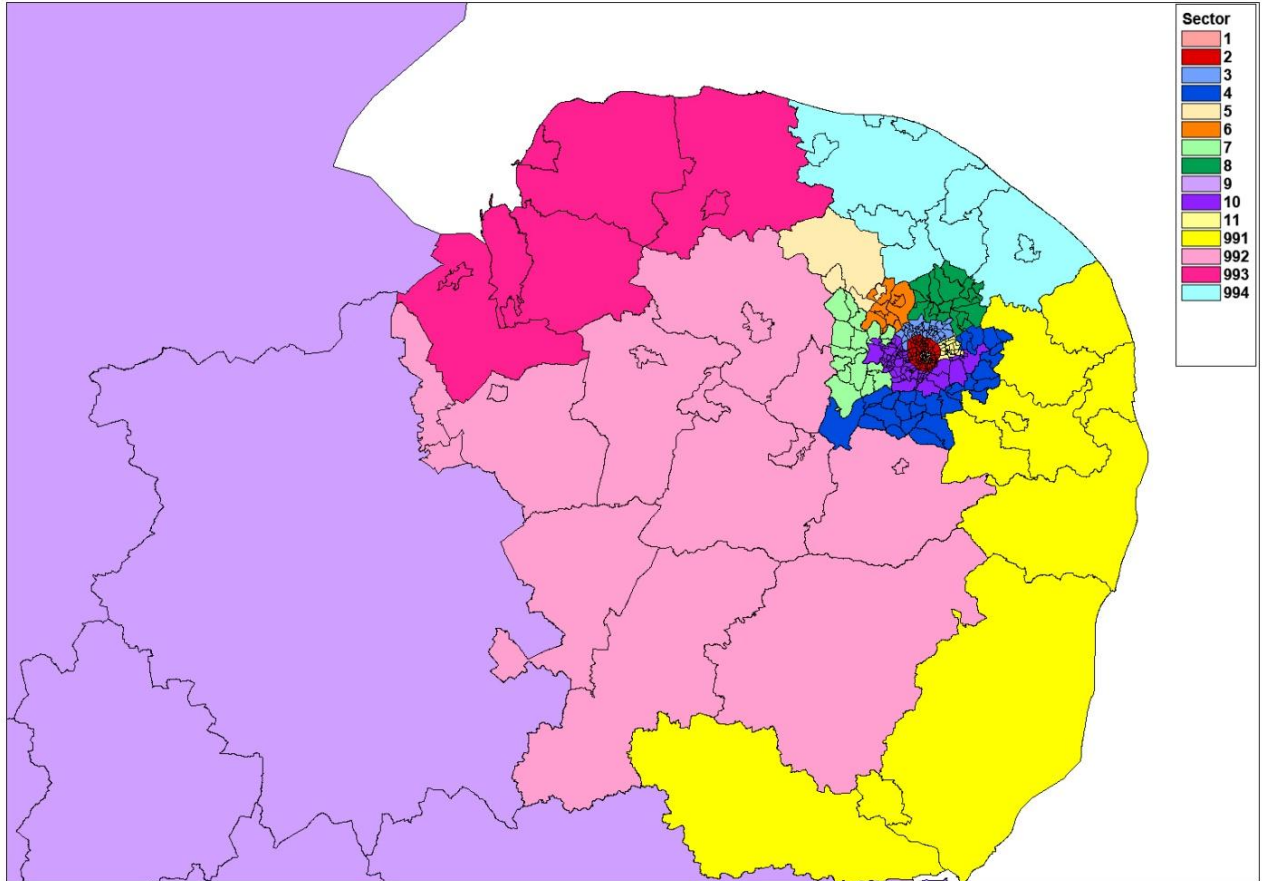


Table 6.2: Sector-to-sector Proportion (%) of Total Time Benefits

Origin Sector	Destination Sector															
	1	2	3	4	5	6	7	8	9	10	11	991	992	993	994	Grand Total
1	-1.0%	-1.3%	-1.1%	-0.4%	-0.1%	-0.1%	1.3%	0.3%	0.3%	0.3%	-0.8%	-1.4%	0.5%	0.0%	-0.2%	-3.6%
2	-1.0%	-0.7%	0.6%	-0.2%	0.1%	-0.1%	0.0%	1.0%	0.3%	0.4%	-0.4%	-0.8%	0.4%	0.4%	0.7%	0.7%
3	-0.5%	1.2%	1.1%	1.0%	0.4%	0.5%	1.1%	0.6%	1.2%	1.7%	0.6%	2.6%	2.6%	1.6%	-0.1%	15.4%
4	0.0%	0.0%	1.1%	0.1%	0.2%	0.9%	0.1%	0.9%	0.0%	0.2%	-0.3%	-0.2%	0.2%	0.2%	1.1%	4.4%
5	-0.1%	0.1%	0.4%	0.2%	0.0%	0.0%	0.0%	0.3%	0.0%	0.2%	0.5%	1.6%	0.0%	0.0%	0.1%	3.3%
6	-0.1%	0.1%	0.3%	1.0%	0.0%	0.0%	0.3%	0.7%	0.1%	0.8%	0.7%	5.5%	0.4%	0.1%	0.3%	10.1%
7	0.3%	0.1%	0.9%	0.2%	0.0%	0.2%	0.1%	1.0%	0.0%	0.1%	-0.5%	0.0%	0.1%	0.0%	0.9%	3.5%
8	0.3%	1.3%	1.3%	1.3%	0.3%	0.8%	1.2%	0.3%	0.5%	2.7%	1.1%	1.8%	2.2%	0.5%	0.2%	15.9%
9	0.7%	0.1%	0.9%	0.0%	0.0%	0.1%	0.0%	0.5%	0.0%	0.0%	-0.6%	0.0%	0.0%	0.0%	0.2%	1.8%
10	0.6%	0.4%	1.8%	0.2%	0.2%	0.7%	0.0%	2.5%	0.1%	0.2%	-0.5%	-0.3%	0.2%	0.4%	2.0%	8.5%
11	0.1%	0.4%	0.8%	-0.1%	0.6%	0.8%	0.2%	1.2%	0.1%	0.3%	0.1%	-0.4%	0.4%	0.4%	1.4%	6.4%
991	-0.5%	0.0%	2.6%	-0.1%	1.0%	3.7%	-0.1%	1.1%	-0.2%	-0.1%	-0.2%	-0.1%	-0.1%	0.7%	1.0%	8.7%
992	0.2%	0.4%	2.5%	0.3%	0.0%	0.3%	0.2%	1.8%	0.0%	0.4%	-0.6%	0.1%	0.0%	0.0%	1.7%	7.3%
993	0.1%	0.3%	1.5%	0.2%	0.0%	0.1%	0.0%	0.5%	0.0%	0.2%	0.5%	1.2%	0.0%	0.0%	0.3%	4.8%
994	-0.8%	0.4%	0.1%	1.8%	0.1%	0.3%	1.2%	0.3%	0.8%	2.3%	1.2%	2.7%	2.0%	0.2%	0.1%	12.6%
Grand Total	-1.7%	2.7%	14.9%	5.6%	2.7%	8.1%	5.7%	13.0%	3.3%	9.6%	0.7%	12.4%	9.0%	4.4%	9.6%	100.0%

6.3 User Benefits by WebTAG Time and Distance Bands

6.3.1 It is important to demonstrate that the concentrations of user benefits are of significant magnitude, that the savings are sensibly distributed over time and distance bands. In line with current WebTAG requirements we have examined time and distance bands within which user benefits fall.

Table 6.3: Net User Benefits by Time Saving Bands (£000)

Time saving bands	0-2mins	2-5mins	>5mins	Total
All user benefits (£000s)	215,113	241,028	363,398	819,539
Proportion of benefits	26%	29%	44%	100%

Notes: All monetary values are expressed in 2010 prices discounted to 2010

Table 6.4: Net User Benefits by Distance Bands (£000)

Distance Bands	Up to 5 kms	5 to 10 kms	10 to 15 kms	15 to 20 kms	20 to 50 kms	50 to 100 kms	>100 kms	Total
All user benefits	46,137	120,176	100,650	65,018	298,899	149,311	39,354	819,545
Proportion	6%	15%	12%	8%	36%	18%	5%	100%

Notes: All monetary values are expressed in 2010 prices discounted to 2010

6.3.2 73% of benefits are due to time savings of more than 2 minutes, and approximately 44% are longer than 5 minutes. The allocation of user benefits to distance bands, shows that longer trips into or around the city account for the majority of the scheme's generated benefits, reflecting its function of providing ease of access to the A47(T) trunk road, providing alternative route for cross city trips and providing benefit to other longer journeys into the city.

6.3.3 Table 6.2 to Table 6.4 confirm further that the economic benefits reported in the appraisal are robust and represent realistic impacts of the NDR scheme together with the city centre traffic management measures.

6.4 Reliability and Stability of the Economic Appraisal Results

6.4.1 WebTAG requires that the economic results are robust and stable based on stability ratios. The impact of transport model convergence noise should be shown to be minimal. In order to do this the demand/supply model convergence (%GAP) is compared against the proportion of user benefits relative to total costs in the appraisal as calculated in TUBA. A ratio of 10 between the two values is recommended in WebTAG.

6.4.2 Table 6.5 shows the total user benefits as a proportion of total do-minimum user costs by mode for the Norwich transport model.

Table 6.5: Total User Benefits as a Proportion of Total User Costs

Mode	2017	2032
Road	0.52%	0.56%
Bus	0.00%	0.00%

6.4.3 Table 6.6 shows the level of convergence of the demand and assignment models.

Table 6.6: Demand and Assignment Model Convergence (% GAP)

	2017		2032	
	Demand model (Target = 0.2%)	Assignment model (Target = 0.1%)	Demand model (Target = 0.2%)	Assignment model (Target= 0.1%)
Do Minimum	0.06	N/A	0.1	-
AM	-	0.036	-	0.0018
IP	-	0.0014	-	0.0014
PM	-	0.0043	-	0.003
OP	-	0	-	0
Do Something	0.1	-	0.08	-
AM	-	0.0037	-	0.0033
IP	-	0.0007	-	0.001
PM	-	0.0041	-	0.004
OP	-		-	0

6.4.4 Convergence (%GAP) statistics of the demand-supply model shown in Table 6.6 fall well below the acceptable value of 0.20% from WebTAG (values smaller than the target values means that the model is better converged). User benefits as a percentage of total costs are around 0.5% for both 2017 and 2032 for the Norwich transport model. The resultant stability ratios are close to 5 for 2017 (0.52/0.1) and close to 6 for 2032 (0.56/0.1). These stability ratios would suggest that the economic results are robust and do not suffer from convergence noise influences. Although these ratios are lower than the value of 10 recommended in WebTAG, taken together with our earlier observations regarding sector location of benefits and time and distance band concentration of benefits, it is clear that the economic benefits reported are robust and not subject to model noise in any significant way. The ratio of 10 is also very difficult to achieve with a large scale model, and thus it is very important that the model is well converged which has been successfully achieved for the NATS transport model.

6.5 Warnings in the TUBA Appraisal

- 6.5.1 Warnings that were produced by TUBA 1.9.1 during the appraisal were used to improve the network and transport model in general. This is described in Appendix C.
- 6.5.2 All warning messages are consistent with the impacts of the NDR scheme and other traffic control measures that have been introduced in other parts of the Norwich model.

7 Accident Benefits

7.1.1 Accident benefits were calculated using COBA software (Version 11 Release 15) which is consistent with the most up to date economic parameters in WebTAG 3.5.6. Accident benefits have been calculated for the whole of the modelled highway network.

7.2 Data Sources

7.2.1 Data was extracted from the NATS highway model for the model years of 2017 and 2032 for input into the COBA assessment. This data included network structure and forecast traffic flows. The SATURN program SATCOBA was used to convert the DM SATURN highway model data to the required COBA input data files. In the DS, network restructuring was applied to the network as defined for the DM to make sure the common links/nodes between DM and DS SATURN networks correspond with the same COBA links/nodes.

7.2.2 Two NDR COBA assessments were undertaken:

- Applying locally derived accident rates. Norfolk County Council provided accident data for the years between 2008 to 2012 inclusive covering the area of detailed modelling. The observed accidents were allocated to the nearest modelled links/junctions within 10 metres of the accident by GIS tool. This data was used by COBA to calculate observed link and junction accident rates. Outside the area of detail modelling, and for the NDR links, default COBA accident rates were applied.
- Applying COBA default accident rates to the whole of the modelled highway network. Observed data can only be applied to existing links and junctions. Any new links or junctions added in the Do Minimum or Do Something scheme must take on default rates derived from national data. A review of the accident data received from NCC reveals that 51% of all current links in the area of detailed modelling had no accidents recorded on them over the five-year period, and hence over the entire 60-year appraisal period will be assumed to be free of accidents. On this basis the relative propensity for accidents on NDR (default data) compared against the rest of the detailed modelled area (observed data) may be distorted. To counter this, an appraisal has been undertaken using COBA default accident rates to the whole of the modelled highway network in both the Do Minimum and Do Something. The

default accident rates are those presented in Section 2 of DMRB Volume 13, Section 2.

7.3 Traffic growth rates

- 7.3.1 COBA is most suitable for fixed demand modelling where the travel demand remains the same for the Do Minimum and Do Something scenarios. Therefore, a slightly different process was adopted to accommodate NDR variable demand model. This deals with, for example, the reflected 'different' traffic growth rates for Do Minimum and Do Something (with impact on vehicle-kilometres) between the assessment years of 2017 and 2032.
- 7.3.2 The COBA assessment had to be divided into two separate data files for the Do Minimum and Do Something. The compound annual growth in vehicle-kilometres between the two forecast years 2017 and 2032 is used as the traffic growth rates for the period between these years.
- 7.3.3 No further traffic growth is assumed post-2032. The Do Minimum annual traffic growth rate is 1.20% for light vehicle and 1.15% for HGV; and the Do Something annual traffic growth rate is 1.28% for light vehicle and 1.19% for HGV. As the HGV demand matrix is fixed for the Do Minimum and Do Something scenarios, the higher growth rate in Do Something indicates that the HGVs will travel further as a result of the scheme.

7.4 Network Structure and Link Flows

- 7.4.1 Link numbers are allocated to the SATURN A-B node references so that A-B and B-A has the same link number with Park and Ride links and zone connector links excluded from the assessment. Links are allocated link types and are given appropriate accident type in the normal way. In the assessment with local accident rates, observed accident rates are calculated from the accident numbers received which are applied to the existing links and junctions within the area of detailed modelling, and future year scheme links in Do Minimum and Do Something scenarios are applied with default accident rates.
- 7.4.2 Link traffic flows are coded in the data files as 2-way AADT flows for both assessment years of 2017 and 2032. The conversion from model period (AM, Inter-Peak, PM and Off-Peak) hourly October flows (which is the validation month of the transport model) to AADT uses suitable, calculated factors.
- 7.4.3 Links that are common to both the Do Minimum and Do Something scenarios are given the same link numbers so that link attributes and observed data can

be accurately transferred from the DM to DS data files. New links are given the unused link number available. Link attributes are allocated on a case by case basis for new links, the NDR scheme is given accident type 11 (modern dual two lane road with 1 metre Hard Strips) and link class 2 (rural all-purpose dual two lane carriageway).

7.5 Junction Assessment

- 7.5.1 In the assessment with local accident data, junctions and links are assessed separately. However, this assessment can only be performed on junctions where observed data is available. This means that at any new junctions that form part of the Do Minimum and Do Something schemes, accidents at junctions will not be taken into account.
- 7.5.2 Attributing default junction accident rates in these locations is not possible due to the manner in which junctions are represented in the SATURN model as a series of nodes. To overcome this, the default data in DMRB Volume 13 for *combined* link and junction accident rates was used for all new links in the Do Minimum and Do Something.
- 7.5.3 In the assessment with default accident data, the accident rates and cost attribute all accidents to links.

7.6 Results Summary

- 7.6.1 Table 7.1 summarises the results of the COBA accident assessment with local accident rates. This shows that the NDR scheme reduces the numbers of accidents in the Norwich area.
- 7.6.2 The reduction in accidents represents £41.2m of monetary benefits in 2010 prices and discounted to 2010.

Table 7.1: Accident Assessment with Local Accident Rates

		60 Year Appraisal Period
		Do Minimum
Number of Personal Injury Accidents		70,984
Casualties	Fatal	1,890
	Serious	12,597
	Slight	91,490
Accident Costs (£000's in 2010 prices discounted to 2010)		5,999,332
		Do Something
Number of Personal Injury Accidents		69,944
Casualties	Fatal	1,898
	Serious	12,488
	Slight	90,226
Accident Costs (£m in 2010 prices discounted to 2010)		5,958,113
		Accident Benefits
Number of Personal Injury Accidents savings		1,041
Casualties	Fatal	-7
	Serious	109
	Slight	1,263
Accident Savings (£000s in 2010 prices discounted to 2010)		41,219

7.6.3 Table 7.2 summarises the results of the COBA accident assessment with default COBA accident rates applied to the whole network. This shows that the NDR scheme reduces both the numbers of accidents in the Norwich area and the severity of those accidents.

7.6.4 The reduction in accidents represents £205.7m of monetary benefits in 2010 prices and discounted to 2010.

Table 7.2: Accident Assessment with COBA Default Accident Rates

		60 Year Appraisal Period
		Do Minimum
Number of Personal Injury Accidents		109,530
Casualties	Fatal	2,309
	Serious	17,300
	Slight	145,423
Accident Costs (£000's in 2010 prices discounted to 2010)		8,418,232
		Do Something
Number of Personal Injury Accidents		106,006
Casualties	Fatal	2,288
	Serious	16,866
	Slight	140,986
Accident Costs (£m in 2010 prices discounted to 2010)		8,212,557
		Accident Benefits
Number of Personal Injury Accidents savings		3,524
Casualties	Fatal	21
	Serious	434
	Slight	4,437
Accident Savings (£000s in 2010 prices discounted to 2010)		205,675

7.6.5 The different assessments yield quite different results in terms of:

- The level of benefit reported. When COBA default rates are used, the overall benefits are £205.7m and significantly greater than local rates case, which reports benefits of £41.2m.
- The impact on casualties. Whilst both assessments lead to an overall reduction in casualties, it can be seen that the application of local rates in the assessment leads to an increase of seven fatalities, whilst using default rates leads to a decrease of 21.

7.6.6 A limitation of the COBA approach when observed data is used is that all new links and junctions take on default accident rates and severity splits. A review of the accident data received from NCC reveals that 51% of all current links in the area of detailed modelling had no accidents recorded on them over the five-year period, and hence over the entire 60-year appraisal period will be assumed to be free of accidents. It is likely that assessment using locally observed data has under-estimated the level of benefit since the representation of accidents on NDR will be unrealistically high compared to the rest of the network.

- 7.6.7 When default rates are used throughout, the assumption is made that all links in the model will have accidents on them over the appraisal period, which might create a rather pessimistic view of the Do Minimum case (especially given the above comment on the number of links where zero accidents have been observed in-situ), and, hence, an over-estimation of the benefits that a new, high standard road can provide when traffic transfers to it.
- 7.6.8 As such, it is reasonable to consider the results presented above as either end of a range of possible outcomes. For the calculation of scheme benefits, the lower value of accident savings were taken forward as this represents a conservative estimate of the benefits. The appraisal also indicates that there will be fewer accidents and casualties overall as a result of the scheme.

8 Wider Economic Impacts

8.1.1 The NDR is forecast to generate wider economics benefits additional to journey time and accident savings reported in previous sections, and is also expected to generate significant job creation and labour movement benefits. The estimation of these wider economics benefits is the subject of DfT's WebTAG unit 3.5.14 'The Wider Impacts Sub-Objective'. This chapter summarises the wider impacts appraisal method adopted and the results that have been obtained for the NDR model.

8.1.2 The guidance sets out wider economic impacts that can be estimated and prescribes how they should be calculated. The wider economic benefits include:

- Agglomeration impacts. These are the impacts of a scheme on concentration of economic activity over an area or region and reflects the accessibility of firms and workers to each other. Transport improvements will lead to increased accessibility and thus a higher level of agglomerated activity and thus improved productivity for firms and workers.
- Increased or decreased output in imperfectly competitive markets. In most cases, markets are not 'perfectly competitive' and this can lead to lower production and higher prices than would exist in the case of a competitive market, normally to the detriment of consumers and the economy as a whole. A reduction in transport costs allows for an increase in production or output in the goods or service markets that use transport.
- Labour market impacts from more/less people working. Transport costs are likely to affect the overall costs and benefits to an individual from working. A change in transport costs is therefore likely to affect the incentives of individuals to work and hence the overall level of labour supplied in the economy.
- Labour market impacts from moves to more/less productive jobs. Transport can affect the incentives for firms and workers to locate and work in different locations which is likely to have implications for productivity, as workers are often more or less productive in different locations.

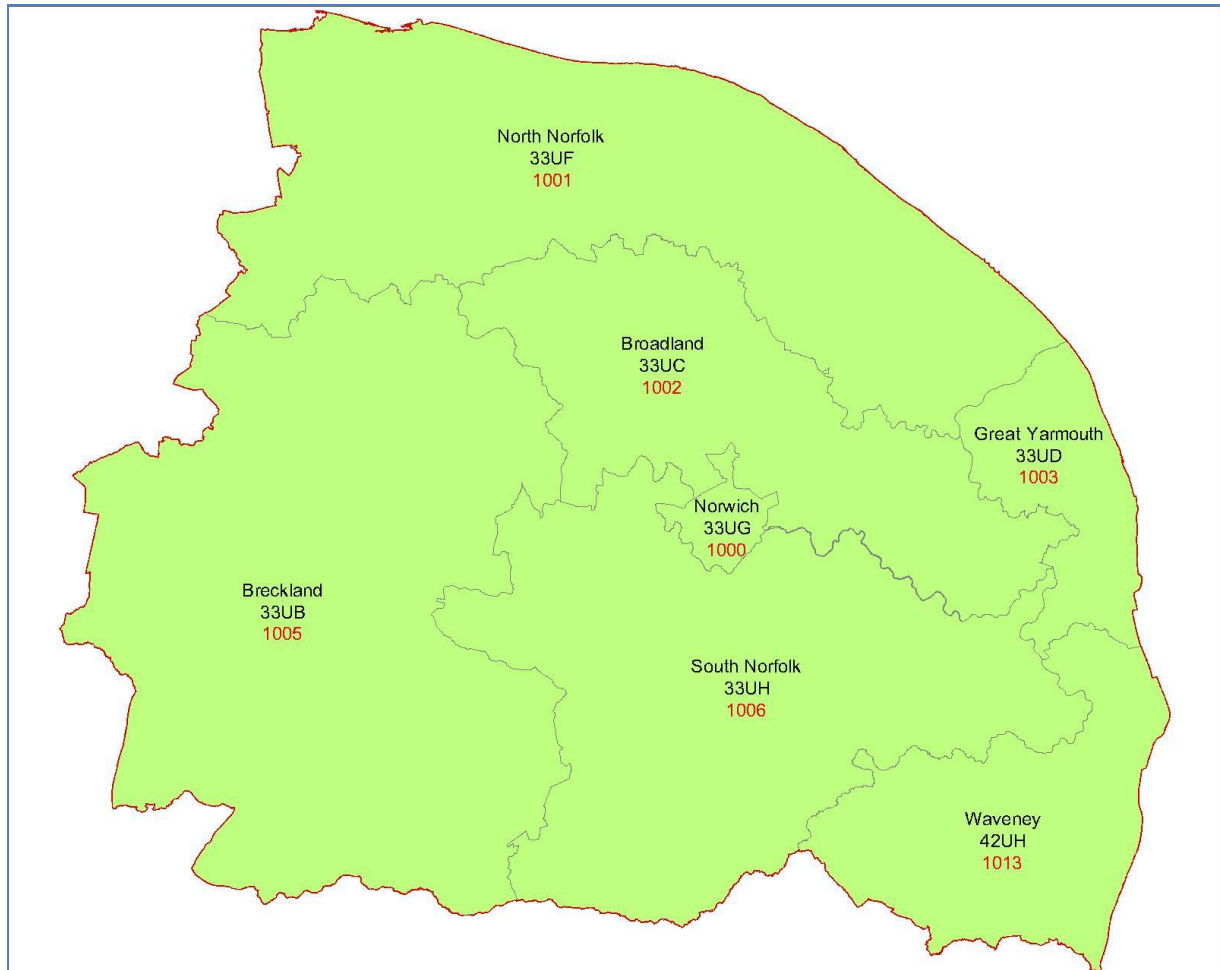
8.1.3 WebTAG methodology seeks to capture only that part of the above impacts that is not already included in the conventional user benefit calculations for

transport schemes as presented in the main economic appraisal report. The formulae and detailed description of the processes can be found in WebTAG 3.5.14.

8.2 Approach Adopted for NDR Wider Impacts Appraisal

- 8.2.1 Figure 8.1 below shows how the Norwich area was sectored for wider benefits appraisal using Wider Impacts in Transport Appraisal (WITAv1.1i-4 Be) software. The local authority districts in the figure correspond to the area from which wider economic benefits were extracted. All local authority zones more distant from the detailed model area are excluded from wider impact benefit appraisal.
- 8.2.2 Economics and employment data for each WITA analysis zone come from the DfT local authority district economics and employment files (data set v2.4, July 2012). Economic data includes GDP per worker by four employment sectors (manufacturing, construction, consumer services and producer services), average wage per worker and index of labour productivity. Employment data contains employment data for four employment sectors described above and for two forecast years 2017 and 2032. The generalised cost of travel between WITA zones comes from transport model data extracted from the main economic appraisal (i.e. TUBA files) – a combination of time, distance and charges (DM and DS scenarios and for the two forecast years 2017 and 2032). Other inputs include the TUBA economics file, several zone correspondence files, global data and a commuting production-attraction data file. More information on WITA can be found in Wider Impacts in Transport Appraisal, User Manual for Version 1.1 beta (Mott MacDonald, 2009).

Figure 8.1: Wider Impacts Analysis Zones and Local Authority Areas



8.3 Wider Economic Benefits Results

8.3.1 Summarised below are wider economic benefits calculated using the DfT's WITA software (version 1.1). Table 8.1 shows that agglomeration benefits make up the bulk of the £187m total wider benefit impacts.

8.3.2 Increased output in imperfect competitive markets is calculated as a proportion of the total business user benefits of the main economic appraisal.

Table 8.1: Summary Wider Economic Benefits of NDR

	Year 2017 (£)	Year 2032 (£)	Full Appraisal Period (£)
Agglomeration – manufacturing	376,864	218,217	12,099,287
Agglomeration – construction	308,611	190,741	10,433,028
Agglomeration - consumer services	946,115	724,016	38,054,835
Agglomeration - producer services	2,413,810	1,577,908	85,351,823
Agglomeration – Total	4,045,400	2,710,882	145,938,973
Labour supply impact	44,195	71,134	2,634,209
Increased output in imperfectly competitive market			38,775,300
The move to more/less productive jobs			Not assessed
Total	4,089,595	2,782,016	187,348,482

Notes: All entries are in £ in 2010 prices discounted to 2010

8.3.3 The estimated benefits of £187m for wider economic impacts feed into the overall VfM consideration.

9 Journey Time Reliability Benefits

- 9.1.1 This Section provides an estimate of journey time reliability benefits for the NDR. 'Reliable journeys' is one of the sub-objectives within the 'Economy' section of scheme appraisal; and the estimate provided in this Section is aimed at addressing this sub-objective for the NDR scheme. The term 'reliability' is often used interchangeably with 'travel time variability' or 'journey time variability'. The definition of journey time variability is provided in WebTAG Unit 3.5.7 - it represents unpredictable variations in journey times, i.e. it excludes predictable variations such as those associated with different times of day, days of the week, or times of the year.
- 9.1.2 WebTAG 3.5.7 recommends the use of the standard deviation (SD) of travel time as the measure of reliability. The standard deviation is a measure of how travel times are distributed around the average, with increasing standard deviation associated with increasing variability. In the appraisal, a monetary value is applied to the standard deviation of travel time. Reliability ratios are used to relate the value of one minute of standard deviation to one minute of average travel time (where the latter is defined by the values of time given in WebTAG Unit 3.5.6 Values of Time and Operating Costs).

9.2 Assumptions

- 9.2.1 WebTAG 3.5.7 methodologies that are used for estimating variability benefits are dependent on the dominating road types in the area where a particular scheme lies. The NDR scheme lies in an area dominated by the city of Norwich which the scheme is designed to positively impact upon. On that basis, the urban road variability methodology described in WebTAG 3.5.7 (section 3.3) is the most appropriate for calculating reliability benefits for the NDR scheme.
- 9.2.2 The NDR reliability assessment uses trip, time and distance matrices originally extracted from the Norwich transport model for purposes of economic appraisal. Time and distance matrices are trip-weighted average matrices across used routes, and do not always represent one selected route. As the methodology for urban variability appraisal assumes no or small distance changes between each OD-pair as a result of the scheme, an average of the Do Minimum and Do Something journey distances have been used in the calculations here.

- 9.2.3 A reliability ratio of 0.8 has been used for cars as recommended in WebTAG 3.5.7, meaning that one minute of standard deviation has the same value as 0.8 minutes of average travel time. A reliability ratio of 1.2 has been used for OGVs and LGVs in the reliability calculations.
- 9.2.4 In line with appraisal tools and published DfT guidance, the reliability benefits for the NDR have been calculated for a period of 60 years, discounted to 2010 and reported in 2010 values.
- 9.2.5 Highway reliability is estimated for the AM, PM and IP time periods only, because OP journey times are usually close to free-flow journey times and there is no significant impact on reliability. Sector to sector journey time reliability results were extracted and those movements within Norwich or benefit from going through Norwich are included in the benefit calculations. This is because urban journey time reliability calculations are applicable for urban areas where free flow speed is less than 30mph.

9.3 Method Adopted for Calculation of Reliability Benefits

- 9.3.1 Because of the size of input matrix files involved in the NDR, a simple software tool has been developed to calculate journey time reliability benefits which, in principle, may be used for assessments of any scheme dominated by urban roads. The NDR reliability benefits are calculated for each OD-movement, time period, user class and model year.
- 9.3.2 The core of the calculations use trip matrices, time matrices, distance matrices, VOTs by purpose, reliability ratios and discount rates as the inputs. The calculations proceed as follows:
- 9.3.3 For each of the OD-pair, 2 modelled years, 3 time periods and 7 appraisal user classes in the NDR traffic model, the program
- Calculates changes in standard deviation between Do Minimum and Do Something using the urban road variability equation given in WebTAG 3.5.7 (Paragraph 3.3.2);
 - Calculates variability benefits by applying VOTs (2010 values by purpose), reliability ratios (by vehicle type) and trips as discussed in WebTAG 3.5.7. The results are at 2010 level and 2010 prices.
 - Generates values for each year in the appraisal period by applying interpolation between the two modelled years, and extrapolation beyond the

last modelled year and also applying VOT growth. These values are in corresponding future year level and 2010 prices.

- Discount all values to 2010 prices and annualise to obtain yearly benefits for each year in the model period and for each OD-pair, time period and user class.
- Aggregate values to produce overall variability benefits for a 60 year period and prepare sectorised benefits.

9.3.4 The NDR reliability benefits are annualised using the same annualisation factors that have been applied in the economic appraisal and reported in 2010 prices discounted to 2010.

9.4 Journey Time Reliability Benefits

9.4.1 WebTAG 3.5.7 indicates that reliability benefits should not be included in estimating the Net Present Value (NPV) and the Benefit to Cost Ratio (BCR) because the methodology is still subject to further research. However, reliability benefits may be taken into account in the assessment of the overall value for money.

9.4.2 Table 9.1 below shows reliability benefits of around £28m (in 2010 prices discounted to 2010) for the 60 year appraisal period . This is equivalent to around 4% of the time benefits generated by the scheme.

Table 9.1: NDR Reliability Benefits

Model Year	Reliability Benefits (£000s)
Full (60yrs) Appraisal	28,398

Notes: Benefits are in 2010 prices and discounted to 2010

9.4.3 Table 9.2 shows the distribution of these benefits over the whole traffic model area. This shows that, although the journey time reliability benefits are concentrated on cross city movements, overall, all areas covered by the transport model do experience some journey time reliability improvements from the NDR scheme.

Table 9.2: Proportion of Sector to Sector Journey Time Reliability Benefits

Origin Sector	Destination Sector															
	1	2	3	4	5	6	7	8	9	10	11	991	992	993	994	Total
1	-0.8%	-7.0%	-2.8%	-1.3%	-0.1%	-0.4%	0.3%	-0.3%	0.0%	-1.6%	-2.6%	-1.4%	0.2%	0.0%	-0.3%	-18.1%
2	-3.3%	-4.3%	2.3%	-0.2%	0.2%	0.1%	0.7%	1.7%	0.1%	2.2%	-1.1%	-0.7%	0.5%	0.3%	0.6%	-1.0%
3	-1.2%	5.1%	4.8%	1.6%	0.7%	0.8%	1.9%	1.2%	0.4%	4.8%	1.9%	2.0%	2.3%	1.0%	-0.2%	27.2%
4	-0.4%	0.2%	1.8%	0.1%	0.1%	1.2%	0.1%	0.8%	0.0%	0.2%	-0.2%	-0.2%	0.1%	0.1%	0.8%	4.9%
5	-0.1%	0.2%	0.6%	0.2%	0.0%	0.0%	0.0%	0.3%	0.0%	0.2%	0.6%	0.9%	0.0%	0.0%	0.0%	2.9%
6	-0.3%	0.7%	0.8%	1.2%	0.0%	0.1%	0.5%	1.1%	0.0%	1.5%	1.1%	3.3%	0.3%	0.0%	0.2%	10.6%
7	-0.3%	0.4%	1.5%	0.1%	0.0%	0.3%	0.2%	1.4%	0.0%	0.2%	-0.3%	0.0%	0.1%	0.0%	0.6%	4.3%
8	0.3%	3.1%	3.0%	1.5%	0.3%	1.2%	1.4%	0.5%	0.1%	4.2%	1.7%	1.3%	1.8%	0.3%	0.2%	21.0%
9	0.2%	0.1%	0.3%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	-0.2%	0.0%	0.0%	0.0%	0.2%	0.9%
10	-0.5%	0.7%	4.2%	0.2%	0.1%	1.2%	0.0%	3.5%	0.0%	1.1%	-0.3%	-0.3%	0.2%	0.2%	1.6%	12.0%
11	-0.3%	1.6%	2.7%	0.1%	0.7%	1.5%	0.3%	1.6%	0.0%	1.0%	0.6%	-0.2%	0.4%	0.3%	1.2%	11.6%
991	-0.3%	0.1%	2.2%	-0.2%	0.5%	2.2%	0.0%	0.8%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	0.4%	0.7%	5.9%
992	0.1%	0.4%	2.4%	0.2%	0.0%	0.2%	0.2%	1.5%	0.0%	0.5%	-0.2%	0.1%	0.0%	0.0%	1.1%	6.5%
993	0.1%	0.3%	0.9%	0.1%	0.0%	0.0%	0.0%	0.4%	0.0%	0.1%	0.3%	0.7%	0.0%	0.0%	0.2%	3.1%
994	-1.1%	0.5%	0.0%	1.4%	0.0%	0.2%	0.8%	0.3%	0.4%	1.8%	1.0%	1.6%	1.3%	0.1%	0.1%	8.4%
Total	-7.9%	2.1%	24.8%	5.1%	2.5%	8.7%	6.4%	14.7%	1.1%	16.2%	2.4%	7.0%	7.1%	2.8%	6.9%	100.0%

10 Conclusion

10.1.1 An economic appraisal for the proposed NDR with proposed complementary measures has been undertaken. The NATS transport model provides the required transport inputs for the appraisal. The variable demand model (VDM) forecasts, which make allowance for traffic generation, redistribution and mode choice effects arising from introduction of the scheme, have been prepared for the NDR proposed opening year of 2017 and the design year of 2032.

10.1.2 The costs of the proposed NDR (including preparation, operation, maintenance, land and construction costs) are shared between local authority and central government. The economic appraisal complies with guidance in WebTAG. It has been assumed in the appraisal that the benefits of the scheme do not change for each year beyond 2032 although traffic will continue to grow which suggests that the PVB and the NPV presented in the table below will be conservative.

10.1.3 Table 10.1 shows a summary of the economic appraisal results:

Table 10.1: Summary of Economic Appraisal (£000's)

	Scenario including Accidents	Scenario also including WEBS and JTR
Present Value of Benefits (PVB)	773,317	989,063
Present Value of Costs (PVC)	185,542	185,542
Net Present Value (NPV)	587,775	803,521
Benefit to Cost Ratio (BCR)	4.168	5.331

Notes: All monetary values expressed in 2010 prices discounted to 2010

10.1.4 The BCR of 4.17 represents Very High value for money under the DfT's VfM criteria. The PVB includes accident benefits but does not include wider economic benefits or journey time reliability benefits. When these are included the BCR increases to 5.33.

10.1.5 It has been demonstrated in this report that the economic benefits calculated are robust and reliable. This has been done by:

- Demonstrating high stability ratios
- Providing sector-to-sector benefits that look realistic, logical and convincing

- Showing plausible breakdown of user benefits by WebTAG time and distance bands
- Providing a sensible breakdown of benefits by time period.

11 Appendices

11.1 Appendix A – Annualisation Factors

11.1.1 Different annualisation factors have been used in the economic appraisal for different time periods. These annualisation factors have been calculated based on one year counts for a selected number of sites in the Norwich area. Days and time periods that are not specifically part of the transport model (e.g. weekends and bank holidays) have been 'fitted' into the modelled time periods as described later in this section.

11.1.2 **Selection of Count Sites:** The following two-way Automatic Traffic Count (ATC) sites were selected from within the urban area of Norwich for the purpose of producing annualisation factors.

- Site 318 – A1151 Rackheath
- Site 337 – A1074 Dereham Road
- Site 345 – B1332 Poringland
- Site 352 – A1074 Dereham Road
- Site 361 – A140 Sweet Briar Road
- Site 363 – A140 Ipswich Road
- Site 367 – Reepham Road
- Site 386 – B1150 Crostwick
- Site 412 – A1067 Attlebridge
- Site 413 – A147 Koblenz Avenue
- Site 419 – C283 Salhouse Road
- Site 426 – B1113 Keswick

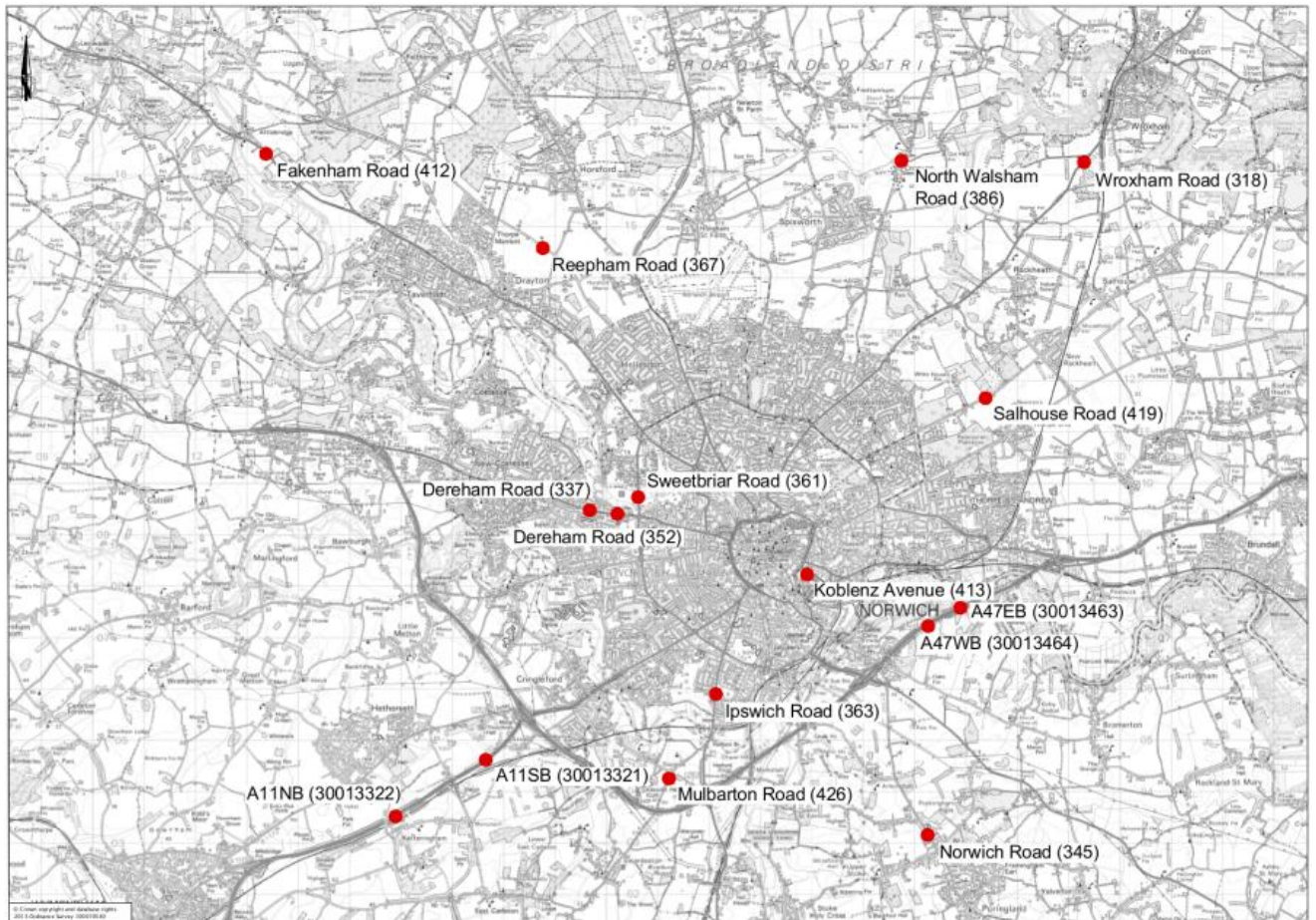
11.1.3 In addition to above ATC sites, the following TRADS sites were also used in deriving annualisation factors.

- Site 30013463 – A47(T) eastbound between A146 and A1042

- Site 30013464 – A47(T) westbound between A146 and A1042
- Site 30013321 – A11 southbound between A47(T) and B1135
- Site 30013322 – A11 northbound between A47(T) and B1135

11.1.4 Figure 11.1 shows the location of ATC and TRADS sites.

Figure 11.1: Map showing Count Sites Used for Production of Annualisation Factors

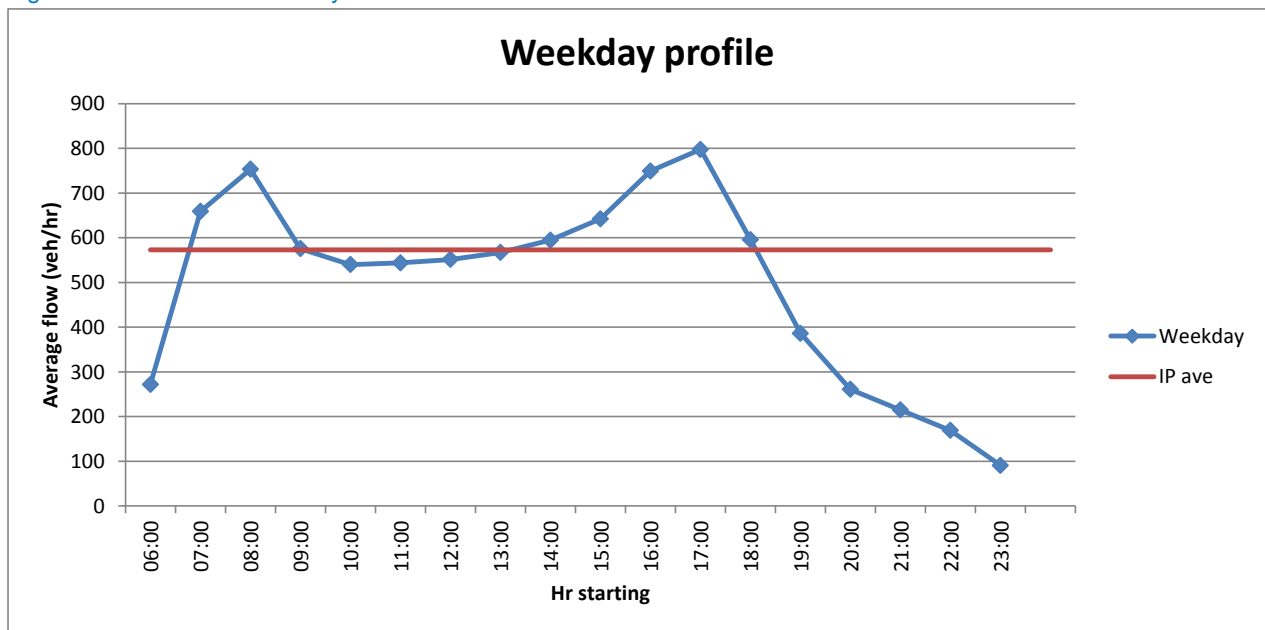


11.1.5 **Calculation of Average Flows - For Each Site:** Each of the selected sites contains almost an entire full year of 2012 hourly traffic flow data. As is commonly the case with traffic data from ATCs/TRADS, there were small amounts of missing data. For each site, any day that has any missing data has been excluded entirely from the analysis. The following data was calculated for each site:

- October average traffic flows were found for each hour of the day for weekdays, Saturdays and Sundays.
- Whole year 2012 average flows were found for each hour of the day for weekdays, Saturdays, Sundays and Bank Holidays.

11.1.6 Calculation of Average Flows - For all Sites Combined: To form overall average flows for all the sites combined, a straight average traffic flow was taken for every hour in the day for the 2012 October and 2012 whole year datasets. For sites with counts in two directions, each direction has effectively been treated as an individual site for the averaging process. Figure 11.2 shows the average October weekday profile calculated from the count sites and also displays the inter-peak average flow.

Figure 11.2: October Weekday Profile for Count Sites



11.1.7 Designation of Weekday Hours: The data suggests that following can be applied in the derivation of weekday annualisation factors:

- AM period (0800-0900) benefits have been derived from the AM peak hour model (0800-0900)
- PM period (1600-1800) benefits have been derived from the PM peak hour model (1700-1800)

- Inter Peak period (0700-0800, 0900-1600, 1800-1900) benefits have been derived from the inter peak model (average hour 1000-1600)
- Off Peak period benefits have been derived from the off peak model (average hour 1900-0700)

11.1.8 Designation of Saturday, Sunday and Bank Holiday Hours as Inter-peak or Off-peak: As there is no weekend assignment model, it was necessary to designate weekend hours as either weekend inter-peak or weekend off-peak in order to produce a full annualisation. 2012 October weekday average flows for the inter-peak average hour and the off-peak average hour were calculated and compared with October average Saturday and Sunday hourly traffic flows, see Figure 11.3 below. It was found that the October inter-peak average hour was 573vehicles/hour and the October off-peak average hour was 137vehicles/hour. The designation of Saturday and Sunday hours as inter-peak or as off-peak is shown in Table 11.1. Saturday and Sunday 19:00-07:00 hours are designated as off-peak. All Bank Holiday hourly flows were designated as weekend off-peak.

Figure 11.3: October Saturday and Sunday Profile for Count Sites

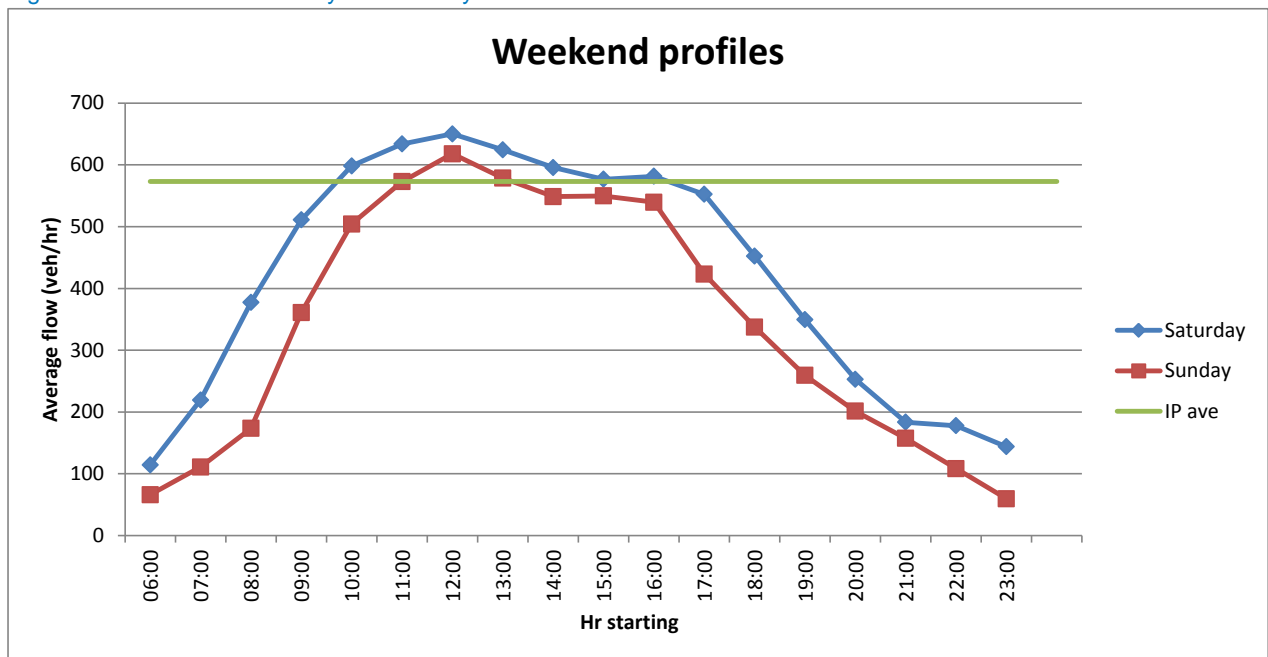


Table 11.1: Designation of Saturday and Sunday 07:00 - 19:00 Hours

Hour	07:00	08:00	09:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00
Flow - Sat	219	377	511	598	634	650	624	596	577	582	552	452
Flow - Sun	111	173	360	504	573	618	579	549	550	540	423	337
Designation - Sat	OP	OP	OP	IP	IP	IP	IP	IP	IP	IP	IP	OP
Designation - Sun	OP	OP	OP	OP	IP	IP	IP	IP	IP	OP	OP	OP

Notes: IP – interpeak, OP – off peak

11.1.9 Calculation of Annualisation Factors: The annualisation factors were calculated by dividing the total flow in 2012 by the average October 2012 hourly flow for each time period. The annualisation factors are shown below in Table 11.2.

Table 11.2: Annualisation Factors

Time Period	Annualisation
AM	246
IP	2,298
PM	481
OP	3,056
Weekend IP	693
Weekend OP	2,974

11.1.10 Journey Purpose Splits for Weekend Time Periods: The composition of non-freight car/ personal LGV was adjusted for the weekend inter-peak and off-peak time periods so that each journey purpose represented the following proportion of total non-freight demand:

- Commute: 8.5%
- Employers Business: 3.2%
- Other 88.3%

11.1.11 In a similar way the weekend inter-peak and off-peak demand was adjusted for public transport so that each purpose represented the following proportion of total public transport demand: The journey purpose proportions were obtained from WebTAG 3.5.6 Table 7: Proportion of Trips Made in Work and Non-Work Time.

- Commute: 6.4%
- Employers Business: 1.5%
- Other 92.1%

11.1.12 Weekend Adjustment for Freight: Annualisation factors derived from total ATC/TRADS traffic flows, as described above, do not provide an accurate representation of freight demand, particularly due to differences between traffic composition in weekend hours and during weekday inter-peak and off-peak average hours. The 2012 ATC/TRADS used to derive annualisation factors were not classified. Classified data was available for the ATC sites for 2012 October. Using the classified traffic data, freight weekend demand adjustment factors were calculated by comparing the proportion of traffic that is freight during the average weekday inter-peak and off-peak with the designated inter-peak and off-peak weekend periods. Table 11.3 shows the calculated freight weekend demand adjustment factors. The freight demand adjustment factors are affected through the matrix factoring process in the TUBA setup.

Table 11.3: Freight Weekend Demand Adjustment Factors

Time Period	LGV	OGV
Weekend IP	0.42	0.23
Weekend OP	1.05	0.73

11.1.13 Factors to Disaggregate Light Vehicles to Car and LGV Personnel: For assignment purposes car and LGV personnel are included into a single user class for commuting and other purposes. However for the purpose of economics it was necessary to disaggregate these so that appropriate economic parameters can be applied. This was done using purpose proportions given in WebTAG 3.5.6, COBA Volume 13 Section 1 (Table 1/1) and NTM road traffic forecasts for east of England for base year of 2012. These proportions are given below in Table 11.4. Same factors were used for home based and non-home based other purposes.

Table 11.4: Car and LGV Personnel Proportions for Different Time Periods

Purpose	Vehicle type	Proportion			
		AM	IP	PM	OP
Commuting	Car	0.9901	0.9611	0.9888	0.9874
	LGV personnel	0.0099	0.0389	0.0112	0.0126
Other	Car	0.9556	0.9763	0.9652	0.9687
	LGV personnel	0.0444	0.0237	0.0348	0.0313

11.2 Appendix B – TUBA Setup

11.2.1 Demand: The DIADEM variable demand model provides TUBA with input demand matrices for highway and public transport modes. Highway demand is provided as Passenger Car Units (PCUs) and the public transport demand

is provided as passengers. Table 11.5 and Table 11.6 show the input demand segmentation.

Table 11.5: Highway Demand Segmentation

User Class	Vehicle Type	Purpose
1	Car/LGV	Home Based Commute
2	Car	Home Based Employers Business
3	Car/LGV	Home Based Other
4	Car/LGV	Non-Home Based Other
5	Car	Non-Home Based Employers Business
6	LGV	Employers Business
7	OGV	Employers Business

Table 11.6: Public Transport Demand Segmentation

User Class	Purpose
1	Home Based Commute
2	Home Based Employers Business
3	Home Based Other
4	Non-Home Based Other
5	Non-Home Based Employers Business

11.2.2 **Skims:** The DIADEM demand model, in combination with the highway and public transport assignment models produces skims of time, distance and cost as shown in Table 11.7 and Table 11.8 below.

Table 11.7: Summary of Highway Skims

Highway Skim	Assignment Unit	TUBA Unit
Vehicle Trips	PCUs/Hour	Vehicles/Hour
Distance	Metres	Kilometres
Time	Seconds	Hours
Car Parking (Local Authority)	Pence	Pence
Car Parking (Private)	Pence	Pence

Table 11.8: Summary of Public Transport Skims

Highway Skim	Assignment Unit	TUBA Unit
Passenger Trips	Passengers/Hour	Passengers/Hour
Time	Seconds	Hours
Fare	Pounds	Pence

11.2.3 **Adjustment to Economics File for Purpose:** The latest TUBA 1.9.1 standard economics file, based on October 2012 WebTAG 3.5.6 values, was used with an adaptation for purposes. Purposes were adjusted to enable separate TUBA analysis for each assignment user class. Table 11.9 shows the new purpose table in the economics file. All of the tables have been

adjusted to include the new purposes shown in the table. The adjustment to the purpose definitions necessitated further changes to the following tables: The changes to the tables listed above, involved only the reformatting of the tables and no adjustment to the default Business, Commute and Other values was made.

- Value of Time
- Value of Time Growth
- Default Person Factors
- Default Person Factors Change

Table 11.9: Revised Purposes

Purpose No.	Purpose Type	Purpose Description
1	B	HB-EB
2	C	HB-Commute
3	O	HB-Other
4	B	NHB-Business
5	O	NHB-Other

11.2.4 Current, Modelled and Appraisal Years: TUBA requires a minimum of two years to be modelled and interpolates/extrapolates benefits for other years over the 60 year appraisal period. For each modelled year, demand and skim matrices for do-minimum and do-something scenarios were input to TUBA. The following years have been included in the scheme file:

- Current Year – 2013
- Modelled Years – 2017, 2032
- Appraisal Period – 2017 – 2076 (60 years)

11.2.5 User Classes: In order to split each TUBA Purpose as defined in the economics file into each possible TUBA Vehicle Type, the following user class structure, as shown in Table 11.10 was devised.

Table 11.10: TUBA User Classes

TUBA User Class	TUBA Vehicle Type	TUBA Purpose	TUBA Person Type
1	Car (1)	Home Based Commute (2)	All* (0)
2	LGV (personal) (2)	Home Based Commute (2)	All* (0)
3	Car (1)	Home Based Employers Business (1)	All* (0)
4	Car (1)	Home Based Other (3)	All* (0)
5	LGV (personal) (2)	Home Based Other (3)	All* (0)
6	Car (1)	Non-Home Based Employers Business (4)	All* (0)
7	Car (1)	Non-Home Based Other (5)	All* (0)
8	LGV (personal) (2)	Non-Home Based Other (5)	All* (0)
9	LGV (freight) (3)	Non-Home Based Employers Business (4)	All* (0)
10	OGV1 (4)	Non-Home Based Employers Business (4)	All* (0)
11	OGV2 (5)	Non-Home Based Employers Business (4)	All* (0)
12	Public Transport (6)	Home Based Commute (2)	Passenger (2)
13	Public Transport (6)	Home Based Employers Business (1)	Passenger (2)
14	Public Transport (6)	Home Based Other (3)	Passenger (2)
15	Public Transport (6)	Non-Home Based Employers Business (4)	Passenger (2)
16	Public Transport (6)	Non-Home Based Other (5)	Passenger (2)

Notes: *All TUBA person type split by TUBA into drivers and passengers using default proportions from the economics file

11.2.6 Demand Factors: The combined car/ personal LGV user classes as supplied by the DIADEM demand model were split into the separated car and personal LGV user class as used in TUBA using factors derived in Appendix A. The following factors, shown in Table 11.11, were used to convert the OGV (all) user class in PCUs supplied by the DIADEM demand model to the OGV1 and OGV2 user classes in vehicles as used by TUBA.

Table 11.11: Vehicular Conversion of OGV User Class

Factor	OGV1	OGV2
PCU to vehicle factor	0.448	0.448
OGV1/ OGV2 Split	53%	47%
OGV (all) PCU to Vehicle Factor	0.237	0.211

Notes: OGV1 and OGV2 splits are from NTM 2013 data set for an average year between 2017 & 2032

11.2.7 Skim Factors: Table 11.12 and Table 11.13 show the unit conversion factors used in TUBA.

Table 11.12: Unit Conversion of Highway Skims

Highway Skim	Assignment Unit	TUBA Unit	Unit Conversion Factor
Distance	Metres	Km	0.001
Time	Seconds	Hours	0.00028
Car Parking (Local Authority)*	Pence	Pence	1
Car Parking (Private)*	Pence	Pence	1

Notes: *Charges are in base price values

Table 11.13: Unit Conversion of Public Transport Skims

Highway Skim	Assignment Unit	TUBA Unit	Unit Conversion Factor
Time	Seconds	Hours	0.00028
Fare*	Pounds	Pence	100

Notes: *Fares are in base price values

11.2.8 Split Public/ Private Parking Charges: Parking charges have been split as 80% private sector, 20% public sector. Parking charges are in price base year (2010) values.

11.2.9 Sectorisation of User Benefits: A sector file was referenced in the scheme file in order to facilitate detailed analysis of the TUBA outputs at 15-sector level shown in Figure 6.1. The sector system has been used to confirm that user benefits accrue in areas of the network that are impacted by the NDR scheme.

11.3 Appendix C – TUBA and COBA Warnings

11.3.1 Summary of TUBA Warnings: Table 11.14 below provides a summary of the warnings produced by TUBA.

Table 11.14: Summary of TUBA Warnings

Warning Type	Number of warnings (Serious Warnings)
Ratio of DM to DS Journey Time too Low	58062 (3070)
Ratio of DM to DS Journey Time too High	124609 (1095)
Ratio of DM to DS Distance too Low	208541 (8876)
Ratio of DM to DS Distance too High	49205 (49205)
DM Speed too Low	190728
DS Speed too Low	194705

11.3.2 Investigation of Serious TUBA Warnings

- *Ratio of DM to DS Journey Time too Low:* These warnings occur where there is a significant rise in journey time from Do Minimum to Do Something scenarios. The majority of the serious warnings relate to travel involving a trip

end in Sector 1, which are as expected due to the city centre traffic management measures which discourage traffic movement in the city centre.

- *Ratio of DM to DS Journey Time too High:* These warnings occur where there is a significant decrease in journey time from Do Minimum to Do Something scenarios. A large proportion of these serious warnings have a trip end in sectors 10, 4, 8 and 6 which are at either end of the proposed highway scheme and therefore significant decreases in journey time would be expected for these movements. The majority of other serious warnings are for trips having both trip ends in Sector 1. It is considered that these warnings occur because of local reassignment issues concerning the city centre measures in Sector 1.
- *Ratio of DM to DS Distance too Low:* These warnings occur where there is a significant rise in trip distance from Do Minimum to Do Something scenarios. The majority of the serious warnings have a trip end in Sector 1 and it is considered that these warnings are caused by local reassignment issues concerning the city centre measures in Sector 1. Also in the modelling of Park and Ride, for the bus leg of the journey the bus journey time is included in the time skims but there is no distance included in the distance skims.
- *Ratio of DM to DS Distance too High:* These warnings occur where there is a significant decrease in journey distance from Do Minimum to Do Something scenarios. All of the serious warnings have a trip end in Sector 1 and it is considered that these warnings are caused by local assignment issues associated with the city centre improvements. Also in the modelling of Park and Ride, for the bus leg of the journey the bus journey time is included in the time skims but there is no distance included in the distance skims.
- *DM Speed too Low & DS Speed too Low:* These warnings occur where speeds are low. The vast majority of these warnings have a trip end in Sector 1. Investigation of these warnings has found that they relate to travel on Park and Ride and are acceptable. In the modelling of Park and Ride, for the bus leg of the journey the bus journey time is included in the time skims but there is no distance included in the distance skims.

11.3.3 **COBA Warning Messages:** The COBA results file contained instances of the following warning messages. An explanation of the warning is given in the sub-bullet point.

- *Additional header or delimiter (9999) lines have been inserted by the program:* Additional header information is inserted by the COBA program to ensure the successful running of the model
- *Some link lengths were greater than 10 km (classes 1-6 and 9-12) or 3 km (classes 7-8):* These long links relate to the external links at the periphery of the model.
- *Link overcapacity was detected:* Refers to a level of link flow that is beyond COBA defaults for a given link type. These have been checked and are acceptable.
- *There was link or node overcapacity in the do-minimum/do-something scheme:* As above.
- *Respecifications or reclassifications caused overcapacity junctions or roads to become undercapacity:* These have been checked and are acceptable. Explicit link flows are given for each forecast years, 2017 and 2032, rather than applying forecast growth rates.
- *Entry link flows have been changed:* As above.
- *Accident rates were given which exceeded the warning limit:* This warning message only appear when an assessment is carried out with local accident data. Accident rates for some links in the period 2008 – 2012 exceed COBA defaults for a given link type. These have been checked and are acceptable.

12 Abbreviations

AADT	Annual Average Daily Traffic
ARCADY	Assessment of Roundabout Capacity and Delay software
AST	Appraisal Summary Table
ATC	Automatic Traffic Count
B1/B2/B8	Development categories: business (including office) / general industrial / storage and distribution
BAFB	The Best And Final funding Bid submitted by Norfolk County Council to the Department for Transport in 2011 for the combined Postwick and NDR schemes
BCIS	Building Cost Information Service
BCR	Benefit Cost Ratio
BGBP	Broadland Gate Business Park development
COBA	Cost Benefit Appraisal – software released by the Department of Transport that has been used to undertake an accident appraisal
DfT	Department for Transport
DIADEM	Dynamic Integrated Assignment and Demand Modelling - software released by the Department for Transport
GDP	Gross Domestic Product
GEH	A comparison statistic named after GE Havers
GNDP	Greater Norwich Development Partnership
GPS	Global Positioning System
GVA	Gross Value Added
HA	Highways Agency
HB	Home Based (trips)
HBEB	Home Based Employers' Business (trips)
HBO	Home Based Other (trips)
HBW	Home Based Work (commuter trips)
HGV	Heavy Goods Vehicle
IP	Inter-peak
JCS	Joint Core Strategy
JTR	Journey Time Reliability
LGV	Light Goods Vehicle
LINSIG	Traffic signal analysis software
LMVR	Local Model Validation Report
MCC	Manual Classified Count (for a link)
MCTC	Manual Classified Turning Counts
NATS	Norwich Area Transportation Strategy
NCC	Norfolk County Council

NDR	Norwich Northern Distributor Road
NHB	Non-Home Based (trips)
NPV	Net Present Value – given by subtracting the Present Value Costs (PVC) from Present Value Benefits (PVB)
NTEM	National Trip End Model – a database containing trip-end, journey mileage, car ownership and population/workforce planning data
NTM	National Transport Model
OD	Origin Destination
OE	Other Externalities
OGV	Other Goods Vehicle (sometimes called HGV)
PA	Production Attraction
PCU	Passenger Car Unit
PDL	Previously Developed Land
PG	Planning Gain
PIA	Personal Injury Accident
PPK	Pence Per Kilometre
PPM	Pence Per Minute
PT	Public Transport
PVB	Present Value Benefits – the stream of benefits over the appraisal period (60 years) that are converted to 2010 prices and discounted to 2010 to give a ‘present value’
PVC	Present Value Costs – the costs of the scheme over the construction period as well as maintenance and operational costs that are converted to 2010 prices and discounted to 2010 to give a ‘present value’
PYV	Present Year Validation
P&R	Park and Ride
QRA	Quantified Risk Assessment
RFC	Ratio of Flow to Capacity
RPI	Retail Price Index
RSI	Road Side Interview
RTF	Road Transport Forecasts
SATME2	Matrix estimation module of the SATURN software
SATURN	Simulation – Assignment model of Traffic on Urban Road Networks software
TA	Transport Assessment
TEC	Transport Externality Cost
TRADS	Traffic flow Data System – the Highways Agency’s database of traffic count data
TRICS	National Trip Generation database
TEMPRO	Trip End Model presentation Program is software released by the Department for Transport to allow detailed analysis of NTEM data
TUBA	Transport User Benefit Appraisal – software released by the Department for Transport that is used to assess transport user benefits of transport schemes

VDM	Variable Demand Modelling
VfM	Value for Money
VISUM	Transport modelling software used (in this case) for public transport modelling
VOC	Vehicle Operating Costs
VOT	Value Of Time
WEBS	Wider Economic Benefits
WebTAG	Web-based Transport Appraisal Guidance produced by the Department for Transport
WITA	Wider Impacts in Transport Appraisal

13 Glossary

Assignment	A process of loading a trip matrix onto routes through a network that accounts for travel costs on the network in identifying the optimum route choice for every trip
Buffer network	The external part of a highway network in which travel is represented by speed/ flow relationships or cruise speeds
Calibration	A process of adjusting the model input data or model parameters to improve the model and its validation
Convergence	An equilibrium between model outputs, in assignment between the flows and travel costs and in demand models between the demand and the costs from the supply model
Cost matrix	A table of travel costs for journeys that may include travel time, operating costs and charges such as tolls or fares
Cruise speeds	Average travel speed along a network link
Demand model	See variable demand model
Demand segment	Travel demand is divided into a number of segments for the purposes of applying different demand modelling procedures. The division is usually by trip purpose and whether the trips are home-based or non-home-based
DMRB	Design Manual for Roads and Bridges – a Highways Agency publication setting out guidance and good practice for design and appraisal of road schemes
Dependent development	Housing or commercial development that can only proceed with the implementation of a transport intervention
Discounting	Discounting is a technique used to compare costs and benefits that occur in different time periods. It is based on the principle known as time preference that people prefer goods and services now rather than later. This preference for goods and services now rather than later applies to both individuals and society. By applying a discount rate, streams of costs and benefits are reduced to their present values.
Do Minimum	The forecast scenario without the proposed transport scheme, but that includes committed transport network improvements and developments
Do Something	The Do Minimum network but with the proposed transport scheme and developments added
Generalised cost	A combination of time and money costs (operating costs and charges) that are expressed in time or money units which are used to represent the total travel costs for a journey within the assignment or demand models
Journey purpose	Trips are divided into different travel purposes, usually work (or commute), employers' business and other. These trip purposes have different generalised costs applied and different demand model responses
Matrix estimation	A process used to adjust an initial or 'prior' matrix so that the resulting assignment of the adjusted matrix matches count data as closely as possible
Network	A mathematical representation of a transport network in a supply-side assignment model, either a highway network which represents vehicle travel, or a public transport network that represents bus and rail services
Speed / flow relationships	Relationship between traffic speed and traffic flow on a network link

Reference trip matrix	A forecast reference matrix based on applying growth from national (or other) datasets, but before the application of adjustments due to the impact of how travel costs will change with growth in travel
User classes	Trips are aggregated into several user classes for the purposes of assignment. These usually represent different types of vehicle (e.g. car, HGV) and different trip purposes
Trip matrix	A table representing travel in a model area between land areas or zones
Validation	A process of comparing the model data with independent data
Variable demand modelling	A model that forecasts changes in travel behaviour such as trip frequency, choice of mode, time of travel and trip distribution
Zone	An area of land or development which is used in a transport model to aggregate individual households or commercial premises into a manageable number of units that can be used to represent journey patterns in the study area. Usually the zone size will be relatively small in the study area, but progressively larger further away from it.

The Norfolk County Council (Norwich Northern Distributor Road (A1067 to A47(T))) Order

5.8 Report of Surveys

Planning Act 2008

Infrastructure Planning

The Infrastructure Planning (Applications: Prescribed Forms and Procedure)
Regulations 2009


PINS Reference Number: TR010015

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This document is submitted in relation to the application for a Development Consent Order by Norfolk County Council to the Secretary of State, under the Planning Act 2008.

The application is for the Norfolk County Council (Norwich Northern Distributor Road (A1067 to A47(T))) Order, to grant development consent for the construction of a new highway running west to east, to south, between the A1067 Fakenham Road and the A47 Trunk Road at Postwick, including improvements to the existing highway network to the north and north east of Norwich.

This document comprises part of the application documents and relates to Regulation 5(2)(q) of the Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009.

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1 Key Summary

1.1 Summary

1.1.1 Data collected in support of the NATS Transport Model is required to ensure that the model is up to date and able to comprehensively and accurately reflect the travel behaviour currently being observed in the vicinity of the proposed Norwich Northern Distributor Road Scheme and the greater Norwich area.

1.1.2 This report provides a description of the traffic surveys undertaken in 2012 and presents a summary of the data collected. It also summarises other data sources that have been used in the modelling work.

1.1.3 The following surveys were undertaken:

- Automatic traffic counts were undertaken at 59 sites over a two-week period between 19 October and 26 November 2012.
- 12-hour manual classified counts were undertaken at 63 sites over a four-day period between 22 October and 26 October 2012.
- Road side interview data was collected at 30 sites over a two-week period between 5 November and 20 November 2012. This was accompanied by MCC and ATC data.
- Journey time data was sourced from TrafficMaster.
- Additional count data where required was obtained from the Highways Agency TRADS database.
- Inbound and outbound vehicle movements from the six Park and Ride sites.
- Supplementary turning count data was sourced for the following junctions:
 - Thickthorn and Postwick Park and Ride sites
 - Reepham Road/Middleton's Lane Roundabout
 - Holt Road Roundabout
 - Junctions to the north of Norwich located at Old Catton and Sprowston

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2 Introduction

2.1 Background

- 2.1.1 Mott MacDonald (MM) has been appointed by Norfolk County Council (NCC) to assist with the development and appraisal of the Norwich Northern Distributor Road (NDR), known as the NDR or referred to as the Scheme.
- 2.1.2 The Scheme would be a dual carriageway all-purpose strategic distributor road, to be classified as the A1270 Principal Road, which would link the A1067 Fakenham Road, near Attlebridge, to the A47 Trunk Road (T) at Postwick. This will be over a length of approximately 20.4km.
- 2.1.3 The NDR is a project of national significance which requires a Development Consent Order (DCO) under the Planning Act 2008 and this formal planning process began in early 2013. It is currently anticipated that the process will be completed in time for the NDR scheme to start construction in 2015 and to be opened in 2017.
- 2.1.4 This document is one of a number that support the DCO, each of which has its own unique document number, and should therefore be read in conjunction with the other documentation. The proposed layout of the NDR is shown in the General Arrangement Plans contained in document number 2.6, whilst the full needs case for the NDR is explained in the Statement of Reason (document 4.1) and the Environmental Statement (document 6.1).
- 2.1.5 To assist with the assessment of the NDR and NATS a multi-modal transport model has been developed. The model has been developed over many years, but the latest version had relied on data collected in 2002 and 2006. For the purpose of progressing the Scheme development surveys were commissioned in 2012 to enable the transport model to be updated. This document reports on those surveys.

2.2 Report contents

- 2.2.1 Following this introduction, the Report of Surveys is divided into the following sections:
- Section 3 provides an overview of the 2012 surveys and the survey programme;
 - Section 4 describes the surveys undertaken to expand the 2006 roadside interviews;

- Section 5 presents the new roadside interviews;
- Section 6 describes the traffic counts undertaken to provide model calibration and validation data.
- Section 7 provides the process for obtaining the journey time data from TrafficMaster;
- Section 8 summarises the other sources of count data collated for the model development
- Section 9 contains information relating to the handling, checking and manipulation of the data prior to being used in the model development.

3 Overview of Surveys

3.1 Purpose and Scope of Data

- 3.1.1 The transport model comprises of separate highway and public transport assignment models developed in SATURN and VISUM software respectively, with variable demand responses catered for with the Department for Transport's DIADEM software.
- 3.1.2 This report contains details of the surveys undertaken for the highway model. Details of additional surveys for the public transport model are contained within the Public Transport Local Model Validation Report (document 5.10).
- 3.1.3 Data collected are required to ensure that the highway assignment model is able to comprehensively and accurately reflect the travel behaviour currently being observed in the vicinity of the proposed scheme and the greater Norwich area and thus form a robust basis for the testing of future (with and without NDR) scenarios.
- 3.1.4 The data has been used in the calibration and validation of the highway assignment model, covering three time periods:
- The morning (AM) peak hour, representing traffic conditions between 08:00 and 09:00;
 - An average inter-peak (IP) hour, representing the average hour between 10:00 and 16:00; and
 - The evening (PM) peak hour between 17:00 and 18:00.
- 3.1.5 Consequently the data was required to cover these three model periods.
- 3.1.6 The survey programme was designed to capture the following data:
- New Roadside interviews (RSI) to replace interview data previously collected in 2002.
 - Traffic counts to expand the new RSI
 - Traffic counts to expand RSI data previously collected in 2006 and considered sufficiently contemporary to be re-used in the current model.
 - Traffic counts, including turning counts, to provide matrix calibration and model validation data.
- 3.1.7 Where traffic counts were undertaken these were carried out in accordance with WebTAG Unit 3.19, in relation to the specific requirement to undertake

a minimum of a two-week automatic traffic count in conjunction with a single day manual classified count.

3.2 Commissioning Surveys

3.2.1 Mott MacDonald was requested by Norfolk County Council (NCC) to appoint a contractor through a procurement process to undertake traffic data collection in the Norwich area in October 2012. Nationwide Data Collection (NDC) was awarded the contract for the survey work following the tender period.

3.2.2 The three different survey types are summarised below.

3.3 Automatic Traffic Counts

3.3.1 Automatic Traffic Counts (ATC) record the hourly volume of traffic by direction. The data is collected to provide longer term flow levels, typically over at least two weeks, in order to avoid daily fluctuations in traffic and provide a longer term average.

3.3.2 The ATC data is used to provide both calibration data for the matrix estimation procedure and also to provide validation checks against modelled traffic flows. These validation checks are carried out independently of the sites used for calibration.

3.3.3 The ATC data is also used to derive factors to convert modelled time period flows into 12-hour Annual Average Weekday Traffic (AAWT), 18-hour AAWT, 6-hour night time AAWT and 24-hour Annual Average Daily Traffic (AADT) flows used in the economic and environmental appraisals.

3.3.4 WebTAG Unit 3.19 states that ATCs are accurate to +/- 5% for the measurement of total vehicle movements. Whilst ATC data is often split into vehicle classes, vehicle splits obtained from the data are not considered to be reliable.

3.4 Manual Classified Counts

3.4.1 Manual Classified Counts (MCCs) - of both link and turning volumes - record the directional volume of traffic by vehicle type. MCC counts are typically undertaken over a single 12-hour period, between 07:00 and 19:00 hours. The MCC data is used to split the longer term ATC volume data into vehicle categories, thus overcoming the daily fluctuations that can be expected in traffic volumes and the inability of ATC collection to record vehicle type with sufficient accuracy.

3.4.2 According to WebTAG Unit 3.19, the accuracy of MCCs for total vehicles is +/- 10%; for cars and taxis: $\pm 10\%$; light goods vehicles: $\pm 24\%$; other goods vehicles: $\pm 28\%$; and all goods vehicles: $\pm 18\%$.

3.4.3 For the purpose of the NDR surveys, MCCs were classified into the following vehicle types:

- Cars
- Taxi
- Light goods vehicle (LGV)
- Other goods vehicle (OGV1)
- Other goods vehicle (OGV2)
- Bus
- Motorcycles
- Bicycles

3.5 Roadside Interviews

3.5.1 Road Side Interviews are used to obtain the origin and destination of the driver along with information relating to the vehicle type, vehicle occupancy and the trip purpose (both the origin and destination end of the trip). Depending on the constraints of the interview site, the surveys may be undertaken by face to face interviews or through the distribution of questionnaires for completion by the driver at a later point in time (with a pre-paid envelope to encourage return).

3.6 Survey Programme

3.6.1 In accordance with the Design Manual for Roads and Bridges (DMRB) guidance, surveys were programmed to be carried out during neutral months, outside of school holidays and other local abnormal traffic periods.

3.6.2 The surveys were carried out as shown below in Table 3.1

Table 3.1: Survey programme

Survey Type	Date from	Date to	Timescales
Automatic traffic counts	19/10/12	26/11/12	Over a minimum two week period, 24 hour
Manual classified counts	22/10/12	26/10/12	Single day between 07:00 to 19:00
Road side interviews	5/11/12	20/11/12	07:00 to 19:00

3.7 Additional data sources

3.7.1 Additional count data were also obtained from other sources and surveys conducted by NCC and did not form part of the survey commission. This included the following:

- Highways Agency TRADS data;
- 2012 turning count data at:
 - Thickthorn Park and Ride site;
 - Postwick Park and Ride site;
 - Holt Road roundabout;
 - Reepham Road/Middleton Lane roundabout;
 - Junctions in the north of Norwich in the Old Catton and Sprowston carried out for the Beyond Green development Transport Appraisal;
- 2006 ATC count data to inform missing gaps in cordon data.
- Journey time data was sourced from TrafficMaster.

3.7.2 These additional data sources are described in more detail in Section 8.

4 Data for Re-Expansion of 2006 RSI Records

4.1 Overview

4.1.1 ATC and MCC surveys were undertaken at the site of the 2006 Road Side Interviews for the purpose of re-expanding the interview records collected in 2006.

4.2 Location

4.2.1 The location of the sites that were subject to a RSI in 2006 is shown in Figure 4.1. Surveys formed an inner and outer cordon around Norwich City centre, along with two screenlines to capture movements to the north-west of the city.

Figure 4.1: Location of 2006 RSI sites



Source: Extracted from Mott MacDonald Norwich Traffic Survey Brief, dated October 2012

4.2.2 The Highway Agency's (HA) monitors traffic on (nearly) every link of the trunk road network which is stored in an on-line database called TRADS, so this data was used where available. Table 4.1 provides a more detailed

description of the locations and indicates whether the commissioned ATC data or TRADS data was used.

Table 4.1: Existing ATC Data (2006)

2006 Site Reference	Site Description	Site Type	Data Type	Source
1	A47 West of A1074	2006 RSI	TRADS	HA
3	A140 south of B1149	2006 RSI	ATC	NDC
4	B1150 north of Walsham Road south of Spixworth	2006 RSI	ATC	NDC
5	A1151 Wroxham Road north of Sprowston	2006 RSI	ATC	NDC
6	C283 Salhouse Road	2006 RSI	ATC	NDC
7	C874 Plumstead Road northeast of Dussindale Drive	2006 RSI	ATC	NDC
9	A47 Potswick Junction west of Cucumber Lane	2006 RSI	TRADS	HA
10	A146 Loddon Road south of A47	2006 RSI	ATC	NDC
11	B1332 Bungay Road south of A47	2006 RSI	ATC	NDC
12	Ipswich Road south of A47	2006 RSI	ATC	NDC
13	B1113 Keswick Main Road north of Swardeston	2006 RSI	ATC	NDC
14	A11 southwest of A47	2006 RSI	TRADS	HA
15	B1172 east of Heathersett west of A47	2006 RSI	ATC	NDC
16	B1108 west of A47 east of Stocks Hill	2006 RSI	ATC	NDC
18	A1074 Dereham Road east of A140	2006 RSI	ATC	NDC
19	A1067 southeast of A140	2006 RSI	ATC	NDC
20	A1402 Aylsham Road south of Ring Road	2006 RSI	ATC	NDC
21	A1151 Sprowston Road south of Ring Road	2006 RSI	ATC	NDC
23	A1242 Yarmouth Road west of Harvey Lane	2006 RSI	ATC	NDC
25	A140 Ipswich Road north of A146	2006 RSI	ATC	NDC
26	A11 Newmarket Road northeast of A140	2006 RSI	ATC	NDC
28	Hellesdon Mill Lane north of A1074	2006 RSI	ATC	NDC
NW1	A1067 Fakenham Road Attlebridge	2006 RSI	ATC	NDC

2006 Site Reference	Site Description	Site Type	Data Type	Source
NW2	C167 Marl Hill Road Morton	2006 RSI	ATC	NDC
NW3	C173 Weston Hall Road Lenwade	2006 RSI	ATC	NDC
NW4	C245 The St Road Felthorpe	2006 RSI	ATC	NDC
NW6	C172 Ringland Road Ringland	2006 RSI	ATC	NDC
NW8	C461 Taverham Lane Taverham	2006 RSI	ATC	NDC
NW10	C162 Costessey Lane Costessey	2006 RSI	ATC	NDC

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5 2012 RSI Data

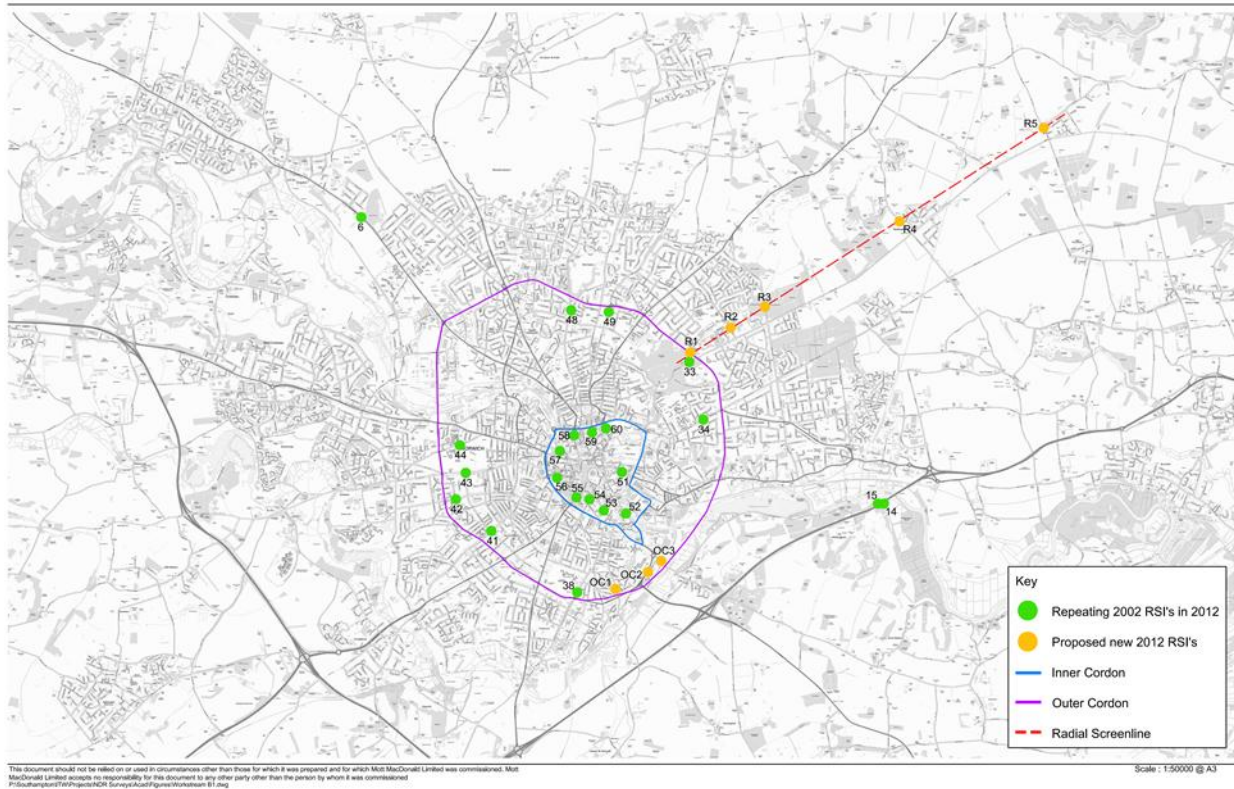
5.1 Overview

5.1.1 Roadside Interviews were undertaken to replace data previously collected in 2002 and to provide origin-destination data for trips crossing an additional radial screenline to the north-east of Norwich city centre. In total, 35 sites were surveyed through a combination of face-to-face interviews and postcard surveys.

5.2 Location

5.2.1 The location of the sites is shown in Figure 5.1.

Figure 5.1: 2012 RSI survey locations



5.3 Methodology

5.3.1 Prior to the commencement of the RSI surveys site visits were undertaken to confirm that the site was positioned in a safe location that did not compromise road user's safety; and that the location would provide an

accurate sample of traffic movements. The surveys located on the A47 required the approval of the Highways Agency and their agents.

- 5.3.2 The layout of the survey sites were designed in accordance with Chapter 8 of the Traffic Signs Manual, and the planning and management of survey sites was in conformity with the Design Manual for Roads and Bridges, Volume 5, Section 1, Part 4 (TA 11/09).
- 5.3.3 Data collection was undertaken at each site for a duration of 12 hours between 07:00 and 19:00. These were undertaken on weekdays, excluding Fridays and outside of school holidays. A 12-hour MCC was undertaken on the day of the survey, with longer term data provided by means of an ATC, or a TRADS site.
- 5.3.4 Postcard surveys were distributed where face-to-face interviews were not possible due to the busy nature of the route or other constraints. Postcard surveys were distributed to vehicle drivers with respondents required to manually complete and return the surveys within two weeks of the survey date. The postcard survey questions were identical to those in the face-to-face interviews. Examples of both the questionnaire form and postcard survey are included within Appendix A. A table detailing the chosen survey method for each site is included in Appendix B. RSI Summary.
- 5.3.5 Interview sample rates were monitored at regular intervals of fifteen minutes to ensure a good representation of vehicle types. The following vehicle classification was included within the interview sample:
- Car
 - LGV/Van
 - OGV 1
 - OGV 2
 - Minibus
- 5.3.6 For the two cordons around the city centre, the interviews were carried out in the outbound direction. On the new radial screenline, interviews were carried out in both directions.
- 5.3.7 Table 5.1 summaries the location and method of data collection. Whilst some sites were entirely face-to-face interviews, and others entirely postcard, it can be seen that both methods of survey collection were employed at some sites. In such cases, it was found that stopping and interviewing drivers was only possible during discreet periods of the day to avoid significant disruption to road users.

Table 5.1: 2012 RSI data collection

Site Reference	Site Locations	Survey Method	Survey Direction
Outer Cordon			
38	Hall Road North of A146 Roundabout	Both	Outbound
41	Unthank Road (Between Christchurch Rd & Mile End Rd)	Both	Outbound
42	The Avenue (Between Christchurch Rd and Colman Rd)	Both	Outbound
43	B1108 Earlham Road (Between Christ \ Church Road & Coleman Road)	Face-to-face	Outbound
44	Bowthorpe Road (Between Dereham Road & Farrow Road)	Both	Outbound
48	Catton Grove Road (Between Woodcock Rd & Mile Cross Lane)	Postcard	Outbound
49	Constitution Hill (Between Wall Rd & Chartwell Rd)	Both	Outbound
33	Gurney Road (Between Gilman Rd & Mousehold Lane)	Face-to-face	Outbound
34	B1140 Plumstead Road (Between Hilary Ave & Heartsease Lane)	Both	Outbound
OC1	Long John Hill (between A146 & Cavell Rd)	Postcard	Outbound
OC2	A1054 Martineau Ln (between A146 & Bracondale Rd)	Postcard	Outbound
OC3	Bracondale Rd (between Europa Way & Bracondale Mill Gate)	Both	Outbound
Inner Cordon			
51	Prince of Wales Road (Between Recorder Road & Riverside Road)	Postcard	Outbound
52	King Street (Between Rouen Road & Carrow Bridge)	Both	Outbound
53	Ber Street (Between Thorn Lane & Finklegate)	Both	Outbound
54	All Saints green (Between Surrey St & Queens Rd)	Postcard	Outbound
55	St Stephen's Street (Between Surrey Street & Queens Road)	Postcard	Outbound
56	Chapelfield North	Face-to-face	Outbound

Site Reference	Site Locations	Survey Method	Survey Direction
57	Westwick Street (Between St Swithins Road & Barn Road)	Both	Outbound
58	Duke Street (Between St Crispins Rd & St Marys Plain)	Postcard	Outbound
59	Magdalen Street At Flyover	Both	Outbound
60	Whitefriars (Between Fishergate & Barrack Street)	Both	Outbound
Other Locations			
6	A1067 Draylon High Road south of Hurn Road	Both	Outbound
14	A47 Eastbound by Postwick Grove	Face-to-face	Eastbound
15	A47 Westbound by Postwick Grove	Face-to-face	Westbound
Radial Screenline			
R1	A1042 Mousehold Lane between Salhouse Road and Roundtree Way	Postcard	Northbound and Southbound
R2	Falcon Road E between Salhouse Road and Blithewood Gardens	Both	Northbound and Southbound
R3	Blue Boar Lane between Salhouse Road and Laundry Lane	Both	Northbound and Southbound
R4	Green Lane E between Salhouse Road and Wilkinson Road	Face-to-face	Northbound and Southbound
R5	B1140 Mill Road between Norwich Road and Hall Drive	Northbound – Both Southbound – Face-to-face	Northbound and Southbound

5.3.8 The total number of interview records collected is summarised in Table 5.2. Over 30,000 interviews were collected, representing just over 18% of all traffic passing the census points.

Table 5.2: Summary interview records

Method	Number of Interview Records
Face to Face	17,674
Postcards	12,815

Method	Number of Interview Records
Total	30,489
Total Traffic (vehicles)	165,814
Overall Sample Rate	18.4%

5.3.9 A summary of the survey sample rates achieved for each site are shown below in Table 5.3. A full interview summary showing the number of interviews and postcards returned at each site is provided in Appendix B.

Table 5.3: RSI Survey sample rates

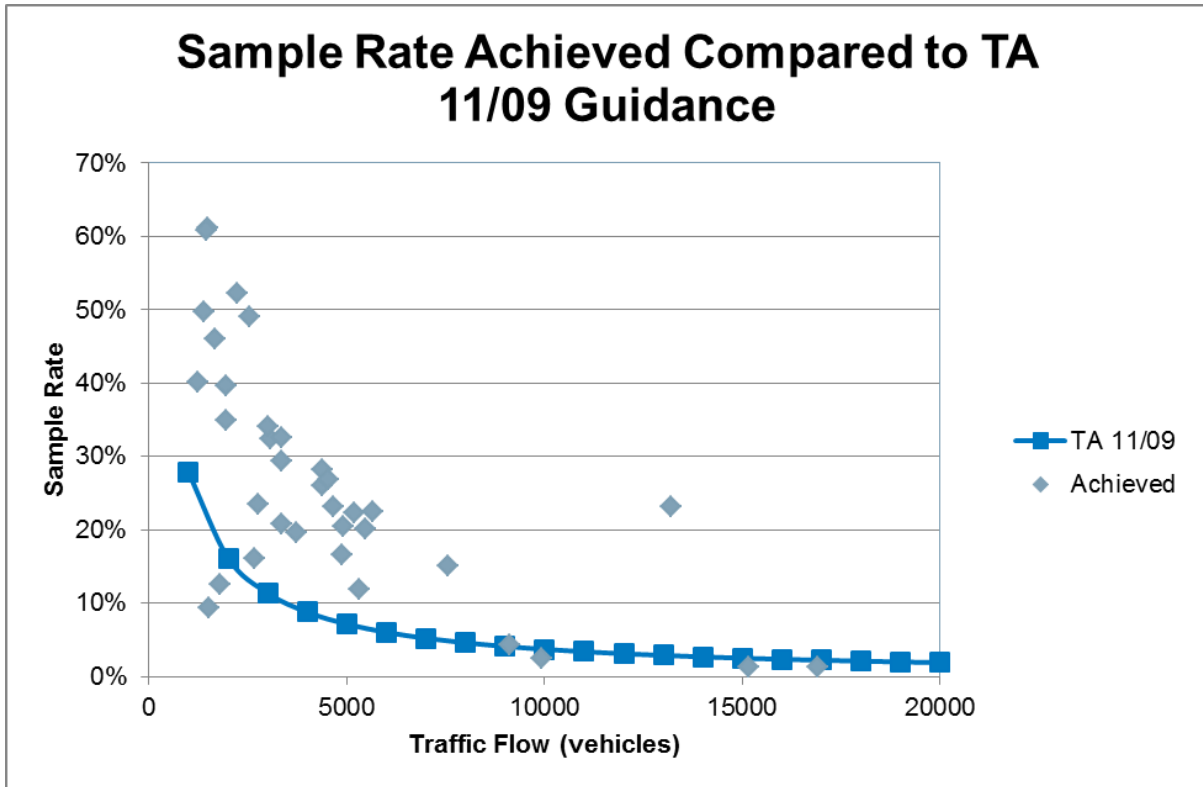
Site Reference	Site Locations	Sample Rate Versus MCC Data
Outer Cordon		
38	Hall Road North of A146 Roundabout	26.1%
41	Unthank Road (Between Christchurch Rd & Mile End Rd)	32.3%
42	The Avenue (Between Christchurch Rd and Colman Rd)	34.9%
43	B1108 Earlham Road (Between Christ \ Church Road & Coleman Road)	26.8%
44	Bowthorpe Road (Between Dereham Road & Farrow Road)	23.2%
48	Catton Grove Road (Between Woodcock Rd & Mile Cross Lane)	16.1%
49	Constitution Hill (Between Wall Rd & Chartwell Rd)	19.6%
33	Gurney Road (Between Gilman Rd & Mousehold Lane)	28.1%
34	B1140 Plumstead Road (Between Hilary Ave & Heartsease Lane)	16.6%
OC1	Long John Hill (between A146 & Cavell Rd)	12.5%
OC2	A1054 Martineau Ln (between A146 & Bracondale Rd)	23.1%
OC3	Bracondale Rd (between Europa Way & Bracondale Mill Gate)	52.2%
Inner Cordons		
51	Prince of Wales Road (Between Recorder Road & Riverside Road)	11.8%

Site Reference	Site Locations	Sample Rate Versus MCC Data
52	King Street (Between Rouen Road & Carrow Bridge)	40.1%
53	Ber Street (Between Thorn Lane & Finklegate)	34.0%
54	All Saints green (Between Surrey St & Queens Rd)	20.9%
55	St Stephen's Street (Between Surrey Street & Queens Road)	9.4%
56	Chapelfield North	22.5%
57	Westwick Street (Between St Swithins Road & Barn Road)	61.2%
58	Duke Street (Between St Crispins Rd & St Marys Plain)	15.0%
59	Magdalen Street At Flyover	29.3%
60	Whitefriars (Between Fishergate & Barrack Street)	32.5%
Other Locations		
6	A1067 Draylon High Road south of Hurn Road	20.2%
14	A47 Eastbound by Postwick Grove	1.3%
15	A47 Westbound by Postwick Grove	1.3%
Radial Screenlines		
R1	A1042 Mousehold Lane between Salhouse Road and Roundtree Way	2.4% NB / 4.4% SB
R2	Falcon Road E between Salhouse Road and Blithewood Gardens	49.8% NB / 60.8% SB
R3	Blue Boar Lane between Salhouse Road and Laundry Lane	20.5% NB / 22.3% SB
R4	Green Lane E between Salhouse Road and Wilkinson Road	46.0% NB / 39.7% SB
R5	B1140 Mill Road between Norwich Road and Hall Drive	23.5% NB / 49.1% SB

5.3.10 With the exception of the sites highlighted in grey, all interview sites had a sample rate (measured as the number of interviews as a percentage of the vehicle count) over 10%; over two-thirds of the sites had a sample rate greater than 20%.

5.3.11 Figure 5.2 shows the sample rate achieved with the desired rate as set out in DMRB Volume 5, Section 1 Part 4 TA 11/09. With the exception of the five sites highlighted, all sites had a sample rate over the required amount (shown by the points on or above the TA 11/09 line).

Figure 5.2: Comparison of achieved sample rate against TA 11/09 guidance



5.3.12 At Site 55 the operation of the survey site was affected by bus stops in close proximity along the road, and buses swinging in and out of the stops frequently struck the traffic management in the early part of the survey. As a result it was necessary to shorten the interview bay, which meant it was not possible to run a full contingent of staff distributing postcards.

5.3.13 The two sites on the A47 Norwich Southern Bypass (Sites 14 and 15) caused significant disruption and major queuing. As a result of Police and County Council requests the sites were abandoned at 09:30 and all traffic management removed from the carriageway. The classified counts continued for the entire period.

5.3.14 Sites R1 Northbound and Southbound operated as postcard distribution sites at adjacent traffic signals on the A1042. This was the only way to operate the sites due to insufficient room to accommodate traffic management for an interview bay. The on-site survey supervisor reported a

very short red phase at the signals, which severely limited the number of postcards that could be issued.

6 Counts for Calibration and Validation

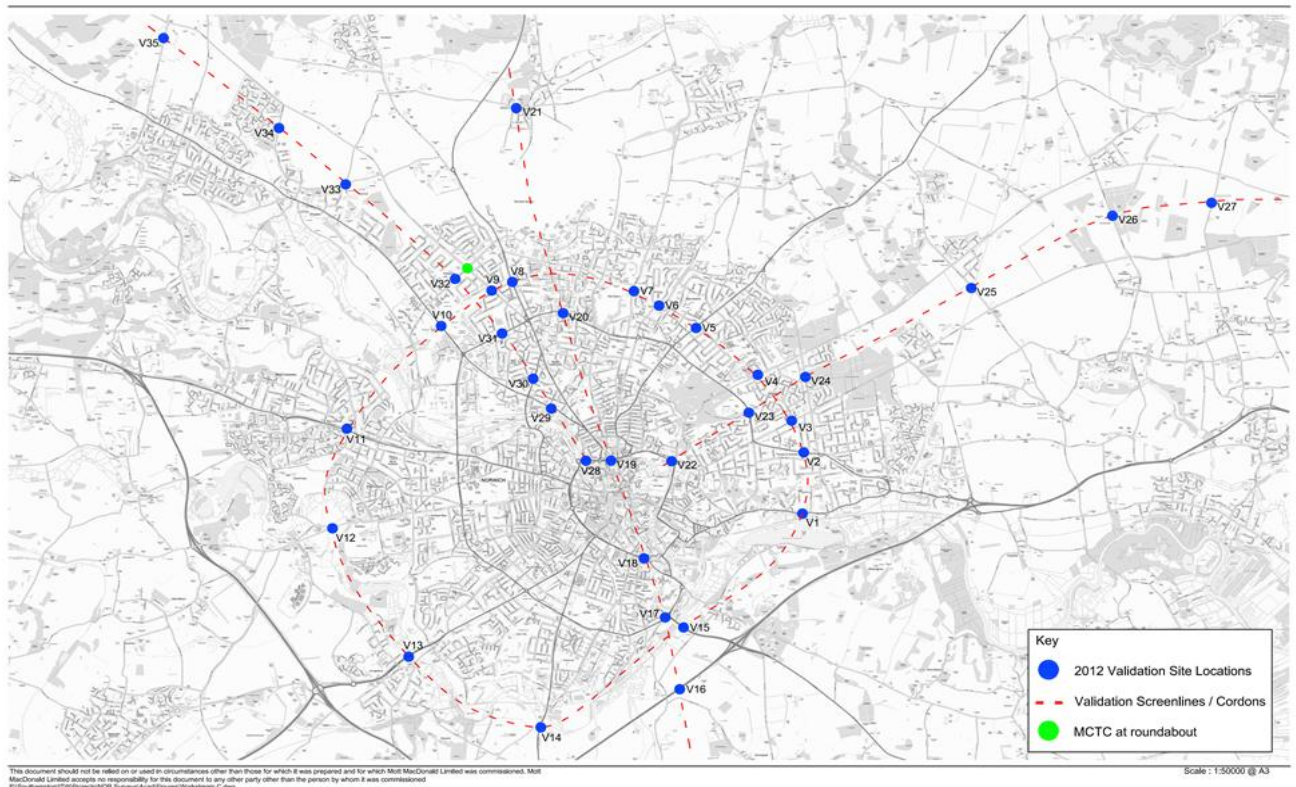
6.1 Overview

6.1.1 ATC and accompanying MCC were carried out on a cordon and screenlines to provide data points for the model calibration and validation.

6.2 Location

6.2.1 The location of these counts is shown in Figure 6.1 with a more detailed site description and period over which the data collected shown in Table 6.1. In one instance (Site V16 on the A47) TRADS data has been used.

Figure 6.1: Location of additional validation sites



Source: Extracted from Mott MacDonald Norwich Traffic Survey Brief, October 2012

Table 6.1: 2012 survey locations at calibration and validation sites

Site Reference	Site Description	Survey Period
V1	Yarmouth Road east of Harvey Lane	Friday 19 October 2012 – Thursday 25 October 2012 Monday 12 November 2012 – Sunday 18 November 2012
V2	St Williams Way east of Margetson Avenue	Monday 22 October 2012 – Sunday 28 October 2012 Monday 29 October 2012 – Sunday 4 November 2012 Monday 5 November 2012 – Sunday 11 November 2012
V3	Plumstead Road north of A1042	Monday 22 October 2012 – Sunday 28 October 2012 Monday 29 October 2012 – Sunday 4 November 2012 Monday 5 November 2012 – Sunday 11 November 2012
V4	Salhouse Road north of A1042	Friday 19 October 2012 – Thursday 25 October 2012 Monday 5 November 2012 – Sunday 11 November 2012
V5	Wroxham Road north of A1042	Friday 19 October 2012 – Thursday 25 October 2012 Monday 5 November 2012 – Sunday 11 November 2012
V6	Constitution Hill north of A1042	Monday 22 October 2012 – Sunday 28 October 2012 Monday 29 October 2012 – Sunday 4 November 2012 Monday 5 November 2012 – Sunday 11 November 2012
V7	Spixworth Road north of A1042	Monday 22 October 2012 – Sunday 28 October 2012 Monday 29 October 2012 – Sunday 4 November 2012 Monday 5 November 2012 – Sunday 11 November 2012

Site Reference	Site Description	Survey Period
V8	Cromer Road north of A140	Monday 22 October 2012 – Sunday 28 October 2012 Monday 29 October 2012 – Sunday 4 November 2012 Monday 5 November 2012 – Sunday 11 November 2012
V9	Reepham Road north of A140	Saturday 20 October 2012 – Friday 26 October 2012 Saturday 27 October 2012 – Friday 2 November 2012 Saturday 3 November 2012 – Friday 9 November 2012
V10	Drayton High Road north of A140	Friday 19 October 2012 – Thursday 25 October 2012 Monday 5 November 2012 – Sunday 11 November 2012
V11	Dereham Road west of Marl Pit Lane	Friday 19 October 2012 – Thursday 25 October 2012 Friday 2 November 2012 – Thursday 8 November 2012 Tuesday 20 November 2012 – Monday 26 November 2012
V12	Earlham Road west of Wilbertforce Road	Friday 19 October 2012 – Thursday 25 October 2012 Tuesday 13 November 2012 – Monday 19 November 2012
V13	A11 Newmarket Road west of Bluebell Road	Friday 19 October 2012 – Thursday 25 October 2012 Friday 26 October 2012 – Thursday 1 November 2012 Friday 2 November 2012 – Thursday 8 November 2012
V14	A140 south of Hall Road	Friday 19 October 2012 – Thursday 25 October 2012 Monday 5 November 2012 – Sunday 11 November 2012

Site Reference	Site Description	Survey Period
V15	A146 west of A47	Monday 22 October 2012 – Sunday 28 October 2012 Monday 29 October 2012 – Sunday 4 November 2012 Friday 9 November 2012 – Thursday 15 November 2012
V16	A47 east of Stoke Road	TRADS: Monthly flows for October 2012 Monthly flows for November 2012
V17	Barrett Road east of Long John Hill	Saturday 3 November 2012 – Friday 9 November 2012 Tuesday 4 December 2012 – Monday 10 December 2012
V18	A147 Bracondale Road east of City Road	Friday 19 October 2012 – Thursday 25 October 2012 Monday 5 November 2012 – Sunday 11 November 2012
V19	A147 St Crispins Road west of Magdalen Street	Monday 22 October 2012 – Sunday 28 October 2012 Monday 29 October 2012 – Sunday 4 November 2012 Monday 5 November 2012 – Sunday 11 November 2012
V20	A1042 Mile Cross Lane east of Vulcan Road	Monday 22 October 2012 – Sunday 28 October 2012 Saturday 3 November 2012 – Friday 9 November 2012
V21	Church Street west of Norwich Road	Monday 22 October 2012 – Sunday 28 October 2012 Monday 29 October 2012 – Sunday 4 November 2012 Monday 5 November 2012 – Sunday 11 November 2012
V22	Barrack Street west of Gurney Road	Friday 19 October 2012 – Thursday 25 October 2012 Monday 5 November 2012 – Sunday 11 November 2012

Site Reference	Site Description	Survey Period
V23	Heartsease Lane north of Rider Haggard Road	Saturday 20 October 2012 – Friday 26 October 2012 Monday 5 November 2012 – Sunday 11 November 2012
V24	Woodside Road south of Greenborough Road	Friday 19 October 2012 – Thursday 25 October 2012 Monday 5 November 2012 – Sunday 11 November 2012
V25	Broad Lane south of Vera Road	Friday 19 October 2012 – Thursday 25 October 2012 Sunday 28 October 2012 – Saturday 3 November 2012 Sunday 4 November 2012 – Saturday 10 November 2012
V26	Honeycombe Road north of Norwich Road	Monday 22 October 2012 – Sunday 28 October 2012 Monday 29 October 2012 – Sunday 4 November 2012 Monday 5 November 2012 – Sunday 11 November 2012
V27	Primrose Corner	Monday 22 October 2012 – Sunday 28 October 2012 Monday 29 October 2012 – Sunday 4 November 2012 Monday 5 November 2012 – Sunday 11 November 2012
V28	A147 St Crispins Road west of Pitt Street	Saturday 20 October 2012 – Friday 26 October 2012 Monday 5 November 2012 – Sunday 11 November 2012
V29	A1057 Drayton Road south of Junction Road	Saturday 20 October 2012 – Friday 26 October 2012 Saturday 27 October 2012 – Friday 2 November 2012 Monday 5 November 2012 – Sunday 11 November 2012

Site Reference	Site Description	Survey Period
V30	A1024 Mile Cross Road north of Half Mile Road	Monday 22 October 2012 – Sunday 28 October 2012 Monday 29 October 2012 – Sunday 4 November 2012 Tuesday 13 November 2012 – Monday 19 November 2012
V31	A140 Boundary Road west of Overbury Road	Friday 2 November 2012 – Thursday 8 November 2012 Friday 9 November 2012 – Thursday 15 November 2012 Friday 19 November 2012 – Monday 22 November 2012
V32	Middleton's Lane west of Westgate	Saturday 20 October 2012 – Friday 26 October 2012 Friday 2 November 2012 – Thursday 8 November 2012
V33	Hall Lane west of George Drive	Tuesday 23 October 2012 – Monday 29 October 2012 Tuesday 30 October 2012 – Monday 5 November 2012 Tuesday 6 November 2012 – Monday 12 November 2012
V34	School Road south of the Thorpe Marriott	Monday 5 November 2012 – Sunday 11 November 2012 Monday 12 November 2012 – Sunday 18 November 2012
V35	Fir Covert Road north of Fakenham Road	Tuesday 23 October 2012 – Monday 29 October 2012 Tuesday 30 October 2012 – Monday 5 November 2012 Tuesday 6 November 2012 – Monday 12 November 2012 Tuesday 13 November 2012 – Monday 19 November 2012

7 Journey Times

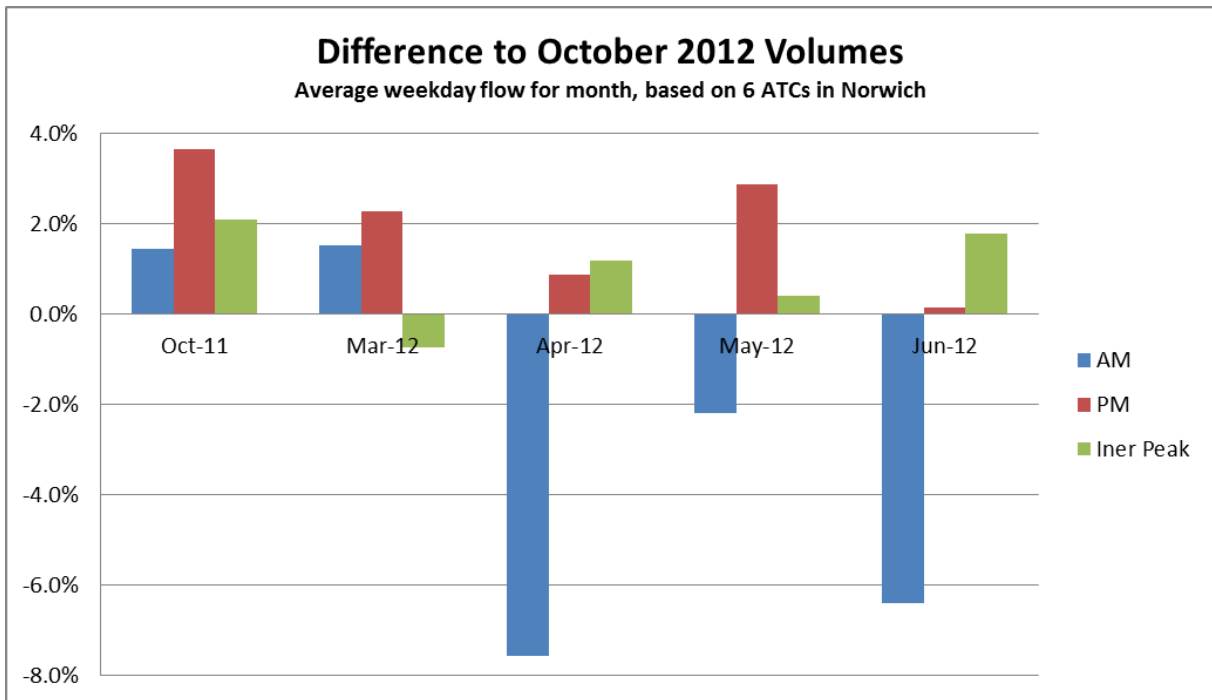
7.1 Overview

7.1.1 Journey time data was collected along key routes pertinent to the proposed scheme. The data recorded the journey time between pre-designated timing points along each route throughout the day. Journey time data were required as part of the assignment model validation and calibration appraisal to ensure any scheme benefits from journey time savings is accurately forecast. Comparison of observed and modelled journey times provides a measure of the appropriateness of the speed-flow relationship in a capacity restrained network, as well as junction delay calculations at fully simulated junctions.

7.2 Methodology

- 7.2.1 Data generated from the movements of GPS-equipped 'probe' vehicles are mapped to a representation of the road network (provided by the Department for Transport) in order to estimate average vehicle journey times across England. Traffic Master collate this data for the whole of England and provide it to the DfT annually, who pass the data on to local authorities.
- 7.2.2 Extraction of journey times from the data provided to Norfolk County Council was undertaken by Mott MacDonald using their in-house "Strat-e-gis" software. The data provided each year is for a 12 month period starting in September. Whilst the traffic model represents traffic demand for October 2012, TrafficMaster data sets were only available for September 2011 to August 2012.
- 7.2.3 Data for March 2012 was used as it represented the closest month to October 2012 in terms of overall traffic demand – as shown in Figure 7.1.

Figure 7.1: Comparison of traffic data with October 2012

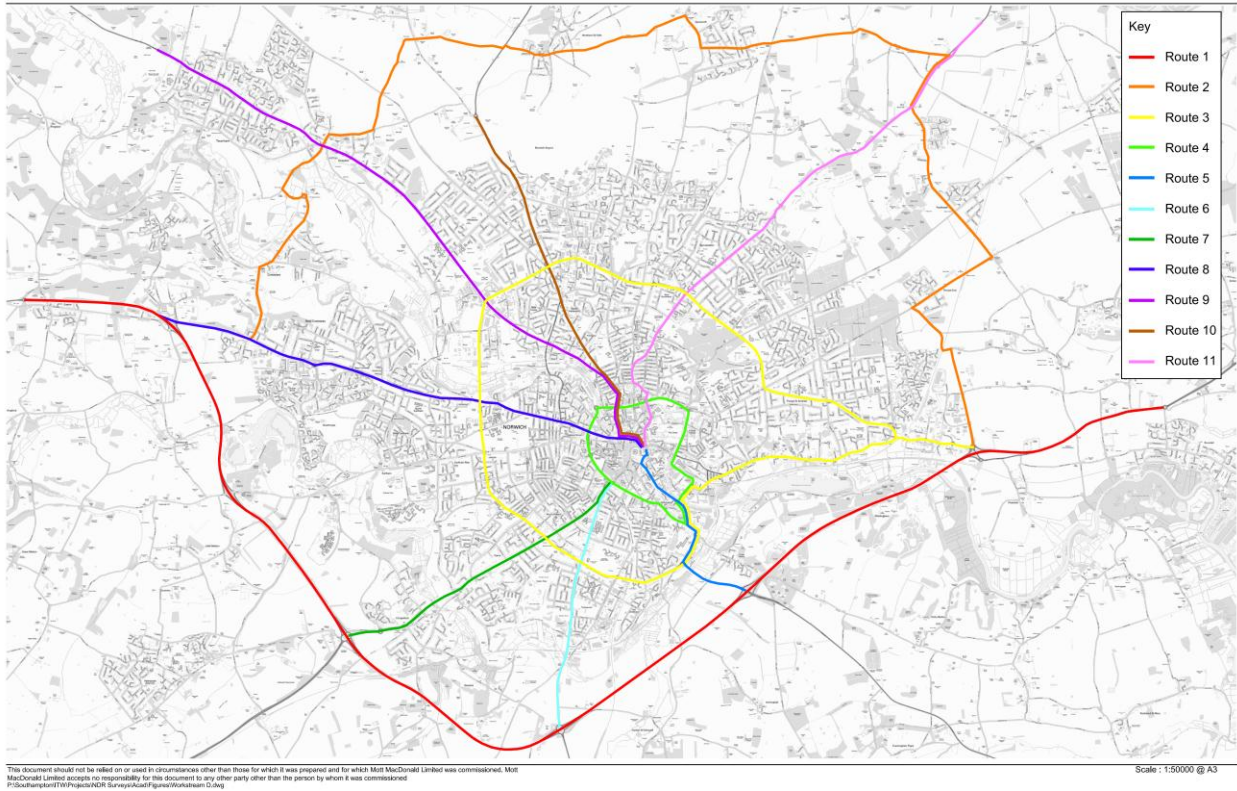


7.2.4 Specific journey time routes were selected for use in validating the SATURN model, with each route split into sections between junctions in the SATURN model. Data was extracted for all school term-time weekdays in March 2012, covering the modelled periods:

- AM peak 08:00-09:00
- Inter-peak averaged over 10:00-16:00
- PM peak 17:00-18:00

7.2.5 The journey time routes assessed are shown below in Figure 7.2 below.

Figure 7.2: Journey time routes



7.3 Data Output

7.3.1 The journey time results were provided for each section, including data on section lengths, together with cumulative results, from which time/distance graphs were produced. TrafficMaster data are provided at a disaggregated level, with a separate link between every junction and main access on each road, with all public roads included. Therefore, each section for the journey time analysis consisted of several TrafficMaster links.

7.3.2 The data on section lengths were compared to the SATURN link lengths, to ensure that there was consistency between the two sets of data.

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8 Other Sources of Data

8.1 TRADS

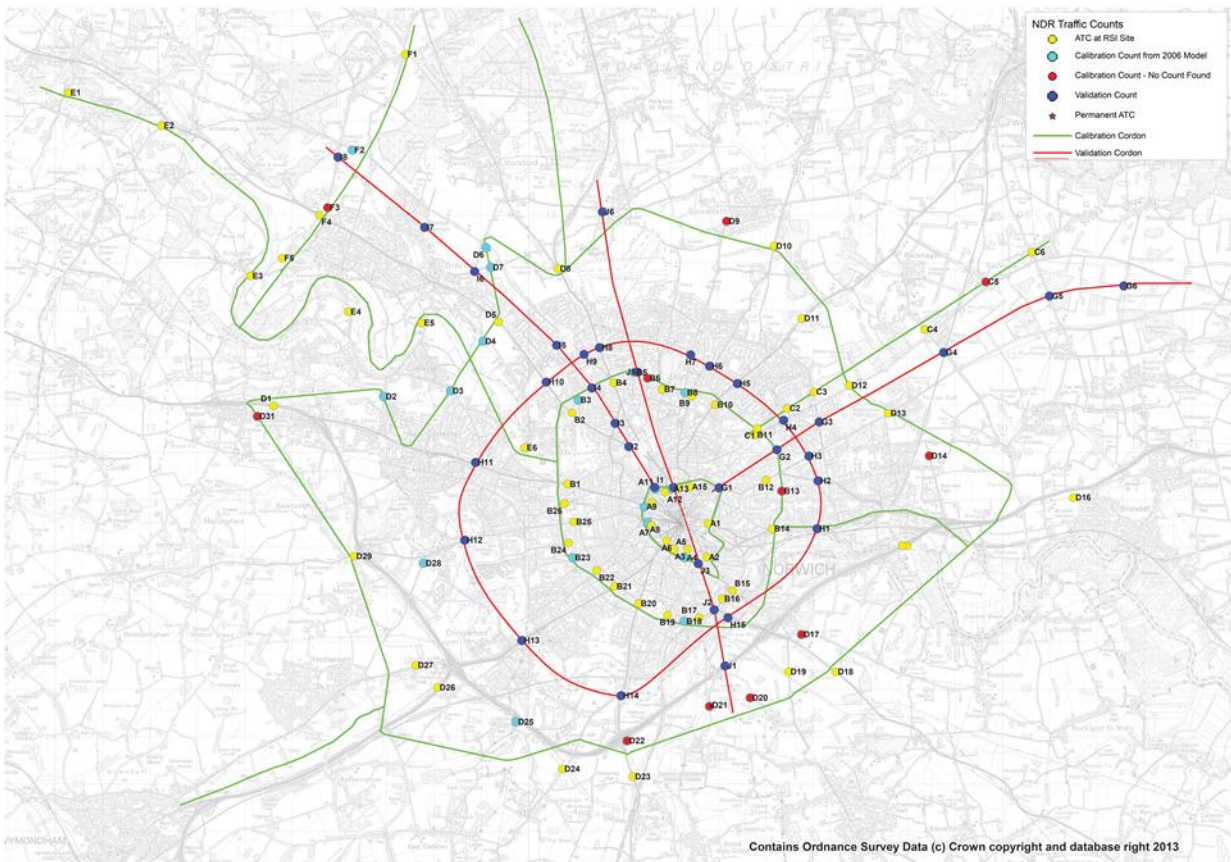
8.1.1 ATC data on the trunk road network was obtained from the Highways Agency’s Traffic Flow Data System (TRADS) at the following locations:

- A47 West of A1074;
- A47 Postwick Junction west of Cucumber Lane;
- A11 Southwest of A47; and
- A47 East of Stoke Road.

8.2 2006 Counts

8.2.1 The locations of the 2006 ATC sites which have been used to infill gaps in the cordons are shown as the light blue markers within Figure 8.1 below.

Figure 8.1: NDR traffic counts



8.2.2 The factors used to convert 2006 count data to 2012 values are detailed in Table 8.1 and Table 8.2 below. These factors were calculated from ATC data collected from 10 locations where data was available for both years.

8.2.3 Table 8.1 shows the factor required to convert from 2006 peak periods to equivalent peak periods in 2012. In this case the peak periods are defined as:

- AM peak period: 07:00-10:00
- IP period: 10:00-16:00
- PM peak period: 16:00-19:00

Table 8.1: 2006 to 2012 yearly growth factors peak periods

Direction	AM	IP	PM
Inbound	0.98	1.04	1.06
Outbound	1.08	1.03	0.99

8.2.4 Table 8.2 shows the factor required to convert from peak hours to the peak periods. These factors are used to allow the transport model flows to be aggregated to daily traffic flows and for the purpose of aggregation associated with the demand modelling processes.

Table 8.2: Time period factors (peak hour to the peak period).

Direction	AM	IP	PM
Inbound	2.56	6.00	2.81
Outbound	2.62	6.00	2.67

8.3 Park and Ride

8.3.1 In and outbound vehicle flows to the following Park and Ride sites was provided by Norfolk County Council:

- Airport;
- Sprowton;
- Postwick;
- Costessey;
- Hartford; and
- Thickthorn.

8.4 Turning Counts

8.4.1 Turning count data was obtained for the roundabout junction on the A47 at the Thickthorn Park and Ride site in April 2012.

8.4.2 ATC and turning count data was obtained in 2012 for the roundabout junction on the A47 at the Postwick Park and Ride site.

8.5 Other Locations

8.5.1 Turning count data was obtained for the Beyond Green development scheme in Old Catton and Sprowston in North Norwich in February 2012. This took the form of 22 turning count sites at junctions within Old Catton and Sprowston. In total 21 sites were used for validation and model calibration purposes.

8.5.2 Manual classified turning counts (MCTCs) were undertaken at the Reepham Road/Middleton Lane roundabout. This was undertaken for a period of 12 hours on 22nd October 2012 using video cameras with the classification reported in line with the MCC surveys.

8.5.3 Traffic counts for the A140 Cromer Road and A1149 Holt Road were derived from turning count proportions from a 2006 turning count survey of the Holt Road Roundabout.

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9 Data Handling

9.1 ATC data

9.1.1 The ATC data was supplied in Microsoft Excel spreadsheet format as summarised in Table 9.1 below.

Table 9.1: Incoming ATC data from NDC

Data	Mott MacDonald Reference	Date Received
Norwich ATC Data – batch 1	233906DP01-NDC-001 Rev A	21 November 2012
Norwich ATC Data – batch 2	233906DP01-NDC-003 Rev A	27 November 2012
Norwich Link Counts – full data set (including batch 1 and 2)	233906DP01-NDC-005 Rev A	29 November 2012
Norwich ATC Data – additional data for site 5, V32 and V33	233906DP01-NDC-006 Rev A	3 December 2012
Norwich ATC Data – batch 3	233906DP01-NDC-007 Rev A	3 December 2012
Norwich ATC Data – remaining data	233906DP01-NDC-008 Rev A	4 December 2012
NDR Count Data Revisions 2 Jan 2013	233906DP01-NDC-010 Rev A	2 January 2013
NDR Count Data Revisions 3 Jan 2013	233906DP01-NDC-011 Rev A	3 January 2013

9.1.2 A copy of this data is available upon request.

9.1.3 Figure 9.1 shows an example of the data received.

Figure 9.1: ATC Data Sample

1 Site		V8														2425 / Norwich						
2 Location		Cromer Road, Aft - Bus Shelter, OSGR: TG 21515 12136														October 2012						
3 Direction		Two way														Automatic Traffic Count						
4		Mon, 22 October 2012																				
5	6 Time	7 Total	8 Classification												9 >PSL	10 >PSL%	11 >SL1	12 >SL1%	13 >SL2	14 >SL2%	15 Mean	16 Vpp
17	18	19	20 1	21 2	22 3	23 4	24 5	25 6	26 7	27 8	28 9	29 10	30 11	31 12	32 30	33 30	34 35	35 35	36 45	37 45	38 85	
39	40	41	42 MCL	43 SV	44 SVT	45 TB2	46 TB3	47 T4	48 ART3	49 ART4	50 ART5	51 ART6	52 BD	53 DRT	54 ACPO	55 ACPO	56 DFT	57 DFT	58	59	60	
8	0000	55	1	52	0	2	0	0	0	0	0	0	0	0	51	92.7	31	56.4	8	14.5	37.8	44.3
9	0100	39	2	34	0	3	0	0	0	0	0	0	0	0	34	87.2	25	64.1	4	10.3	37.9	43.2
10	0200	34	0	24	0	4	0	0	0	4	0	2	0	0	31	91.2	23	67.6	3	8.8	37.4	44.1
11	0300	53	0	36	0	8	0	0	0	5	1	3	0	0	47	88.7	36	67.9	10	18.9	37.9	45.9
12	0400	111	2	83	1	14	3	1	0	2	3	2	0	0	101	91	75	67.6	12	10.8	37.1	42.5
13	0500	309	13	252	0	27	5	1	0	1	6	4	0	0	274	88.7	150	48.5	23	7.4	35.4	40.9
14	0600	612	14	505	4	71	8	3	0	0	6	1	0	0	512	83.7	231	37.7	24	3.9	34.3	39.1
15	0700	1484	28	1300	10	112	14	7	0	8	3	2	0	0	630	42.5	105	7.1	6	0.4	28.8	33.1
16	0800	1621	30	1432	9	103	19	7	3	5	4	6	2	1	484	29.9	65	4	2	0.1	27.9	32
17	0900	1270	17	1084	7	120	18	7	0	4	6	6	0	1	561	44.2	92	7.2	4	0.3	29.1	33.6
18	1000	1229	10	1070	6	103	11	7	2	3	5	10	0	2	574	46.7	90	7.3	1	0.1	29.7	33.3
19	1100	1307	6	1156	12	98	11	7	2	2	4	5	2	2	622	47.6	79	6	1	0.1	29.5	32.9
20	1200	1314	10	1157	6	110	8	4	1	5	4	9	0	0	692	52.7	146	11.1	4	0.3	30.5	34.2
21	1300	1315	13	1156	5	97	11	11	3	4	7	7	1	0	722	54.9	158	12	1	0.1	30.4	34.4
22	1400	1394	14	1223	7	106	14	7	1	3	7	11	1	0	625	44.8	102	7.3	1	0.1	29.2	33.3
23	1500	1369	13	1190	9	121	17	4	0	4	4	5	1	1	629	45.9	84	6.1	1	0.1	29.5	33.1
24	1600	1613	35	1429	10	107	14	7	0	0	4	3	2	2	659	40.9	125	7.7	7	0.4	29.1	33.1
25	1700	1612	25	1486	4	76	6	8	0	2	0	4	1	0	691	42.9	102	6.3	5	0.3	29.3	32.9
26	1800	1138	12	1042	4	59	7	5	0	3	3	1	2	0	619	54.4	159	14	2	0.2	30.3	34.7
27	1900	782	15	727	3	27	2	2	1	1	0	3	1	0	586	74.9	176	22.5	6	0.8	32.5	36
28	2000	474	9	440	1	18	1	1	0	1	0	3	0	0	371	78.3	151	31.9	13	2.7	33.4	38
29	2100	405	9	379	2	10	2	0	0	1	2	0	0	0	328	81	117	28.9	11	2.7	33.7	38.5
30	2200	339	7	312	1	15	2	1	0	0	0	1	0	0	281	82.9	126	37.2	8	2.4	33.7	38.3
31	2300	143	3	135	0	4	0	0	0	0	1	0	0	0	117	81.8	65	45.5	12	8.4	35.2	40.3
32	07-19	16666	213	14725	89	1212	150	81	12	43	51	69	12	9	7508	45	1307	7.8	35	0.2	29.4	33.3
33	06-22	18939	260	16776	99	1338	163	87	13	46	53	81	14	9	9305	49.1	1982	10.5	89	0.5	29.9	34
34	06-00	19421	270	17223	100	1357	165	88	13	46	54	82	14	9	9703	50	2173	11.2	109	0.6	30	34
35	00-00	20022	288	17704	101	1415	173	90	13	58	64	93	14	9	10241	51.1	2513	12.6	169	0.8	30.2	34.4

9.2 MCC data

9.2.1 The MCC data was supplied in Microsoft Excel spreadsheet format. The following data files were received.

Table 9.2: Incoming MCC data

Data	Mott MacDonald Reference	Date received
Norwich MCC Data – Batch 1	233906DP01-NDC-002	21 November 2012
Norwich MCC Data – Batch 2	233906DP01-NDC-004	27 November 2012

Source: Mott MacDonald incoming document register

9.2.2 The data was issued to the modelling team without any modification. A copy of this data is available upon request.

9.2.3 Figure 9.2 shows an example of the MCC data received.

Figure 9.2: MCC data sample

2425 / NORWICH OCTOBER 2012 CLASSIFIED COUNT										2425 / NORWICH OCTOBER 2012 CLASSIFIED COUNT																			
SITE: 1					DATE: 25/10/2012					SITE: 1					DATE: 25/10/2012														
LOCATION: A47 Between A1074 and Easton Roundabout										DAY: Thursday					LOCATION: A47 Between A1074 and Easton Roundabout										DAY: Thursday				
TIME	CAR	TAXI	LGV	OGV1	OGV2	PSV	MCL	PCL	TOT	TIME	CAR	TAXI	LGV	OGV1	OGV2	PSV	MCL	PCL	TOT										
07:00	202	0	34	13	22	1	1	0	273	07:00	160	1	34	9	12	0	1	0	217										
07:15	259	0	52	7	13	3	2	0	336	07:15	171	5	42	6	12	2	0	0	238										
07:30	313	2	47	13	22	0	5	0	402	07:30	201	3	36	9	13	5	1	0	268										
07:45	334	2	52	15	12	0	3	0	418	07:45	259	1	32	12	17	1	2	0	324										
H/TOT	1108	4	185	48	69	4	11	0	1429	H/TOT	791	10	144	36	54	8	4	0	1047										
08:00	365	15	52	6	13	2	0	0	453	08:00	221	0	34	14	10	1	1	0	281										
08:15	360	12	35	18	17	1	1	1	445	08:15	261	0	54	25	11	0	0	0	351										
08:30	317	14	31	17	19	3	2	0	403	08:30	232	4	31	17	17	1	1	0	303										
08:45	255	7	42	10	15	2	0	0	331	08:45	181	5	30	22	16	1	1	0	256										
H/TOT	1297	48	160	51	64	8	3	1	1632	H/TOT	895	9	149	78	54	3	3	0	1191										
09:00	271	10	32	9	17	4	2	0	345	09:00	158	7	23	14	16	3	0	0	221										
09:15	237	11	21	15	15	5	0	0	304	09:15	171	1	22	17	25	2	0	0	238										
09:30	231	4	25	18	12	1	1	0	292	09:30	153	2	26	13	15	4	1	0	214										
09:45	180	6	39	11	16	2	0	0	254	09:45	160	1	24	17	16	1	0	0	219										
H/TOT	919	31	117	53	60	12	3	0	1195	H/TOT	642	11	95	61	72	10	1	0	892										
10:00	156	8	25	13	14	2	0	0	218	10:00	137	4	19	9	14	3	0	0	186										
10:15	186	2	35	13	18	3	1	0	258	10:15	145	2	35	9	21	0	1	0	213										
10:30	161	2	26	16	17	1	0	0	223	10:30	153	1	23	8	16	1	1	0	203										
10:45	167	3	23	13	14	1	1	0	222	10:45	122	2	37	12	21	1	1	0	196										
H/TOT	670	15	109	55	63	7	2	0	921	H/TOT	557	9	114	38	72	5	3	0	798										
11:00	172	2	26	11	15	0	2	0	228	11:00	144	2	24	14	28	2	1	0	215										
11:15	143	4	31	10	13	1	1	0	203	11:15	160	1	20	16	10	0	3	0	210										
11:30	175	0	18	15	12	0	1	0	221	11:30	154	0	13	16	14	1	0	0	198										
11:45	173	2	20	11	19	2	1	0	228	11:45	159	1	22	10	20	1	0	0	213										
H/TOT	663	8	95	47	59	3	5	0	880	H/TOT	617	4	79	56	72	4	4	0	836										
12:00	166	2	13	17	19	0	0	0	217	12:00	186	3	16	11	24	1	1	0	242										
12:15	154	2	11	12	6	1	0	0	186	12:15	180	3	13	6	11	0	1	0	214										
12:30	198	3	28	10	16	0	0	0	255	12:30	176	1	16	12	13	1	1	0	220										
12:45	143	3	22	5	11	2	4	0	190	12:45	164	0	24	13	14	1	1	0	217										
H/TOT	661	10	74	44	52	3	4	0	848	H/TOT	706	7	69	42	62	3	4	0	893										
13:00	197	1	23	14	20	0	0	0	255	13:00	173	5	14	11	12	1	0	0	216										
13:15	193	2	24	8	10	1	1	0	239	13:15	189	1	24	13	14	0	0	0	241										
13:30	209	1	25	10	21	0	1	0	267	13:30	198	0	27	15	12	4	0	0	256										
13:45	168	0	25	8	15	1	2	0	219	13:45	163	2	14	14	13	2	1	0	209										

9.3 RSI data

9.3.1 The RSI data was supplied in Microsoft Excel spreadsheet format. The following data files were received:

- Site 4nb.xls
- Site 4sb_mi.xls
- Site 6 face to face_mi.xls
- Site 6 postcards_mi.xls
- Site 14_mi.xls
- Site 15_mi.xls
- Site 38 face to face_mi.xls
- Site 38 postcards_mi.xls
- Site 41 face to face_mi.xls
- Site 41 postcards_mi.xls
- Site 42 face to face_mi.xls

- Site 42 postcards_mi.xls
- Site 43_mi.xls
- Site 44 face to face_mi.xls
- Site 44 postcards_mi.xls
- Site 48_mi_revised.xls
- Site 49 face to face_mi.xls
- Site 49 postcards_mi.xls
- Site 51_mi.xls
- Site 52 face to face_mi.xls
- Site 52 postcards_mi.xls
- Site 53 face to face_mi.xls
- Site 53 postcards_mi.xls
- Site 54_mi.xls
- Site 55 face to face_mi.xls
- Site 55 postcards_mi.xls
- Site 57 face to face_mi.xls
- Site 57 postcards_mi.xls
- Site 58_mi.xls
- Site 59 face to face_mi.xls
- Site 59 postcards_mi.xls
- Site 60 face to face_mi.xls
- Site 60 postcards_mi.xls
- Site OC1_mi.xls
- Site OC2_mi.xls
- Site OC3 face to face_mi.xls
- Site OC3 postcards_mi.xls
- Site R1Nb_mi.xls
- Site R1sb_mi.xls
- Site R2 NB face to face_mi.xls
- Site R2 NB postcards_mi.xls
- Site R2 SB face to face_mi.xls
- Site R2 SB postcards_mi.xls
- Site R3 NB face to face_mi.xls
- Site R3 NB postcards_mi.xls
- Site R3 SB face to face_mi.xls
- Site R3 SB postcards_mi.xls
- Site R5 NB face to face_mi.xls
- Site R5 NB postcards_mi.xls
- Site R5 SB_mi.xls

9.3.2 The data was issued to the modelling team without any modification. A copy of this data is available upon request.

9.3.3 Figure 9.3 shows the typical presentation of the RSI data received.

Figure 9.3: Typical RSI Spreadsheet

1	logic	SerialNo	IntNo	Site	InterviewDate	InterviewType	VehOther	Occupan	OPostcod	OPurpose	OOther	DPostcod	DPurpose	DOther	results_o	results_d	OEasting	ONorthing	DEasting	DNorthing
2		1	1	34	15/11/2012	09:30	1		2 NR2 4JL	5		NR13 3AA	5		7	7	621819	309126	640260	310334
3		1	2	34	15/11/2012	09:30	1		1 NR3 3JQ	4		NR7 9NS	5		7	7	622611	310747	625291	309914
4		1	3	34	15/11/2012	09:30	1		1 NR2 3TD	3		NR7 0AB	4		7	7	620906	308917	626287	309878
5		1	4	34	15/11/2012	09:30	1		1 NR14 8QX	2		NR1 4JT	4		7	7	623889	303927	624974	309411
6		2	2	34	15/11/2012	09:30	1		1 NR8 5DD	1		NR5 0LE	8		7	7	617430	311988	618677	310865
7		2	3	34	15/11/2012	09:30	1		2 NR2 2HU	9		NR13 4QH	1		7	7	621860	307420	632752	311683
8		2	4	34	15/11/2012	09:30	1		1 NR1 1EE	7		NR7 0AB	7		7	7	623814	308429	626287	309878
9		3	1	34	15/11/2012	09:30	1		1 NR1 3PT	4		NR7 9NZ	1		7	7	623091	307706	625467	309834
10		3	3	34	15/11/2012	09:30	1		1 NR5 8TG	1		NR13 5AD	3		7	7	618978	309608	631495	312029
11		4	1	34	15/11/2012	09:30	1		2 NR3 3HR	3		NR13 5AJ	7		7	7	622819	310133	628022	311135
12		4	2	34	15/11/2012	09:30	1		2 NR6 6RQ	3		NR1 4JZ	6		7	7	622275	311677	625187	309478
13		4	3	34	15/11/2012	09:30	1		2 NR4 7UY	7		NR7 0AB	1		7	7	618143	307129	626287	309878
14		4	4	34	15/11/2012	09:30	1		2 NR1 3DD	6		NR5 0LE	1		7	7	623164	308307	618677	310865
15		5	1	34	15/11/2012	09:30	1		1 NR1 4ES	5		NR1 4AB	3		7	7	624077	309097	625191	309536
16		5	2	34	15/11/2012	09:30	1		2 NR1 3SH	6		NR7 0SR	6		7	7	622892	308143	627575	308981
17		5	4	34	15/11/2012	09:30	1		2 NR4 68A	6		NR1 4JT	6		7	7	622449	306587	624974	309411
18		6	1	34	15/11/2012	09:30	1		2 NR1 3DD	6		NR7 9NP	1		7	7	623164	308307	625269	309709

9.3.4 On receipt of the data a series of manual checks were carried out by the survey contractor, NDC, and Mott MacDonald to ensure its accuracy.

9.4 ATC Data Checking

9.4.1 All ATC data was checked to ensure its accuracy and reliability. Checks included:

- Tidality - ATC flows were plotted by time and direction, and judged as to whether the inbound/outbound flows were as expected (for example, Inbound; AM peak flows, Outbound; PM peak flows).
- Anomalies - any recorded spikes or troughs in the data that did not follow the overall trend of the site, were removed from the dataset.
- Vehicle Class - flows by vehicle classification were examined to confirm they appeared sensible in terms of the relative proportions.

9.4.2 Anomalous results were relatively rare, but when observed these instances were removed from the dataset.

9.4.3 At sites where ATC and MCC counts had been undertaken on the same site, on the same day, an analysis of the data was carried out to confirm that both counts had recorded similar volumes of traffic. A sample of the MCC videos was also undertaken to ensure the vehicle classification split had been accurately recorded.

9.5 RSI Data Checking

9.5.1 The Contractor NDC was to undertake and provide evidence of a series of checks on the collected data. This included:

- Evidence of RSI interview sample rates;
- Accuracy of transcription between enumerator records and electronic spreadsheets;
- Evidence that the compilation of raw RSI interview records was carried out correctly;
- Logic checks to ensure that origins and destinations were representative for the survey site;
- Accuracy of classification of vehicle types;
- Checks to ensure that traffic counts are representative of the characteristics of the survey site (i.e. checks of direction, tidality, hourly profiles); and
- Checks to identify any data anomalies.

9.5.2 In addition, Mott MacDonald carried out an independent review of the new RSI data. Data checks included general sense checking and origin/destination checking.

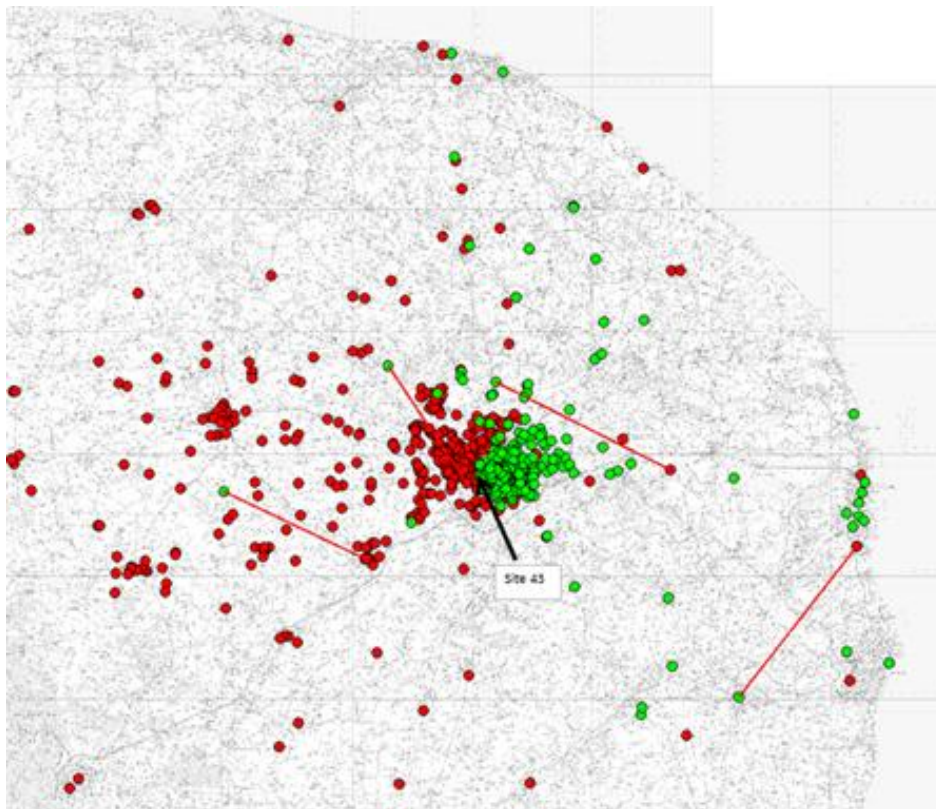
9.5.3 The following checks have been performed in regards to general sense checking:

- Time period - all data received was checked to ensure that records were correctly referenced to a valid time. The RSIs were carried out between the hours of 07:00 and 19:00, and were referenced to 15 minute intervals.
- Vehicle - data was checked to ensure that no more than five vehicle types were represented and that vehicle occupancy was appropriate. Car occupancy should not be greater than 7, LGV, OGV1 and OGV2 not greater than 3 and Bus no greater than 14.
- Postcode & purpose - all data was checked for the presence of records with the same origin/destination postcode or journey purpose. For example, 'home-home' and 'work-work' journey purposes were deemed to be erroneous and removed from the data set.
- Journey purpose - data was organised into charts representing the proportion of trips by origin and destination purposes. This was reviewed in relation to the site location in order to convey any systematic problems with the data.
- Vehicle distribution - data was organised to show the distribution of vehicle classification obtained. Again, this was reviewed in relation to the site location order to ensure sensibility and express any recognisable problems with the data.
- ATC cross-check - manual vehicle counts from RSI sites were compared with the Automatic Traffic Count data for the same site,

where available on the same day. The percentage difference between these two measures was calculated in order to ensure a good level of accuracy was achieved in the manual counts, and so we could calculate an accurate sample rate.

9.5.4 MapInfo GIS software was used to plot origin and destination postcodes, with a straight line (i.e. crow fly route) drawn between the two points in order to visually represent the recorded trip. This process enabled potentially invalid journeys to be highlighted; in particular that the journey records were in the appropriate direction (i.e. the origin and destination appeared on the correct side of the RSI location) and that the recorded trip was likely to have passed through the RSI. Figure 9.4 shows an example of a GIS origin/direction check for RSI Site 43, with illogical trips highlighted with a red line

Figure 9.4: Typical RSI Origin-Destination Check



Source: Contains Ordnance Survey Data (c) Crown copyright and database right 2013

9.5.5 In the case shown in Figure 9.4 4 illogical journeys were highlighted from 1,053 records. On completion of this process it was determined that illogical trips did not represent a significant number of trips within the dataset, and therefore were not removed from the dataset.

9.6 Data Manipulation

9.6.1 The average hourly weekday traffic flows from ATC data have been calculated for each direction of travel. The corresponding MCC was then used to split the ATC into vehicle categories.

9.7 Data Output

9.7.1 The data output from all surveys is available upon request.

10 Glossary of Abbreviations

AADT	Annual Average Daily Traffic
AAWT	Annual Average Weekday Traffic
ATC	Automatic Traffic Count
DfT	Department for Transport
DIADEM	Dynamic Integrated Assignment and Demand Modelling - software released by the Department for Transport
DMRB	Design Manual for Roads and Bridges – a Highways Agency publication setting out guidance and good practice for design and appraisal of road schemes
EB	East Bound
GIS	Geographic Information System - designed to capture, store, manipulate, analyse, manage, and present all types of geographical data
GPS	Global Positioning System
HA	Highways Agency
HGV	Heavy Goods Vehicle
LGV	Light Goods Vehicle
MCC	Manual Classified Count (for a link)
MCTC	Manual Classified Turning Counts
NATS	Norwich Area Transportation Strategy
NB	North Bound
NCC	Norfolk County Council
NDC	Nationwide Data Collection (company specialising in traffic surveys)
NDR	Norwich Northern Distributor Road

OD	Origin Destination
OGV1	A sub-category of OGV. Includes all rigid vehicles over 3.5 tonnes gross vehicle weight with two or three axles
OGV2	A sub-category of OGV. Includes all rigid vehicles with four or more axles and all articulated vehicles
RSI	Road Side Interview
SATURN	Simulation – Assignment model of Traffic on Urban Road Networks software
SB	South Bound
TRADS	Traffic flow Data System – the Highways Agency’s database of traffic count data
TrafficMaster	The company that collates movements of vehicles equipped with GPS equipped ‘probe vehicles’
VISUM	Transport modelling software used (in this case) for public transport modelling
WB	West Bound
WebTAG	Web-based Transport Appraisal Guidance produced by the Department for Transport

Figure A.2: Example of roadside interview postcard survey

Norfolk County Council
at your service

Mott MacDonald

NORWICH TRAFFIC SURVEYS

This survey will provide vital information to enable us to consider measures to relieve traffic problems in the area. Please answer the following questions concerning the journey you were making when handed this card. Please return it using the FREEPOST envelope provided. Thank you for your assistance.

All completed questionnaires will be entered into a prize draw. Three questionnaires will be drawn, each for a prize of £100 in Marks & Spencers vouchers. If you wish to enter the prize draw please complete Question 7.

Site Number (Office use only)			
Time of Issue (Office use only)	Q1 - What type of vehicle were you driving?	Q2 - Would you please tell us the exact address you had JUST come from, i.e. before being stopped? Include the postcode if possible.	Q3 - And your reason for being there?
07:00	1 - Car / Taxi / Minibus	HOUSE No. / FIRM /	1 - Home
07:30	2 - Light Goods Vehicle	CAR PARK	2 - Temporary Residence
08:00	Van, under 3.5 tonnes	STREET	3 - Normal Place of Work
08:30	3 - HGV type 1	TOWN	4 - Employers Business
09:00	2 axle twin rear tyres or three axle rigid	COUNTY	5 - Education (including pickup / drop off)
09:30	4 - HGV type 2	POSTCODE	6 - Shopping
10:00	Rigid vehicles with 4 or more axles and all articulated vehicles		7 - Personal Business (e.g. Bank, Dentist etc)
10:30	5 - Bus or Coach		8 - Visit Friends or Family
11:00			9 - Recreation and Leisure
11:30			10 - Other (please specify)
12:00			
12:30			
13:00			
13:30			
14:00	Q4 - How many people were in the vehicle, including the driver?	Q5 - Would you please tell us the exact address were going to NEXT? Include the postcode if possible	Q6 - And your reason for going there?
14:30		HOUSE No. / FIRM /	1 - Home
15:00		CAR PARK	2 - Temporary Residence
15:30		STREET	3 - Normal Place of Work
16:00		TOWN	4 - Employers Business
16:30		COUNTY	5 - Education (including pickup / drop off)
17:00		POSTCODE	6 - Shopping
17:30			7 - Personal Business (e.g. Bank, Dentist etc)
18:00			8 - Visit Friends or Family
18:30			9 - Recreation and Leisure
			10 - Other (please specify)
G7 - PRIZE DRAW		Winners will be notified by telephone. To enter the prize draw complete the following details:	
Name.....		Tel.....	

We should emphasise that although drivers are required to obey the instructions of the traffic officer, participation in this survey is purely voluntary. All information is collected on a strictly confidential basis. Address information is required to enable allocation of an accurate geographical location when details of the journeys are analysed. Once this has been done the addresses and survey questionnaires will be destroyed. For further information please telephone Ian Parkes 01 603 223288. Finally we would like to apologise for any inconvenience caused by this survey and thank you for your co-operation.

11.2 Appendix B. RSI Summary

Figure B.1: RSI Summary

Site No	Name	Day/Date	Direction	face to face					postcards			postcards					interview total	mcc	sample
				clean	reversed	illogical	void	total	issued	returned	sample	clean	reversed	illogical	void	total			
6	A1067 Drayton High Road south of Hurn Road	14-Nov	N	1015	4	43	30	1092	99	14	14.1%	14	0	0	0	14	1106	5483	20.2%
14	A47 Eastbound by Postwick Grove	21-Nov	E	198	2	13	5	218									218	16921	1.3%
15	A47 Westbound by Postwick Grove	21-Nov	W	164	3	8	25	200									200	15153	1.3%
33	Gurney Road (Between Gilman Rd & Mousehold Lane)	19-Nov	E	1078	14	39	100	1231									1231	4375	28.1%
34	B1140 Plumstead Road (Between Hilary Ave & Heartsease Lane)	15-Nov	E	299	7	14	37	357	1905	452	23.7%	415	19	8	10	452	809	4880	16.6%
38	Hall Road North of A146 Roundabout	12-Nov	S	479	21	61	72	633	2189	512	23.4%	442	29	20	21	512	1145	4391	26.1%
41	Unthank Road (Between Christchurch Rd & Mile End Rd)	12-Nov	S	458	16	22	41	537	1411	461	32.7%	420	19	16	6	461	998	3087	32.3%
42	The Avenue (Between Christchurch Rd and Colman Rd)	13-Nov	W	538	20	32	36	626	181	55	30.4%	52	0	2	1	55	681	1954	34.9%
43	B1108 Earlham Road (Between Christchurch Road & Coleman Road)	13-Nov	W	1053	21	57	84	1215									1215	4532	26.8%
44	Bowthorpe Road (Between Dereham Road & Farrow Road)	13-Nov	W	352	17	25	53	447	2503	632	25.2%	593	13	19	7	632	1079	4647	23.2%
48	Catton Grove Road (Between Woodcock Rd & Mile Cross Lane)	14-Nov	N						1476	430	29.1%	406	9	9	6	430	430	2670	16.1%
49	Constitution Hill (Between Wall Rd & Chartwell Rd)	14-Nov	N	254	5	16	15	290	1766	441	25.0%	409	14	11	7	441	731	3721	19.6%
51	Prince of Wales Road (Between Recorder Road & Riverside Road)	05-Nov	E						2350	628	26.7%	517	40	40	31	628	628	5330	11.8%
52	King Street (Between Rouen Road & Carrow Bridge)	08-Nov	E	296	20	20	42	378	421	120	28.5%	103	11	0	6	120	498	1242	40.1%
53	Ber Street (Between Thorn Lane & Finklegate)	05-Nov	S	577	42	36	136	791	826	239	28.9%	218	9	6	6	239	1030	3026	34.0%
54	All Saints green (Between Surrey St & Queens Rd)	05-Nov	S						2392	700	29.3%	614	34	28	24	700	700	3357	20.9%
55	St Stephen's Street (Between Surrey Street & Queens Road)	06-Nov	S						580	141	24.3%	92	13	17	19	141	141	1503	9.4%
56	Chapelfield North	06-Nov	W	959	74	115	128	1276									1276	5663	22.5%
57	Westwick Street (Between St Swithins Road & Barn Road)	06-Nov	W	702	52	17	45	816	411	89	21.7%	76	4	7	2	89	905	1478	61.2%
58	Duke Street (Between St Crispins Rd & St Marys Plain)	07-Nov	N						3968	1132	28.5%	989	39	67	37	1132	1132	7549	15.0%
59	Magdalen Street At Flyover	07-Nov	N	565	9	2	82	658	1131	320	28.3%	282	18	9	11	320	978	3340	29.3%
60	Whitefriars (Between Fishergate & Barrack Street)	07-Nov	N	532	11	19	118	680	1450	414	28.6%	347	15	33	19	414	1094	3365	32.5%
OC1	Long John Hill (between A146 & Cavell Rd)	12-Nov	S						894	224	25.1%	206	6	10	2	224	224	1792	12.5%
OC2	A1054 Martineau Ln (between A146 & Bracondale Rd)	08-Nov	W						9921	3058	30.8%	2937	35	25	61	3058	3058	13214	23.1%
OC3	Bracondale Rd (between Europa Way & Bracondale Mill Gate)	08-Nov	S	913	6	24	43	986	513	180	35.1%	168	1	6	5	180	1166	2234	52.2%
R1 - NB	A1042 Mousehold Lane between Salhouse Road and Roundtree Way	19-Nov	N						925	240	25.9%	203	15	6	16	240	240	9915	2.4%
R1 - SB	A1042 Mousehold Lane between Salhouse Road and Roundtree Way	19-Nov	S						1605	399	24.9%	340	2	39	18	399	399	9118	4.4%
R2 - NB	Falcon Road E between Salhouse Road and Blithewood Gardens	15-Nov	N	453	36	36	19	544	526	143	27.2%	127	8	7	1	143	687	1380	49.8%
R2 - SB	Falcon Road E between Salhouse Road and Blithewood Gardens	15-Nov	S	600	79	54	51	784	283	94	33.2%	90	2	2	0	94	878	1444	60.8%
R3 - NB	Blue Boar Lane between Salhouse Road and Laundry Lane	15-Nov	N	325	25	89	24	463	2858	544	19.0%	418	53	55	18	544	1007	4914	20.5%
R3 - SB	Blue Boar Lane between Salhouse Road and Laundry Lane	15-Nov	S	376	26	37	17	456	2063	706	34.2%	586	84	27	9	706	1162	5200	22.3%
R4 - NB	Green Lane E between Salhouse Road and Wilkinson Road	20-Nov	N	694	9	18	49	770								770	1673	46.0%	
R4 - SB	Green Lane E between Salhouse Road and Wilkinson Road	20-Nov	S	615	60	38	61	774								774	1951	39.7%	
R5 - NB	B1140 Mill Road between Norwich Road and Hall Drive	20-Nov	N	152	1	16	37	206	1419	447	31.5%	382	15	34	16	447	653	2775	23.5%
R5 - SB	B1140 Mill Road between Norwich Road and Hall Drive	20-Nov	S	1090	18	76	62	1246								1246	2537	49.1%	
			Totals	14737	598	927	1412	17674	46066	12815	27.8%	11446	507	503	359	12815	30489	165814	18.4%
			%split	83.4%	3.4%	5.2%	8.0%					89.3%	4.0%	3.9%	2.8%				

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11.3 Appendix C. Journey Time Output Examples

Figure C.1: Time distance graph example

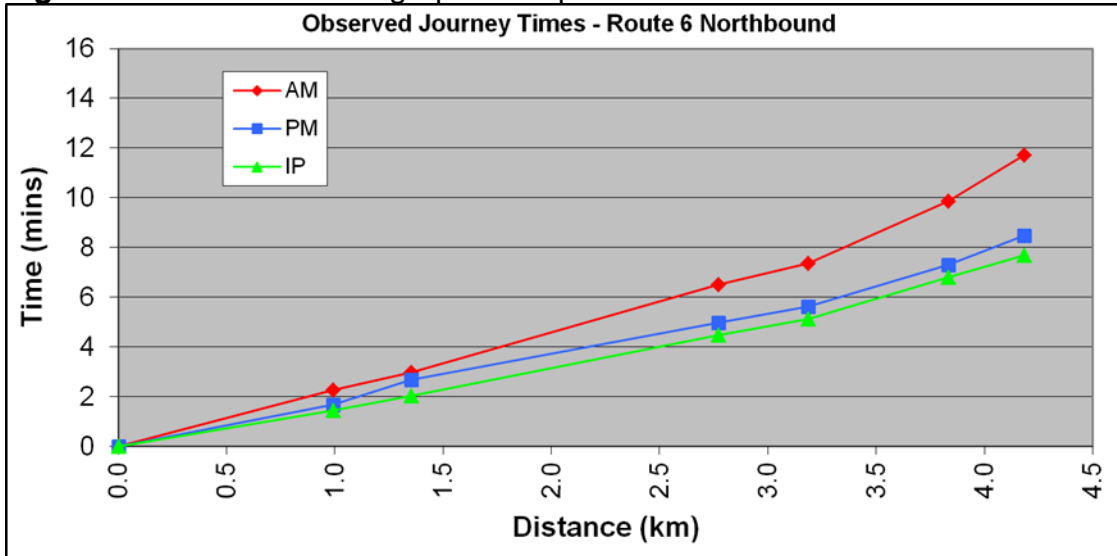
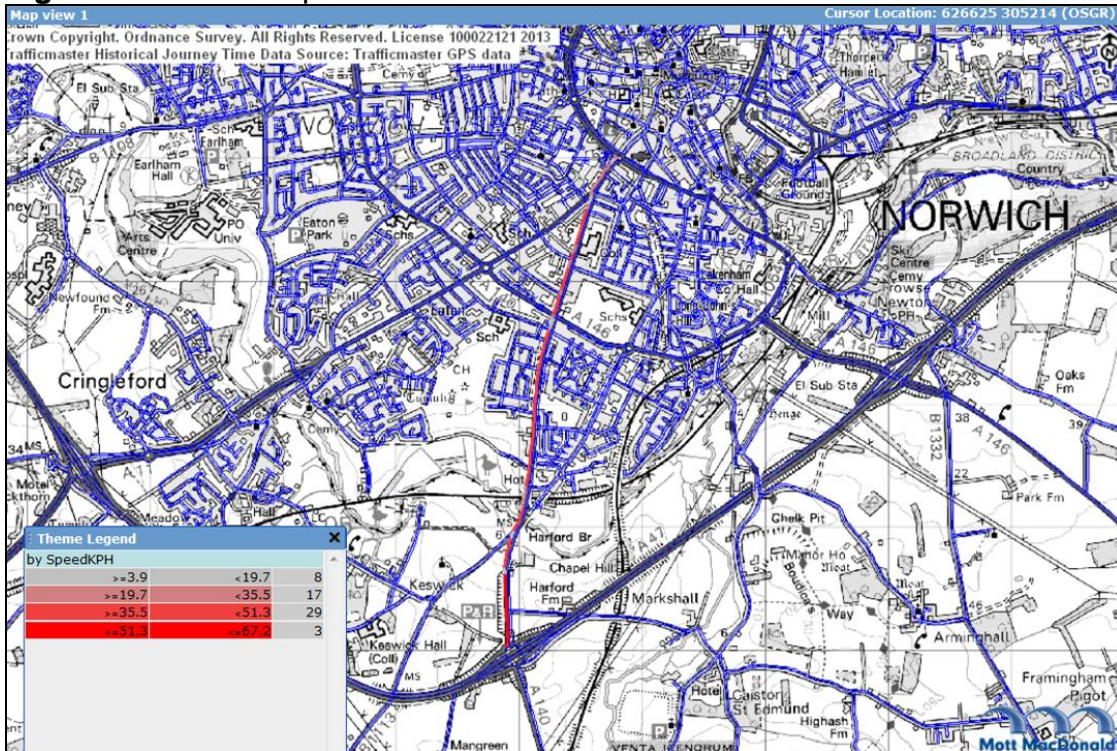


Figure C 2: Heat map



The Norfolk County Council (Norwich Northern Distributor Road (A1067 to A47(T))) Order

5.9 Highway Model – Local Model Validation Report

Planning Act 2008

Infrastructure Planning

The Infrastructure Planning (Applications: Prescribed Forms and Procedure)
Regulations 2009


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MM filing reference: 233906/DP/01/233906DP01-DOC-006

This document is submitted in relation to the application for a Development Consent Order by Norfolk County Council to the Secretary of State, under the Planning Act 2008.

The application is for the Norfolk County Council (Norwich Northern Distributor Road (A1067 to A47(T))) Order, to grant development consent for the construction of a new highway running west to east, to south, between the A1067 Fakenham Road and the A47 Trunk Road at Postwick, including improvements to the existing highway network to the north and north east of Norwich.

This document comprises part of the application documents and relates to Regulation 5(2)(q) of the Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009.

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1 Key Summary

- 1.1.1 Mott MacDonald has been appointed by Norfolk County Council (NCC) to develop and update the existing Norwich Area Transportation Strategy (NATS) transport model of Norwich for the purposes of supporting the promotion of the Norwich Northern Distributor Road (NDR).
- 1.1.2 Highway models have been developed in SATURN to represent the AM peak hour (08:00-09:00), an average hour in the inter-peak (10:00 – 16:00) and the PM peak hour (17:00 – 18:00).
- 1.1.3 The development of the highway model relies on some of the information collected for the previous version of the model, however this is limited to the origin-destination information from the 2006 roadside interview surveys (RSI). Other data, including new RSIs and traffic counts was obtained through a new data collection exercise that was undertaken in the autumn of 2012. Full details of the data collection exercise to collate this information are included in the Report of Surveys (document 5.8).
- 1.1.4 For the 2012 rebase of the NDR model eleven journey time routes have been defined to cover the principal radial and ring routes in the urban area as well as extending into the rural fringe. Observed journey time data has been sourced from Traffic Master subject to checks on the integrity of the dataset in each case.
- 1.1.5 Trip matrices have been prepared in line with advice given in WebTAG (Unit 3.10.2) and DMRB (Volume 12) based on both observed and synthetic data. Details of checks undertaken at key stages in the development of the matrices to ensure that the provenance of the matrices is maintained are presented in this report. Checks include analysis of the observed and synthetic matrices prior to merging and, subsequent to merging, comparisons with counts before applying matrix estimation. Analyses of the effects of matrix estimation are also documented.
- 1.1.6 The model convergence has been monitored and meets the criteria in WebTAG (Unit 3.19) in all time periods.
- 1.1.7 The model achieves a good level of traffic flow calibration with results indicating a close match to observations on the calibration screenlines and for individual link counts, with the WebTAG (Unit 3.19) criteria for GEH and flow proximity being met in all time periods for both all vehicles and cars.

- 1.1.8 Traffic flow validation has been undertaken against independent count data and assessment of the validation process shows that the model also achieves a good level of flow validation in each of the modelled time periods, meeting many of the validation criteria and is close to meeting the criteria in WebTAG (Unit 3.19) in other cases.
- 1.1.9 The journey time validation is considered to be reasonably good with the model recreating journey times that are representative on key routes in the modelled area. The discrepancy with observed journey times in the AM and PM peak hours is considered to be acceptable on the basis that the majority of links over which journey times have been compared are generally consistent with observations and that where overall journey time routes do fall outside the acceptability guidelines this is generally as a result of short sections, or single junctions, where delay has not been fully represented in the model.
- 1.1.10 It is considered that the base year highway assignment models developed for the 2012 NATS transport model demonstrate a good representation of traffic behaviour in the study area and form a robust basis from which future year forecasts for the NDR scheme can be developed.

2 Introduction

2.1 Background

- 2.1.1 Mott MacDonald has been appointed by Norfolk County Council (NCC) to assist with the development and appraisal of the Norwich Northern Distributor Road, known as the NDR or referred to as the Scheme.
- 2.1.2 The Scheme would be a dual carriageway all-purposes strategic distributor road, to be classified as the A1270 Principal Road, which would link the A1067 Fakenham Road near Attlebridge, to the A47 Trunk Road (T) at Postwick. This will be over a length of approximately 20.4km.
- 2.1.3 The NDR is a project of national significance which requires a Development Consent Order (DCO) under the Planning Act 2008 and this formal planning process began in 2013. It is currently anticipated that the process will be completed in time for the NDR scheme to start construction in 2015 and to be opened in 2017.
- 2.1.4 This document is one of a number that support the DCO, each of which has its own unique document number, and should therefore be read in conjunction with the other documentation. The proposed layout of the NDR is shown in the General Arrangement Plans contained in document number 2.6, whilst the full needs case for the NDR is explained in the Statement of Reason (document 4.1) and the Environmental Statement (document 6.1).
- 2.1.5 This document has been prepared to describe the updating of the existing (NATS) transport model of Norwich for the purposes of supporting the appraisal of the NDR. The development of the traffic model has been undertaken in line with current Department for Transport (DfT) guidance, and particularly with that contained in WebTAG (Unit 3.19), such that the model is suitable for the preparation of the DCO submission.
- 2.1.6 Figure 2.1 below shows the preferred route for the NDR scheme.

Figure 2.1: Preferred Route of the NDR Scheme



2.2 Overall Modelling System

2.2.1 The existing modelling system consists of three main elements:

- A highway assignment model developed in SATURN
- A public transport assignment model developed in VISUM
- A variable demand model using the DIADEM software.

2.2.2 Key changes from previous versions of the Norwich SATURN model include:

- Rebasing the Norwich model to 2012 through the collection of new survey data including new road side interviews (RSI) at locations previously surveyed in 2002 and at locations along a new radial screenline;
- Changes to the arrangement of calibration and validation screenlines;
- New tracker/satnav journey time data collected from Traffic Master; and
- New signal data for key junctions incorporated into model.

2.3 Purpose of Report

2.3.1 The purpose of this report is to document the development of the revised 2012 highway model including:

- The key characteristics of the model;
- The data used to develop the model;
- The process used to develop highway demand; and
- The calibration and validation of the model.

2.3.2 This report constitutes the local model validation report for the highway (SATURN) model and describes the development of the model in detail and presents the validation of model outputs against observed traffic flows and journey times. Other reports of relevance to the modelling work include:

- Report of Surveys¹;
- Local Model Validation Report - Public Transport Model² ; and
- Traffic Forecasting Report³.

2.4 Structure of Report

2.4.1 Following the introductory chapter, this report is structured as follows:

- Chapter 3 provides an outline description of the model development and structure;
- Chapter 4 presents the development of the highway network;
- Chapter 5 describes the development of the observed and synthetic demand matrices;
- Chapter 6 covers the work involved in calibrating the network and matrices, through matrix estimation;
- Chapter 7 describes the local model validation, in terms of both traffic flows and journey times. Comparisons are in each case based upon the validation criteria in WebTAG Unit 3.19.
- Chapter 8 sets out conclusions

¹ DCO Document 5.8 - Norwich Northern Distributor Road, Report of Surveys 2012

² DCO Document 5.10 - Norwich Northern Distributor Road, Local Model Validation Report, Public Transport Model

³ DCO Document 5.6 - Norwich Northern Distributor Road, Traffic Forecasting Report

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3 Data Used in Model Development

3.1 Overview

- 3.1.1 To develop the base year model, information is required on travel demand and network performance.
- Travel demand refers to travel patterns i.e. where people are travelling to and from and the volumes of traffic between each origin and destination.
 - Network performance relates to how the network is operating, for example travel times or junction delays.
- 3.1.2 The base year model should reflect observed travel patterns, including origin-destination movements and volumes of traffic making these movements. It should also represent network characteristics and performance including routing, traffic volumes at specific locations and journey times between key locations. To obtain this information a data collection exercise has been undertaken. The key elements of this exercise are:
- Origin destination data
 - Traffic count data
 - Journey time data
- 3.1.3 The development of the highway model relies on some of the information collected for the previous version of the model, however this is limited to the origin-destination information from the 2006 roadside interviews. Other data, including new RSIs and traffic counts was obtained through a new data collection exercise that was undertaken in the autumn of 2012. Full details of the data collection exercise to collate this information are included in the Report of Surveys (document 5.8).
- 3.1.4 A summary of the data used to develop the current model is outlined in the following section.

3.2 Summary of existing traffic data

- 3.2.1 The data used to develop the previous NATS traffic model consisted of the following:
- Roadside Interview Surveys (62 sites)
 - Manual Classified Counts (MCC) (56 turning counts, 106 link counts)
 - Automatic Traffic Counts (ATC) (106 sites)
 - Journey Time Surveys (9 bi-directional routes)

- 3.2.2 Traffic data used in the NATS model were primarily taken from surveys undertaken in 2002 and 2006 with a small number of additional traffic counts being undertaken in 2010.
- 3.2.3 Existing traffic data that were retained from the previous modelling work for use in the 2012 rebasing of the Norwich model consisted of RSI origin-destination data from surveys undertaken in 2006. Data from earlier RSI surveys was discarded along with the associated count data.
- 3.2.4 The locations of the 2006 RSI sites from which origin-destination data were retained are indicated in Figure 3.1 below.

Figure 3.1: Location of 2006 RSI Sites



3.3 Data for SATURN Model Update

- 3.3.1 The previous Norwich Area Transportation Strategy (NATS) model is based on a large amount of trip interview data from surveys undertaken in 2002 (26 sites) as well as 2006 data (36 sites). Due to the prohibitive cost of updating all the RSI sites an approach has been adopted that replaces the ten year old 2002 interview data but reuses that from 2006, albeit with the 2006 OD data being expanded to 2012 traffic counts.
- 3.3.2 An exercise to gather this interview data was undertaken in the autumn of 2012 along with the collection of contemporaneous traffic counts at a number of locations in addition to the RSI sites for the purposes of calibration and validation of the traffic model.

3.4 New Roadside Interview Surveys

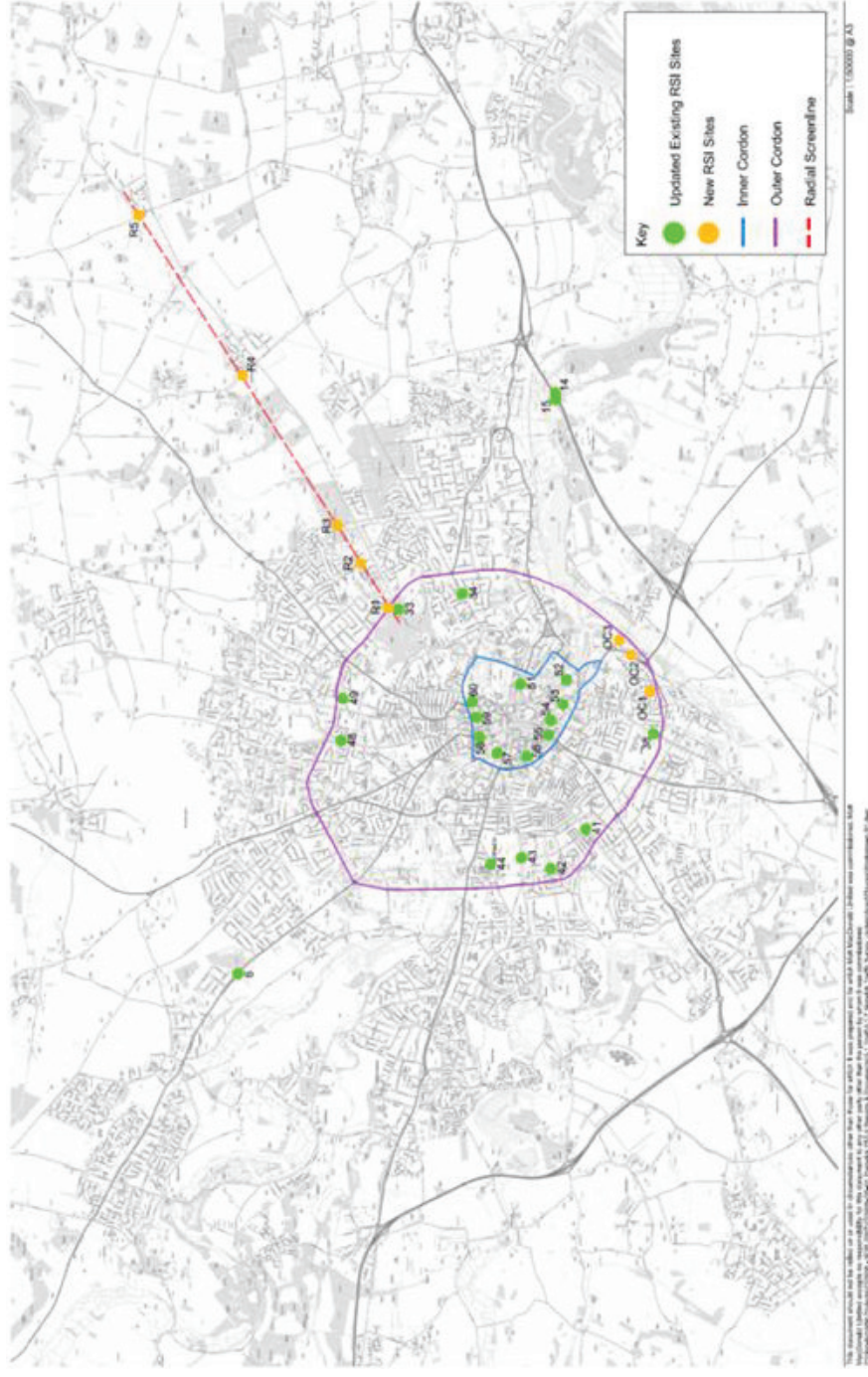
- 3.4.1 A key issue that arose during the last model build and update was that the existing RSI screenlines were comprehensive in intercepting radial trips, but poorer at intercepting orbital trips. This is important for NDR so the data collection has been enhanced with a new radial screenline (dashed on Figure 3.2) with five new sites that pick up orbital movements in the north-east quadrant.
- 3.4.2 In addition to the new radial screenline the existing cordons have been enhanced as follows:
- The 2002 sites 12 and 13 on Longwater Lane have been omitted from the new data collection exercise as they repeat the data captured by the River screenline.
 - The southern part of the outer cordon has been modified so that a more watertight cordon can be formed. The modification consists of the exclusion of existing sites 1 and 20 (A47 west of A1074 and A146 Barrett Road respectively) and the inclusion of three new RSI sites (shown as OC1 to OC3 in Figure 3.2).
- 3.4.3 The result of the above changes is that 30 new RSI surveys were undertaken in October/November 2012 (avoiding the school holiday period in the week commencing 29th October). Of these, 22 are at sites previously surveyed in 2002; 5 new sites form the radial screenline to the north east and 3 new sites are included to the southern part of the outer cordon. The new sites are shown in orange in Figure 3.2.
- 3.4.4 A summary list of the 2012 RSI surveys is provided in Table 3.1.

Table 3.1: List of RSI sites for 2012 update

Site Reference	Site Location	Survey Direction
Outer cordon		
38	Hall Road (between Barrett Road and Cecil Road)	Outbound
41	Unthank Road (Between Christchurch Rd & Mile End Rd)	Outbound
42	The Avenues (Between Christchurch Rd and Colman Rd)	Outbound
43	B1108 Earlham Road (Between Christchurch Road & Coleman Road)	Outbound
44	Bowthorpe Road (Between Dereham Road & Farrow Road)	Outbound
48	Catton Grove Road (Between Woodcock Rd & Mile Cross Lane)	Outbound
49	Constitution Hill (Between Wall Rd & Chartwell Rd)	Outbound
33	Gurney Road (Between Gilman Rd & Mousehold Lane)	Outbound
34	B1140 Plumstead Road (Between Hilary Ave & Heartsease Lane)	Outbound
OC1	Long John Hill (between A146 & Cavell Rd)	Outbound
OC2	A1054 Martineau Ln (between A146 & Bracondale Rd)	Outbound
OC3	Bracondale Rd (between Europa Way & Bracondale Mill Gate)	Outbound
Inner Cordon		
51	Prince of Wales Road (Between Recorder Road & Riverside Road)	Outbound
52	King Street (Between Rouen Road & Carrow Bridge)	Outbound
53	Ber Street (Between Thorn Lane & Finklegate)	Outbound
54	All Saints green (Between Surrey St & Queens Rd)	Outbound
55	St Stephen's Street (Between Surrey Street & Queens Road)	Outbound
56	Chapelfield North	Outbound
57	Westwick Street (Between St Swithins Road & Barn Road)	Outbound
58	Duke Street (Between St Crispins Rd & St Marys Plain)	Outbound
59	Magdalen Street At Flyover	Outbound
60	Whitefriars (Between Fishergate & Barrack Street)	Outbound

Site Reference	Site Location	Survey Direction
Other locations		
6	A1067 Drayton High Road (between Hurn Road and Drayton Wood Road)	Outbound
14	A47 Eastbound by Postwick Grove	Eastbound
15	A47 Westbound by Postwick Grove	Westbound
Radial screenline		
R1	A1042 Mousehold Lane between Salhouse Road and Roundtree Way	Southbound and Northbound*
R2	Falcon Road East between Salhouse Road and Blithewood Gardens	Southbound and Northbound*
R3	Blue Boar Lane between Salhouse Road and Linacre Avenue	Southbound and Northbound*
R4	Green Lane West between Salhouse Road and Wilkinson Road	Southbound and Northbound*
R5	B1140 Mill Road between Norwich Road and Lower Street	Southbound and Northbound*

Figure 3.2: RSI sites for 2012 update



3.5 New Traffic Count Data

3.5.1 Traffic count data has been collected for all the RSI sites (both the newly surveyed sites and the 2006 sites) to allow all the RSI data to be expanded to a common October 2012 base. The 2006 RSI sites where new ATCs (29 in total) have been undertaken are shown in Figure 3.1 and summarised in Table 3.2. ATC counts have been undertaken at 59 RSI sites in total with counts being undertaken for both directions over a two-week period, including the day of the RSI survey for the 2012 RSI sites.

Table 3.2: The 2006 RSI sites where ATC surveys have been undertaken in 2012

Site Reference	Site Location
1	A47 Between A1074 and Easton Roundabout
3	A140 Between B1149 and Middletons Lane
4	B1150 North Walsham Road between Crostwick Lane and Beeston Lane
5	A1151 Wroxham Road Between P&R and Beeston Lane
6	C283 Salhouse Road Between Blue Boar Lane and Green Lane East
7	C874 Plumstead Road Between Dussindale Drive and Green Lane North
9	A47 Postwick Between interchange and Church Lane
10	A146 Loddon Road Between B1332 and Fox Lane
11	B1332 Bungay Road Between A146 and Arminghall Lane
12	A140 between A47 and Mangreen
13	B1113 Between Low Road and Mangreen Lane
14	A11 Between Station Lane and A47
15	B1172 Between Station Lane and A47
16	B1108 Between Stocks Hill and Rectory Lane
18	A1074 Dereham Road Between Sweetbriar Road and Waterworks Road
19	A1067 Between Boundary Road and Whiffler Road
20	A1402 Aylsham Road Between Boundary Road and Spenke Road
21	A1151 Sprowston Road Between Chartwell Road and Templemere
23	A1242 Yarmouth Road Between Stanley Avenue and Harvey Lane
25	A140 Ipswich Road Between Daniels Road and Lime Tree Road
26	A11 Newmarket Road Between Mile End Road and Christchurch Road
28	Hellesdon Road at bridge over river
NW1	A1067 Fakenham Road Between Fir Covert Road and Attlebridge

Site Reference	Site Location
NW2	C167 Marl Hill Road Morton
NW3	C173 Weston Hall Road Lenwade
NW4	C245 The Street Felthorpe
NW6	C172 Ringland Road Ringland at bridge
NW8	C461 Taverham Lane Taverham at bridge
NW10	C162 Costessey Lane Costessey at bridge

3.5.2 Further to the above requirement for count data to expand the RSI data, two-week ATC data has also been collected for the purposes of model validation. It is acknowledged that the previous model build resulted in a limited selection of sites that could be organised onto screenlines for the purposes of validation. In light of this, the arrangement of validation screenlines and cordons has been revised significantly with the introduction of several new screenlines. The resulting arrangement of validation screenlines is shown in Figure 3.3.

3.5.3 The validation screenlines required ATC data to be collected at 35 sites with sites on the SRN being covered by the HA TRADS data. For each of the sites count data was collected for both directions. A summary of the ATC sites for validation is provided in Table 3.3 below.

Table 3.3: Validation count locations

Site Reference	Site Location
V1	Yarmouth Road Between Bishops Close and South Avenue
V2	St Williams Way Between Thunder Lane and Thor Loke
V3	Plumstead Road Between Heartsease Lane and Witard Road
V4	Salhouse Road Between Falcon Road East and Avian Way
V5	Wroxham Road Between Recreation Ground Road and Allen's Avenue
V6	Constitution Hill Between Allen's Lane and Mounteney Close
V7	Spixworth Road Between Church Street and The Warren
V8	Cromer Road Between Bramble Avenue and Brabazon Road
V9	Reepham Road Between Hastings Avenue and Pinewood Close
V10	Drayton High Road Between Middletons Lane and Hellesdon Park Road
V11	Dereham Road Between Norwich Road and Gurney Road
V12	Earlham Road Between Wilberforce Road and Old Watton Road

V13	A11 Newmarket Road Between Bluebell Road and Colney Lane
V14	A140 Between B1113 and A140
V15	A146 Between Martineau Lane and A47
V16	A47 Between A146 and A140
V17	Barrett Road Between Long John Hill and A146
V18	A147 Bracondale Between City Road and Carrow Hill
V19	A147 St Crispins Road at Magdalen Street flyover
V20	A1042 Mile Cross Lane Between Vulcan Road South and Partridge Way
V21	Church Street (Horsham St Faiths) Between West Lane and Back Street
V22	Barrack Street Between Silver Road and Gurney Road
V23	Heartsease Lane Between Rider Haggard Road and Salhouse Road
V24	Woodside Road Between Greenborough Road and Chipperfield Road
V25	Broad Lane Between Vera Road and Norwich Road
V26	Honeycombe Road Between B1140 Norwich Road and Belt Road
V27	Primrose Corner Between B1140 and Belt Road
V28	A147 St Crispins Road Between Pitt Street and Barker Street
V29	A1057 Drayton Road Between Junction Road and Stone Road
V30	A1024 Mile Cross Road Between Half Mile Road and Woodward Road
V31	A140 Boundary Road Between Overbury Road and City View Road
V32	Middleton's Lane Between Westgate and Kinsale Avenue
V33	Hall Lane Between George Drive and Carter Road
V34	School Road Between Reepham Road and Badgers Brook Road
V35	Fir Covert Road Between Fakenham Road and Reepham Road

3.5.4 Manual classified counts (MCC) were undertaken in conjunction with the ATCs to allow classification by vehicle type of all the ATC data. MCCs have been undertaken using video cameras at 94 sites (59 RSI sites and 35 validation sites) over a 12 hour period from 0700 to 1900.

3.5.5 A single manual classified turning count (MCTC) has been undertaken as part of the 2012 data collection exercise. The survey is located at the roundabout junction of Middletons Lane and Reepham Road (see Figure 3.3)

3.5.6 This MCTC was done to add to the other turning counts referenced below to help improve calibration.

3.6 Other traffic count data

3.6.1 In addition to the data collected specifically for the purposes of rebasing the Norwich model a number of other traffic counts were also ultimately used in the calibration of the peak hour models. These data consisted of the following:

- Turning counts at the A11/A47 Thickthorn Junction;
- Turning counts at the A47 Postwick Junction;
- Various count data from the Beyond Green planning application;
- ATC data on Middle Road; and
- Turning counts at the A140 Cromer Road/Holt Road Roundabout.

3.6.2 The locations of these additional calibration counts are illustrated in Figure 3.4. It should be noted that in some cases data was only available for the peak periods and therefore these additional sites were not generally used in the development of the inter-peak model.

Figure 3.3: Validation count locations for 2012 update

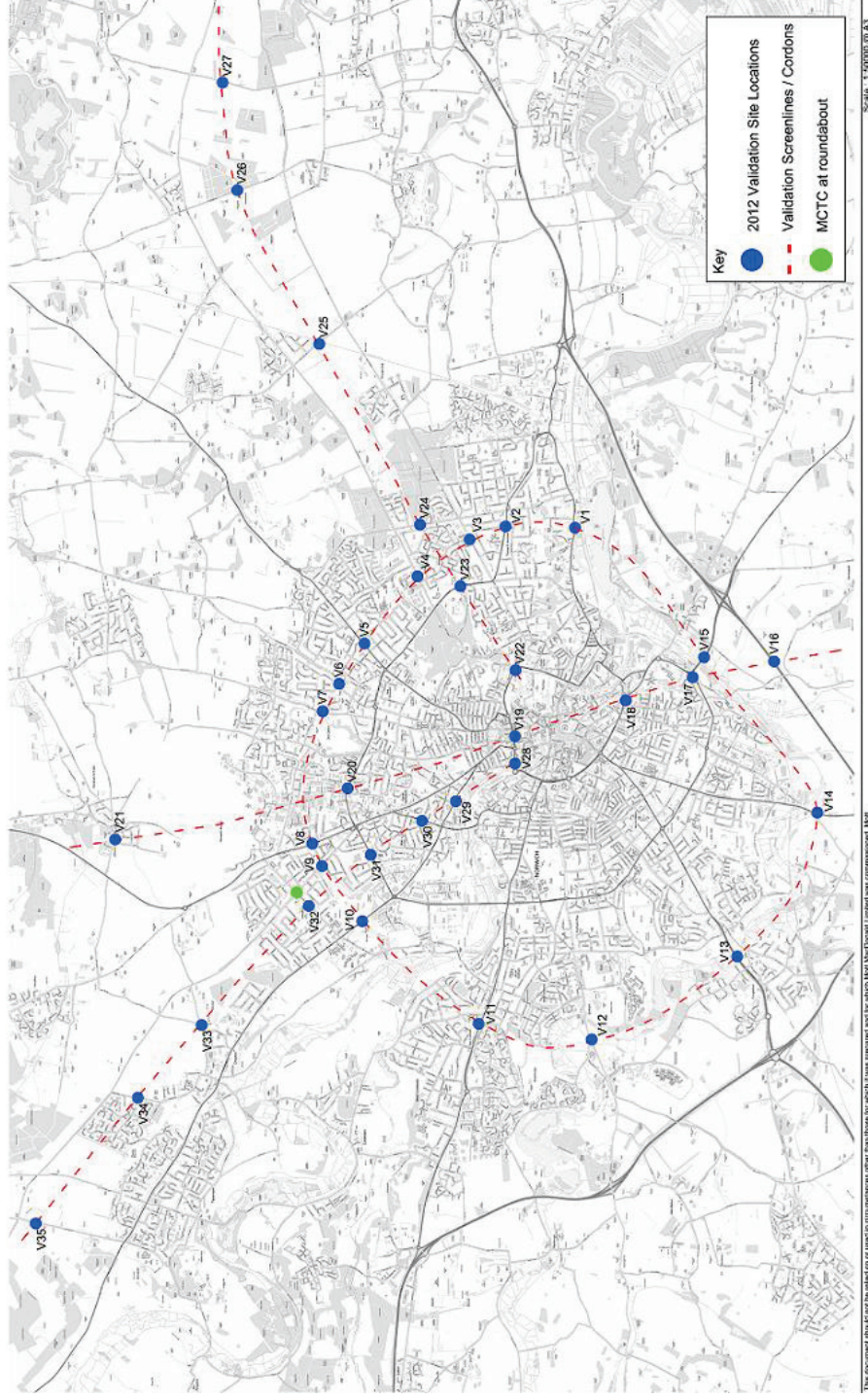
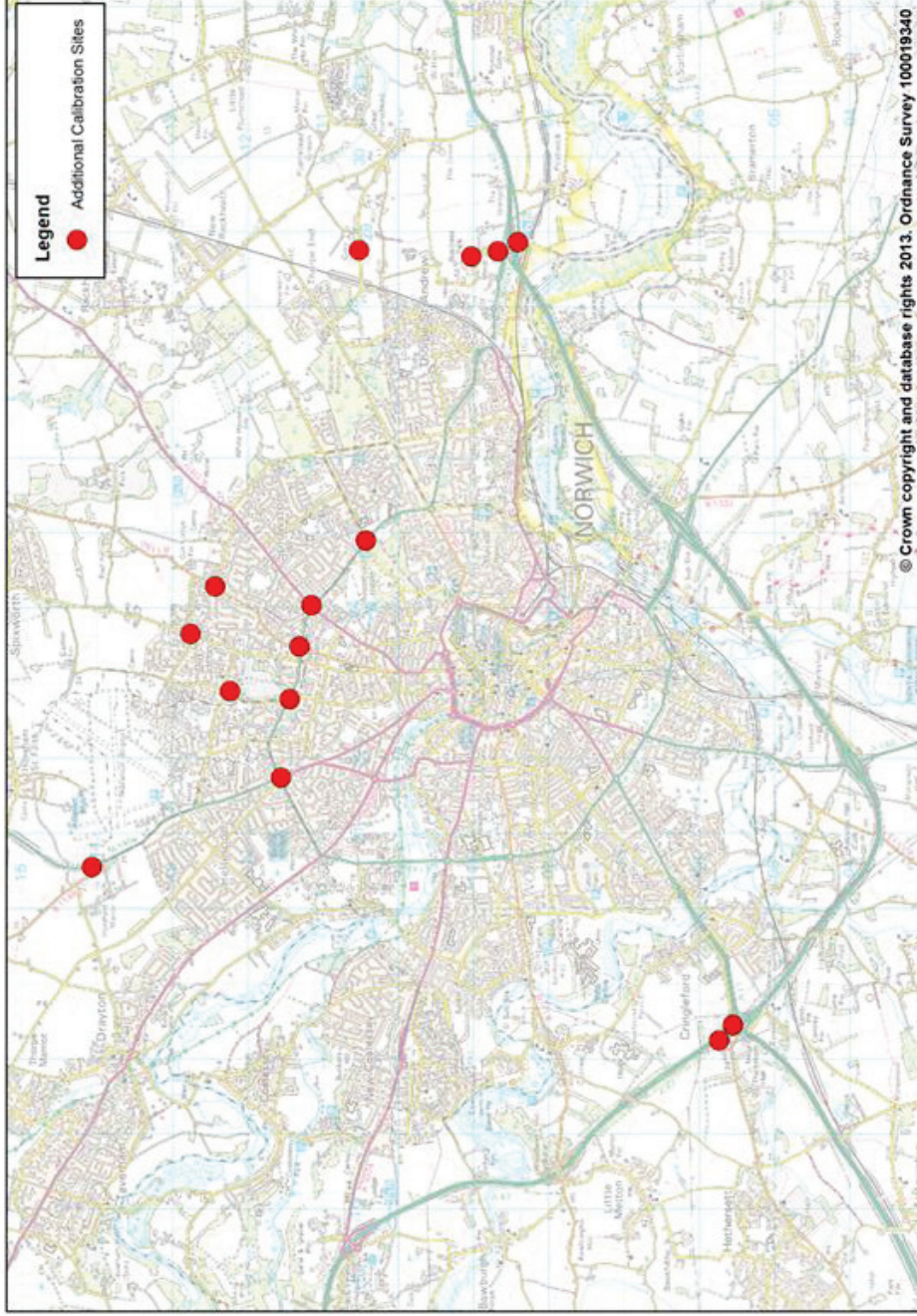


Figure 3.4: Additional calibration count sites



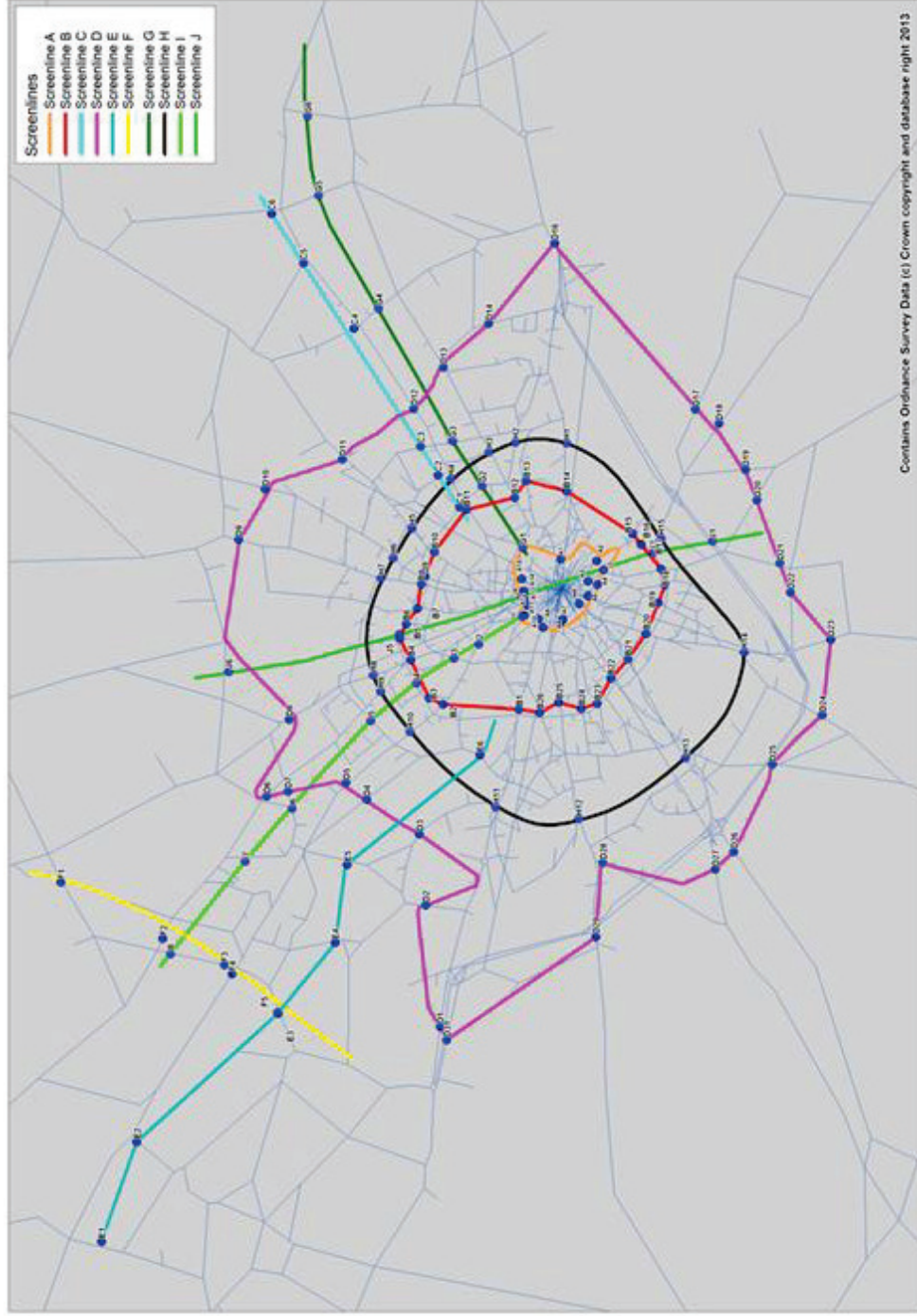
3.7 Normalisation of Counts

- 3.7.1 The main traffic counts used in the modelling were those collected in the autumn 2012 surveys. As these surveys were undertaken in the months of October and November it was appropriate to check that there was no significant variation in traffic flows between the two months that could skew the data. Examination of long term ATC data indicated that the variability in flows between October and November was minimal and therefore no adjustment was considered to be needed to normalise the November data to be consistent with that from October.
- 3.7.2 Other counts that were used in the traffic modelling (as indicated in 3.6) were undertaken over a range of different years/months. In order to use these counts in the modelling work it was necessary to apply adjustments to normalise the data to October 2012. Adjustments were generally based on long term ATC counts as appropriate.
- 3.7.3 For a number turning counts from the Beyond Green dataset, particularly those on the outer ring road, the sites were coincident with recently collected ATC data. At these sites the turning proportions were retained with volumes being controlled to the new October/November 2012 ATC counts.

3.8 Application of Traffic Counts

- 3.8.1 The traffic count dataset has been used for a number of purposes including:
- As control counts for expansion of interview data
 - For matrix calibration
 - Assignment validation
- 3.8.2 Figure 3.5 shows the locations of traffic counts used in the development of the highway model and their arrangement into screenlines/cordons as described in the sections below.

Figure 3.5: Location and Arrangement of Traffic Counts used in Model Development



3.9 Calibration screenlines

3.9.1 The following calibration screenlines have been used for the new NDR model. In all cases, the screenlines are bi-directional. The calibration screenlines are indicated in Figure 3.5.

- Inner Ring Road (RSI) Cordon (Screenline A) - a cordon around Norwich city centre just inside the inner ring road intersecting 15 radial routes and the 6 park and ride routes.
- Outer Ring Road (RSI) Cordon (Screenline B) - a cordon just inside the outer ring road, intersecting 23 radial routes and the 6 park and ride routes.
- North East (RSI) Screenline (Screenline C) - a radial screenline consisting of five points, oriented southwest/northeast and running parallel to Salhouse Road (to the north) from A1042 Mousehold Lane in the west to the B1140 Bell Lane in the east.
- Outer (RSI) Cordon (Screenline D) - a cordon around the outskirts of Norwich intersecting 23 radial routes. The cordon extends beyond the A47 to the south; west of the A47/A1074 Longwater Interchange; north of Norwich Airport and beyond A47/A1042 Postwick Junction to the east.
- River (RSI) Screenline (Screenline E) - a screenline consisting of 17 points running northwest/southeast through the centre of Norwich following the River Wensum from Weston Hall Road in the west to the A47 crossing of the River Yare in the east.
- North West (RSI) Screenline (Screenline F) - a screenline consisting of 4 points running southwest/northeast just east of Taverham to the north west of Norwich.

3.10 Validation screenlines

3.10.1 The following validation screenlines were proposed for the new NDR model. In all cases the screenlines are bi-directional. The proposed validation screenlines are indicated in Figure 3.5.

- North East radial Screenline (Screenline G) - a screenline running radially from the inner ring road at A147 Barrack Street (west of Gurney Road) out of town parallel, and to the south of Salhouse Road. The screenline consists of 6 points ending at Primrose Corner.
- Intermediate Cordon (Screenline H) - a cordon of Norwich lying between the Outer Ring Road (RSI) cordon and the Outer calibration

cordon. The cordon intersects 15 radial routes. (Sites H8 to H11 were used in calibration)

- North West Radial Screenline (Screenline I) – a screenline running radially from the inner ring road at A147 St Crispins Road (west of Pitt Street) out of town parallel, and to the north of A1067 Fakenham Road. The screenline consists of 8 points ending at Fir Covert Road.
- North/South Screenline (Screenline J) - a north/south screenline running through Norwich city centre. The screenline consist of 6 points and runs from the A47 (west of the A146 Trowse Interchange) in the south, through to Church Street, Horsham St Faith. (Screenline J was used in calibration)

3.10.2 The intention was that all four of these screenlines be retained for validation purposes, although during the course of validation (and indeed at the scoping stage) it was recognised that it would be necessary to use some of these data in the calibration.

3.10.3 For the final model validation the north/south screenline (screenline J) was used in the calibration dataset along with the northwest portion of the intermediate cordon (screenline H, points H8, H9, H10 and H11).

3.11 Journey Times

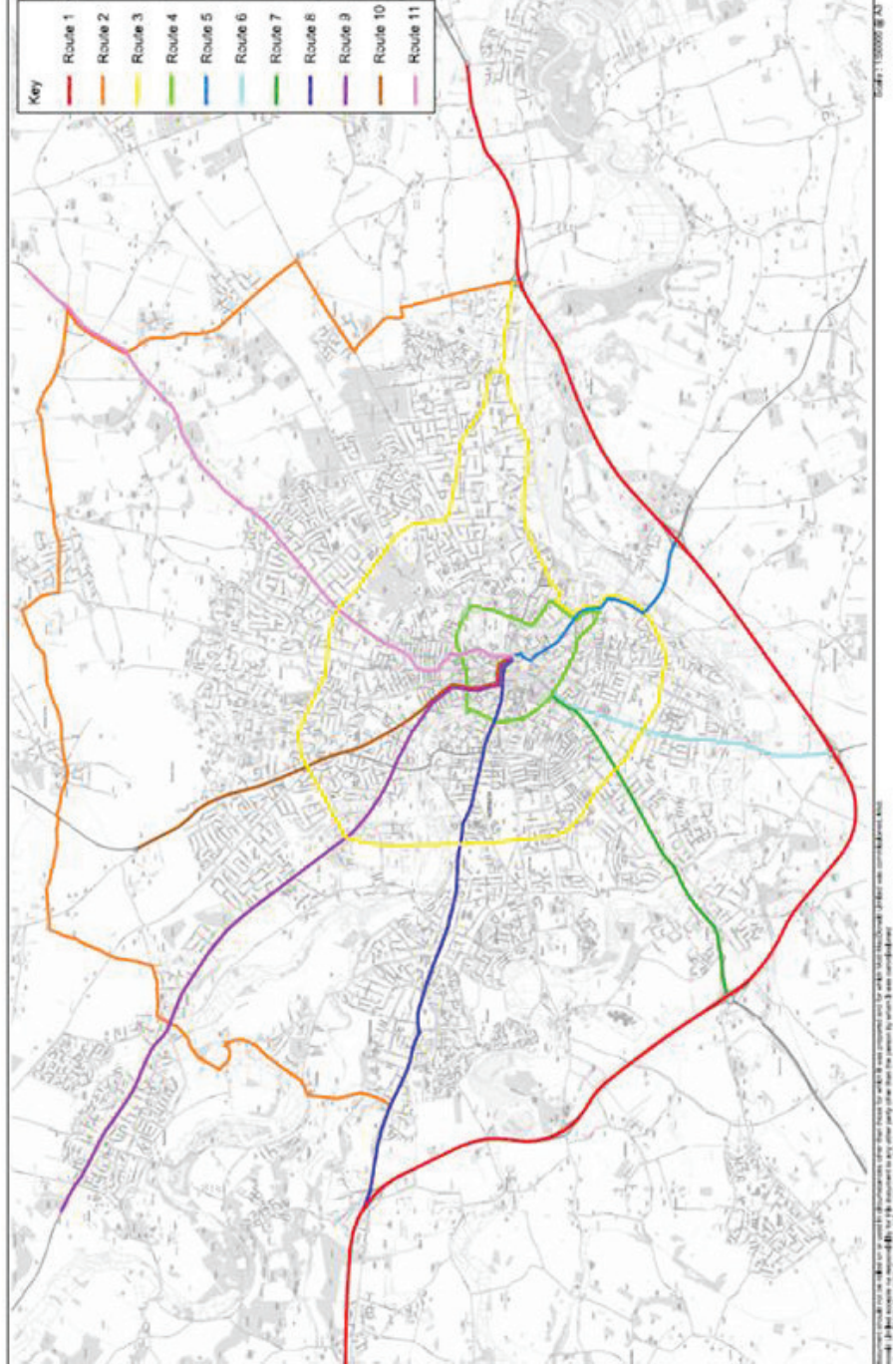
3.11.1 For the 2012 rebase of the NDR model a new arrangement of 11 journey time routes was adopted compared to the 9 routes used in the previous modelling work. Journey time data was sourced from Traffic Master subject to checks on the integrity of the dataset in each case. It is considered that the arrangement of routes and the use of Traffic Master data provides reliable journey time data for key areas of the network.

3.11.2 The arrangement of journey time routes for the 2012 rebase is illustrated in Figure 3.6 with a summary of routes provided in Table 3.4 below.

Table 3.4: Summary of journey times

Journey Time Route	Site Location
Route 1 (Red)	A47 Norwich Bypass
Route 2 (Orange)	Norwich northern orbital route
Route 3 (Yellow)	Outer ring road circular (via Postwick)
Route 4 (Light Green)	Inner ring road circular
Route 5 (Light Blue)	A47/A146 Trowse Interchange to city centre
Route 6 (Cyan)	A140 Ipswich Road
Route 7 (Dark Green)	A11 Newmarket Road
Route 8 (Dark Blue)	A47/A1074 Longwater Interchange to city centre (Dereham Road)
Route 9 (Purple)	A1067 Fakenham Road
Route 10 (Brown)	A140 Holt Road/Cromer Road/Aylsham Road
Route 11 (Pink)	A1151 Wroxham Road

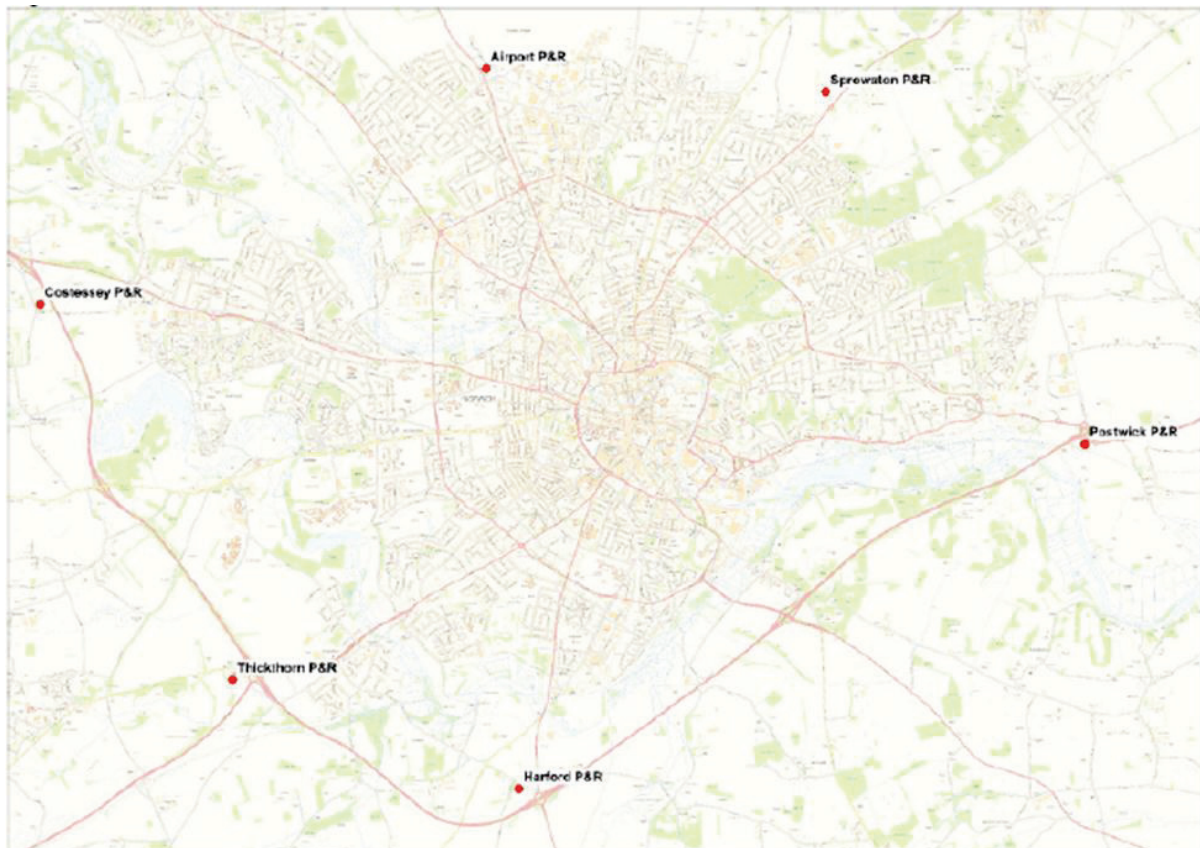
Figure 3.6: Journey time routes



3.12 Park and Ride

3.12.1 There are six Park and Ride sites serving Norwich City Centre. The location of these sites is shown in Figure 3.7. As part of the data collection exercise parking accumulation data were obtained for each of the Park and Ride sites from which flow profiles throughout the day could be derived.

Figure 3.7: Park and Ride sites



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4 Network Development

4.1 Summary Approach

4.1.1 The 2006 NATS model that was recalibrated in 2011 for the appraisal of the Postwick scheme was considered to be the most appropriate starting point for the rebase to 2012. It was anticipated that this network would be largely representative already, although some enhancements to the network were considered during the rebasing exercise as well as the coding of schemes built since 2006.

4.1.2 In developing the existing NATS model a number of checks and enhancements to the model coding and structure have been implemented. Significant changes to the previous model include:

- Redefining the area of detailed modelling such that all areas of simulation coding fall within the fully modelled area;
- Roundabout coding has been changed generally within the model such that the use of roundabout nodes (Type 2 or 5) has been limited to roundabouts less than 28m in diameter (i.e. mini-roundabouts). Elsewhere roundabouts have been coded as a series of priority nodes;
- A review of junction coding has been undertaken across the simulated area and priority and signalised nodes have been systematically recoded based on generic parameters for various common junction arrangements (see section 4.7)
- The external area has been recoded with fixed speeds;
- Network topology has been validated through the use of GIS to reliably establish connectivity and link lengths.

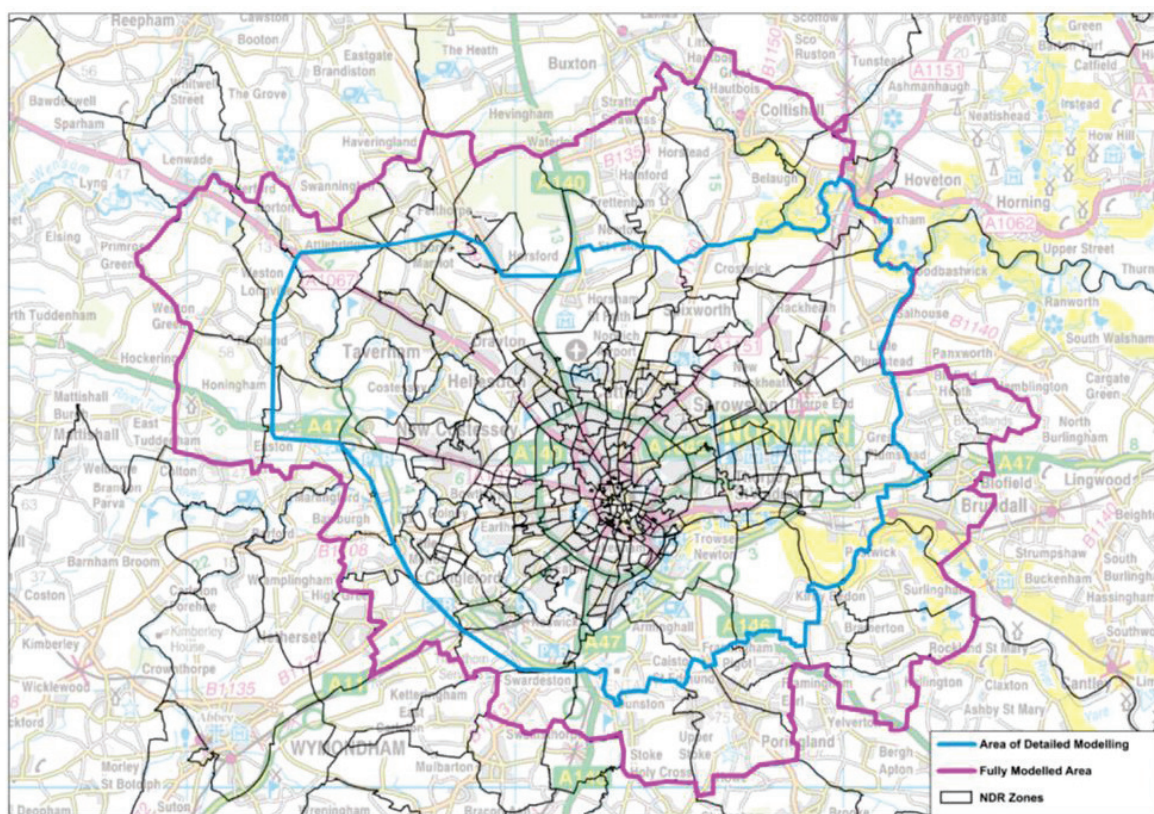
4.2 Geographical Extent of Model and Network Hierarchy

4.2.1 Two main areas have been defined within the model in line with WebTAG guidance. The areas are as follows (and are illustrated in Figure 4.1)

- Fully Modelled Area– this is the area over which proposed interventions have influence, subdivided into:
 - *Area of Detailed Modelling* – the area in which significant impacts of interventions are certain. Modelling in this area is characterised by representation of all trip movements, small zones and, detailed network representation with

- junction modelling (including flow metering and blocking back).
- *Rest of Fully Modelled Area* – this is the area over which the impacts of interventions are considered to be quite likely, but relatively weak in magnitude. This area is characterised by representation of all trip movements, somewhat larger zones and less network detail than the area of detailed modelling with speed/flow modelling.
 - *External Area* – the impacts of interventions can be assumed to be negligible here. In terms of detail it would be expected that the network represents a large proportion of the rest of Great Britain, with only a partial representation of demand – i.e. external to external movements through the FMA; large zones; skeletal network and fixed speed modelling

Figure 4.1: Modelled Areas



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4.2.2 The definition of modelled areas as shown in Figure 4.1 has been significantly revised from the previous version of the Norwich SATURN model such that

the fully modelled area is now explicitly defined in accordance with WebTAG (unit 3.19) guidance.

4.3 Key Model Parameters

4.3.1 *Modelling software* - the highway model has been developed using the SATURN software. Version 11.1.09 has been adopted.

4.3.2 *Modelling base year* - the model represents an average weekday in October for a base year of 2012.

4.3.3 *Modelled time periods* - SATURN models have been developed for the AM and PM peak hours and for an average hour in the inter-peak. Based on an analysis of long-term ATC data, the modelled hours are as follows:



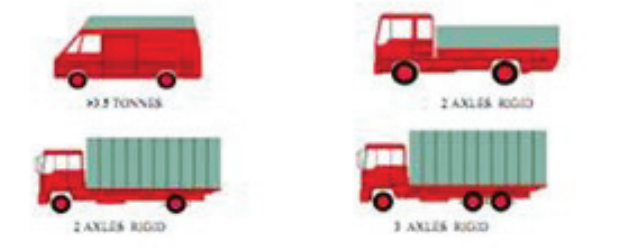


- AM Peak hour (08:00 – 09:00)
- Average Inter Peak Hour (10:00 – 16:00)
- PM Peak hour (17:00 – 18:00)

4.3.4 For the purposes of forecasting at a 24-hour level an off-peak model covering the period from 19:00 to 07:00 has been derived from the inter-peak model, although this off-peak model has not been validated. Details of the off-peak model are discussed in the NDR Forecasting Report.

4.4 Assignment User Classes

4.4.1 For the purposes of the NDR SATURN modelling work, the vehicle classes and definitions from the COBA manual were adopted, as shown in Figure 4.2 below.

Figure 4.2: Vehicle classification

<p>CAR</p>	 <p>SALOON ESTATE</p> <p>PEOPLE CARRIER CAR TOWING CARAVAN/TRAILER</p>
<p>LIGHT GOODS VEHICLE (LGV)</p>	 <p>VAN ≤ 3 TONNES PICKUP</p>
<p>OTHER GOODS VEHICLES (OGV 1)</p>	 <p>≤ 3 TONNES 2 AXLES RIGID</p> <p>2 AXLES RIGID 3 AXLES RIGID</p>
<p>OTHER GOODS VEHICLES (OGV 2)</p>	 <p>4 OR MORE AXLES RIGID 3 AXLES ARTIC</p> <p>4 OR MORE AXLES ARTIC OTHER GOODS VEHICLE WITH TRAILER</p>
<p>BUSES & COACHES (PSV)</p>	 <p>DOUBLE DECK BUS SINGLE DECK BUS OR COACH</p>

Source: Figure 8.1 COBA Vehicle Categories, DMRB Volume 13 Section 1

4.4.2 Modelled vehicle classes were further split by purpose and by Home-based (HB) and Non-Home-based (NHB) trips to allow for variations in the perceived costs of travel between different journey purposes. Segments for light vehicles included commuting, employer's business and other trips. Light goods vehicles (LGV) on employer's business were modelled as a separate user class with ordinary goods vehicles (OGV1 and OGV2) forming the final user class.

4.4.3 A summary of the SATURN user classes adopted for the base model validation is provided in Table 4.1 below.

Table 4.1: SATURN user classes

SATURN User Class	Vehicle Type	Description
1	Car and LGV (personal)	HB Work (Commuting)
2	Car and LGV (personal)	HB Employer's Business
3	Car and LGV (personal)	HB Other
4	Car and LGV (personal)	NHB Employer's Business
5	Car and LGV (personal)	NHB Other
6	LGV	LGV Employer's business
7	HGV	OGV1 and OGV2

4.4.4 In the SATURN assignments vehicles were represented in passenger car units (PCUs) based on the factors provided in Table 4.2 below.

Table 4.2: Passenger car unit (PCU) factors

Vehicle Type	PCU factor (PCUs/vehicle)
Car/LGV	1
HGV	2.3
Bus	2

4.5 Buffer Network Coding

4.5.1 Outside of the area of detailed modelling the network representation in the model is less detailed and is often referred to as buffer network (as opposed to simulation network). In the buffer area the representation of the road network in the traffic model is link based with the network described in terms of its link characteristics.

4.5.2 The buffer coding for the rebased 2012 model has been revised significantly from the previous version of the NATS model with links outside the fully modelled area now generally being coded with fixed speeds. Inside the fully modelled area the buffer network is coded with speed-flow curves as detailed below.

4.5.3 In addition, link lengths in the buffer area and throughout the model have been updated in the new model based on distances derived from GIS.

4.6 Speed flow curves

4.6.1 Speed flow curves are used to relate the average modelled speed along a particular type of link with the number of vehicles. The application of speed flow curves was limited to an area surrounding the detailed model area where flows were to be reasonably represented, as indicated in Figure 4.3. The speed flow relationships were based on those presented in COBA 10.

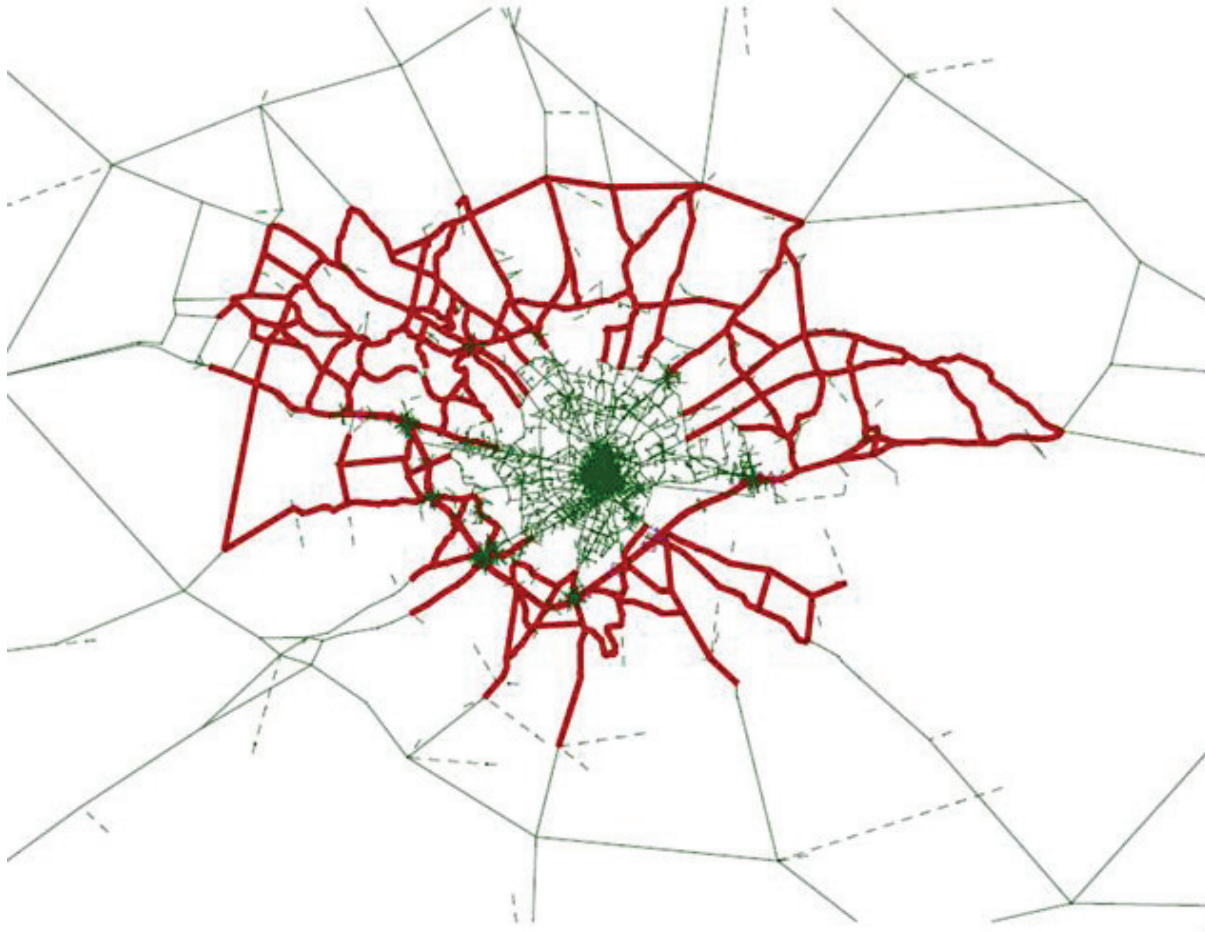
4.6.2 In SATURN the speed flow relationship is defined by the free flow speed (S0, km/hr), speed at capacity (S2, km/hr), capacity (C, PCU/hr) and the shape of the relationship, which is determined by the power function (N). In SATURN these are attributed by link type through use of a capacity index.

4.6.3 The speed flow curves used in the highway model are shown in Table 4.3 below.

Table 4.3: SATURN Speed Flow Curves

Capacity Index	Link type description	S0 (kph)	S2 (kph)	C (PCU/hr)	No
10	S7.3 Rural (A Rd)	87	45	1640	2.2
11	S7.0 Rural (B Rd)	78	45	1380	2.1
12	S6.5 Rural (C Rd)	67	45	1010	1.8
13	Suburban Single 40mph	61	25	1270	2.3
14	'Small Town 30mph	40	30	880	2.5
15	'Winding Rural Single	50	40	800	2.0
20	D2 Rural (Dual A Rd)	110	45	4360	5.0
21	D2 Suburban Slit Dev	78	35	3460	3.3
22	D2 Suburban Typ Dev	71	35	2540	2.0

Figure 4.3: Extent of Speed Flow Curves



4.7 Simulation Network Coding

- 4.7.1 In the simulation area the assumption is that the effect of junctions is the key determinant on route choice. As such, within this area junction nodes are coded in detail to include the junction type, number of approach lanes, priority/conflicts, signal timings, saturation flows etc. As a result of this approach the delay at junctions by individual turning movements can be modelled as well as junction interaction, e.g. the effect of blocking back of traffic and flow metering.
- 4.7.2 With a large number of junctions in a model it is impractical to calculate a unique saturation flow for each individual movement at each junction. Instead, a series of typical values can be applied during the model build and during the calibration of the model those junctions where the generic approach gives rise to problems can be investigated and values adjusted within acceptable ranges.

Priority Junctions

4.7.3 Standard saturation flows for movements at priority junctions were developed for the rebased highway model, which took into account the approach width, turning radii and visibility on each arm of a junction, with the saturation flow for each individual movement being calculated separately. These have been calculated based on information included in TRRL Report SR 810 and TRRL Report LR 942.

4.7.4 Table 4.4 details the saturation flows that were adopted for major arm unopposed movements at priority junctions in the simulation network. Minor arm and major arm opposed movement saturation flows are shown in Table 4.5.

Table 4.4 Saturation flows (PCU/hr) on priority junction major arm unopposed movements

Nearside/Offside	Approach Width	Entry Width	Downhill/Uphill	Gradient	Turning Proportion	Turning Radius	Movement	Left Turn	Straight	Right Turn
								Sat Flow		
N	3.5	3.5	0	0	1	20	←	1828		
N	3.5	3.5	0	0	1	40	←	1894		
N	3.5	3.5	0	0	0.5	20	↖	1894	1894	
N	3.5	3.5	0	0	0.5	40	↖	1929	1929	
N	3.5	3.5	0	0	0.5	20	↔	1894		1894
N	3.5	3.5	0	0	0.5	40	↔	1929		1929
N	3.5	3.5	0	0	0.333	20	↕	1917	1917	1917
N	3.5	3.5	0	0	0.333	40	↕	1941	1941	1941
N	3.5	3.5	0	0	0	0.1	↑		1965	
O	3.5	3.5	0	0	0	0.1	↑		2105	
O	3.5	3.5	0	0	0.5	20	↗		2029	2029
O	3.5	3.5	0	0	0.5	40	↗		2066	2066
O	3.5	3.5	0	0	1	20	→			1958
O	3.5	3.5	0	0	1	40	→			2029

4.7.5 Two saturation flows for each movement were calculated, based upon turning radius. The turning radius adopted for each movement was determined from reference to aerial photography, available mapping and junction plans.

Table 4.5: Saturation flows (PCU/hr) on priority junction minor arm and major arm opposed movements

Minor Arm			Major Arm Opposed
Left	Ahead	Right	Right
721	721	574	721

4.7.6 The global GAP parameter that defines the minimum gap accepted by a vehicle that gives way at priority junctions (or traffic signals) was set as 2 seconds. The value of GAP at various individual junctions was subsequently overridden during the model calibration process to better represent observed behaviour as described in section 6.4

Signalised Junctions

4.7.7 The saturation flows in Table 4.6 were adopted at signalised junctions. The values displayed are per movement per full lane. Short flared approaches were coded with saturation flows of less than 800 PCU/hr, usually 600 PCU/hr.

Table 4.6: Signalised Junctions Saturation Flows (PCU/hr)

Left flare	Left	Ahead & Left	Ahead	Ahead & Right	Right	Right flare
<800	1800	1900	1950	1900	1850	<800

4.7.8 These values of saturation flow are based on TRRL Report RR67 and assume standard values for lane width, entry width, turning proportion and turning radii to establish a generic set of junction parameters that it was felt represent saturation flows at the average signalised junction. The effect of gradient on saturation flows was ignored.

4.7.9 Signalised junctions either run on fixed timings, or are Vehicle Activated, MOVA controlled or SCOOT controlled. In the case of fixed timings, the SATURN coding is relatively straightforward, with staging, intergreens and stage timings coded as indicated from the available data. Where variable or vehicle actuated signal plans are in operation an equivalent fixed time plan has been calculated based on operational data obtained from Norfolk County Council.

Roundabout Coding

- 4.7.10 The approach taken for signalised and non-signalised roundabouts was different. In the case of signalised roundabouts, relevant signal time data were obtained in the same way as for signalised junctions and, in general, signalised roundabouts were coded as a series of separate nodes.
- 4.7.11 Non-signalised roundabouts, if greater than 28m in diameter, were coded as a series of priority junctions. This allowed for lane gains/drops on the circulating carriageway to be more accurately represented, and was considered to be preferable when modelling non-circular roundabouts – since different link lengths can be modelled between different approaches on the circulating carriageway.
- 4.7.12 Roundabouts with a diameter of less than 28m were modelled as single nodes. Table 4.7 shows the saturation flows adopted at all non-signalised roundabouts, whether coded as a ‘Type 2’ single node roundabout or an ‘exploded’ priority node roundabout. These saturation flows were used on incoming links only, as required at Type 2 roundabouts. Circulating saturation flows on ‘exploded’ roundabouts were coded as per major arm priority links. Saturation flows were calculated based on formulas included in TRRL Report SR 810 and TRRL Report LR 942.

Table 4.7: Saturation flows at Type 2 and Type 5 roundabouts

Approach Width – V (metres)	Average Effective Flare Length – I (Metres)	Entry Width – E (metres)			
		3.5 (1)	7.0 (2)	10.5 (3)	14.0 (4)
3.5 (1)	10	1060	1561	1715	1790
	20	1060	1740	2061	2248
	30	1060	1833	2275	2561
	40	1060	1889	2420	2790
7.0 (2)	10		2121	2621	2776
	20		2121	2801	3121
	30		2121	2893	3335
	40		2121	2950	3481
10.5 (3)	10			3182	3682
	20			3182	3861
	30			3182	3954
	40			3182	4010
14.0 (4)	10				4242
	20				4242
	30				4242
	40				4242

4.7.13 The global GAPR parameter that defines the minimum gap accepted by a vehicle that gives way at a roundabout entry was set as 2 seconds.

Pedestrian crossing

4.7.14 The coding of pedestrian crossings in the model was reviewed during the rebasing and a large number of the previously coded on-demand crossings were removed. Crossings that remained in the model are those where data indicated that there was substantial demand by pedestrians and that activation of the crossing had a significant impact on traffic.

Banned turns

4.7.15 Banned turns were coded using a banned turns file. As the model is validated for each vehicle type, banned turns are unique to a particular vehicle type, e.g. OGVs.

Height and weight restrictions

4.7.16 Height and weight restrictions are included in the model using turn or link based restrictions. Height and weight restrictions were taken as applying to OGVs only.

Bus routes

4.7.17 Bus route and frequency is required particularly in the simulation area in order that the model will recognise the contribution made by buses to total traffic flows on links and at junctions.

4.7.18 Bus routes were coded as end-to-end journeys, this allows for bus turning flows to be taken into account within junction calculations, thus contributing to delays. Details of bus services and frequencies were obtained from the public transport model.

Zones

4.7.19 The zoning system from the existing 2006 model has largely been retained for the 2012 rebase with the only changes being the segregation of known future development sites. The zoning system consists of 413 zones in total. A summary of the number of zones by location is shown below in Table 4.8.

4.7.20 Plans showing the zone system are included in Appendix A.

Table 4.8: Details of zone system

Location	Number of zones
Within Norwich	280
Norfolk	118
External	15
TOTAL	413

4.8 Representation of Park and Ride

4.8.1 There are six Park and Ride sites serving Norwich city centre. The location of these sites is shown in Figure 3.7 and these sites have been included in the model. Park and Ride users will have been intercepted at the Road Side Interview (RSI) cordons as part of the RSI data collection process for the

highway model. Therefore Park and Ride trips are represented in the car matrices.

- 4.8.2 Patronage of Park and Ride is determined in the traffic assignment process. Taking trips going into the city centre as an example, in the traffic model vehicles have the choice of driving all of the way to the city centre and parking in the city centre or driving to the Park and Ride site and catching a bus to the city centre.
- 4.8.3 For a particular origin and destination the choice between using Park and Ride or driving all of the way is determined by the generalised costs of travel between competing routes. These costs are made up of a combination of time, distance and toll/charge.
- 4.8.4 For those vehicles driving all of the way to the city centre:
- Time refers to the drive time to their destination, access time to the car, and access and egress time from parking place to final destination.
 - Distance refers to the driving distance to the city centre
 - Toll/charge refers to the car parking charge in the city centre.
- 4.8.5 For those persons using Park and Ride:
- Time refers to the access time to car at origin, drive time to the Park and Ride site, access and waiting time for the Park and Ride bus, bus journey time and egress time from bus stop to final destination.
 - Distance refers to the distance from the origin to the Park and Ride site (excluding distance from Park and Ride site to the city centre)
- 4.8.6 City centre parking charges were calculated by journey purpose reflecting the different lengths of stay and vehicle occupancies. These were average values across the city centre. A summary of the charges applied in the modelling is included in Table 4.9 below. For commuting the charge is based on all-day parking in a long stay car-park whereas the charge for employer's business and other trip purposes assumes a 4 hour stay in a short-stay car-park.

Table 4.9: Parking Charges (2010 prices)

Journey Purpose	Charge
Commuting	£4.15
Employer's Business/Other	£5.90

Source: MM Calculation: NET-021 44444 Car Park Charges

4.8.7 Charges were applied in two stages with half the value being applied to the inbound trip and half to the outbound trip. In the AM peak charges were only applied to inbound trips and in the PM peak only the outbound trips were charged. In the inter-peak model half the charge was applied to both inbound and outbound trips.

4.8.8 Park and Ride charges have been obtained from NCC. These have been adjusted by purpose to allow for season ticket use by commuters and also to take into account factors such as variations in vehicle occupancy and differences between peak and off-peak fares. A summary of charges applied by journey purpose and modelled period is included in Table 4.10. The application of park and ride charges in the modelling was similar to that described above for parking charges with both inbound and outbound legs attracting an equal portion of the charge.

Table 4.10: Park and Ride Charges (2010 prices)

Journey Purpose	Charge
Commuting (AM/IP/PM)	£2.22
Employer's Business/Other (AM/PM)	£3.16
Employer's Business/Other (IP)	£2.72

Source: MM Calculation: NET-023 44444 Park and Ride

4.8.9 In the assignment process only cars (all journey purposes) are allowed to use Park and Ride. LGVs (employers business) and OGVs are banned.

4.8.10 The restrictions to use of the Park and Ride site by time period are shown in Table 4.11.

Table 4.11: Park and Ride restrictions by Time Period

Time Period	Towards City Centre	From City Centre
AM Peak	Allowed	Banned
Inter Peak	Allowed	Allowed
PM Peak	Banned	Allowed

4.9 Assignment Algorithm

4.9.1 The route choice during a highway assignment is determined by the generalised travel cost incurred on each route. Generalised cost for a particular route between an Origin(O) and Destination (D) is a function of the travel time for a route and the distance travelled on the route plus any fares/tolls for the particular route, as shown in the equation below.

Generalised Cost = $VOT \times \text{Time} + VOC \times \text{Distance} + \text{Tolls}$, where:

- VOT = values of time (pence per minute; PPM)
- VOC = vehicle operating cost (pence per km; PPK)

4.9.2 Tolls in the assignment process include car parking charges in the city centre and Park and Ride charges.

4.9.3 In general, for private trips including cars and goods vehicles, time is the most significant part of the equation, with distance less significant. This relative weighting of time and distance varies depending on the trip purposes e.g. commuter trips will be more time critical whereas leisure trips are more sensitive to distance.

4.9.4 The assignment utilises the Wardrop Equilibrium assignment algorithm which seeks to arrange traffic on congested networks such that the cost of travel on all routes used between each O-D pair is equal to the minimum cost of travel and all unused routes have equal or greater cost.

4.10 Generalised Cost Parameters

4.10.1 SATURN requires values of time and distance for generalised cost to be used by the assignment. The PPM and PPK values used in the assignment were calculated by using Values of Time and Operating Costs from WebTAG (Unit 3.5.6 – February 2013). The OGV (or HGV) values of time in WebTAG represent the driver's value of time; these have been modified by a factor of 2 to also take into account the operators' value of time (in accordance with WebTAG Unit 3.19). The values used in the SATURN model are summarised in Table 4.12 below.

Table 4.12: PPM and PPK values (pence)

Vehicle Class	Purpose	AM		IP		PM	
		PPM	PPK	PPM	PPK	PPM	PPK
Car/LGV	Home Based Work	12.39	7.51	12.29	7.51	12.10	7.51
Car	Home Based Employer's Business	53.83	13.74	52.61	13.74	51.85	13.74
Car/LGV	Home Based Other	15.84	7.51	16.47	7.51	16.92	7.51
Car	Non-Home Based Employer's Business	53.83	13.74	52.61	13.74	51.85	13.74
Car/LGV	Non-Home Based Other	15.84	7.51	16.47	7.51	16.92	7.51
LGV	Non-Home Based Employer's Business	20.66	15.95	20.66	15.95	20.66	15.95
HGV	Employer's Business	35.85	45.63	35.85	45.63	35.85	45.63

Source: MM Calculation NET-123 - 88888 Generalised Costs 7UC

5 Development of Demand

5.1 Overview

- 5.1.1 This section deals with the development of the base year travel demand. For home-based purposes 24-hour production-attraction (PA) matrices are required, with non-home based purposes, including freight being covered by origin-destination (OD) matrices. For assignment, peak hour origin/destination matrices must then be derived, requiring the development of time period factors to be applied to the PA matrices.
- 5.1.2 The highway matrices have been built from a combination of observed and synthetic data.

5.2 Synthetic Matrix Development

- 5.2.1 The synthetic trip matrices for the rebased 2012 model have been based to a large degree on those synthetic matrices developed for the 2006 NATS model. For private vehicles only the previous 2006 tripends have been retained, but for goods vehicles the previous matrices have been used as a basis from which to prepare 2012 trip matrices.

5.3 Synthetic Private Vehicle Matrices

- 5.3.1 For private vehicles the 2006 synthetic tripends derived with CTripend and described in the previous LMVR have been taken from the previous model development and factored by purpose using NTEM 6.2 to give 2012 tripends.
- 5.3.2 Trip distribution models have been developed using the following function:

$$T_{ij} = O_i \frac{B_j \exp(\beta c_{ij})}{\sum_j B_j \exp(\beta c_{ij})}$$

Where

- O_i are the production trip end totals,
 - B_j are the attraction trip end totals
 - C_{ij} is the cost matrix.
- 5.3.3 For each purpose a singly constrained distribution model has been calibrated to represent the average trip length from the National Travel Surveys. The only available local observed data on highway trip length was that collected

from the roadside interview surveys. However, those surveys were originally designed to capture specific movements and would potentially miss out on some shorter trips; therefore they are not considered representative of average trip lengths in the study area. In the absence of any other data the synthetic matrices were calibrated to trip length data from the National Travel Survey. The average trip lengths used for the calibration are shown in Table 5.1 below.

Table 5.1: Target Average Trip Length by purpose

Trip Purpose	Average Trip Length (km)
HB Work	15.8
HB Employers Business (EB)	31.7
HB Education	6.7
HB Shopping	9.2
HB Personal Business (PB)	10.8
HB Recreation / Social	13.7
HB Visiting friends & relatives (for HB trips only)	16.4
HB Holiday / Day trip	44.9
NHB Work	15.8
NHB Employers Business (EB)	31.7
NHB Education	6.7
NHB Shopping	9.2
NHB Personal Business (PB)	10.8
NHB Recreation / Social	13.7
NHB Holiday / Day trip	44.9

Source: MM Calculation SYN-007 NTS Average Trip Length By Purpose

5.4 Synthetic Goods Vehicle Matrices

5.4.1 During previous work on the NATS model a set of goods vehicle matrices for a 2006 base year was developed. For LGVs these matrices were based on an analysis of planning and socio-economic data in addition to observed LGV data from RSI surveys. In conjunction with this, a set of OGV matrices was previously derived from the 2005 DfT's NUTS4 OGV matrix.

5.5 Development of 2012 Goods Vehicle Matrices

5.5.1 The 2006 matrices were used as a starting point from which to develop 2012 matrices. In this regard the 2006 LGV and OGV matrices have been factored

in-line with observations of growth of LGV and OGV traffic (from DfT Road Traffic Statistics – Tables TRA8901a and TRA2501) to give 2012 synthetic goods vehicle matrices. The factors applied are shown in Table 5.2 below.

Table 5.2: 2006 to 2012 Goods Vehicle Growth Factors

	From 2006 to 2012
LGV	+1.9%
OGV	-6.2%

Source: Calculation ref: SYN-009 - Freight Factors 2006 to 2012

5.6 Comparison of Trip Length Distributions

- 5.6.1 A comparison has been carried out between the trip length distribution from the synthetic matrices, compared to the trip length distribution from the observed data set. This is for those OD movements that are fully observed from the OD surveys. The purpose of this comparison is to demonstrate that the synthetically derived trip matrices are reasonably consistent with those derived from observations. Details of these analyses are presented in Appendix C.
- 5.6.2 The charts in Appendix C show a reasonable match between the observed and synthetic matrices for the fully modelled movements, although they also fairly consistently show that the synthetic matrices have proportionally more trips than the observed matrices in the shorter distance bands. This is not wholly unexpected as the RSI surveys will tend to underestimate short distance trips and therefore the distributions of the matrices are considered to be sufficient as an initial input to the calibration of the assignment models.

5.7 Synthetic Matrix Assignment

- 5.7.1 An initial set of 12 hour (average hour) OD matrices was prepared and assigned to the SATURN highway model with a view to comparing the flows resulting from the synthetic matrices with the aggregate screenline and cordon counts. The synthetic matrices were subsequently factored at the sector level to improve consistency with observed screenline counts. The results from an assignment of the finalised synthetic matrices are presented in Appendix D.
- 5.7.2 Table D.1 shows a comparison of link flows across the calibration/validation screenlines and cordons following an assignment of the 12-hour synthetic matrix. Modelled results are presented by direction and by vehicle type and compared against observed 12-hour count data. Differences are colour

coded to indicate discrepancies between the model and the counts of greater than +/-10%.

- 5.7.3 From the results it can be noted that the assignment of the synthetic matrices generally shows a good fit against aggregate screenline counts with most modelled screenlines being within 10% of the counts for all vehicles combined and also for cars only. The radial calibration screenline to the east (screenline C) compares less well against the counts but this RSI screenline should be well represented in the observed build and is therefore not a particular concern. On the northwest screenline (screenline F) in the synthetic matrix assignment the modelled flow is higher than the count in the eastbound direction. The proximity of large model zones in this area could be a factor in this discrepancy, although the screenline is also represented in the observed build so again is less of a concern.

5.8 Observed Matrix Build

- 5.8.1 Observed Road Side Interview (RSI) data from 2006 and 2012 has been used to build an observed demand matrix. RSI sites included in the observed matrix build form three cordons and two screenlines around Norwich. The location of these screenlines together with individual sites on each screenline is shown in Figure 3.1 and Figure 3.2
- 5.8.2 These interviews have largely been conducted in the outbound direction. In order to fully represent trip patterns, interview data has been transposed using the following rules where a return direction interview site does not exist.
- Average trip duration by overall purpose has been estimated (as indicated in Table 5.3.
 - From Home trips have been assumed to have an associated To Home trip later in the day
 - To Home trips have been assumed to have an associated From Home trip earlier in the day
 - Commute From Home trips have had the full trip duration added to the interview time if they occur before 12noon, after that they have had half the trip duration added to account for part time working
 - Commute To Home trips have had the full trip duration subtracted from the interview time if they occur after 3pm, before that they have had half the trip duration subtracted to account for part time working
 - Employer's Business/Other From Home trips have had the average trip duration added to the interview time, and the To Home trips have had the average trip duration subtracted

- Non Home Based trips have had the average trip duration added to the interview time - the assumption being that they will have to go somewhere after the NHB trip

Table 5.3: Return Times

	Trip Duration	Half Trip Duration
Commute	09:00	04:00
Business	03:00	
Other	02:30	

Expansion

- 5.8.3 RSI records were expanded to MCC counts carried out in 2012 and then factored to ATCs.
- 5.8.4 In addition to the expansion factors used to uplift the number of interviews to match the passing counts by vehicle type two sets of additional factors were also applied to the RSI data set during the data expansion process. These were a postcard response bias factor to compensate for issues associated with self-completion postcards and a corridor factor to compensate for those links within the cordons and screenlines where it was not possible to undertake roadside interview surveys.
- 5.8.5 The return rate of postcard forms can vary significantly between travel purposes and user classes. In order to reduce the adverse impact of response bias for the Norwich model, postcard data was adjusted using correction factors that are based on responses from a selected number of sites. When the 2006 and 2012 surveys were conducted, a number of sites were surveyed using both face-to-face interviews and postcards. Some of these were conducted on the same day and during the same time period as each other. These sites provide a source of data for checking and accounting for bias. The correction factors deal with purpose bias only. As survey data is expanded by vehicle type, any bias by vehicle type was automatically corrected in that process.
- 5.8.6 Tests indicated that the sample size for this factor was not sufficient if factors were calculated for each site. Therefore, a global adjustment factor has been produced by time period and survey year. A summary table of the factors derived to account for response bias is included in Appendix E Table E.1.

5.8.7 It was not possible to undertake RSIs on a number of roads crossing the survey cordons for a variety of reasons including safety, physical layout or low flows. In these instances classified counts were available and corridor correction factors were applied to adjacent sites where it was considered that the travel patterns would be representative. A summary of sites where corridor correction factors were applied is shown in Appendix E Table E.2

5.9 Creation of Fully Observed Matrices

5.9.1 The first step in the process was to create 12-hour matrices by purpose for fully observed movements. Observed trips may have been captured by the same cordon more than once or crossed more than one cordon. The ERICA program has been used to combine datasets from multiple cordons. This is essentially a database application that builds trip matrices from origin-destination (OD) data. ERICA allows the merging of data from multiple screenlines where a particular OD movement could be observed at more than one screenline or cordon, in accordance with DfT methodologies, using variance weighted averages.

5.9.2 The matrices are built in ERICA origin-destination format and converted to production-attraction format at a later stage.

5.10 ERICA Set Up

5.10.1 ERICA requires each RSI site to be allocated to a cordon. The ERICA cordon segments are shown in Appendix F Table F.1.

5.10.2 ERICA also requires a set up file to identify those movements that are fully observed and identify which screenline or cordon particular sector to sector movements should be taken from. Fully observed sectors for the matrix build are shown in Table 5.4 for the A and B matrices. The sectors are shown in Figure 5.1. Trips for those sector to sector movements that are not fully observed are derived from the synthetic matrices.

5.10.3 A trip can be picked up from more than one cordon if it crosses multiple cordons. Where particular ODs are observed by more than one cordon/screenline a separate matrix can be built for each set of observations. To account for this, more than one matrix can be built within ERICA. In the case of the Norwich model, two matrices (A and B) are built. The A and B matrix represent two separate observations of the same movement. The A and B matrices are then merged using variance weighting.

Figure 5.1: Sectors

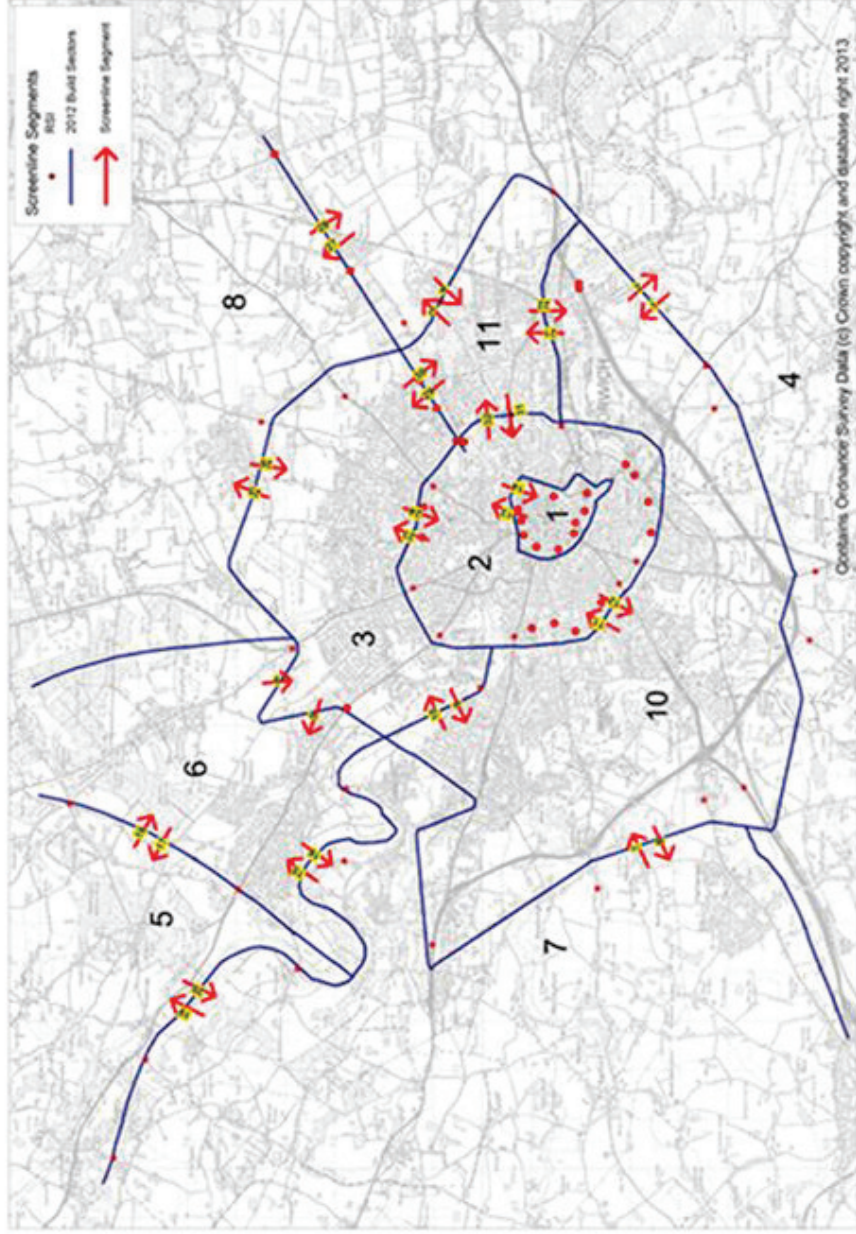


Table 5.4: Fully observed sector to sector movements

OD	1	2	3	4	5	6	7	8	9	10	11	99
1	0	1	1	1	1	1	1	1	1	1	1	1
2	1	0	1	1	1	1	1	1	1	1	1	1
3	1	1	0	1	1	1	1	1	1	1	1	1
4	1	1	1	0	1	1	0	1	0	1	1	0
5	1	1	1	1	0	1	1	0	0	1	1	0
6	1	1	1	1	1	0	1	0	1	1	1	0
7	1	1	1	0	1	1	0	1	0	1	1	0
8	1	1	1	1	0	0	1	0	1	1	1	0
9	1	1	1	0	0	1	0	1	0	1	1	0
10	1	1	1	1	1	1	1	1	1	0	1	1
11	1	1	1	1	1	1	1	1	1	1	0	1
99	1	1	1	0	0	0	0	0	0	1	1	0

1 = Movements that are fully observed

5.10.4 The demand segments specified for the matrix build are shown in Table 5.5

Table 5.5: Demand Segments

Demand Segment	PA/OD	Vehicle Type	Description	Direction
1	PA	Car/LGV	Home Based Work	To Home
2	PA	Car/LGV	Home Based Work	From Home
3	PA	Car	Home Based Employer's Business	To Home
4	PA	Car	Home Based Employer's Business	From Home
5	PA	Car/LGV	Home Based Other	To Home
6	PA	Car/LGV	Home Based Other	From Home
7	OD	Car	Non-Home Based Employer's Business	NHB
8	OD	Car/LGV	Non-Home Based Other	NHB
9	OD	LGV	Non-Home Based Employer's Business	NHB
10	OD	HGV	Employer's Business	Any

5.11 Home-Based Purposes Matrix Build

5.11.1 The home-based elements of the demand matrix are initially built as 12-hour origin destination matrices using the ERICA program. These are network wide, fully observed, matrices. Each 12-hour matrix is factored to 24 hours using a factor calculated by purpose as shown in Table 5.6 below. The factors used have been derived from NTS data that has been locally adjusted using a factor calculated from a sample of ATC data.

5.11.2 From the RSI data both from home and to home trips will have been observed and matrices will initially be built for both of these purposes. To form a true PA matrix the 'to home' trip matrices were transposed to create a second estimate of 'from home' trips. The 'from home' and the transposed 'to home' matrices are merged by taking an average of 'to home' and 'from home' trips. This provides a true PA format 24-hour matrix, one for Home Based Work, one for Home Based Employer's Business and one for Home Based Other.

Table 5.6: 12-24-hour Factors

Purpose	Factor
HB Work - To Home	1.151
HB Work - From Home	1.102
HB EB - To Home	1.247
HB EB - From Home	1.068
HB Other - To Home	1.356
HB Other - From Home	1.210

5.12 Non Home-Based Origin-Destination Matrix

5.12.1 The non-home based purposes (freight is included in this process) are built in 12 hour origin destination format. These are built in ERICA using the processes described in Section 5.10.

5.13 OGV Matrices

5.13.1 In the observed build ordinary goods vehicles (OGV1 and OGV2) were identified separately and ultimately converted to PCUs using factors of 1.9 for OGV1 and 2.9 for OGV2 prior to being combined in a single OGV user class. Subsequently a PCU factor of 2.3 has been used for OGV in the modelling work.

5.14 Creation of Time Period Matrices

5.14.1 The matrices for the various trip purposes were prepared in different ways with home-based purpose matrices ultimately being constructed as 24-hour PA and the other non-home based purposes being peak period OD matrices.

5.14.2 For assignment the matrices were required to represent the peak hour for AM and PM and an average hour for the inter-peak period. To achieve this 24-hour PA matrices were first converted to period matrices and then all the period matrices (including the NHB OD elements) were subsequently factored to represent the relevant peak hour.

5.14.3 The 24-hour PA matrices were converted to AM, IP, PM and OP period matrices using a series of factors derived from traffic count data, the RSI surveys and from NTS as indicated in Table 5.7 below.

Table 5.7: PA to OD conversion factors

Time Period	HBW		HBEB		HBO	
	from Home	to Home	from Home	to Home	from Home	to Home
AM	0.800	0.024	0.408	0.020	0.276	0.055
IP	0.092	0.151	0.491	0.436	0.442	0.435
PM	0.015	0.694	0.037	0.346	0.108	0.248
OP	0.093	0.131	0.064	0.198	0.174	0.262

Source: MM Calculation PA_ODFactors_MX19.xls

5.14.4 For each time period the resulting “from Home” period matrices were then added to the transpose of the “to Home” matrices to form equivalent OD period matrices for the home-based purposes.

5.14.5 Subsequently the period matrices were factored to hourly matrices using values derived from observed traffic count data. The factors applied are presented in Table 5.8.

Table 5.8: Time period to hourly factors

	AM	IP	PM
Car	0.398	0.167	0.392
LGV	0.339	0.167	0.359
OGV	0.315	0.167	0.325

5.15 Observed Matrix Assignment (12-hour)

5.15.1 By combining the individual time period matrices a set of 12-hour observed matrices were produced. The 12-hour observed matrices were assigned to the SATURN network as a check of their suitability for use in the calibration of the base model and also to ensure that there were no problems with the build. The results of these 12-hour (average hour) assignments are presented in Appendix I.

5.15.2 N.B. the observed matrices only contain fully observed trips and therefore screenlines that are crossed by a substantial number of partially observed movements are shown as under-represented in this comparison.

5.16 Merge of Observed and Synthetic Matrices

5.16.1 The 24-hour observed home based matrices are merged with the synthetic 24-hour home based matrices. Where a sector to sector movement is classed as not fully observed and hence not included in the ERICA matrix build, the synthetic trip is taken. Where a sector to sector movement is fully observed and hence included in the matrix build, 90% of the observed cell value is added to 10% of the synthetic cell value. Fully observed movements were identified in Table 5.4.

5.16.2 Matrices for non-home based purposes (including freight) were merged at the 12-hour level using a similar methodology to that adopted for home-based purposes. Following the merge the 12-hour non-home based matrices are subsequently factored back to time period matrices using the factors in Table 5.9.

Table 5.9: 12-hour to period factors for non-home based purposes

Purpose	AM	IP	PM
NHBEB	0.119	0.597	0.284
NHBO	0.093	0.567	0.34
LGV	0.288	0.477	0.234
OGV	0.289	0.565	0.146

5.17 Merged Matrix Assignment (12-hour)

5.17.1 The results from an assignment of the merged 12-hour matrices are provided in Appendix J where Table J.1 shows a comparison of link flows across the calibration/validation screenlines and cordons following an assignment of the 12-hour merged matrix. Modelled results are presented by direction and by

vehicle type and compared against observed 12-hour count data. Differences are colour coded to indicate discrepancies between the model and the counts of greater than +/-10%.

5.17.2 From the results of the merged assignment it can be seen that the majority of screenlines and cordons are modelled within 10% of the aggregate screenline counts particularly for all vehicles combined. For cars the same trends are noted, but are more pronounced than the all vehicle comparison to the detriment of the comparison against screenline counts.

5.17.3 The results of the merged assignment at the 12-hour (average hour) level were considered to be reasonable, although it was recognised that some improvement to the fit against counts would be beneficial to the development of the peak hour models. On the basis of the results of the merged assignment it was therefore considered appropriate to adjust the merged matrices through a process of matrix estimation at the 12-hour level

6 Model Calibration

6.1 General

6.1.1 During calibration various elements of the model were adjusted in order to achieve a good fit between the model and various observations of traffic flow and journey time. As well as changes made to the network, adjustments were also made to the trip matrices through matrix estimation at both the 12-hour level and then subsequently at the peak hour assignment level.

6.1.2 As is typical of similar transport models, the calibration of this updated NATS highway assignment model was undertaken in an iterative manner, with improvements being implemented in such a way that several assignments were undertaken prior to reaching a state in which the model was deemed to be adequately calibrated and validated. As such the results presented below are based on the final assignments – where indicators of goodness of fit have been improved to a point where further effort to adjust the model was not deemed to be worthwhile in the context of preparing a base model suitable for forecasting the effects of the NDR scheme.

6.2 Traffic Flow Calibration Criteria

6.2.1 WebTAG (Unit 3.19) validation criteria for traffic flows have been used as the guideline for assessing the results of the calibrated model. Table 6.1 below shows the model validation criteria according to WebTAG.

6.2.2 According to the guideline, the model validation is measured by assessing the goodness of fit between the assigned hourly flow and the corresponding independent observed data.

Table 6.1: WebTAG Validation Criteria

Criteria and Measures	Acceptability Guidelines
Assigned Hourly flows compared with observed flows	
1. Individual flows within 15% for flows 700-2700 vph	>85% of cases
2. Individual flows within 100 vph for flows < 700 vph	
3. Individual flows within 400 vph for flows > 2700 vph	
4. Total screenline flows (normally > 5 links) to be within 5%	All (or nearly all) screenlines
5. GEH statistic	
i. Individual flows: GEH < 5	> 85% of cases
ii. Screenline (+) totals: GEH < 4	All (or nearly all) screenlines
Modelled journey times compared with observed times	
6. Times within 15% (or 1 minute, if higher)	> 85% of routes

Source: WebTAG Unit 3.19 Tables 1, 2 and 3

6.2.3 The goodness of fit was assessed by estimating the GEH value at the individual calibration points. The GEH formula is as follows:

$$GEH = \sqrt{\frac{(M - O)^2}{(M + O)/2}}$$

Where:

- M = modelled flow (vehicles per hour);
- O = observed flow (vehicles per hour)

6.2.4 These criteria have been used for testing the model against data used in model building, as part of the calibration process, as well as testing the model against independent data as part of the validation process (described separately in Chapter 7)

6.3 Traffic Count Dataset for Matrix Calibration

6.3.1 As noted in sections 3.9 and 3.10, seven cordons and screenlines were adopted for the matrix calibration process. These cordons and screenlines were all used in the matrix build process. The following screenlines were used:

- Inner Ring Road Cordon (A) – just inside the Inner Ring Road
- Outer Ring Road Cordon (B) – Just inside the Outer Ring Road
- North East Screenline (C) – radial screenline to north east of Norwich
- Outer cordon (D) – Around the outskirts of Norwich
- River Screenline (E) – along the River Wensum
- North West Screenline (F) – to the north west of Norwich
- North/South Screenline (J) – bisecting Norwich town centre

6.3.2 In addition to the above screenlines, 4 sites on the intermediate validation cordon (H) were also used in the model calibration (sites H8, H9, H10 and H11).

6.3.3 The screenlines and cordons are illustrated in Figure 3.5. In addition to these, a series of counts not on screenlines or cordons which intercepted trips in between screenlines and cordons were used for calibration, the locations of these are shown in Figure 3.4.

6.4 Network Calibration

6.4.1 During the period of model calibration various elements of the network were reviewed following comparisons of model data against observations of traffic counts and journey times. In addition, ongoing checking of the model network coding also revealed improvements that could be made to the representation of the highway beyond the confines of the generic approach adopted for the initial coding as described in Section 4.7.

6.4.2 Network calibration was driven by aiming to achieve a good fit between the modelled and observed journey times and link flows. Modifications made to the network included changes to zone centroid loading points, signal timings, priority junction/roundabout parameters and complex coded junctions.

6.4.3 *Zone-centroid loading points* - in the initial network coding an approach was adopted whereby each model zone was coded with a single zone centroid connector. This approach was preferred as multiple connectors can lead to model instability, particularly when running matrix estimation. However, a consequence of this approach was that in a number of cases the zone access

point had insufficient capacity to accommodate traffic demand and trips were effectively trapped on zone connectors, unable to access the network and leading to unrealistic delays.

- 6.4.4 To alleviate this issue some problem connectors were coded with additional capacity to reflect the fact that the single modelled access was acting as a proxy for several entries onto the network in actuality. In other cases, and where deemed appropriate, additional connectors were coded to achieve a capacity increase. This latter approach was generally only applied to larger model zones, where it was unrealistic to expect traffic to load at a single point without causing downstream problems on the network itself.
- 6.4.5 *Signal Timings* - The signal timings used in the original coding were provided by NCC and in many cases were provided as a series of operating parameters rather than fixed plan timings. As a result during the calibration it was necessary to review many of the signalised junctions (generally within the confines of the operational parameters) to ensure that junction operation within the model matched as well as possible with observations, both in terms of delay and throughput of traffic.
- 6.4.6 *Priority Junction/Roundabout Parameters* - The generic approach to the coding of priority junctions and roundabouts enabled a level of consistency to be achieved across the simulated network. However, at some of the major priority junctions/roundabouts within the model the generic approach to coding did not provide a particularly good representation of how these junctions operated. This was particularly the case for the congested roundabouts such as those on the inner and outer ring roads
- 6.4.7 *Complex Junction Coding* - Several complex junctions consisting of many links and nodes are included in the NATS model and during the course of the model calibration it was necessary to ensure that these behaved in a manner consistent with observations. To achieve this it was occasionally necessary to increase the complexity of junction coding to allow individual lanes to be coded separately or to allow flared approaches to be represented more accurately. This was achieved through the introduction of additional nodes and links and in general enabled traffic streams with different behaviours to be separated.

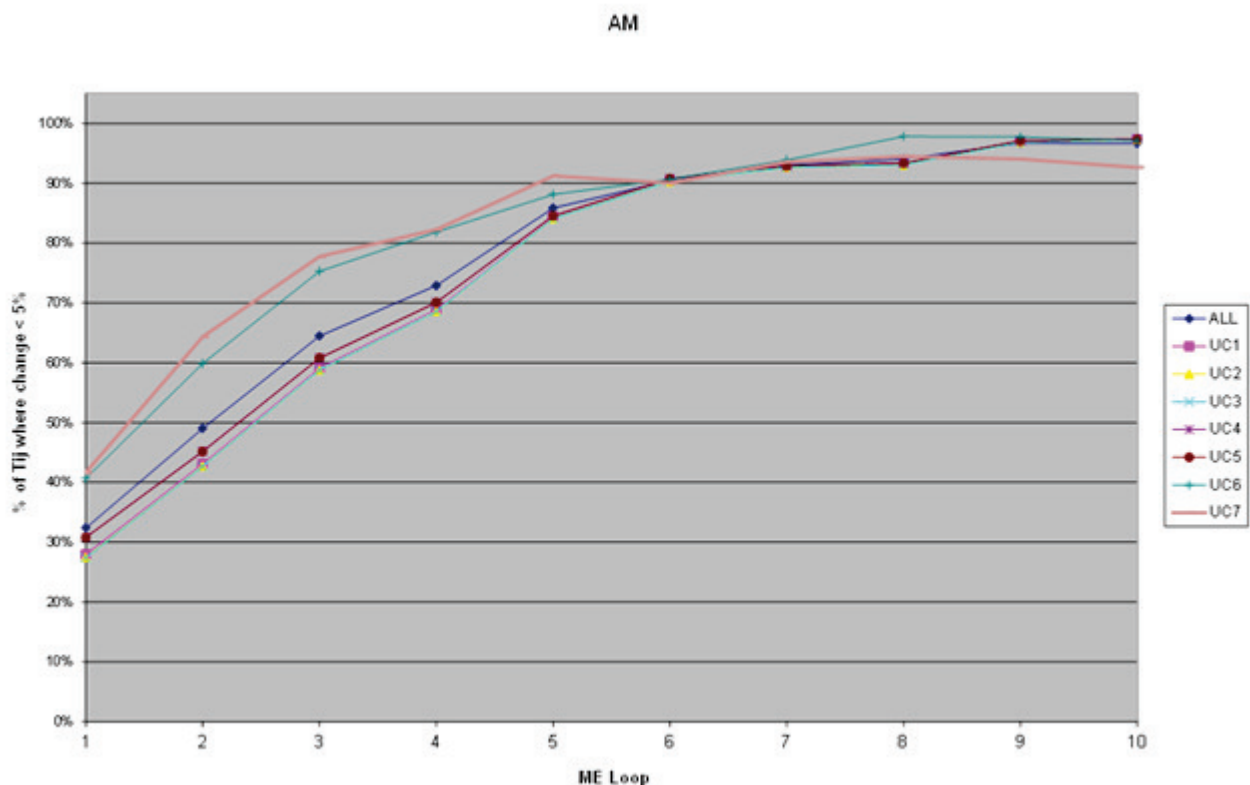
6.5 Matrix Estimation from counts (12-hour level)

- 6.5.1 Following the initial assignment of the 12-hour merged matrices described in section 5.17. it was considered appropriate to attempt to improve the fit of the modelled flows against observations prior to splitting the matrices into three

separate hourly time periods (AM, IP and PM) and calibrating at the hourly level.

6.5.2 Matrix estimation (ME) was undertaken within SATURN using the SATPIJA and SATME2 modules and was based on counts by vehicle type (car, LGV, HGV) aggregated across screenlines by direction (the two town centre cordons A and B were omitted from the counts due to concerns that routing could influence the flows across these two cordons over the 12-hour period). To ensure a reasonable level of convergence for the matrix estimation process it was established through testing that nine iterative loops of SATURN, SATPIJA and SATME2 were required. The results from testing are illustrated in Figure 6.1 below, which shows a plot of the proportion of ij pairs where trips change by less than 5% as a result of matrix estimation, between consecutive loops of the matrix estimation process.

Figure 6.1: Convergence of ME process – Proportion of ij pairs where trips change by less than 5% by ME loop



6.5.3 Following a satisfactory result from the 12-hour matrix estimation process the output 12-hour matrices were used along with the 12-hour prior matrices to adjust the hourly prior assignment matrices on a pro-rata basis. Following this

the calibration of the AM, inter-peak and PM models was undertaken. However, in the course of calibrating the three hourly models various elements of the network were modified and as such it was considered appropriate to revisit the 12-hour matrix estimation process iteratively throughout the various stages of model calibration.

- 6.5.4 The results from the final run of matrix estimation at the 12-hour level are presented in Appendix K
- 6.5.5 Table K.1 shows a comparison of link flows across the calibration/validation screenlines and cordons following the application of matrix estimation at the 12-hour level. Modelled results are presented by direction and by vehicle type and compared against observed 12-hour count data. Differences are colour coded to indicate discrepancies between the model and the counts of greater than +/-10%.
- 6.5.6 From the results in Table K.1 it can be noted that the comparison against aggregate screenline counts shows that at the 12-hour level the model matches the observations reasonably well. Compared to the results of the merged matrices (shown in Appendix J) it can be seen that matrix estimation has had a positive impact on the fit of the model, particularly for cars.
- 6.5.7 Screenline F to the northwest is an exception to this general trend although the difficulties at this location are considered to be a consequence of the coarse zoning adjacent to this screenline that makes it difficult to model trips across it accurately.

6.6 Analysis of the effects of matrix estimation

- 6.6.1 To understand the changes that matrix estimation had made to the prior matrix and to ensure that the effects were reasonable, it was necessary to undertake various analyses. These included regression analyses of both cell values and tripends, comparisons of trip length distributions and comparisons of sector to sector movements.
- 6.6.2 Table 6.2 below summarises the tests undertaken to understand the difference between the prior and post matrix estimation matrices. It was agreed during the scoping of the model that these targets were challenging and would not be considered as strict pass and fail criteria.

Table 6.2: Tests of Significance of Matrix Estimation Changes

Measure	Benchmark Criteria
Matrix zonal cell values	Slope within 0.98 and 1.02 Intercept near zero R2 in excess of 0.95
Matrix zonal trip ends	Slope within 0.99 and 1.01 Intercept near zero R2 in excess of 0.98
Trip length distributions	Means within 5% Standard deviations within 5%
Sector to sector level matrices	Differences within 5%

Source: WebTAG Unit 3.19 Highway Assignment Modelling

6.6.3 Linear regression analysis of the post and prior ME matrices have been undertaken within SATURN based on the following expression: $y=A+Bx$

6.6.4 The results of these analyses are presented as the intercept and slope coefficients 'A' and 'B' along with the R² coefficient of determination.

6.6.5 Table 6.3 below shows a comparison at the cellular level with Table 6.4 and Table 6.5 showing comparisons for origins and destinations respectively. Data cells in the tables have been colour coded to indicate compliance with the targets defined in Table 5.2 and as can be seen the effects of matrix estimation at the 12-hour level are generally all within the prescribed limits except for LGVs where the slope exceeds the target for both origin and destination tripends.

Table 6.3: Cell by cell regression analysis

UC	Definition	A	B	R ²
1	Car-HBW	-0.0020	0.9990	0.9996
2	Car-HBEB	0.0000	0.9960	0.9966
3	Car-HBO	-0.0030	1.0000	0.9999
4	Car-NHBEB	0.0000	0.9960	0.9980
5	Car-NHBO	0.0000	1.0000	0.9998
6	LGV	0.0030	1.0120	0.9901
7	OGV	0.0000	1.0000	0.9984

Source: MM Calculation CAL-465 - Regression Analysis 12HR ME

Table 6.4: Origin tripend regression analysis

UC	Definition	A	B	R ²
1	Car-HBW	-0.5910	0.9900	0.9993
2	Car-HBEB	-0.0860	0.9910	0.9987
3	Car-HBO	-0.8060	0.9930	0.9997
4	Car-NHBEB	-0.0900	0.9940	0.9990
5	Car-NHBO	-0.0700	0.9970	0.9997
6	LGV	0.5180	1.0760	0.9972
7	OGV	-0.1450	1.0110	0.9991

Source: MM Calculation CAL-465 - Regression Analysis 12HR ME

Table 6.5: Destination tripend regression analysis

UC	Definition	A	B	R ²
1	Car-HBW	-0.6180	0.9900	0.9991
2	Car-HBEB	-0.1050	0.9940	0.9983
3	Car-HBO	-0.8800	0.9940	0.9997
4	Car-NHBEB	-0.0990	0.9960	0.9984
5	Car-NHBO	-0.0780	0.9970	0.9995
6	LGV	0.7400	1.0550	0.9932
7	OGV	0.3940	0.9890	0.9986

Source: MM Calculation CAL-465 - Regression Analysis 12HR ME

- 6.6.6 Plots showing comparisons of the trip length distribution pre and post matrix estimation at the 12-hour level are presented in Appendix L.
- 6.6.7 From the plots it is evident that whilst matrix estimation at the 12-hour level has had some effect on the trip length distributions, none of the changes noted represent a significant impact for any of the modelled user classes.
- 6.6.8 Analyses of sector to sector movements before and after matrix estimation are presented in Appendix M. The results of the analysis generally show relatively modest changes in movements between sectors with changes being varied in nature and no particular trends standing out. As a result of this it was considered that the effects of matrix estimation had not had a detrimental effect on the matrices.

6.7 Matrix Estimation from counts (Peak Hour level)

- 6.7.1 Following the initial successful application of matrix estimation at the 12-hour level in which screenline flows were generally found to be either close to, or within 15% of the observations, the post estimation 12-hour matrices were considered to form a reasonable platform from which to develop the peak hour matrices for detailed model calibration and validation.

6.7.2 Having split the 12-hour matrices into assignment matrices for the AM peak hour, the PM peak hour and an average hour in the inter-peak (as described in Section 5.14, the process adopted for matrix estimation from counts was similar to that used for the 12-hour matrix estimation, although counts were applied individually rather than being grouped into screenlines as this was found to give a better result. As with the 12-hour matrix estimation approach described above the output matrices were taken from the ninth iterative loop of the SATURN, SATPIJA, SATME2 process.

Analysis of the effects of matrix estimation

6.7.3 As with matrix estimation at the 12-hour level, linear regression analysis has been undertaken following matrix estimation at the peak hour level to allow the pre and post matrix estimation matrices to be compared and any large changes to be understood.

6.7.4 The results of these analyses are presented in Table 6.6 to Table 6.14 below, which indicate the intercept and slope coefficients 'A' and 'B' along with the R² coefficient of determination. Tables are presented for the AM Peak, the inter-peak and the PM peak, with data cells in the tables being colour coded to indicate compliance with the notional targets defined in Table 6.2.

AM Peak

Table 6.6: Cell by cell regression analysis

UC	Definition	A	B	R ²
1	Car-HBW	-0.0020	1.0000	0.9925
2	Car-HBEB	0.0000	1.0000	0.8652
3	Car-HBO	0.0020	1.0000	0.9978
4	Car-NHBEB	0.0010	0.9900	0.9398
5	Car-NHBO	0.0010	1.0010	0.9956
6	LGV	0.0040	1.0060	0.9093
7	OGV	0.0030	1.0000	0.9914

Source: MM Calculation CAL-464 - Regression Analysis Peak Hour ME

Table 6.7: Origin tripend regression analysis

UC	Definition	A	B	R ²
1	Car-HBW	1.9690	0.9670	0.9902
2	Car-HBEB	0.0890	0.9830	0.9713
3	Car-HBO	1.9790	0.9880	0.9954
4	Car-NHBEB	0.1010	1.0350	0.9807
5	Car-NHBO	0.4200	1.0030	0.9928
6	LGV	2.3980	0.9610	0.9682
7	OGV	1.1540	1.0090	0.9975

Source: MM Calculation CAL-464 - Regression Analysis Peak Hour ME

Table 6.8: Destination tripend regression analysis

UC	Definition	A	B	R ²
1	Car-HBW	1.3150	0.9750	0.9814
2	Car-HBEB	-0.1390	1.0150	0.9540
3	Car-HBO	1.6350	0.9920	0.9953
4	Car-NHBEB	0.1690	1.0200	0.9551
5	Car-NHBO	0.5320	0.9910	0.9853
6	LGV	1.2160	1.0460	0.9670
7	OGV	1.0120	1.0140	0.9963

Source: MM Calculation CAL-464 - Regression Analysis Peak Hour ME

Inter Peak

Table 6.9: Cell by cell regression analysis

UC	Definition	A	B	R ²
1	Car-HBW	0.0000	1.0000	0.9973
2	Car-HBEB	0.0000	0.9970	0.9805
3	Car-HBO	0.0030	1.0000	0.9993
4	Car-NHBEB	0.0000	1.0080	0.9796
5	Car-NHBO	0.0010	1.0000	0.9974
6	LGV	0.0020	0.9980	0.9498
7	OGV	0.0010	1.0000	0.9967

Source: MM Calculation CAL-464 - Regression Analysis Peak Hour ME

Table 6.10: Origin tripend regression analysis

UC	Definition	A	B	R ²
1	Car-HBW	0.3430	0.9700	0.9947
2	Car-HBEB	0.1140	0.9610	0.9888
3	Car-HBO	2.2120	0.9880	0.9978
4	Car-NHBEB	0.4810	0.9600	0.9916
5	Car-NHBO	0.8910	0.9850	0.9956
6	LGV	1.4470	0.9290	0.9810
7	OGV	0.4600	0.9980	0.9990

Source: MM Calculation CAL-464 - Regression Analysis Peak Hour ME

Table 6.11: Destination tripend regression analysis

UC	Definition	A	B	R ²
1	Car-HBW	0.2670	0.9770	0.9947
2	Car-HBEB	0.0240	0.9750	0.9908
3	Car-HBO	1.9880	0.9900	0.9971
4	Car-NHBEB	0.1620	0.9950	0.9825
5	Car-NHBO	0.7400	0.9920	0.9925
6	LGV	1.2180	0.9490	0.9787
7	OGV	0.0720	1.0110	0.9988

Source: MM Calculation CAL-464 - Regression Analysis Peak Hour ME

PM Peak

Table 6.12: Cell by cell regression analysis

UC	Definition	A	B	R ²
1	Car-HBW	-0.0050	0.9990	0.9948
2	Car-HBEB	0.0000	0.9970	0.9457
3	Car-HBO	0.0000	1.0000	0.9985
4	Car-NHBEB	0.0000	1.0120	0.9647
5	Car-NHBO	-0.0010	0.9990	0.9965
6	LGV	0.0020	0.9950	0.9347
7	OGV	0.0000	0.9990	0.9924

Source: MM Calculation CAL-464 - Regression Analysis Peak Hour ME

Table 6.13: Origin tripend regression analysis

UC	Definition	A	B	R ²
1	Car-HBW	-0.4530	0.9750	0.9875
2	Car-HBEB	-0.2190	1.0200	0.9797
3	Car-HBO	0.3970	0.9960	0.9966
4	Car-NHBEB	0.0290	0.9920	0.9870
5	Car-NHBO	-0.1150	0.9910	0.9939
6	LGV	1.2150	0.9670	0.9826
7	OGV	0.1320	0.9940	0.9979

Source: MM Calculation CAL-464 - Regression Analysis Peak Hour ME

Table 6.14: Destination tripend regression analysis

UC	Definition	A	B	R ²
1	Car-HBW	0.2270	0.9660	0.9915
2	Car-HBEB	-0.0470	0.9930	0.9788
3	Car-HBO	0.9180	0.9890	0.9954
4	Car-NHBEB	-0.5870	1.0530	0.9754
5	Car-NHBO	-0.3820	0.9990	0.9911
6	LGV	0.7580	1.0050	0.9665
7	OGV	-0.0700	1.0080	0.9976

Source: MM Calculation CAL-464 - Regression Analysis Peak Hour ME

6.7.5 It can be seen from the tables above that the parameters from the regression analyses mostly fall within the prescribed limits for each of the three time periods. Where values exceed the WebTAG guidelines they generally do so only by a small margin and changes made to the matrices by the matrix estimation process are not considered to give cause for concern in the context of the calibration of the model.

Trip Length Distribution

6.7.6 Plots showing comparisons of the trip length distribution pre and post matrix estimation at the peak hour level are presented in Appendix N.

6.7.7 In general the plots indicate that whilst matrix estimation at the peak hour level has had some impact on the trip length distribution, the impact of this is relatively slight in all the modelled time periods with most variations being minor in nature.

Sector Analysis

6.7.8 Analyses of sector to sector movements before and after matrix estimation are presented in Appendix O (sectors are as per those used for the 12-hour analysis and are as indicated in Appendix M. Naturally, at the individual user class level the changes resulting from matrix estimation have caused a number of changes at the 12 sector level that are significantly greater than the 5% guide given in Table 6.2 above. However, this could be in part a consequence of the relatively fine sector system used for the comparison. On the whole it is considered that the results of the analysis generally show relatively modest changes in movements between sectors with changes being varied in nature and no particular trends standing out. As a result of this it is considered that the effects of matrix estimation have not had a detrimental effect on the matrices.

6.8 Conclusions

6.8.1 A robust approach to estimating the matrices has been followed, taking into account the impact of changes at both the 12-hour and the peak hour level. The results from the analysis of the estimated matrices indicate that the degree of change from the prior matrices are, for the most part within, or close to the challenging targets set out in WebTAG guidance.

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7 Model Validation

7.1 General

- 7.1.1 Following the model calibration described in Chapter 6 the results from the final peak hour assignments are presented below. Comparisons by peak hour for model flows and journey times against observations are presented along with key statistics from the assignments to demonstrate the robustness of the results.
- 7.1.2 The majority of the model results are presented in the appendices with flow comparisons for calibration and validation screenlines summarised in Appendix R (with detailed results in Appendix S) and journey time charts in Appendix T.

7.2 Assignment Model Convergence and Stability

- 7.2.1 An assignment model can be monitored using a variety of indicators to assess the degree to which the assignment process has converged;
- Global stability indicators, based on comparison between successive iterations of network-wide values of total journey time, total journey distance, total or average travel costs or average speeds.
 - Disaggregate stability indicators, based on absolute changes in values of individual link flows, costs or times, origin-destination costs of a combination of these.
 - Proximity indicators, reflecting how close the current flow and cost pattern is to the assignment objective.
- 7.2.2 In general, iterative methods for reaching equilibrium will not converge absolutely. Rather, it is necessary to demonstrate that the model has achieved convergence to an acceptable level to be able to produce stable, consistent and robust model results. Care needs to be exercised to distinguish between convergence and stability. Stability can be achieved without there being convergence to a solution.
- 7.2.3 It was decided that the criteria from WebTAG (Unit 3.19) should be used for this study although in practice stricter criteria were applied to the assignments such that the convergence exceeded the requirements of WebTAG. In particular, the measurement of proximity using the Gap statistic, which is required to be below 0.1% since the model is to be used with variable demand modelling (via the use of DIADEM) and possibly economic appraisal.

7.2.4 Other indicators of model stability included the following:

- Percentage flow (changing less than 1%) for more than 98% of links.
- Relative Average Absolute Difference (RAAD) in link flows less than 1%
- Average Absolute Difference (AAD) in link flows less than 1 vehicle per hour

7.2.5 A summary of the convergence achieved for the three peak hour models is provided in Appendix P which shows the models are very well converged.

7.3 Route Analysis

7.3.1 To provide confidence that the highway model is assigning trips along appropriate routes a series of select link analyses were undertaken in SATURN. The results of these analyses are presented in Appendix Q and are generally as expected with traffic routeing in a logical manner.

7.3.2 Directional plots are shown for the AM and PM peaks for the following sites:

- A47 east of Postwick Junction
- A47 west of Longwater Interchange
- A11 west of Thickthorn Junction

7.4 Flow Comparisons

7.4.1 The results from the model flow calibration and validation are presented in summary form below for 'all vehicles' and 'cars' with a summary by screenline provided in Appendix R. A detailed breakdown of each screenline is provided in Appendix S where comparisons for individual counts are presented by screenline for each of the three time periods.

Calibration Screenlines

7.4.2 The calibration and validation used the guidelines set out in WebTAG (Unit 3.19), which were previously summarised in Table 6.1.

7.4.3 Table 7.1 shows the results for all vehicles combined across the calibration screenlines with Table 7.2 giving the equivalent comparison just for cars.

Table 7.1: Summary of screenline flow calibration results (All Vehicles)

Criteria	Cases	AM	IP	PM	Target
Total screenline within 5% of observed	15 (16 IP)	13	11	13	All or nearly all screenlines
Total screenline flow GEH<4	15 (16 IP)	12	16	13	All or nearly all screenlines
Individual link flows (proximity)	171	91%	98%	94%	>85% of cases
Individual link flows GEH<5	171	86%	94%	90%	>85% of cases

Source: MM Calculation CAL-462 - Link Flow Summary - Peak_Hour_ME_060813

Table 7.2: Summary of screenline flow calibration results (Cars)

Criteria	Cases	AM	IP	PM	Target
Total screenline within 5% of observed	15 (16 IP)	14	13	14	All or nearly all screenlines
Total screenline flow GEH<4	15 (16 IP)	14	16	14	All or nearly all screenlines
Individual link flows (proximity)	171	93%	98%	96%	>85% of cases
Individual link flows GEH<5	171	87%	95%	92%	>85% of cases

Source: MM Calculation CAL-462 - Link Flow Summary - Peak_Hour_ME_060813

7.4.4 For the purposes of summarising the level of calibration across the screenlines, a total of 15 screenlines are defined in the AM and PM Peak hours (seven screenlines in two directions and the Park & Ride screenline in a single direction) and 16 screenlines for the Inter Peak (eight screenlines in two directions).

7.4.5 With reference to the full calibration and validation results presented in Appendix S nearly all of the calibration screenlines achieve a GEH value of less than 4 in each of the three modelled periods.

7.4.6 In the AM Peak, 12 of the 15 screenlines (both directions considered separately) calibrate with GEH values of less than 4, while this figure increases to 13 of the 15 screenlines in the PM Peak. All 16 screenlines calibrate with GEH values of less than 4 in the Inter Peak.

7.4.7 Importantly, the most critical screenlines in the context of the NDR scheme (Outer Cordon (D) and North/South (J)) both calibrate well in each modelled period.

7.4.8 It is also worth noting that along the screenlines that do not achieve an overall GEH of less than 4, the vast majority of individual count sites satisfy the calibration criteria. For example, whilst the inbound Outer Ring Road

screenline does not achieve a GEH of less than 4 in the AM Peak, of the 24 individual count sites that constitute the screenline only three of these fail to achieve the relevant calibration criteria.

7.4.9 This is also reflected in the calibration results at the individual link level where it can be seen that more than 85% of links achieve the link-based calibration criteria of a GEH value of less than 5 in each modelled period.

Validation Screenlines

7.4.10 Similarly to the calibration flow comparisons above the tables below show the equivalent statistics for the validation screenlines. Whilst there is a degree of overlap, these screenlines have not been used in the model calibration and therefore provide an independent set of data against which the model flows can be validated. As the data used for validation has not been used in model building the comparison between observations and the model is naturally not as close as for the calibration screenlines detailed above.

7.4.11 Table 7.3 presents a summary of the validation results for all vehicles with the comparison for cars shown in Table 7.4.

Table 7.3: Summary of screenline flow validation (All Vehicles)

Criteria	Cases	AM	IP	PM	Target
Total screenline within 5% of observed	6	4	4	5	All or nearly all screenlines
Total screenline flow GEH<4	6	4	5	5	All or nearly all screenlines
Individual link flows (proximity)	58	84%	84%	84%	>85% of cases
Individual link flows GEH<5	58	81%	78%	86%	>85% of cases

Source: MM Calculation CAL-462 - Link Flow Summary - Peak_Hour_ME_060813

Table 7.4: Summary of screenline flow validation (Cars)

Criteria	Cases	AM	IP	PM	Target
Total screenline within 5% of observed	6	5	4	5	All or nearly all screenlines
Total screenline flow GEH<4	6	5	5	5	All or nearly all screenlines
Individual link flows (proximity)	58	86%	84%	84%	>85% of cases
Individual link flows GEH<5	58	86%	81%	86%	>85% of cases

Source: MM Calculation CAL-462 - Link Flow Summary - Peak_Hour_ME_060813

7.4.12 For the purposes of summarising the model validation on the screenline basis, a total of 6 validation screenlines are defined (three screenlines in both directions).

7.4.13 Four of the six screenlines validate in the AM Peak, while five of the six validate in both the Inter Peak and PM Peak models.

7.4.14 Two of the three screenlines (the North East and the Outer Cordon screenlines) validate in both directions in each of the three modelled periods.

7.4.15 The North West validation screenline (Screenline I) does not achieve the screenline validation criteria in either direction in the AM Peak or in the northeast direction in the Inter Peak and PM Peak. However, on an individual count site basis the screenline can be seen to validate well. For example, only one site has a GEH of more than 5 in the northeast direction in the AM Peak and no sites have a GEH of more than 5 in the opposite direction. Similarly, only one individual site has a GEH value of more than 5 in the PM Peak in the northeast direction.

7.5 Journey Time Validation

7.5.1 In addition to the validation of link flows the model is also validated against observed journey times along a series of set routes. The routes used are described in section 3.11 and shown graphically in Figure 3.6. The tables below summarise the results of the journey time validation whilst detailed plots of each of the journey routes for each of the time periods are presented in Appendix T.

7.5.2 A summary of the journey time validation for all time periods is shown in Table 7.5 with detailed summaries of the AM peak, inter peak and PM peak models provided below.

Table 7.5: Journey Time Validation Summary

Time Period	Number of Routes	Number Achieving Validation Criteria	Percentage Achieving Validation Criteria
AM Peak	22	17	77%
Inter Peak	22	22	100%
PM Peak	22	17	77%

- 7.5.3 Table 7.6 below provides a summary of the AM peak journey time validation with detailed plots of the journey time profiles being provided in section Appendix T.
- 7.5.4 From Table 7.6 it can be seen that 17 of the 22 journey routes in the AM peak hour satisfy the WebTAG criteria of being within 15% of the observed time. Routes that fall outside the criteria include Route 4 anti-clockwise; Route 6 (northbound); Route 7 (southbound); Route 8 (eastbound) and Route 10 (southbound). In all cases the modelled journey time is faster than the observations, although in the case of Routes 7 and 8 the modelled time is only just outside the 15% criterion.
- 7.5.5 On closer inspection of the route profiles (in Appendix T) it can be noted that the routes highlighted above, whilst being fast over their entire length, are generally too fast over quite short sections and that the vast majority of the routes by length track the observations quite closely.
- 7.5.6 For Route 4 clockwise (Inner Ring Road) the first 2km section leading up to the junction with the A11 St Stephens is too fast in the model, but the remainder of the route can be seen in Figure T.7 to track the observations at a constant offset, indicating that the remainder of the route matches closely with the observations.
- 7.5.7 Similarly, Route 6 northbound (Ipswich Road) can be seen in Figure T.12 to be too fast in the model up to the Outer Ring Road but after this point the rest of the route into town mirrors observations well.
- 7.5.8 Route 7 southbound covers the A11 route out of Norwich. The profile for this route is indicated in Figure T.13 where it can be noted that the section that is too fast in the model is from the Outer Ring Road to the start of the dual carriageway section (a length of approximately 1.5km). The rest of the route can be seen to match the observations well.
- 7.5.9 The profile for Route 8 eastbound (Dereham Road) is shown in Figure T.16 and indicates that the model is too fast overall on this route. However, on inspection of the journey time profile it can be seen that the route generally

follows the observations closely except for a short section at around 3.5km. This point represents the signalised junction of Dereham Road and Norwich Road where the model is under-representing eastbound delay in the AM peak.

7.5.10 Route 10 southbound (A140 Cromer Road) is shown in Figure T.20. The graph shows that the modelled times deviate from observations after approximately 2.5km. This portion of the curve represents the southbound approach to the Boundary Junction with the Outer Ring Road. Delays on this approach are lower than observations but elsewhere this route tracks the journey time profile reasonably well.

Table 7.6: AM Peak Journey Time Validation Summary

AM Peak		% routes meeting DMRB criteria (AM) 77%				
Route	Name	Direction	Journey Time (minutes)			% Difference
			Observed	Modelled	Difference	
AM Peak						
Route 1	A47 Brundall Roundabout to A47 Easton Roundabout	WB	14.58	14.01	-0.57	-3.90%
Route 1	A47 Easton Roundabout to A47 Brundall Roundabout	EB	14.71	14.13	-0.58	-3.96%
Route 2	Postwick Interchange to A1074 Dereham Road (North Norwich Circular)	WB	36.98	40.29	3.31	8.95%
Route 2	A1074 Dereham Road (North Norwich Circular) to Postwick Interchange	EB	37.22	39.11	1.90	5.10%
Route 3	A1042, A140, A146, A147, A1242 (Outer Ring Road Clockwise)	CW	55.32	47.29	-8.03	-14.51%
Route 3	A1042, A140, A146, A147, A1242 (Outer Ring Road Anti-Clockwise)	ACW	57.32	53.54	-3.78	-6.60%
Route 4	A1242, A147 (Inner Ring Road Clockwise)	CW	19.73	15.67	-4.06	-20.57%
Route 4	A1242, A147 (Inner Ring Road Anti-Clockwise)	ACW	20.76	21.08	0.32	1.52%
Route 5	City Centre to A47/A140 Junction	SB	6.92	7.78	0.86	12.43%
Route 5	A47/A140 Junction to City Centre	NB	10.80	10.94	0.14	1.25%
Route 6	St Stephens Street Roundabout to A47/A140 Junction	SB	9.09	7.87	-1.22	-13.44%
Route 6	A47/A140 Junction to St Stephens Street Roundabout	NB	11.72	9.17	-2.55	-21.73%
Route 7	St Stephens Street Roundabout to A47/A11 Junction	SB	9.57	7.99	-1.58	-16.52%
Route 7	A47/A11 Junction to St Stephens Street Roundabout	NB	12.71	11.21	-1.49	-11.76%
Route 8	Duke Street Roundabout to A47/A1074 Junction	WB	18.76	19.38	0.62	3.33%
Route 8	A47/A1074 Junction to Duke Street Roundabout	EB	24.00	19.71	-4.29	-17.89%
Route 9	Duke Street Roundabout to Taverham (A1067 Fakenham Road)	WB	15.40	17.01	1.61	10.47%
Route 9	Taverham (A1067 Fakenham Road) to Duke Street Roundabout	EB	22.45	19.22	-3.22	-14.36%
Route 10	City Centre to Norwich Airport (Manor Park Roundabout)	NB	11.54	11.11	-0.43	-3.73%
Route 10	Norwich Airport (Manor Park Roundabout) to City Centre	SB	18.76	15.18	-3.58	-19.10%
Route 11	City Centre to A1157 Wroxham Road at Bear's Grove	NB	14.60	13.80	-0.80	-5.45%
Route 11	A1157 Wroxham Road at Bear's Grove to City Centre	SB	18.17	17.24	-0.93	-5.10%

Source: MM Calculation CAL-457 -
Peak_Hour_ME_060813_Journey_Time_Validation_AvgLinkTime_AM

7.5.11 Table 7.7 below shows the journey time validation summary for the inter-peak period. As can be seen from the table and from the charts in Appendix T, the journey times reproduced by the inter-peak model are a good match to the observations.

Table 7.7: Inter-Peak Journey Time Validation Summary

Inter-Peak		% routes meeting DMRB criteria (IP)				100%
Route	Name	Direction	Journey Time (minutes)		Difference	% Difference
			Observed	Modelled		
Inter-Peak						
Route 1	A47 Brundall Roundabout to A47 Easton Roundabout	WB	14.22	13.49	-0.73	-5%
Route 1	A47 Easton Roundabout to A47 Brundall Roundabout	EB	14.48	13.46	-1.01	-7%
Route 2	Postwick Interchange to A1074 Dereham Road (North Norwich Circular)	WB	34.67	35.96	1.29	4%
Route 2	A1074 Dereham Road (North Norwich Circular) to Postwick Interchange	EB	33.90	34.90	1.00	3%
Route 3	A1042, A140, A146, A147, A1242 (Outer Ring Road Clockwise)	CW	44.66	41.31	-3.35	-7%
Route 3	A1042, A140, A146, A147, A1242 (Outer Ring Road Anti-Clockwise)	ACW	43.61	40.60	-3.01	-7%
Route 4	A1242, A147 (Inner Ring Road Clockwise)	CW	15.64	15.32	-0.32	-2%
Route 4	A1242, A147 (Inner Ring Road Anti-Clockwise)	ACW	16.20	16.17	-0.03	0%
Route 5	City Centre to A47/A140 Junction	SB	6.52	7.35	0.83	13%
Route 5	A47/A140 Junction to City Centre	NB	6.21	6.84	0.62	10%
Route 6	St Stephens Street Roundabout to A47/A140 Junction	SB	7.58	7.24	-0.35	-5%
Route 6	A47/A140 Junction to St Stephens Street Roundabout	NB	7.70	7.52	-0.18	-2%
Route 7	St Stephens Street Roundabout to A47/A11 Junction	SB	7.27	7.48	0.21	3%
Route 7	A47/A11 Junction to St Stephens Street Roundabout	NB	7.30	7.31	0.01	0%
Route 8	Duke Street Roundabout to A47/A1074 Junction	WB	18.39	19.69	1.31	7%
Route 8	A47/A1074 Junction to Duke Street Roundabout	EB	17.44	16.50	-0.94	-5%
Route 9	Duke Street Roundabout to Taverham (A1067 Fakenham Road)	WB	14.69	15.16	0.47	3%
Route 9	Taverham (A1067 Fakenham Road) to Duke Street Roundabout	EB	16.88	16.53	-0.35	-2%
Route 10	City Centre to Norwich Airport (Manor Park Roundabout)	NB	11.14	10.82	-0.32	-3%
Route 10	Norwich Airport (Manor Park Roundabout) to City Centre	SB	13.94	11.88	-2.07	-15%
Route 11	City Centre to A1157 Wroxham Road at Bear's Grove	NB	13.90	13.58	-0.33	-2%
Route 11	A1157 Wroxham Road at Bear's Grove to City Centre	SB	13.76	14.02	0.27	2%

Source: MM Calculation CAL-458 -
Peak_Hour_ME_060813_Journey_Time_Validation_AvgLinkTime_IP

7.5.12 From Table 7.8 it can be seen that 17 of the 22 journey routes in the PM peak hour satisfy the WebTAG criteria of being within 15% of the observed time. Routes that fall outside the criteria include Routes 3 and Route 4 in both directions and Route 10 northbound. Of these routes both Route 3 and 4 clockwise, only narrowly fall outside the 15% target.

7.5.13 From the graphs in Appendix T it can be seen that Route 3 clockwise (Outer Ring Road) and both directions of Route 4 (Inner Ring Road) show similar trends with modelled journey times being marginally too fast throughout the

route. This is attributable to the model slightly underrepresenting the observed delays at the roundabout junctions on the Inner and Outer Ring Roads.

7.5.14 Route 3 anti-clockwise, whilst still being too fast overall is affected to a greater extent by delays at the A140 Cromer Road (Boundary Junction) shown around 8km into the route on Figure T.50 where the observed delays are not fully represented in the model.

Table 7.8: PM Peak Journey Time Validation Summary

PM Peak							% routes meeting DMRB cri	77%
Route	Name	Direction	Journey Time (minutes)		Difference	% Difference		
			Observed	Modelled				
PM Peak								
Route 1	A47 Brundall Roundabout to A47 Easton Roundabout	WB	14.27	13.97	-0.29	-2.04%		
Route 1	A47 Easton Roundabout to A47 Brundall Roundabout	EB	14.05	14.00	-0.04	-0.31%		
Route 2	Postwick Interchange to A1074 Dereham Road (North Norwich Circular)	WB	36.42	37.84	1.42	3.91%		
Route 2	A1074 Dereham Road (North Norwich Circular) to Postwick Interchange	EB	37.67	36.62	-1.05	-2.79%		
Route 3	A1042, A140, A146, A147, A1242 (Outer Ring Road Clockwise)	CW	55.07	45.59	-9.48	-17.21%		
Route 3	A1042, A140, A146, A147, A1242 (Outer Ring Road Anti-Clockwise)	ACW	56.64	43.50	-13.15	-23.21%		
Route 4	A1242, A147 (Inner Ring Road Clockwise)	CW	22.55	18.68	-3.87	-17.14%		
Route 4	A1242, A147 (Inner Ring Road Anti-Clockwise)	ACW	21.54	17.09	-4.45	-20.64%		
Route 5	City Centre to A47/A140 Junction	SB	7.37	8.22	0.85	11.47%		
Route 5	A47/A140 Junction to City Centre	NB	8.73	8.49	-0.24	-2.70%		
Route 6	St Stephens Street Roundabout to A47/A140 Junction	SB	8.47	7.35	-1.12	-13.18%		
Route 6	A47/A140 Junction to St Stephens Street Roundabout	NB	8.49	8.03	-0.46	-5.38%		
Route 7	St Stephens Street Roundabout to A47/A11 Junction	SB	8.50	8.53	0.03	0.31%		
Route 7	A47/A11 Junction to St Stephens Street Roundabout	NB	7.56	7.78	0.22	2.94%		
Route 8	Duke Street Roundabout to A47/A1074 Junction	WB	22.74	21.94	-0.80	-3.50%		
Route 8	A47/A1074 Junction to Duke Street Roundabout	EB	19.50	19.35	-0.16	-0.81%		
Route 9	Duke Street Roundabout to Taverham (A1067 Fakenham Road)	WB	17.76	16.25	-1.51	-8.52%		
Route 9	Taverham (A1067 Fakenham Road) to Duke Street Roundabout	EB	17.97	18.26	0.28	1.58%		
Route 10	City Centre to Norwich Airport (Manor Park Roundabout)	NB	13.67	11.03	-2.64	-19.33%		
Route 10	Norwich Airport (Manor Park Roundabout) to City Centre	SB	15.73	14.07	-1.66	-10.57%		
Route 11	City Centre to A1157 Wroxham Road at Bear's Grove	NB	15.74	14.10	-1.64	-10.41%		
Route 11	A1157 Wroxham Road at Bear's Grove to City Centre	SB	14.63	16.11	1.48	10.12%		

Source: MM Calculation CAL-459 -
Peak_Hour_ME_060813_Journey_Time_Validation_AvgLinkTime_PM

7.6 Summary

- 7.6.1 The new 2012 NATS model accurately reproduces flows across key screenlines and at locations in respect of the assessment of the NDR scheme.
- 7.6.2 The link flow calibration indicates that flows across the calibration screenlines meet WebTAG criteria in terms of total flow across the screenline and individual link flows. In terms of validation, the model only marginally fails to meet the full WebTAG flow criteria.
- 7.6.3 The journey time validation indicates that modelled speeds are representative on key routes in the modelled area. The discrepancy with observed journey times in the AM and PM peak hours is considered to be acceptable on the basis that the majority of links over which journey times have been compared are reasonably consistent with observations and that where overall journey time routes do fall outside the prescribed limits this is generally as a result of short sections, or single junctions, where delay has not been fully represented in the model
- 7.6.4 On the basis of the results set out in this chapter, it can be concluded that the model forms a reasonable basis for forecasting the impact of the NDR scheme

8 Conclusions

- 8.1.1 Mott MacDonald has been appointed by Norfolk County Council (NCC) to develop and update the existing (NATS) transport model of Norwich for the purposes of supporting the promotion of the Norwich Northern Distributor Road (NDR).
- 8.1.2 Models have been developed to represent the AM peak hour (08:00-09:00), an average hour in the inter-peak (10:00 – 16:00) and the PM peak hour (17:00 – 18:00).
- 8.1.3 Trip matrices have been prepared in line with current guidance based on both observed and synthetic data. Details of checks undertaken at key stages in the development of the matrices are presented in the report to ensure that provenance of the matrices is maintained. Checks include analysis of the observed and synthetic matrices prior to merging and, subsequent to merging, comparisons with counts before applying matrix estimation. Analyses of the effects of matrix estimation are also documented.
- 8.1.4 The model convergence meets WebTAG criteria in all time periods.
- 8.1.5 The model achieves a good level of flow calibration with results indicating a close match to observations on the calibration screenlines and for individual link counts, with the WebTAG criteria for GEH and flow proximity being met in all time periods for both all vehicles and cars.
- 8.1.6 Flow validation has been undertaken against independent data and assessment of the validation process shows that the model also achieves a good level of flow validation in each of the modelled time periods, meeting many of the validation criteria and is close to meeting the WebTAG criteria in other cases.
- 8.1.7 The journey time validation is considered to be reasonably good with the model recreating journey times that are representative on key routes in the modelled area. The discrepancy with observed journey times in the AM and PM peak hours is considered to be acceptable on the basis that the majority of links over which journey times have been compared are generally consistent with observations and that where overall journey time routes do fall outside the acceptability guidelines this is generally as a result of short sections, or single junctions, where delay has not been fully represented in the model.

- 8.1.8 In conclusion, it is considered that the base year highway assignment models developed for the 2012 NATS transport model demonstrate a good representation of traffic behaviour in the study area and form a robust basis from which future year forecasts for the NDR scheme can be developed.

9 Glossary of Abbreviations

ATC	Automatic Traffic Count
DfT	Department for Transport
DIADEM	Dynamic Integrated Assignment and Demand Modelling - software released by the Department for Transport
DMRB	Design Manual for Roads and Bridges – a Highways Agency publication setting out guidance and good practice for design and appraisal of road schemes
COBA	Dft’s Cost-Benefit Analysis tool
EB	East Bound or Employer’s Business
ERICA	The Department for Transport’s Matrix builder software
GAP	Minimum gap (in seconds) accepted by a vehicle which gives way at priority junctions or traffic signals. Also a measure of Wardrop equilibrium assignment convergence
GAPR	As GAP above in relation to junctions but for entry onto roundabouts
GEH	Statistical tool to measure closeness of model to observed flows
GIS	Geographic Information System - designed to capture, store, manipulate, analyse, manage, and present all types of geographical data
GPS	Global Positioning System
HA	Highways Agency
HB	Home-based
HBEB	Home-based Employers Business
HBO	Home-based Other
HBW	Home-based Work
HGV	Heavy Goods Vehicle
LGV	Light Goods Vehicle

LINVAL	DfT Link flow validation program referenced in the ERICA Manual
LMVR	Local Model Validation Report
MATVAL	DfT matrix building program referenced in the ERICA Manual
MCC	Manual Classified Count (for a link)
MCTC	Manual Classified Turning Count
ME	Matrix Estimation
MOVA	Microprocessor Optimised Vehicle Actuation
NATS	Norwich Area Transportation Strategy
NB	North Bound
NCC	Norfolk County Council
NDC	Nationwide Data Collection (company specialising in traffic surveys)
NDR	Norwich Northern Distributor Road
NHB	Non-home-based
NHBEB	Non-home based Employer's Business
NHBO	Non-home –based Other
NTEM	National Trip End Model
NTS	National Travel Survey
OD	Origin Destination
OGV	Other Goods Vehicle
OGV1	A sub-category of OGV. Includes all rigid vehicles over 3.5 tonnes gross vehicle weight with two or three axles
OGV2	A sub-category of OGV. Includes all rigid vehicles with four or more axles and all articulated vehicles
OP	Off-peak
PA	Production-attraction

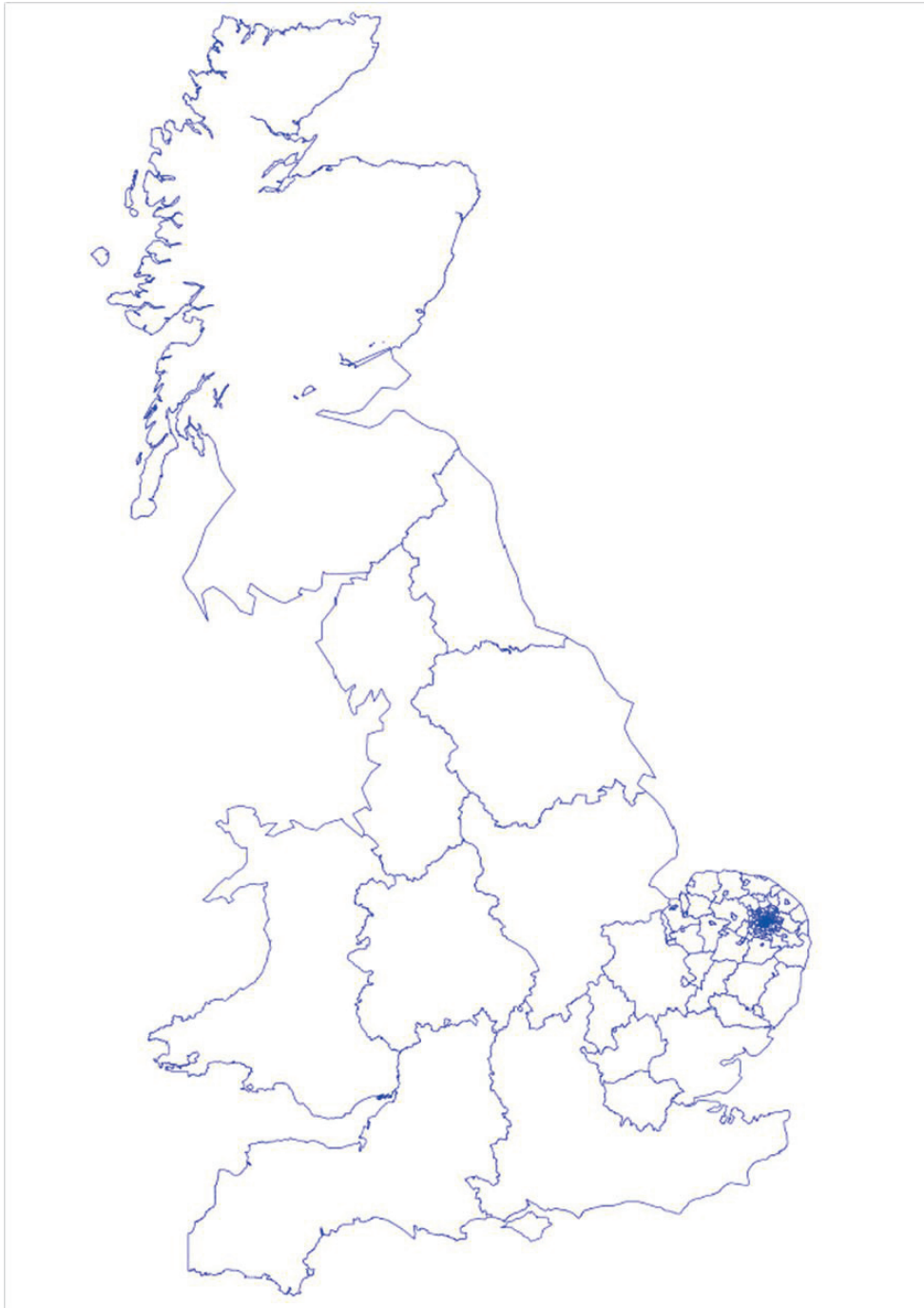
PCU	Passenger Car Unit
RSI	Road Side Interview
SATPIJA	Part of the SATURN suite of programs used to determine the proportion of trips for each ij movement on a particular link
SATME2	Part of the SATURN suite of programs used for matrix estimation (Matrix Estimation from Maximum Entropy)
SATURN	Simulation – Assignment model of Traffic on Urban Road Networks software
SB	South Bound
SCOOT	Split Cycle Offset Optimisation Technique
SRN	Strategic Road Network
TAM	Traffic Appraisal Manual
TRADS	Traffic flow Data System – the Highways Agency’s database of traffic count data
TRRL	Transport and Road Research Laboratory
VISUM	Transport modelling software used (in this case) for public transport modelling
WB	West Bound
WebTAG	Web-based Transport Analysis Guidance produced by the Department for Transport

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10 Appendices

10.1 Appendix A: Zone Plans

Figure A.1: Norwich NDR Model Zone Plan (1 of 4)



The Norfolk County Council (Norwich Northern Distributor Road (A1067 to A47(T))) Order

5.10 Public Transport Local Model Validation Report (LMVR)

Planning Act 2008

Infrastructure Planning

The Infrastructure Planning (Applications: Prescribed Forms and Procedure)
Regulations 2009


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1 Key Summary

1.1.1 The primary aim of the public transport model is to provide:

- Accurate representation of public transport usage in both base and forecast years;
- Changes in costs and demand for public transport to feed into the demand model to assess levels of modal transfer.

1.1.2 The model has been developed from surveys that have been carried out over a number of years, most recently surveys of bus patronage were carried out in 2013. The model represents bus and rail services and patronage in Norwich for a base year of 2012.

1.1.3 The model represents the AM peak hour (08:00-09:00), an average inter-peak hour (10:00-16:00) and the PM peak hour (17:00-18:00) which are consistent with the highway assignment model.

1.1.4 The model has been very successfully calibrated, but in doing this it was not possible to independently validate the assigned flows as all the available on-board count information was used for calibration. This was judged to be the best use of the available data.

1.1.5 Given the role of the model in the appraisal of the Norwich Northern Distributor Road (NDR), it is considered that the public transport model provides a good representation of base year supply and demand as part of the transport model forecasting system.

2 Introduction

- 2.1.1 Mott MacDonald (MM) has been appointed by Norfolk County Council (NCC) to assist with the development and appraisal of the Norwich Northern Distributor Road, known as the NDR or referred to as the Scheme.
- 2.1.2 The Scheme would be a dual carriageway all-purpose strategic distributor road, to be classified as the A1270 Principal Road, which would link the A1067 Fakenham Road near Attlebridge, to the A47 Trunk Road (T) at Postwick. This will be over a length of approximately 20.4km.
- 2.1.3 The NDR is a project of national significance which requires a Development Consent Order (DCO) under the Planning Act 2008 and this formal planning process began in early 2013. It is currently anticipated that the process will be completed in time for the NDR scheme to start construction in 2015 and to be opened in 2017.
- 2.1.4 This document is one of a number that support the DCO, each of which has its own unique document number, and should therefore be read in conjunction with the other documentation. The proposed layout of the NDR is shown in the General Arrangement Plans contained in document number 2.6, whilst the full needs case for the NDR is explained in the Statement of Reasons (document 4.1) and the Environmental Statement (document 6.1).
- 2.1.5 Norfolk County Council (NCC) submitted a Major Scheme Business Case (MSBC) for the Norwich Northern Distributor Road (NDR) to the Department for Transport (DfT) in July 2008. Programme Entry for the scheme was granted in January 2010.
- 2.1.6 In October 2010 as part of the Government's Comprehensive Spending Review, the DfT reviewed the funding of all major local transport schemes. The outcome of this review was that the NDR was included in a Development Pool of schemes. Despite these schemes offering good value for money the DfT invited scheme promoters to undertake some further analysis and submit improved funding bids. These revised funding bids were submitted in September 2011. Ministerial decisions were made in December 2011 to award funding for NDR.
- 2.1.7 For that purpose Mott MacDonald updated an existing 2006 VISUM Public Transport Model for the September 2011 submission. The aim of the updating was to produce a VISUM model which could provide inputs into the demand model which was in production-attraction format so that the overall modelling

approach complied with the WebTAG guidance. This resulted in the re-building of the base year matrices using origin and destination interview data collected in 2009 for bus and rail services in Norwich. At the same time further enhancements were introduced into the modelling including the development of a more refined zoning system, and the revision of the public transport services. The base year of 2006 was retained during the September 2011 updating.

2.1.8 This report was prepared as part of the DCO submission. For this the public transport model was updated to a 2012 base which complied with the current DfT guidance.

2.1.9 The required 2012 modelling system consisted of three main elements:

- A highway assignment model developed in SATURN software
- A public transport model developed in VISUM software
- A demand model using the DIADEM software

2.1.10 This report details the updating of the VISUM Public Transport (PT) model to 2012, the revision of the public transport services along with their timetables and presents the model calibration achieved following the guidelines contained in WebTAG.

2.1.11 The structure of the report is as follows:

- Chapter 3 details public transport data collection
- Chapter 4 explains supply and assignment model development
- Chapter 5 contains information on matrix calibration using matrix estimation
- Chapter 6 reports model validation results
- Chapter 7 provides conclusions on the 2012 base PT model and
- Appendices contain information on bus surveys and fares
- A glossary and bibliography are included at the end

3 Public Transport Data Collection

3.1 Background

3.1.1 The transport model components were to be brought up to date by rebasing the model to 2012. Whilst the highway surveys were conducted during the autumn of 2012, public transport data was collected in May 2013. It was considered that there would be very little difference between patronage in autumn 2012 and spring 2013, especially for bus data. This was supported by NTEM v6.2 public transport forecasts for Norfolk which are very similar for 2012 and 2013. Any differences would be statistically insignificant and would not have any effect on the forecasts for NDR.

3.1.2 The public transport data collection in 2013 comprised the following:

- Bus monitoring counts
- The updating of the bus services running in or around Norwich
- The collection of the timetables of the bus services identified above
- Checking and confirming that rail services remain similar

3.1.3 The gathered information formed the necessary dataset that enabled the model to be calibrated so that the updated 2012 model represented the bus and rail network operation as closely as possible. No further rail patronage information was collected for 2012 PT model rebasing. This was done on the basis that the NDR would have very little impact on rail travel or be affected by that mode as the rail network serves only a limited number of radial routes in the Norwich area.

3.2 Bus Monitoring Counts

3.2.1 Counts of bus passengers were undertaken on an annual basis on a cordon of sites around Norwich until 2008 by the Public Transport Unit (PTU) of NCC. These were one day counts of buses and bus occupancy counts undertaken on on-board buses. However, due to budget constraints the bus monitoring counts were stopped in 2008.

3.2.2 To support the 2012 PT model update and the model calibration exercise a series of on-board bus counts were commissioned and undertaken in May 2013. These replicated the historic sites that were previously surveyed up to

2008 by NCC, and they covered bus stops on a cordon inside the A140/A1042 outer ring road. Several stands at Castle Meadow which are not on above cordon were also surveyed. They are shown in Figure 3.1 below and include the following locations:

- Thorpe Road
- Bracondale
- Long John Hill
- Newmarket Road
- Hall Road
- Constitution Hill
- Plumstead Road
- Bowthorpe Road
- The Avenues
- Earlham Road
- Dereham Road
- Drayton Road
- Aylsham Road
- Catton Grove Road
- Sprowston Road
- Ipswich Road
- Unthank Road
- Castle Meadow – Stands B, E, P, R and W

3.2.3 Each bus stop was surveyed in the AM peak, interpeak and PM peak periods as follows for a total of 9 hours:

- AM Peak 07:30 – 09:30
- Interpeak 10:00 – 12:00 and 13:00 – 15:00
- PM Peak 15:30 – 18:30

3.2.4 Surveys were completed within a single week. Each site was surveyed for one weekday within this week except Castle Meadow stands B, E, P, R and W which were surveyed for the whole week. The counts at Castle Meadow provided day to day variability of bus patronage which was required for the subsequent matrix estimation, and the location of Castle Meadow was chosen because it was noted that many of the bus services included in the updated 2012 model stopped at that location. Survey dates are given below in Table 3.1.

Table 3.1: Survey Dates

Count site(s)	Date
Thorpe Road, Bracondale, Plumstead Road, Castle Meadow	13 th May 2013
Long John Hill, Newmarket Road, Hall Road, The Avenue, Ipswich Road, Castle Meadow	14 th May 2013
Bowthorpe Road, Earlham Road, Dereham Road, Unthank Road, Castle Meadow	15 th May 2013
Constitution Hill, Catton Grove, Sprowston Road, Castle Meadow	16 th May 2013
Drayton Road, Aylsham Road, Castle Meadow	17 th May 2013

Notes: For each site both inbound and outbound surveys were carried out on the same day.

3.2.5 Patronage counts were undertaken by enumerators boarding the bus services at the survey bus stops. This was done for both directions of travel on each scheduled bus, but excluding Park & Ride buses as these were dealt with separately within the highway assignment model. The following information was gathered for each bus:

- Time of arrival
- Bus service number
- Bus operator
- Bus type
- Number of passenger boarding and alighting
- Number of on-board through-stop passengers (excluding alighting and boarding passengers)

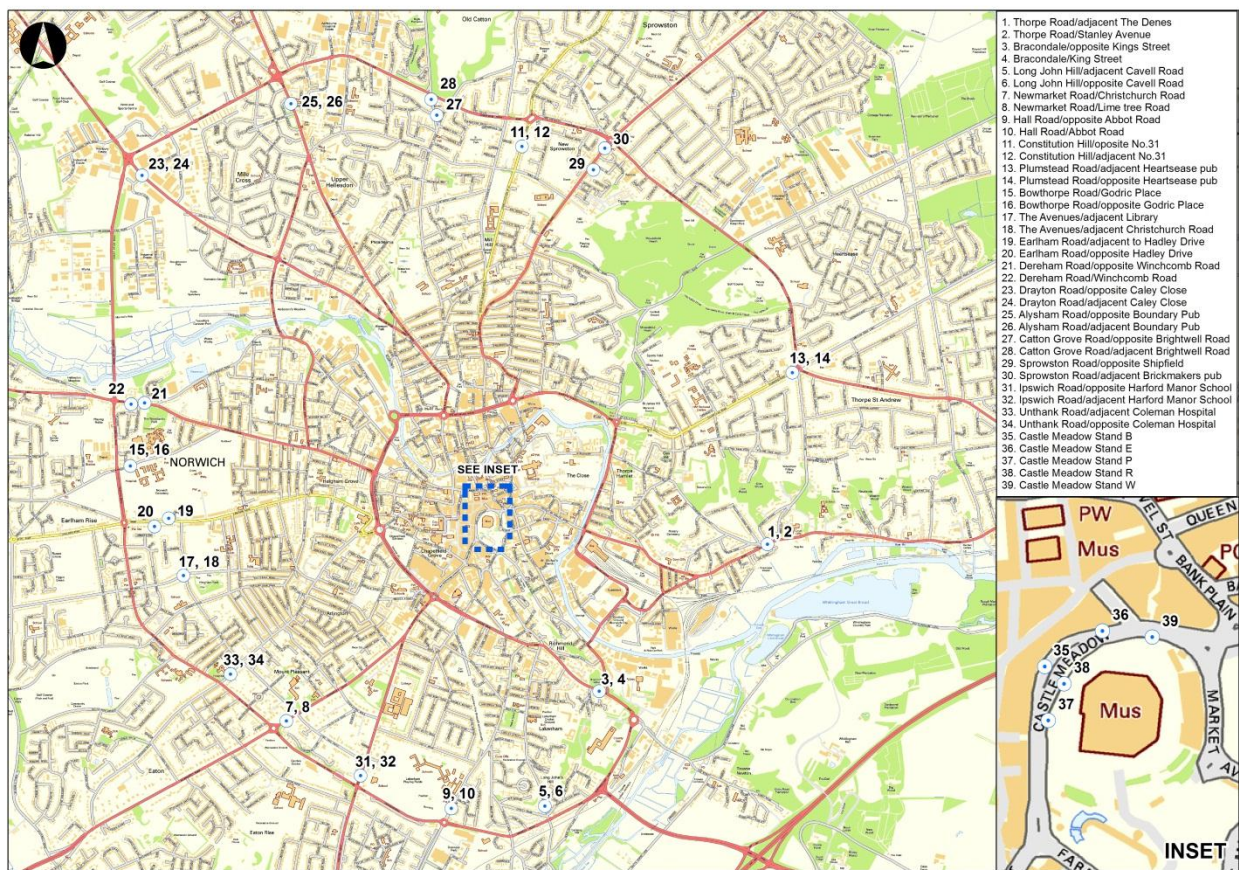
3.2.6 Any buses not stopping (or those that the enumerators were unable to board) were also recorded on the survey sheets with the time, service number, bus type and operator, along with a comment stating that the bus did not stop. The numbers of passengers on board were estimated taking into account the bus type (i.e. double decker, single decker, coach, small bus and bendy bus) and their maximum seating capacities along with the rough enumerator's estimates on the bus. The following maximum capacities were assumed (see Table 3.2).

Table 3.2: Assumed maximum seating capacity

Bus Type	Maximum Seating Capacity
Double Deck	67
Single Deck	42
Coach	47
Small Bus	33

3.2.7 Details of the surveyed bus stop locations and services that pass through these bus stops are included in Appendix A, which also contains summary survey data of the bus on-board through passenger counts.

Figure 3.1: Bus Monitoring Count Locations



3.3 Bus and Rail Service and Timetable Information Collection

3.3.1 There have been significant changes to bus routes and timetables since 2006, and the updated PT model uses February 2013 service and timetables provided by the NCC (<http://www.travelineeastanglia.org.uk>). Bus timetables also provided up to date information on bus stops. The February 2013 data set was examined for changes from autumn 2012 and other than minor changes in service timings, the timetable used is also considered to represent the 2012 base.

3.3.2 The modelled rail services were compared with the latest timetables and were shown to be very similar, with only minor changes in service timings. Therefore the model is representative of the rail service in the 2012 base.

3.4 Bus and Rail Fares

3.4.1 Bus and rail fares by distance stages for 2006 were available from the 2006 PT model. Real growth in bus and rail fares between 2006 and 2012 was obtained from Railways: fares statistics, "*Standard Note: SN/SG/6384, House of Commons Library, 2013*".

3.4.2 Values of time were obtained from WebTAG 3.5.6 October 2012.

3.4.3 More details on the use of real growth in PT fares and value of time can be found in Section 4.

4 Supply and Assignment Development

4.1 Overview of the Model

4.1.1 Supply and assignment model development is similar to what was reported in the 2011 Public Transport Local Model Validation Report (Norfolk County Council, 2011). There are no changes to modelling time periods or the extent of the model.

4.1.2 The public transport model has been developed to represent the following time periods which are consistent with the highway assignment model.

- AM peak hour - 8:00 am to 9:00 am
- Average interpeak hour - 10:00 am to 4:00 pm
- PM peak hour - 5:00 pm to 6:00 pm

4.1.3 The public transport model represents a base year of 2012. The network structure, rail and bus service patterns and demand are all representative of this year. The demand in the model reflects an average 2012 October weekday.

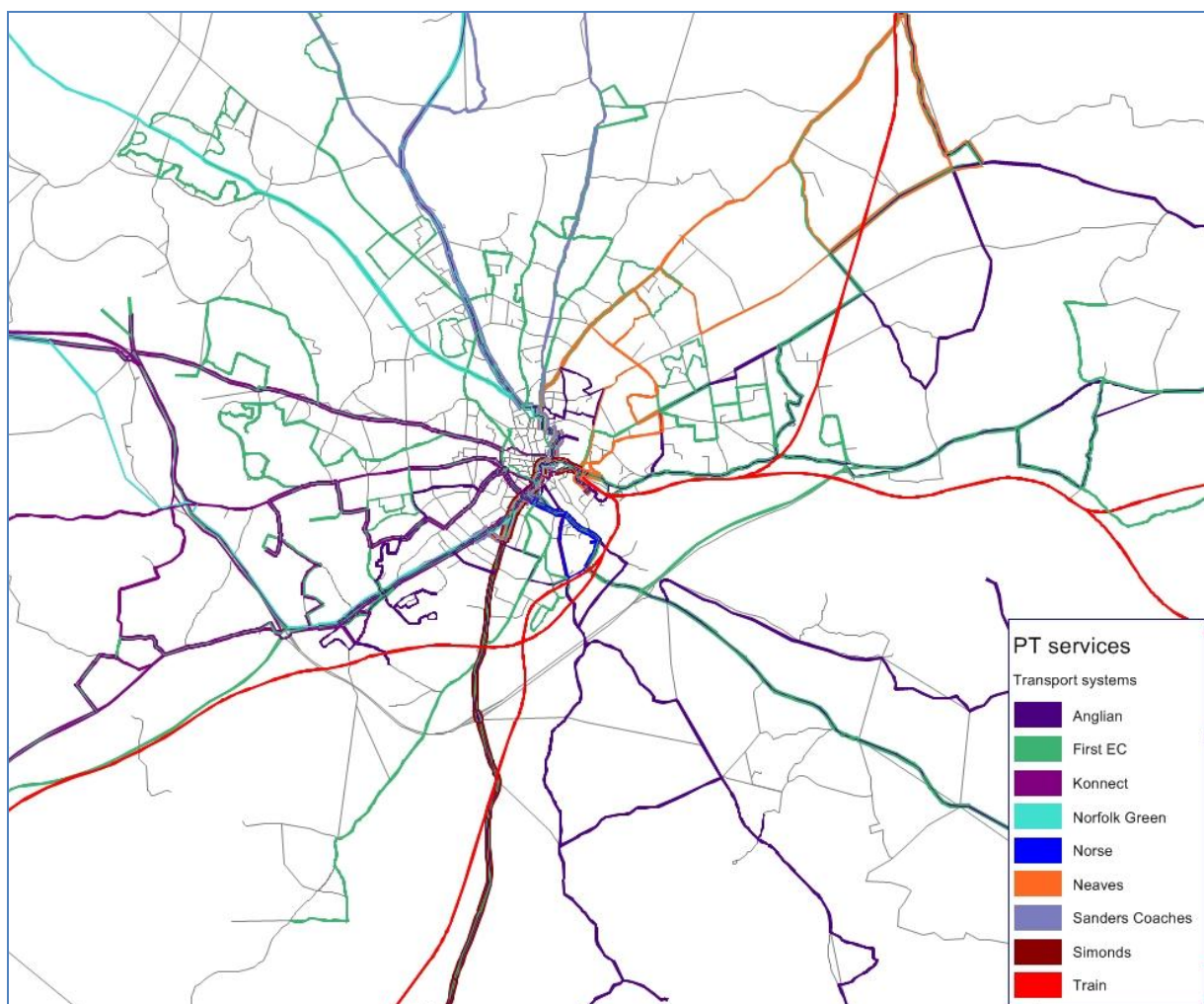
4.1.4 Information on bus service provision in terms of services operating, routing, frequency, stopping patterns, and journey times were obtained from the service providers/NCC via the information published on-line (<http://www.travelineeastanglia.org.uk>). A review of the services included in the model was undertaken, and where required these were added/amended as appropriate. The following main bus operators were identified and included in the updated 2012 model:

- EC/First
- Anglian
- Konnect
- Norfolk Green
- Norse
- Neaves
- Sanders Coaches
- Simonds

4.1.5 All timetables relating to the above individual services for each operator were coded into the model between 07:00 and 19:00.

4.1.6 The above changes ensured that bus service network and timetables were representative of the 2012 base service conditions. The rail network was already representative of the base service pattern. Figure 4.1 shows the extent of the public transport network.

Figure 4.1: Extent of the Bus and Rail Network in the Detailed Model Area



4.1.7 The zoning system in the public transport model is consistent with the zoning system used in the highway assignment model. The zoning system has been updated from the zoning system in the 2006 model to include several additional zones mainly representing developments in appropriate detail. The

updated 2012 VISUM PT model contains 413 zones in total. More details on zones can be found in Highway Local Model Validation Report (Mott MacDonald, 2013).

4.2 Assignment Details

4.2.1 The assignment model uses a timetable- (or schedule) based assignment process. This allows fares to be included in the assignment procedure. The Generalised Journey Time (GJT in minutes) of the assignment algorithm, which informs the path search mechanism for the most attractive path for each OD pair, takes the following form:

$$\text{GJT} = (\text{IVT}) + 2*(\text{AT}) + 2*(\text{ET}) + 2*(\text{WT}) + 2*(\text{OWT}) + 2*(\text{TWT}) + \text{TF} + \text{Fare}$$

4.2.2 Where

- IVT - in-vehicle time
- AT and ET - access and egress time
- WT - walking time
- OWT and TWT - origin and transfer waiting time
- TF = 7.5 - Transfer penalty (minutes) per number of transfers

4.2.3 As the GJT calculation includes fares, appropriate values of time and fare coefficients were required. Model operates in units of generalised time hence the fare coefficient is the time equivalent (in minutes) of a £1 fare. Values of time were calculated from WebTAG Unit 3.5.6 October 2012 and appropriate fare coefficients calculated. Value of times (VOT) in 2010 prices and fare coefficients can be found in Table 4.1 below for the assignment user classes that were retained from the previous 2006 model, i.e. Commuting, Employers' Business and Other.

Table 4.1: Value of time and corresponding fare coefficient by user class

User class	Perceived value of time (£/hr 2010 prices)		2012 fare coefficient (min/£)
	2010	2012	
Employers' business	21.69	21.70	2.77
Commuting	6.46	6.46	9.29
Other	5.71	5.71	10.51

Source: WebTAG unit 3.5.6 October 2012

4.2.4 Real growth in bus and rail fares between 2006 and 2012 were first calculated using data collected from Railways: fares statistics, "*Standard Note: SN/SG/6384, House of Commons Library, 2013*", and can be found in Table 4.2 below. 2006 distance based fares were then uplifted to 2012 level by applying real growth in fare. Since above fares are still in 2002 prices these were then uplifted to 2010 prices by applying growth in the retail price index between 2002 and 2010 which is 26.9% (RPI from Table A3, SN/SG/6384, House of Commons Library 2013). Distance based PT fares for the First and Anglian bus operators and rail are given in Appendix B, noting that the same First fares were also used for the remaining bus operators given the lack of available 2012 information.

Table 4.2: Real Growth in PT Fares between 2006 and 2012

Year	PT fare index	
	Bus fare	Rail fare
2006	126	131
2012	144	150
Real growth 2006 to 2012	14.3%	14.5%

Source: Table A4, SN/SG/6384, House of Commons Library 2013, 1987=100

5 Model Calibration

5.1 Overview

- 5.1.1 No new PT matrix building exercise was carried out for the 2012 PT model update. However, instead of relying on the validated 2006 PT matrices, the 2012 Present Year Validation (PYV) PT matrices (bus + rail) developed for the Postwick Hub Study were used as "prior" matrices for the 2012 matrix estimation (ME) process which was used for the model updating.
- 5.1.2 As mentioned in Section 3 on-board bus counts carried out at 17 count locations were used in the matrix estimation process. The Castle Meadow bus stops which were surveyed for the whole week provided the day-to-day variability or a tolerance for the counts used within the ME process.
- 5.1.3 No rail counts were undertaken in 2012, and therefore the PT matrix calibration excluded rail.

5.2 Matrix Calibration using Matrix Estimation (ME)

- 5.2.1 The Matrix Estimation (ME) was carried out using VISUM's matrix correction tool TFlowFuzzy. All demand segment matrices were adjusted using the matrix estimation process.
- 5.2.2 On-board through bus passenger counts for the AM and PM peak hours were directly available from the surveys. On-board through bus passenger counts for the average interpeak hour were derived from the 10:00 - 15:00 and 15:30 - 16:00 data where the latter period was uplifted so that data for the whole hour from 15:00 - 16:00 could be derived.
- 5.2.3 The ME process used the 2012 Postwick PYV PT matrices as prior matrices, and these were adjusted by TFlowFuzzy to match the May 2013 observed on-board bus through counts. The goodness of fit of the matrix estimation was assessed by comparing the modelled passenger flows against the corresponding observed figures for each modelled time peak hour in the AM, PM and average Inter-peak. WebTAG 3.11.2 indicates that modelled flows should be within 25% of the counts except where observed flows are particularly low (less than 150) for individual links. Moreover it requires at least 85% of the links to have GEH less than 5. As before GEH value of 5 is considered as appropriate maximum limit since this can be applied to any observed flow. All flow comparisons were undertaken at the hourly level.

5.2.4 Table 5.1 provides a summary of the number of individual sites achieving the GEH calibration criteria, and Table 5.2 to Table 5.4 provide detailed comparisons of observed and modelled flows for bus for individual time periods. These indicate that as a result of the matrix calibration process the modelled passenger flows show an excellent match with the observations in all peak hours with GEH statistics well below the recommended value of 5.

Table 5.1: Site Calibration - Summary

Peak	No of Sites	Inbound		Outbound	
		No GEH <5	% GEH <5	No GEH <5	% GEH <5
AM 08:00-09:00*	16	16	100	16	100
Average IP 10:00-16:00	17	17	100	17	100
PM 17:00-18:00	17	17	100	17	100

Notes: *Observed passenger counts were not available for one of the sites in the AM peak due to an incident

Table 5.2: Bus Passenger Flow Calibration – AM Peak Hour 08:00-09:00

Location			Inbound				Outbound					
	Observed	Modelled	Abs. Diff	% Diff (M-O)/O	GEH	GEH Criteria met	Observed	Modelled	Abs. Diff	% Diff (M-O)/O	GEH	GEH Criteria met
Thorpe Rd	213	207	6	-3%	0.41	1	143	136	7	-5%	0.55	1
Bracondale	312	305	7	-2%	0.38	1	107	107	0	0%	0.02	1
Long John Hill	34	33	1	-1%	0.09	1	1	0	1	-100%	1.41	1
Hall Rd	67	61	6	-9%	0.75	1	16	17	1	6%	0.25	1
Ipswich Rd	146	151	5	3%	0.41	1	14	15	1	7%	0.26	1
Newmarket Rd	316	303	13	-4%	0.72	1	101	104	3	3%	0.30	1
Unthank Rd	75	78	3	4%	0.37	1	74	69	5	-6%	0.53	1
The Avenue	2	4	2	100%	1.15	1	1	2	1	100%	0.82	1
Earlham Rd*	-	-	-	-	-	-	-	-	-	-	-	-
Bowthorpe Rd	53	53	1	1%	0.07	1	28	29	1	4%	0.19	1
Dereham Rd	181	183	3	1%	0.19	1	75	74	1	-1%	0.09	1
Drayton Rd	137	135	2	-1%	0.17	1	26	27	1	4%	0.19	1
Aylsham Rd	159	142	17	-11%	1.39	1	26	27	1	4%	0.19	1
Catton Grove Rd	36	37	1	3%	0.17	1	5	7	2	40%	0.82	1
Constitution Hill	118	109	9	-7%	0.80	1	14	10	4	-29%	1.15	1
Sprowston Rd	50	53	3	6%	0.42	1	35	36	1	4%	0.21	1
Plumstead Rd	83	81	2	-2%	0.22	1	35	35	0	0%	0.00	1
Total	1979	1935	44	-2%	1.00	1	699	695	4	-1%	0.16	1

Notes: *No data was available at this site for AM peak due to an incident

Table 5.3: Bus Passenger Flow Calibration – Average Interpeak hour 10:00-16:00

Location			Inbound				Outbound					
	Observed	Modelled	Abs. Diff	% Diff (M-O)/O	GEH	GEH Criteria met	Observed	Modelled	Abs. Diff	% Diff (M-O)/O	GEH	GEH Criteria met
Thorpe Rd	91	89	2	-2%	0.17	1	100	99	1	-1%	0.11	1
Bracondale	127	127	0	0%	0.01	1	187	185	2	-1%	0.13	1
Long John Hill	13	13	0	3%	0.11	1	5	6	1	25%	0.52	1
Hall Rd	26	24	2	-8%	0.42	1	38	35	3	-8%	0.50	1
Ipswich Rd	30	33	3	11%	0.60	1	75	77	2	3%	0.28	1
Newmarket Rd	145	139	6	-4%	0.53	1	147	147	0	0%	0.02	1
Unthank Rd	85	86	1	1%	0.11	1	86	85	1	-1%	0.11	1
The Avenue	3	3	0	-6%	0.11	1	4	4	0	-9%	0.20	1
Earlham Rd	116	116	0	0%	0.04	1	165	164	1	-1%	0.10	1
Bowthorpe Rd	74	72	2	-2%	0.21	1	121	117	4	-3%	0.35	1
Dereham Rd	114	115	1	1%	0.11	1	147	146	1	-1%	0.11	1
Drayton Rd	69	69	0	0%	0.01	1	74	74	0	-1%	0.05	1
Aylsham Rd	103	88	15	-14%	1.51	1	151	150	1	-1%	0.11	1
Catton Grove Rd	21	22	1	5%	0.22	1	26	28	2	7%	0.35	1
Constitution Hill	73	66	7	-10%	0.87	1	59	52	7	-12%	0.94	1
Spowston Rd	67	69	2	4%	0.30	1	60	62	2	4%	0.29	1
Plumstead Rd	59	57	2	-3%	0.20	1	68	68	0	0%	0.02	1
Total	1213	1188	25	-2%	0.73	1	1514	1499	15	-1%	0.37	1

Table 5.4: Bus Passenger Flow Calibration – PM Peak hour 17:00-18:00

Location			Inbound				Outbound					
	Observed	Modelled	Abs. Diff	% Diff (M-O)/O	GEH	GEH Criteria met	Observed	Modelled	Abs. Diff	% Diff (M-O)/O	GEH	GEH Criteria met
Thorpe Rd	192	176	16	-8%	1.18	1	203	197	6	-3%	0.42	1
Bracondale	73	73	0	0%	0.03	1	314	307	7	-2%	0.38	1
Long John Hill	21	19	2	-10%	0.45	1	11	13	3	24%	0.73	1
Hall Rd	16	13	3	-19%	0.79	1	39	36	3	-8%	0.49	1
Ipswich Rd	13	15	2	15%	0.53	1	195	197	3	1%	0.18	1
Newmarket Rd	76	80	4	6%	0.48	1	128	130	2	2%	0.18	1
Unthank Rd	113	107	6	-5%	0.57	1	82	81	1	-1%	0.11	1
The Avenue	1	2	1	100%	0.82	1	3	4	1	33%	0.53	1
Earlham Rd	91	91	0	0%	0.00	1	99	102	3	3%	0.30	1
Bowthorpe Rd	27	27	0	0%	0.00	1	192	183	9	-5%	0.68	1
Dereham Rd	70	69	1	-2%	0.15	1	235	231	4	-2%	0.28	1
Drayton Rd	62	61	1	-2%	0.16	1	140	137	3	-2%	0.25	1
Aylsham Rd	32	29	3	-9%	0.50	1	92	94	2	2%	0.21	1
Catton Grove Rd	7	8	1	14%	0.37	1	57	58	1	2%	0.13	1
Constitution Hill	3	4	1	33%	0.53	1	91	81	10	-11%	1.08	1
Spowston Rd	19	21	2	11%	0.45	1	51	54	3	6%	0.41	1
Plumstead Rd	11	13	2	18%	0.58	1	82	81	1	-1%	0.11	1
Total	827	808	19	-2%	0.67	1	2013	1986	27	-1%	0.61	1

5.3 Impacts of the ME process

- 5.3.1 The impacts of matrix estimation on the structure of the matrix were investigated by looking at sectoral changes (see Figure 5.1) in the matrix and changes in the trip length distributions. The sector system used here is consistent with the sector system used in highway model validation checks.
- 5.3.2 Sectoral changes to the matrix in each time period are presented in Table 5.5 to Table 5.10. These include absolute change and GEH. The overall change in demand from the ME process is a reduction in the 2012 modelled demand of 18% in the AM peak hour, 0% in the inter peak hour and 14% in the PM peak hour.
- 5.3.3 The comparisons indicate that in the peak hour time periods the impact of matrix estimation is to decrease the size of the matrix and thus the prior matrices had overestimated PT demand in the peak hours. The key impact is to modify trips between a few sector movements and this is consistent in the time periods. Overall, those movements most impacted upon by matrix estimation are not key movements in respect to the proposed NDR.

Figure 5.1: Sectors for Matrix Comparisons

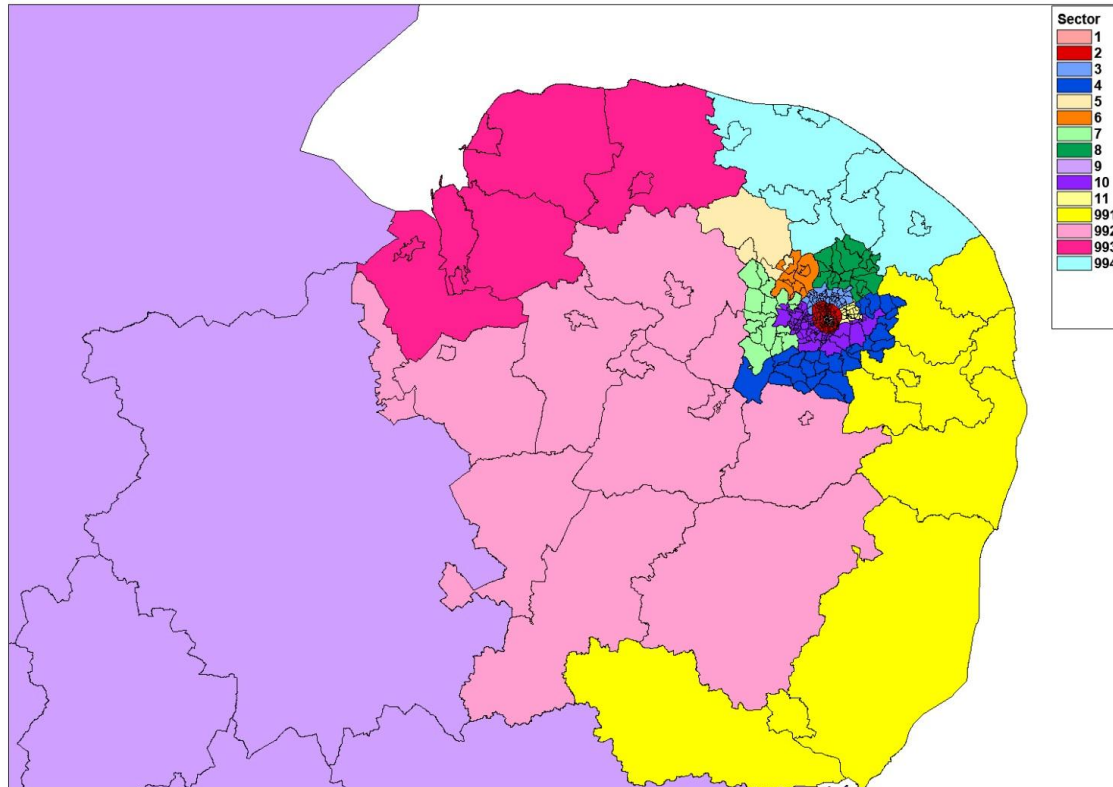


Table 5.5: Impact of Matrix Estimation AM Peak – Absolute Change

Sector	1	2	3	4	5	6	7	8	9	10	11	991	992	993	994	Total
1	0	-18	-54	-13	-1	-18	-17	-24	0	-76	-4	-9	-7	-1	-9	-250
2	-69	-33	-58	-9	-1	-22	-14	-6	0	-79	0	-34	-15	-1	-52	-393
3	-81	-29	-3	0	0	0	-2	0	0	-6	1	0	-3	-2	0	-126
4	-42	-10	-1	0	0	0	0	0	0	-2	0	-1	-1	0	0	-59
5	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-2
6	-21	-6	0	0	0	0	0	0	0	-1	0	0	0	0	0	-30
7	20	4	-1	0	0	0	0	0	0	-2	1	2	-1	0	0	21
8	-88	-4	0	0	0	0	0	0	0	0	0	0	0	0	0	-92
9	0	0	0	0	0	-5	0	0	0	-2	0	0	0	0	0	-7
10	-208	-83	-8	-1	0	-3	-3	-2	0	-9	0	-1	-5	0	-6	-330
11	-9	0	-3	0	0	0	0	0	0	-2	0	0	0	0	0	-15
991	-8	-70	-2	0	0	0	-1	0	0	-2	0	0	0	0	-8	-91
992	-24	-55	-3	-1	0	0	-2	-1	0	-17	-3	0	-1	0	-5	-113
993	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
994	-21	-19	-1	0	0	0	-1	0	0	-2	-1	0	-2	0	0	-46
Total	-552	-323	-134	-25	-3	-49	-41	-33	0	-201	-5	-43	-36	-4	-82	-1532

Table 5.6: Impact of Matrix Estimation AM Peak – GEH

Sector	1	2	3	4	5	6	7	8	9	10	11	991	992	993	994
1	0.0	1.0	7.2	2.5	1.1	4.4	3.5	4.3	0.0	6.1	0.6	1.8	1.7	0.9	3.4
2	1.8	1.8	7.9	1.7	1.4	4.6	3.1	1.5	0.0	4.6	0.0	3.4	1.8	0.6	7.1
3	4.5	3.4	1.1	0.0	0.0	0.1	1.1	0.0	0.0	1.5	0.4	0.2	1.3	1.4	0.4
4	3.8	1.8	1.1	0.0	0.1	0.2	0.3	0.0	0.1	0.3	0.1	0.3	0.2	0.1	0.4
5	0.4	0.3	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.5	0.1	0.0	0.1	0.0	0.0
6	2.0	1.1	0.0	0.0	0.0	0.0	0.3	0.1	0.2	0.8	0.2	0.0	0.3	0.0	0.7
7	1.9	0.6	0.8	0.3	0.0	0.1	0.0	0.1	0.0	0.4	0.4	0.7	0.7	0.0	0.4
8	9.2	1.1	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.2	0.0	0.3	0.0	0.0
9	0.0	0.0	0.0	0.2	0.3	2.7	0.0	0.0	0.0	1.2	0.0	0.0	0.0	0.0	0.0
10	8.6	5.1	2.6	0.2	0.4	1.9	0.8	1.3	0.1	0.9	0.1	0.3	1.3	0.3	2.9
11	0.7	0.0	1.4	0.2	0.1	0.2	0.3	0.2	0.0	0.6	0.0	0.0	0.1	0.1	0.2
991	0.7	4.1	1.1	0.1	0.4	0.3	0.7	0.1	0.0	0.7	0.1	0.0	0.0	0.1	3.2
992	3.8	4.7	2.0	0.2	0.4	0.9	1.0	0.8	0.0	2.8	0.8	0.1	0.3	0.3	2.4
993	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0
994	5.0	2.9	0.5	0.3	0.1	0.4	0.7	0.0	0.0	1.3	0.5	0.2	0.9	0.0	0.1

Table 5.7: Impact of Matrix Estimation Interpeak – Absolute Change

Sector	1	2	3	4	5	6	7	8	9	10	11	991	992	993	994	Total
1	0	-4	1	-9	0	7	3	-25	0	78	-1	7	-7	0	-5	45
2	3	0	-2	-4	0	3	1	-1	1	50	0	7	-14	0	2	46
3	7	6	3	0	0	0	4	0	0	14	0	1	-2	0	0	34
4	-23	-7	0	0	0	0	0	0	0	0	0	0	0	0	0	-31
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	1	1	0	0	0	0	0	0	0	1	0	0	0	0	0	1
7	8	4	2	0	0	0	0	0	0	1	0	1	0	0	0	17
8	-17	0	1	0	0	0	0	0	0	1	0	0	0	0	0	-15
9	0	1	0	0	0	0	0	0	0	1	0	0	0	0	1	4
10	0	7	3	0	0	0	-1	0	0	1	0	0	-6	0	0	5
11	12	5	1	0	0	0	0	0	0	3	0	1	0	0	0	22
991	-4	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	-4
992	-16	-45	-2	-2	0	-1	-2	-1	0	-12	-5	-1	-1	0	-3	-91
993	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
994	-4	-6	0	0	0	0	0	0	-1	-1	0	0	0	0	0	-12
Total	-34	-38	6	-14	0	11	7	-27	0	136	-7	15	-32	0	-5	21

Table 5.8: Impact of Matrix Estimation Interpeak – GEH

Sector	1	2	3	4	5	6	7	8	9	10	11	991	992	993	994
1	0.0	0.2	0.1	1.2	0.2	1.1	0.5	3.6	0.0	4.3	0.1	1.0	1.7	0.2	1.6
2	0.1	0.0	0.2	0.9	0.2	0.7	0.3	0.4	0.1	3.4	0.1	0.7	1.6	0.1	0.3
3	0.6	0.8	1.1	0.2	0.0	0.2	1.9	0.0	0.0	3.4	0.2	0.6	1.0	0.0	0.0
4	3.8	1.7	0.1	0.0	0.0	0.1	0.1	0.0	0.4	0.0	0.2	0.0	0.0	0.1	0.1
5	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.2	0.0	0.0
6	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.4	0.0	0.1	0.6	0.0	0.0
7	1.3	0.8	1.1	0.2	0.1	0.2	0.0	0.5	0.1	0.3	0.2	0.5	0.2	0.0	0.2
8	2.5	0.0	0.7	0.0	0.0	0.2	0.8	0.0	0.7	0.4	0.0	0.0	0.2	0.0	0.0
9	0.0	0.1	0.0	0.2	0.0	0.3	0.1	0.0	0.0	0.6	0.0	0.1	0.0	0.0	0.4
10	0.0	0.5	0.8	0.0	0.2	0.2	0.1	0.2	0.2	0.1	0.0	0.1	1.3	0.1	0.0
11	1.4	0.9	0.6	0.0	0.0	0.2	0.3	0.0	0.0	0.9	0.0	0.4	0.0	0.0	0.0
991	0.6	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.0	0.1	0.0	0.0	0.1	0.0	0.1
992	4.0	5.6	1.6	0.6	0.4	1.1	1.1	1.2	0.0	2.9	2.4	0.3	0.2	0.3	2.0
993	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.1	0.0	0.0
994	1.3	1.0	0.2	0.1	0.0	0.1	0.1	0.0	0.4	0.3	0.0	0.1	0.2	0.1	0.0

Table 5.9: Impact of Matrix Estimation PM Peak – Absolute Change

Sector	1	2	3	4	5	6	7	8	9	10	11	991	992	993	994	Total
1	-7	-160	-21	-6	0	3	-18	-56	0	20	4	19	-13	1	-15	-249
2	-35	-49	-15	-4	0	3	-6	-2	-29	13	4	4	-26	0	-22	-166
3	-40	-36	-3	-1	0	0	-1	0	0	-6	-3	-1	-2	0	0	-93
4	-10	-8	0	-3	0	0	0	0	0	-3	0	-1	0	0	0	-25
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	-3	0	0	0	0	0	0	0	-3	-1	0	0	0	0	0	-8
7	-17	-12	-2	0	0	0	-7	0	0	-3	0	-1	-1	0	0	-46
8	-18	-4	0	-1	0	0	0	-10	0	-1	0	0	0	0	-3	-37
9	0	-44	0	0	0	0	0	0	0	-1	0	0	0	0	-1	-47
10	-57	-15	-3	-3	0	-1	-3	1	-2	-16	-2	-2	-4	0	-1	-106
11	6	19	2	0	0	0	0	0	0	3	0	2	4	0	0	37
991	-4	-10	0	-1	0	0	-1	0	0	0	0	-5	-1	0	0	-22
992	-4	-24	0	-1	0	-1	-1	1	0	-5	0	-2	-1	0	-1	-39
993	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
994	-7	-32	0	0	0	0	0	-2	0	-4	0	-3	-3	0	-1	-52
Total	-195	-374	-41	-21	-2	3	-38	-69	-35	-3	4	12	-49	1	-46	-853

Table 5.10: Impact of Matrix Estimation PM Peak – GEH

Sector	1	2	3	4	5	6	7	8	9	10	11	991	992	993	994
1	1.1	5.4	1.4	0.6	0.3	0.3	2.4	6.6	0.1	0.9	0.4	1.9	2.0	0.6	4.0
2	2.1	3.0	2.0	0.7	0.3	0.4	1.1	0.8	2.0	0.8	0.6	0.3	2.6	0.1	3.7
3	5.9	5.7	1.1	0.9	0.1	0.2	1.0	0.2	0.0	2.1	1.5	0.7	1.6	0.1	0.6
4	2.1	1.7	0.0	0.6	0.0	0.1	0.0	0.2	0.1	0.6	0.3	0.4	0.1	0.1	0.3
5	0.2	0.2	0.0	0.1	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.2	0.0	0.1	0.1
6	0.7	0.1	0.2	0.1	0.1	0.1	0.2	0.0	2.2	0.3	0.1	0.1	0.3	0.0	0.2
7	3.9	3.3	1.4	0.4	0.1	0.4	1.0	0.2	0.1	1.1	0.5	0.7	0.6	0.0	0.7
8	3.7	1.2	0.2	0.3	0.1	0.0	0.1	1.2	0.0	0.8	0.0	0.2	0.5	0.0	0.7
9	0.0	2.6	0.0	0.2	0.1	0.3	0.0	0.2	0.0	0.3	0.0	0.2	0.2	0.0	0.4
10	4.7	0.9	0.8	0.7	0.3	0.6	0.8	1.0	1.2	1.6	0.6	0.7	0.7	0.0	0.8
11	1.1	2.7	1.0	0.1	0.1	0.4	0.3	0.0	0.0	1.1	0.2	1.2	1.2	0.2	0.2
991	1.0	1.1	0.1	0.4	0.0	0.1	0.5	0.1	0.0	0.1	0.1	0.8	0.4	0.0	0.4
992	1.2	3.0	0.0	0.4	0.4	0.8	0.5	0.8	0.1	1.4	0.2	0.8	0.4	0.1	0.6
993	0.3	0.2	0.4	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.0
994	2.8	4.8	0.4	0.3	0.0	0.5	0.2	0.6	0.2	2.1	0.2	1.3	1.9	0.0	0.4

5.3.4 Changes in trip length distribution as a result of matrix estimation are shown in Figure 5.2 to Figure 5.10 by purpose and time period. The comparisons indicate that the 2012 matrix estimation process resulted in small increases in both short and long distance trips and a small reduction in medium distance trips, and this is consistent across all journey purposes and time periods.

Figure 5.2: Comparison of Trip Length Distribution – Commute AM Peak

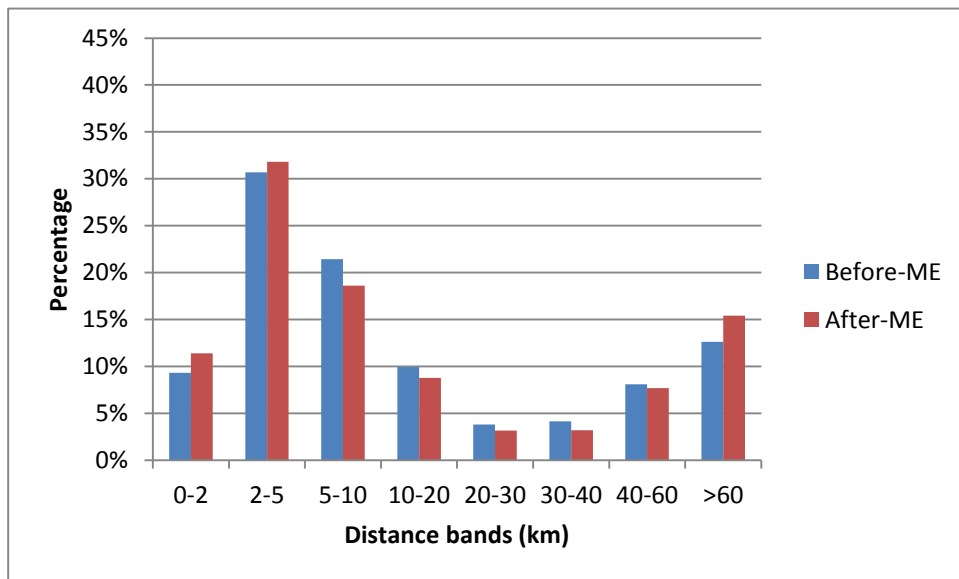


Figure 5.3: Comparison of Trip Length Distribution – Employers Business AM Peak

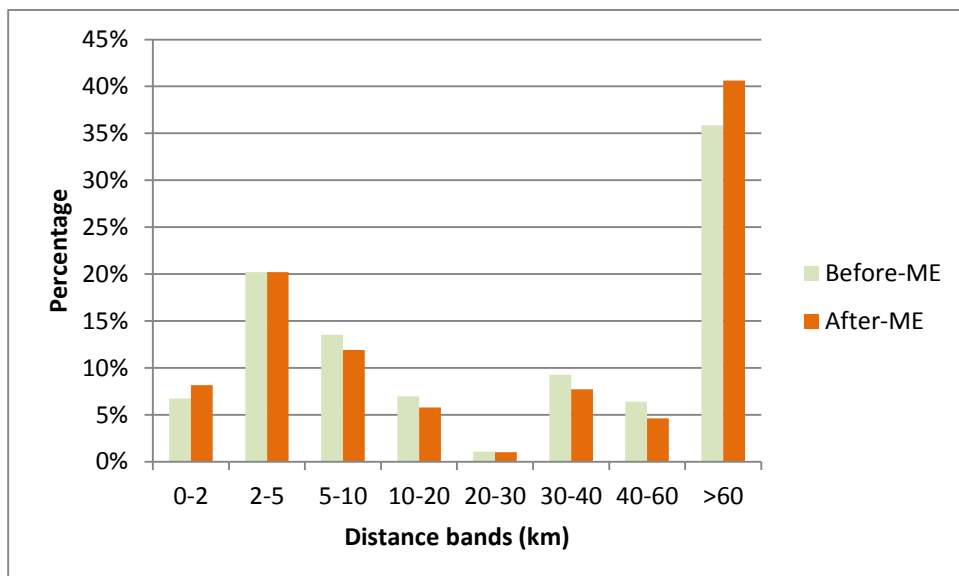


Figure 5.4: Comparison of Trip Length Distribution – Other AM Peak

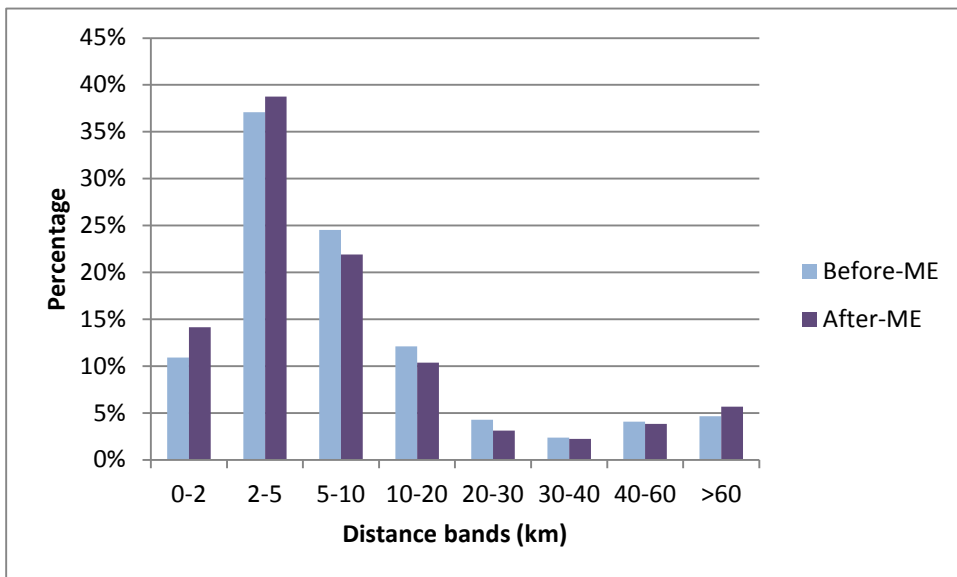


Figure 5.5: Comparison of Trip Length Distribution – Commute Interpeak

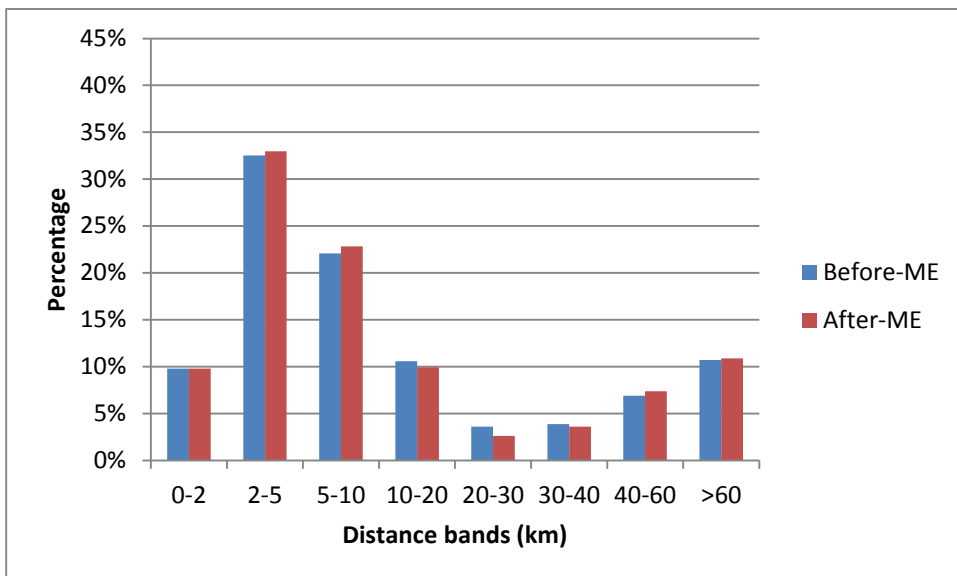


Figure 5.6: Comparison of Trip Length Distribution – Employers Business Interpeak

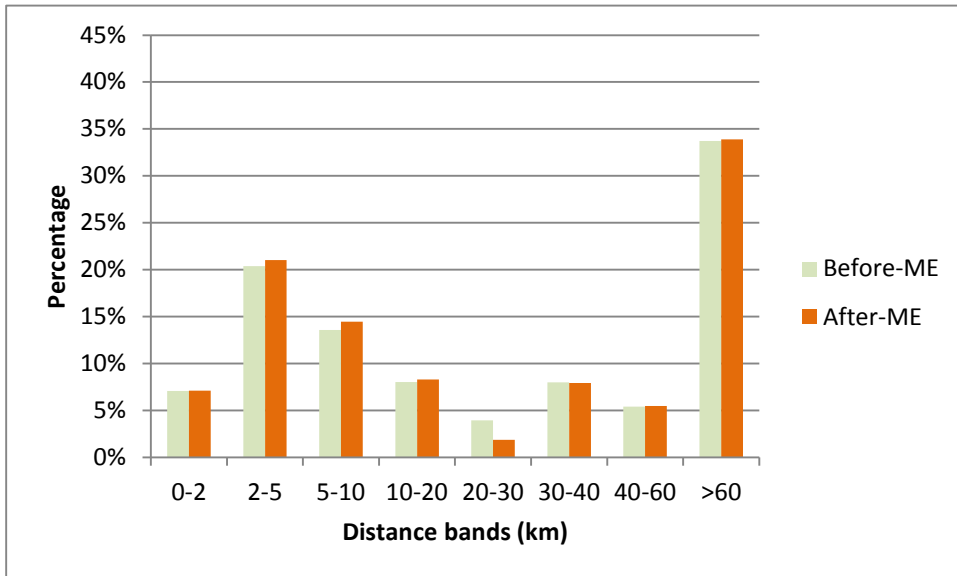


Figure 5.7: Comparison of Trip Length Distribution – Other Interpeak

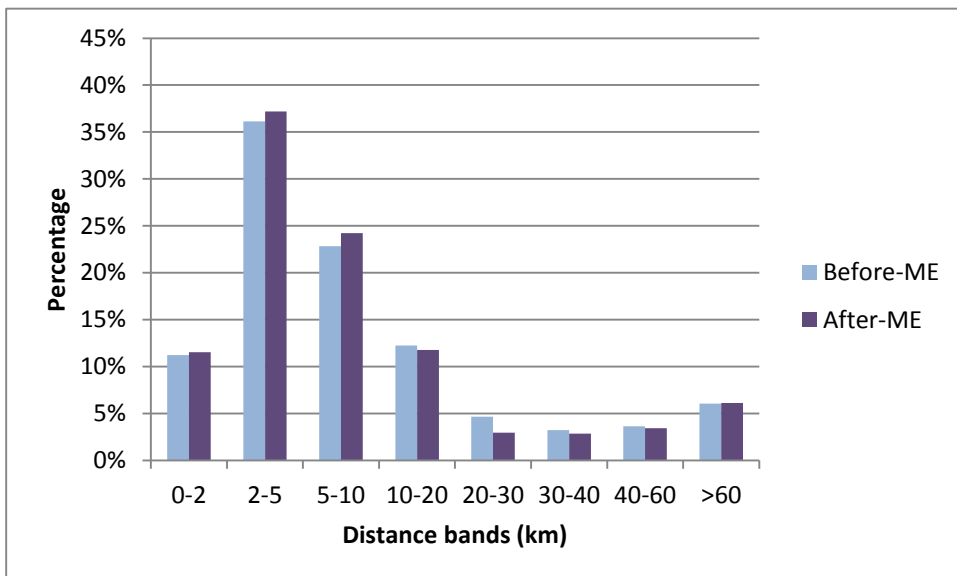


Figure 5.8: Comparison of Trip Length Distribution – Commute PM Peak

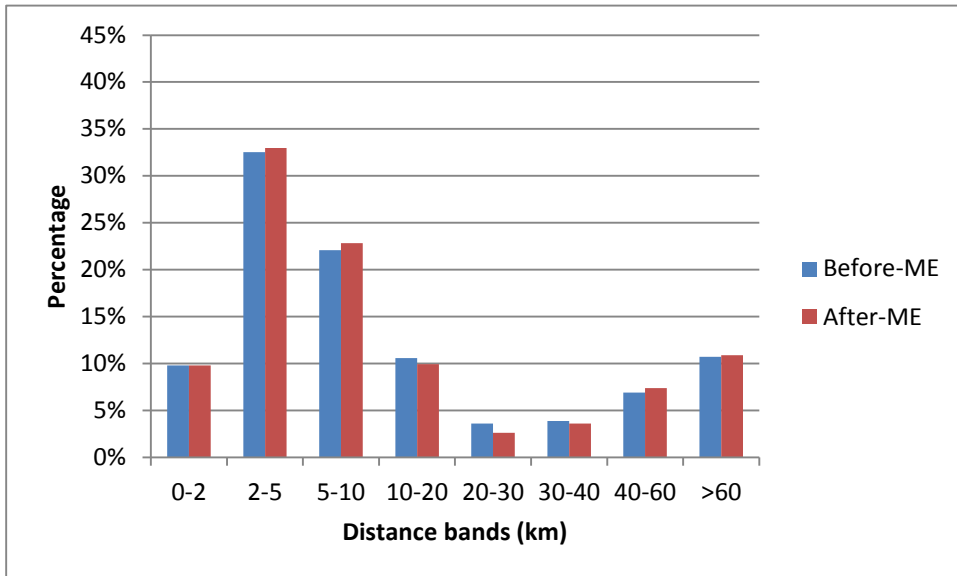


Figure 5.9: Comparison of Trip Length Distribution – Employers Business PM Peak

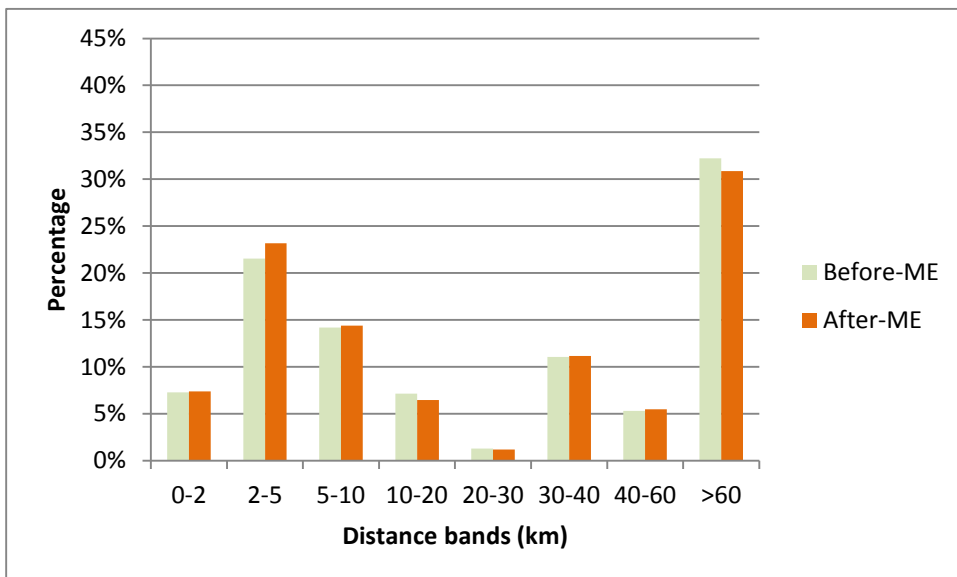
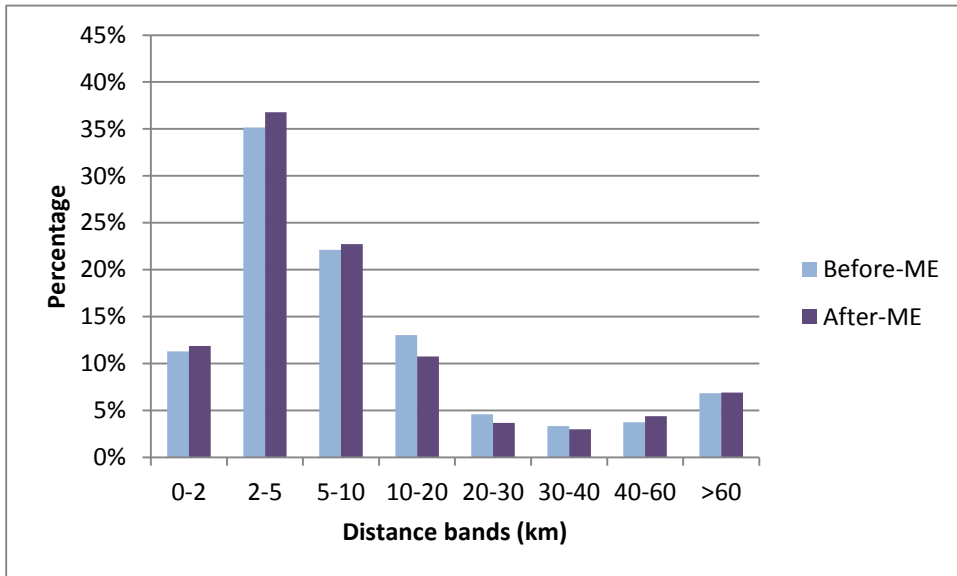


Figure 5.10: Comparison of Trip Length Distribution – Other PM Peak



6 Model Validation

6.1 Introduction

6.1.1 WebTAG Unit 3.11.2 outlines the validation criteria for public transport assignment models. The guideline suggests that there are three checks required:

- Validation of trip matrix
- Network and services validation; and
- Assignment validation

6.2 Validation of Trip Matrix

6.2.1 NCC no longer collates public transport patronage information. It was therefore not possible to carry out trip matrix validation on PT patronage at peak hour or 24 hour level. In addition, Electronic Ticket Machine (ETM) data was not available. Whilst manual counts had been carried out for updating the model it was considered that using all of these in the calibration was a better use of the data and would produce a better model than reserving some of the data for validation. Given the primary focus of the NDR appraisal is on using traffic data from the highway model, this approach was considered to be acceptable. In addition, the results from the demand modelling show a small level of mode switch with the modelling framework, so that any uncertainty in the PT model forecasts would have an insignificant effect on NDR forecasts.

6.3 Network and Service Validation

6.3.1 A number of checks have been carried out on the network and representation of services:

- The routing for each service included in the model has been checked against routing included in the timetables by plotting each service.
- A comparison between observed and modelled journey time for each service was undertaken.

6.3.2 These checks indicated that modelled service routeings and journey times were in line with observed timetable information.

6.3.3 Network and service validation also involved in looking at level of patronage on each of the service. Patronage graphs in Figure 6.1 to Figure 6.3 indicate an accurate representation of service patterns.

6.4 Assignment Validation

6.4.1 A series of sense checks were carried out on the assignment to ensure that model was working appropriately. All of these checks indicated that the assignment routines were working as expected. These included:

- A check of assignment statistics to ensure trips from all origins and destinations were assigned in all peaks.
- A visual check of routeing to ensure that sensible assignment routes were used.
- A check to ensure that majority of demand was assigned to a public transport service i.e. there were very small amount of walk only movements in all peaks. Table 6.1 below indicate that walk only trips is a very small proportion of total trips in each peak.
- A check to see that all services had demand assigned to them.

Table 6.1: Percentage of walk only PT trips

	AM	IP	PM
Total with trips with a ride	6,672	4,870	5,270
Trips without ride (walk only trips)	160	96	103
% of walk only trips	2.4%	2.0%	2.0%

Figure 6.1: Patronage plots for AM peak

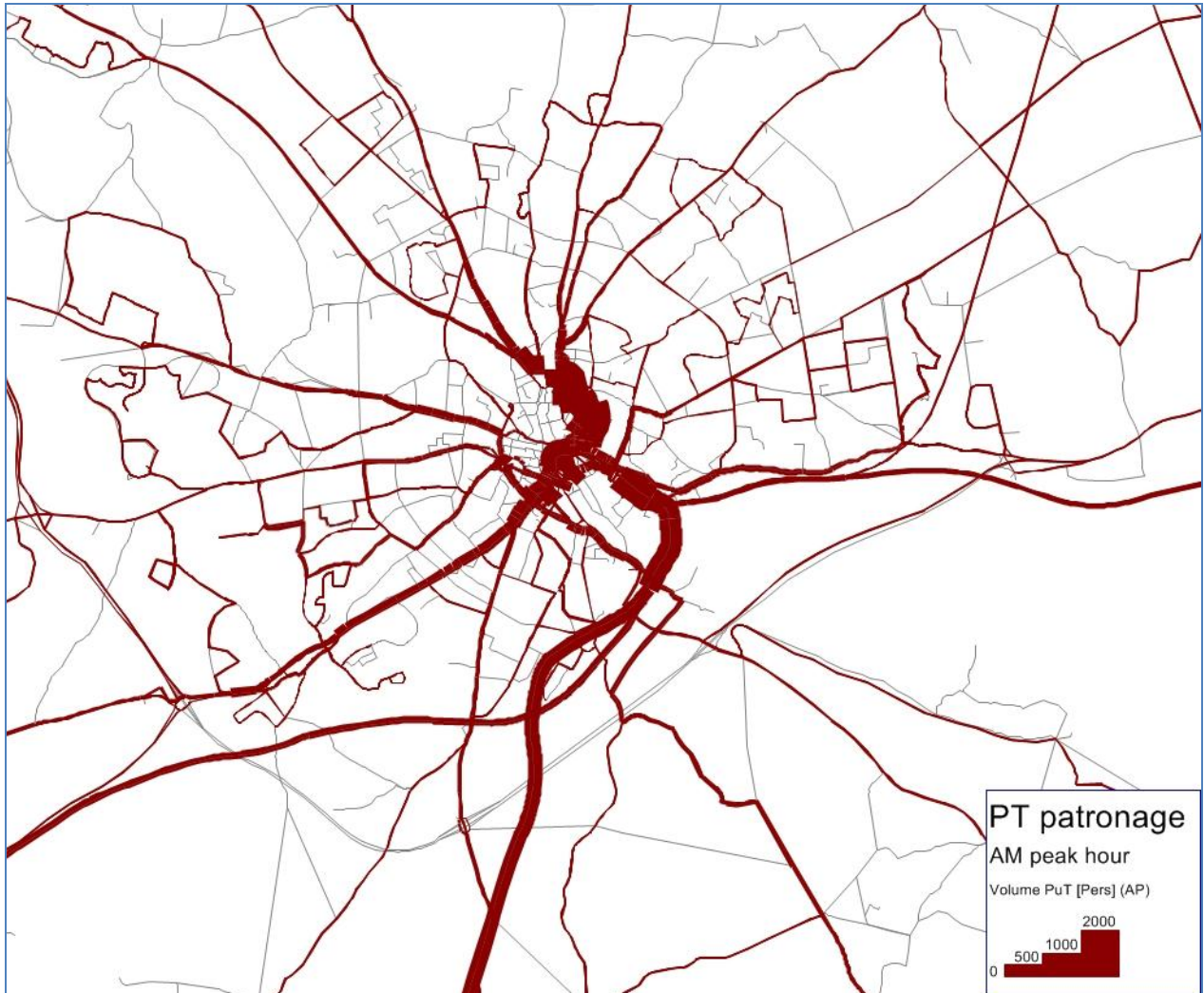


Figure 6.2: Patronage plots for interpeak

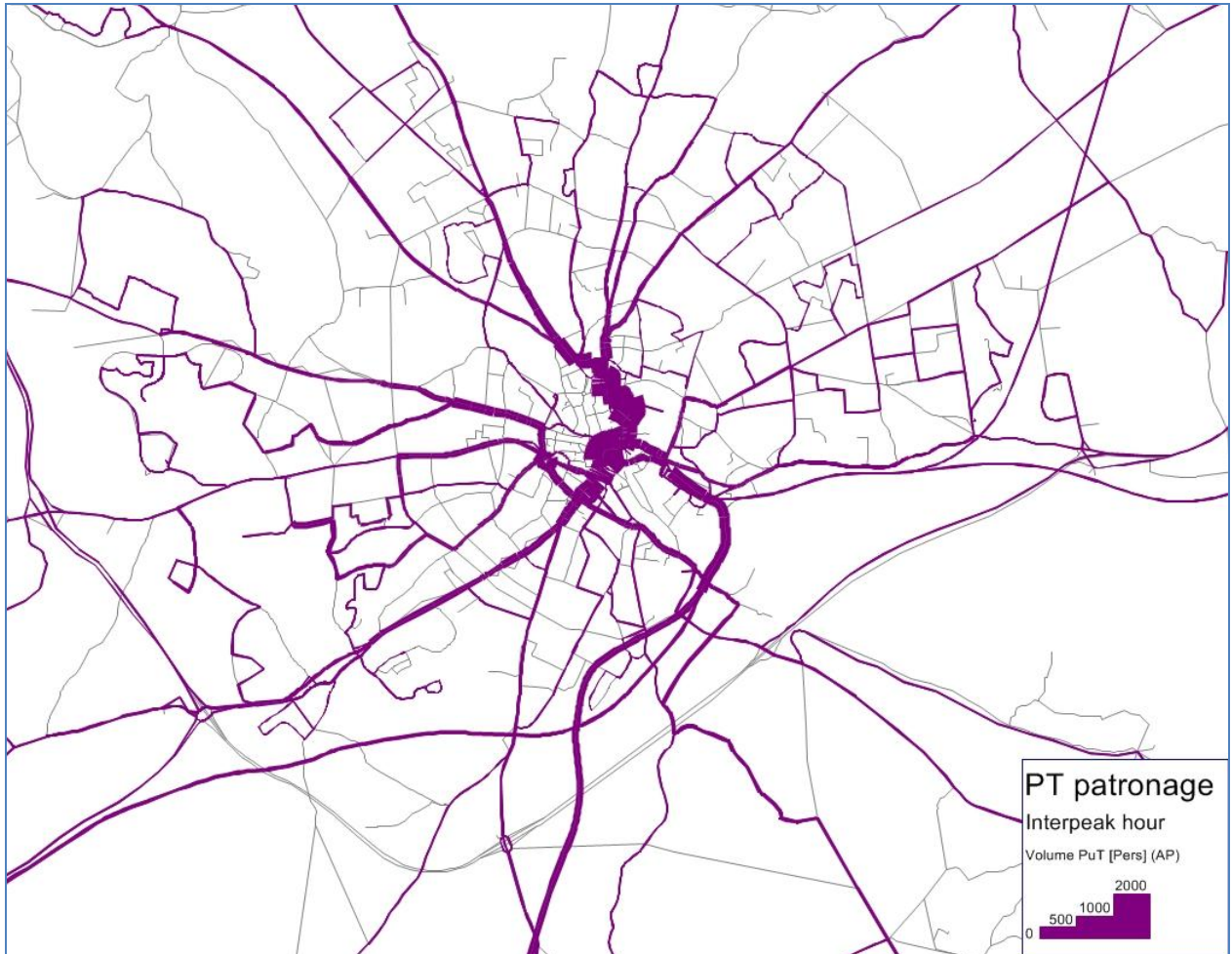
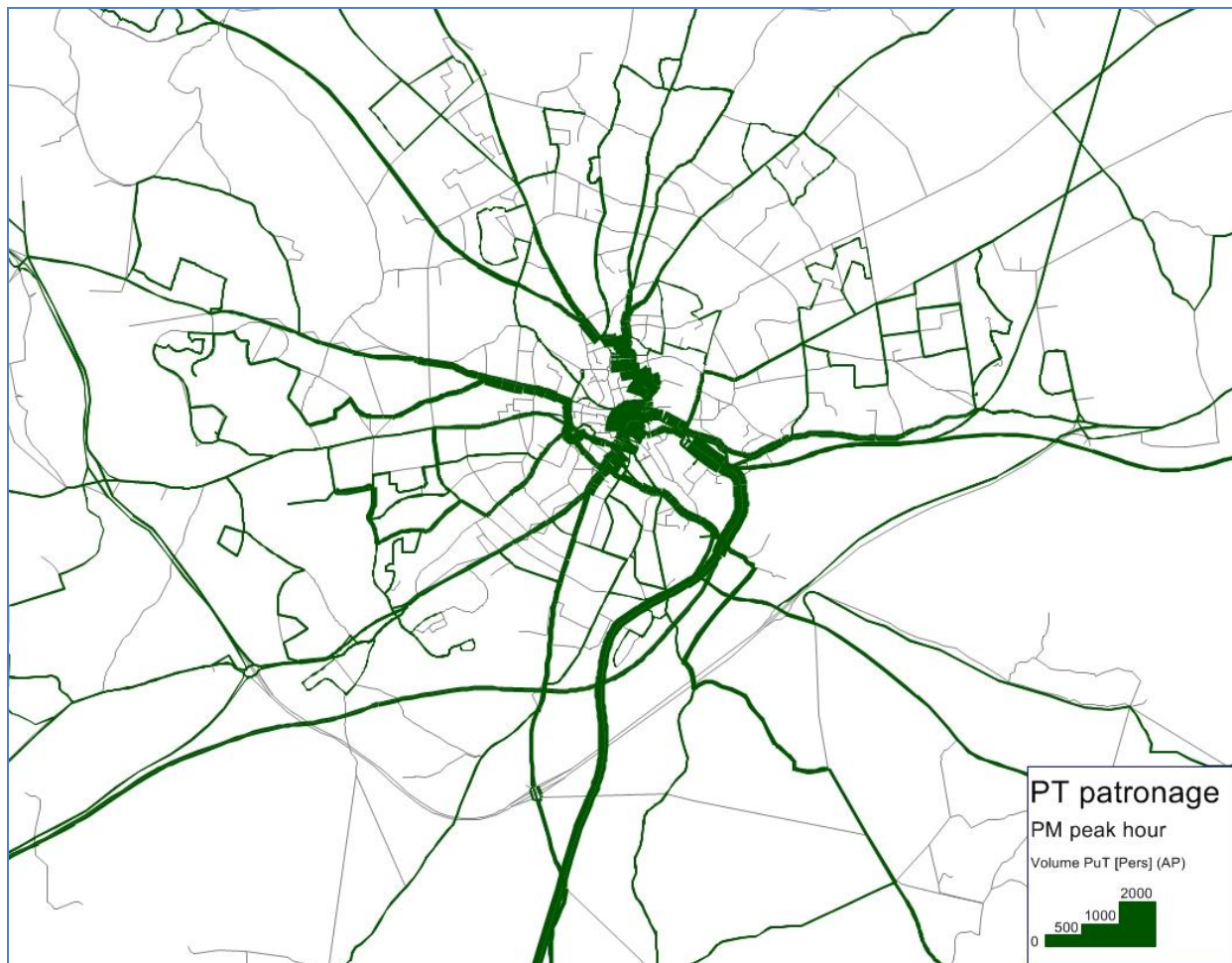


Figure 6.3: Patronage plots for PM peak



6.5 PT flow validation

6.5.1 No independent PT flow validation was undertaken during the development of the 2012 public transport model. The 2012 bus dataset captured all bus trips into Norwich from outside of the urban area and a significant proportion of trips from the suburbs into the city centre and cross city trips. However this was used for the 2012 matrix calibration, as it was considered that the benefits of using this data in calibration to provide a better representation of public transport movements was more important than using it in independent validation. For the purposes of the assessment of the NDR Scheme this is considered acceptable as the public transport modelling has very little influence on the highway traffic forecasts.

7 Appendices

7.1 Appendix A: Bus Survey Information

Table 7.1: Bus Stop Details at Survey Locations

ID Number	Bus Stop	Direction In/Out of cordon	Services to be Surveyed (non-Park and Ride ONLY)
1	Thorpe Road/adjacent The Denes	In	14, 14A, 15, 15A, X47, A47, 123, 124
2	Thorpe Road/Stanley Avenue	Out	14, 14A, 15, 15A, X47, A47, 123, 124
3	Bracondale/opposite Kings Street	In	X2, 001, 100, 146, 570, 587, 588
4	Bracondale/King Street	Out	X2, 001, 100, 146, 570, 587, 588
5	Long John Hill/adjacent Cavell Road	In	004, 31, 100
6	Long John Hill/opposite Cavell Road	Out	004, 31
7	Newmarket Road/Christchurch Road	In	6, X6, 11A, 13, 14, 15, 14A, 15A, 121, 999
8	Newmarket Road/Lime Tree Road	Out	6, X6, 11A, 13, 14, 15, 14A, 15A, 121, 999
9	Hall Road/opposite Abbot Road	In	36
10	Hall Road/Abbot Road	Out	36, 004
11	Constitution Hill/opposite No.31	In	13, 13C, 55, 210
12	Constitution Hill/adjacent No.31	Out	13, 13C, 55, 210, T2
13	Plumstead Road/adjacent Heartsease pub	In	13C, 23, 23A, 24, 24A, 32
14	Plumstead Road/opposite Heartsease pub	Out	23, 23A, 24, 24A, 32
15	Bowthorpe Road/Godric Place	In	21, 22
16	Bowthorpe Road/opposite Godric Place	Out	21, 22
17	The Avenues/adjacent Library	In	999
18	The Avenues/adjacent Christchurch Road	Out	999
19	Earlham Road/adjacent to Fairhaven Court	In	3, 4, 15, 25A
20	Earlham Road/opposite Hadley Drive	Out	3, 4, 15, 25A
21	Dereham Road/opposite Winchcomb Road	In	5, 23, 23A, 24, 24A
22	Dereham Road/Winchcomb Road	Out	5, 23, 23A, 24, 24A
23	Drayton Road/opposite Caley Close	In	28, 29, 29A, 29B, X29
24	Drayton Road/adjacent Caley Close	Out	28, 29, 29A, 29B, X29
25	Aylsham Road/opposite Boundary pub	In	25, 36, 37, 38, 44A, X44, T2
26	Aylsham Road/adjacent Boundary pub	Out	002, 36, 37, 38, 44A, X44, 45, CH4
27	Catton Grove Road/opposite Brightwell Road	In	21, 22
28	Catton Grove Road/adjacent Brightwell Road	Out	21, 22
29	Sprowston Road/opposite Shipfield	In	11, 11A, 36
30	Sprowston Road/adjacent Brickmakers pub	Out	11, 11A, 36
31	Ipswich Road/opposite Harford Manor Sch	In	003, 1, 2, 10A, 36, 37, 122
32	Ipswich Road/adjacent Harford Manor Sch	Out	003, 2, 10A, 37, 122
33	Unthank Road/adjacent Colman Hospital	In	25

ID Number	Bus Stop	Direction In/Out of cordon	Services to be Surveyed (non-Park and Ride ONLY)
34	Unthank Road/opposite Colman Hospital	Out	25
35	Castle Meadow Stand B	N/A	1, 2, 121, 122, 123, 124, 999, A47, X47
36	Castle Meadow Stand E	N/A	25, 25A, 31, 36, 37, 38, 44A, 45, X44
37	Castle Meadow Stand P	N/A	1, 2, 5A, 10A, 25, 25A, 32, 36, 37, 38, 45, 55, 210
38	Castle Meadow Stand R	N/A	11, 11A, 121, 122, 123, 124, 999, A47, X47
39	Castle Meadow Stand W	N/A	13, 14, 14A, 15, 15A, 28, 29, 29A, 29B, CH4

Table 7.2: Details of Bus Services

Bus Service	Operator	Approximate Frequency	Destination
001	Anglian	60 mins	Norwich City Centre - Surlingham
002	Konect Bus	20 mins	Norwich Bus Station - Sheringham
003	Anglian	120 mins	Norwich City Centre - Harleston
004	Anglian	60 mins	Norwich Bus Station – Harleston/Hempnell Green/Topcroft
1	Simonds	120 mins	Norwich Rail Station - Diss
2	Simonds	60 mins	Norwich Rail Station – Roydon (Diss)
3	Konect Bus	60 mins	Norwich Bus Station - Shipdham
4	Konect Bus	60 mins	Norwich Bus Station – Swanton Morley/Dereham
6	Konect Bus	60 mins	Norwich Bus Station - Ashill
10A	Semence	3 / day	Norwich City Centre - East Harling
11, 11A	First Norwich	10 mins	Sprowston - Norwich University Hospital
13	First Norwich	15 mins (AM Peak) / 30 mins thereafter	Attleborough - Spixworth
14, 14A	First Norwich	15 mins (AM Peak) / 30 mins thereafter	Silfield - Wroxham
15	First Norwich	30 mins (AM Peak) / 60 mins thereafter	Blofield Heath – Wymondham
15A	First Norwich	35 mins (AM Peak) / 60 mins thereafter	Wymondham - Lingwood
21	First Norwich	15 mins (AM Peak) / 30 mins thereafter	Old Catton – Norwich University Hospital
22	First Norwich	30 mins	Old Catton – University of East Anglia
23, 23A	First Norwich	15 mins	Heartsease – New Costessey
24, 24A	First Norwich	15 mins	Thorpe St Andrew – Queens Hill
25, 25A	First Norwich	8 mins	Norwich Rail Station – University of East Anglia
28	First Norwich	20 mins	Norwich City Centre – Thorpe Marriott
29, 29A, 29B	First Norwich	60 mins	Norwich City Centre - Taverham
31	First Norwich	1 / day	Norwich Circular

Bus Service	Operator	Approximate Frequency	Destination
32	Neaves	4 / day	Norwich City Centre - Sprowston
36	First Norwich	15 mins (AM Peak) / 30 mins thereafter	Long Stratton – Horsford
37	First Norwich	30 mins	Hellesdon – Mulbarton
38	First Norwich	30 mins	Norwich City Centre – Old Catton
44	Sanders Coaches	30 mins (AM Peak) / 60 mins thereafter	Norwich – Sheringham / Holt
44A	Sanders Coaches	60 mins	Norwich Bus Station - Aylsham
45	Sanders Coaches	120 mins	Norwich City Centre - Holt
55	Sanders Coaches	5 in AM Peak / 60 mins thereafter	Norwich Bus Station – North Walsham
100	Norfolk County	20 mins	Norwich City Centre - County Hall
121	Anglian	30 mins	Norwich Rail Station - Eaton
122	Anglian	60 mins	Norwich City Centre - Cringleford
123	Anglian	15 mins (AM Peak) / 30 mins thereafter	Norwich City Centre – Wroxham
124	Anglian	60 mins	Norwich City Centre – Pilson Green
146	Anglian	30 mins	Norwich City Centre – Lowestoft
210	Sanders Coaches	6 / day	Norwich Bus Station – North Walsham
445	Sanders Coaches	4 / day	Norwich – Sheringham
570	Anglian	120 mins	Norwich City Centre – Thurlton
587	Anglian	30 mins	Norwich City Centre – Poringland
588	Anglian	30 mins	Norwich City Centre – Bungay/Halesworth
999	Anglian	30 mins	Eaton Park – Gertrude Road
A47	Anglian	60 mins	Norwich Bus Station - Gorleston
CH4	Norfolk Green	1 / day	Norwich City Centre - Cromer
T2	Norfolk Green	3 / day	Hellesdon – Sprowston
X2	First Norwich	30 mins	Norwich City Centre – Lowestoft
X6	Konect Bus	60 mins	Norwich Bus Station - Attleborough
X29	Norfolk Green	30 mins (AM Peak) / 60 mins thereafter	Norwich Bus Station - Fakenham
X41	Sanders Coaches	3 / day	Norwich – Sheringham
X44	Sanders Coaches	30 mins	Norwich Bus Station – Sheringham
X47	Anglian	60 mins	Norwich Bus Station - Gorleston

Table 7.3: Summary Bus Passenger Data at Survey Sites

Site	Location	07:30-08:00	08:00-09:00	09:00-09:30	10:00-11:00	11:00-12:00	13:00-14:00	14:00-15:00	15:30-16:00	16:00-17:00	17:00-18:00	18:00-18:30
Site 1	Thorpe Road Inbound	109	213	59	143	107	89	58	28	113	192	42
Site 2	Thorpe Road Outbound	59	143	57	56	82	153	107	52	193	203	60
Site 3	Bracondale Inbound	147	312	128	226	175	123	81	15	69	73	14
Site 4	Bracondale Outbound	26	107	23	58	89	260	237	145	221	314	120
Site 5	Long John Hill Inbound	0	34	0	32	21	11	0	0	0	21	0
Site 6	Long John Hill Outbound	0	1	0	11	3	11	0	0	0	11	0
Site 7	Newmarket Road Inbound	104	316	144	345	82	111	109	40	158	76	22
Site 8	Newmarket Road Outbound	70	101	23	80	136	197	133	94	253	128	78
Site 9	Hall Road Inbound	0	67	17	25	8	19	12	34	18	16	1
Site 10	Hall Road Outbound	0	16	20	0	30	30	31	50	34	39	21
Site 11	Constitution Hill Inbound	36	118	21	157	71	90	19	14	31	3	0
Site 12	Constitution Hill Outbound	3	14	4	35	35	49	32	73	128	91	64
Site 13	Plumstead Road Inbound	33	83	8	87	76	44	32	27	18	11	7
Site 14	Plumstead Road Outbound	16	35	30	39	66	66	68	50	89	82	38
Site 15	Bowthorpe Road Inbound	48	53	47	93	97	69	55	28	44	27	7
Site 16	Bowthorpe Road Outbound	17	28	15	38	77	118	150	111	139	192	55
Site 17	The Avenues Inbound	0	2	4	4	3	5	4	0	2	1	0
Site 18	The Avenues Outbound	0	1	0	0	0	7	5	5	6	3	0
Site 19	Earlham Road Inbound*	46	-	-	89	113	111	117	74	79	91	48
Site 20	Earlham Road Outbound*	34	-	-	83	127	144	178	147	123	99	78
Site 21	Dereham Road Inbound	132	181	60	173	194	83	76	22	59	70	53
Site 22	Dereham Road Outbound	23	75	8	102	150	174	113	99	180	235	90
Site 23	Drayton Road Inbound	106	137	25	98	92	19	27	55	39	62	17

Site	Location	07:30-08:00	08:00-09:00	09:00-09:30	10:00-11:00	11:00-12:00	13:00-14:00	14:00-15:00	15:30-16:00	16:00-17:00	17:00-18:00	18:00-18:30
Site 24	Drayton Road Outbound	38	26	14	26	55	94	114	42	156	140	38
Site 25	Aylesham Road Inbound	33	159	33	139	150	93	73	30	60	32	4
Site 26	Aylesham Road Outbound	0	26	11	76	117	115	124	163	149	92	44
Site 27	Catton Grove Inbound	33	36	11	26	27	17	9	13	14	7	7
Site 28	Catton Grove Outbound	3	5	4	8	22	42	33	13	64	57	19
Site 29	Sprowston Road Inbound	30	50	45	69	57	55	29	62	32	19	2
Site 30	Sprowston Road Outbound	9	35	6	47	41	24	78	55	66	51	62
Site 31	Ipswich Road Inbound	39	146	0	42	32	45	18	6	5	13	3
Site 32	Ipswich Road Outbound	10	14	0	52	77	59	68	59	85	195	15
Site 33	Unthank Road Inbound	7	75	23	39	52	124	74	68	77	113	64
Site 34	Unthank Road Outbound	20	74	30	106	74	72	77	51	113	82	38

Notes: *Data not available for the period from 08:00 to 09:30 due to an accident

Table 7.4: Average weekday bus passenger data at Castle Meadows sites

Site	Location	07:30-08:00	08:00-09:00	09:00-09:30	10:00-11:00	11:00-12:00	13:00-14:00	14:00-15:00	15:30-16:00	16:00-17:00	17:00-18:00	18:00-18:30
Site 35	Stand B	5	27	5	25	29	31	34	14	43	43	21
Site 36	Stand E	59	67	38	101	165	200	193	274	357	245	147
Site 37	Stand P	160	199	93	138	110	70	69	39	54	53	29
Site 38	Stand R	92	122	42	86	53	46	41	42	40	26	10
Site 39	Stand W	62	103	46	73	57	41	29	35	37	57	30

7.2 Appendix B: Fares

Table 7.5: Distance Based Rail Fares

Distance (km)	2012 fare in 2010 prices(£)
10	1.74
20	3.48
30	5.22
40	6.96
50	8.70
60	10.44
70	12.18
80	13.92
90	15.66
100	17.40
110	19.14
120	20.88
130	22.62
140	24.37
150	26.11
160	27.85
170	29.59
180	31.33
190	33.07
200	34.81

Table 7.6: Distance Based Bus Fares

First and other operators		Anglian	
Distance (km)	2012 fare in 2010 prices (£)	Distance (km)	2012 fare in 2010 prices (£)
1	1.16	1	0.73
2	1.60	2	1.31
3	1.74	3	1.60
4	2.03	4	1.89
5	2.18	5	2.03
7	2.32	6	2.18
8	2.47	7	2.32
10	2.62	8	2.47
13	2.76	10	2.62
16	2.91	12	2.76
20	3.05	14	2.91
26	3.20	16	3.05
		19	3.20
		23	3.34
		27	3.49

8 Glossary

Assignment	A process of loading a trip matrix onto routes through a network that accounts for travel costs on the network in identifying the optimum route choice for every trip
Calibration	A process of adjusting the model input data or model parameters to improve the model and its validation
Convergence	An equilibrium between model outputs, in assignment between the flows and travel costs and in demand models between the demand and the costs from the supply model
Cost matrix	A table of travel costs for journeys that may include travel time, operating costs and charges such as tolls or fares
Cruise speeds	Average travel speed along a network link
Demand model	See variable demand model
Demand segment	Travel demand is divided into a number of segments for the purposes of applying different demand modelling procedures. The division is usually by trip purpose and whether the trips are home-based or non-home-based
Generalised cost	A combination of time and money costs (operating costs and charges) that are expressed in time or money units which are used to represent the total travel costs for a journey within the assignment or demand models
Journey purpose	Trips are divided into different travel purposes, usually work (or commute), employers' business and other. These trip purposes have different generalised costs applied and different demand model responses
Matrix estimation	A process used to adjust an initial or 'prior' matrix so that the resulting assignment of the adjusted matrix matches count data as closely as possible
Network	A mathematical representation of a transport network in a supply-side assignment model, either a highway network which represents vehicle travel, or a public transport network that represents bus and rail services
Reference trip matrix	A forecast reference matrix based on applying growth from national (or other) datasets, but before the application of adjustments due to the impact of how travel costs will change with growth in travel
User classes	Trips are aggregated into several user classes for the purposes of assignment. These usually represent different types of vehicle (e.g. car, HGV) and different trip purposes
Trip matrix	A table representing travel in a model area between land areas or zones
Validation	A process of comparing the model data with independent data
Variable demand modelling	A model that forecasts changes in travel behaviour such as trip frequency, choice of mode, time of travel and trip distribution
Zone	An area of land or development which is used in a transport model to aggregate individual households or commercial premises into a manageable number of units that can be used to represent journey patterns in the study area. Usually the zone size will be relatively small in the study area, but progressively larger further away from it.

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5.11 Summary Results of Sensitivity Tests

Planning Act 2008

Infrastructure Planning

The Infrastructure Planning (Applications: Prescribed Forms and Procedure)
Regulations 2009

PINS Reference Number: TR010015

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1 Key Summary

- 1.1.1 Funding approval for the Norwich Northern Distributor Road (NDR) was sought in 2011 through the Department for Transport's (DfT) Development Pool process. A business case was developed and submitted in accordance with the guidance in the Treasury Green Book. Ministerial decisions were made in December 2011 to award funding.
- 1.1.2 The NDR is a project of national significance which requires a Development Consent Order (DCO) under the Planning Act 2008. The submission was made in January 2014. Since that time there have been some further developments that are considered in this report. These include:
- Revised WebTAG guidance was made definitive at the end of January 2014 after the Scheme submission; and
 - The Joint Core Strategy (JCS) that was reviewed and approved at Examination in 2013 has been formally adopted by the Greater Norwich Development Partnership (GNDP) authorities; and
 - The Postwick Scheme orders have been approved by the Secretaries of State and Ministerial approval of funding was confirmed in April 2014.
- 1.1.3 The Transport Assessment for the Scheme is set out in submission document ref. 5.5. This included an operational assessment of the Scheme design with traffic forecasts based on the full implementation of JCS, as set out in the Traffic Forecasting Report document ref. 5.6. The forecasts were based on the transport model described in the Highway and Public Transport Local Model Validation Reports (document refs. 5.9 and 5.10). The transport assessment concluded that the Scheme design is considered to be the best possible balance between relieving the existing network whilst ensuring acceptable conditions on this new part of the network.
- 1.1.4 The Economic Appraisal Report (document ref. 5.7) shows that the Scheme would deliver very high value for money (VfM), the Benefit Cost Ratio (BCR) value exceeding 4, according to DfT's VfM criteria. In addition the Land Use and Economic Development Report (document ref. 10.3) sets out the substantial benefits of jobs, GVA and infrastructure investment that the Scheme would help to bring to the City.

1.1.5 This report contains a number of sensitivity test results to address the changes since the submission and to further examine the robustness or sensitivity of the results. The tests include:

- Showing the effect on the economic appraisal of new WebTAG values of time and growth;
- Sensitivity testing upper and lower bound ranges for values of time;
- Testing low and high growth;
- An alternative network scenario with Postwick included in the Do Minimum network;
- An alternative growth scenario with only JCS developments that would be unlocked by Postwick and an economic appraisal using a dependent development approach. This has been tested with and without the developer link roads.

1.1.6 The series of sensitivity tests has been undertaken primarily to test the robustness of the economic appraisal of the Scheme to changes in parameters, forecast assumptions and methodology. The traffic flow forecasts of the Scheme in these test scenarios have also been reviewed and where appropriate operational performance has been assessed.

1.1.7 The sensitivity test results indicate that BCR ranges from 3.68 – 5.36 (inclusive of accident benefits) and 4.75 – 6.86 when WEBs and JTR are included as can be seen from summary table below. Both of these represent high/very high value for money for all sensitivity tests (BCR above 3 / 4) according to DfT's VfM criteria.

Scenario	BCR (including accidents)	BCR (also including WEBs and JTR)
DCO submission	4.17	5.33
<i>Sensitivity tests</i>		
New WebTAG parameters	4.26	5.42
New WebTAG – non work VOT reduced by 25%	3.68	4.75
New WebTAG – non work VOT increased by 25%	4.85	6.07
New WebTAG – work VOT reduced by 25%	4.02	5.13
New WebTAG – work VOT increased by 25%	4.51	5.69
Low growth	3.76	4.75

Scenario	BCR (including accidents)	BCR (also including WEBs and JTR)
High growth	4.55	5.73
Postwick in DM	5.29	6.77
Dependent development_link roads included*	4.76	5.99
Dependent development_link roads excluded*	4.73	5.99

Notes: *This dependent development BCR excludes very high additional GVA benefits of £422.4m and development benefits (includes planning gain and transport external costs) of £1,146m

1.1.8 It is therefore concluded that the transport benefits reported in the submission are robust and that the Scheme would deliver high or very high value for money.

1.1.9 In addition to the transport benefits the testing using the dependent development methodology shows that the completion of the NDR would deliver very high development benefits amounting to £1,146m. In addition the business development dependent on completion of the NDR could realise £422m of GVA benefits, though these should not simply be added to development benefits.

2 Introduction

2.1 Background

- 2.1.1 Mott MacDonald (MM) has been appointed by Norfolk County Council (NCC) to assist with the development and appraisal of the Norwich Northern Distributor Road, known as the NDR or referred to as the Scheme.
- 2.1.2 The Scheme would be a dual carriageway all-purpose strategic distributor road, to be classified as the A1270 Principal Road, which would link the A1067 Fakenham Road near Attlebridge, to the A47(T) Trunk Road at Postwick. This will be over a length of approximately 20.4km.
- 2.1.3 The NDR is a project of national significance which requires a Development Consent Order (DCO) under the Planning Act 2008 and this formal planning process began in early 2013. It is currently anticipated that the process will be completed in time for the Scheme to start construction in 2015 and to be opened in 2017.
- 2.1.4 This document is one of a number that support the DCO, each of which has its own unique document reference number, and should therefore be read in conjunction with the other documentation. The proposed layout of the NDR is shown in the General Arrangement Plans contained in document ref. 2.6, whilst the full needs case for the NDR is explained in the Statement of Reasons (document ref. 4.1) and the Environmental Statement (document ref. 6.1).
- 2.1.5 Funding approval for the NDR was sought in 2011 through the Department for Transport's (DfT) Development Pool process. A business case was developed and submitted in accordance with the guidance in the Treasury Green Book. Ministerial decisions were made in December 2011 to award funding.
- 2.1.6 The NDR DCO submission was submitted on 8th January 2014 and has been accepted for examination by the planning inspectorate on 4th February 2014.

2.2 Purpose and Layout of Report

- 2.2.1 This report presents the results of sensitivity testing that would provide additional information for the examination. These tests address changes since the submission that include:

- Revised WebTAG guidance was made definitive at the end of January 2014 after the Scheme submission; and
- The Joint Core Strategy (JCS) that was reviewed and approved at Examination in 2013 has been formally adopted by the GNDP authorities; and
- The Postwick Scheme orders have been approved by the Secretaries of State and Ministerial approval of funding was confirmed in April 2014.

2.2.2 The report sets out to provide, where appropriate:

- A review of the flow and operational assessment of the Scheme under sensitivity tests where appropriate.
- An assessment of safety benefits of the scheme under the sensitivity test
- An assessment of economic benefits for consumer and business users from several sensitivity tests based on the variable demand model (VDM) forecasts and the likely expenditure profile during the assessment period where appropriate.
- An assessment of the scheme Value for Money (VfM) under these sensitivity tests based on the corresponding VDM model outputs and the latest available scheme costs where appropriate. The Guidance on Value for Money describes the criteria used to determine the VfM of various types of schemes.

2.2.3 The methodology used to produce the safety and economic appraisal is described in detail in DCO submission document ref. 5.7. This methodology was mainly retained for these sensitivity tests. More information is given where a different methodological approach has been applied.

2.2.4 This report contains the following sections after the current introductory section:

- Section 3 – describes details of the sensitivity tests;
- Section 4 – contains scheme costs excluding Postwick costs and will be used in scenarios where Postwick is included in the Do Minimum.;
- Sections 5 to 8 – present the results of the flow, operational, safety and economic appraisal for each sensitivity test separately;
- Section 9 – presents conclusions from the sensitivity test appraisals.

2.2.5 Supporting information is included in Appendix A in Section 10.

2.2.6 Sections 11 and 12 contain Abbreviations and Glossary.

3 Description of Sensitivity Tests

3.1 Overview

- 3.1.1 In order to test the impact of the changes described in the previous section and to provide additional information on further WebTAG requirements, several sensitivity tests were carried out. More details on these tests can be found in later sections.
- 3.1.2 The economic appraisal complies with the latest guidance in WebTAG. It has been assumed in the appraisal that the benefits of the scheme do not change for each year beyond 2032 although traffic will continue to grow which suggests that the PVB and the NPV presented for the scheme and each sensitivity test will be conservative.
- 3.1.3 For each sensitivity test economic and safety appraisals have been carried out. As with the DCO submission, the economic appraisal calculates TUBA benefits, wider economic benefits (using WITA) and journey time reliability benefits. Safety appraisal was based on COBA. In addition to the above benefits, dependent development benefits such as Transport External Costs (TEC), Planning Gain (PG) and Gross Value Added (GVA) benefits are calculated for dependent development scenarios (see below for more information on this sensitivity test).
- 3.1.4 The costs of the scheme are shared between local authority and central government.
- 3.1.5 In addition a review of traffic flow impacts and the operational assessment of the Scheme have been carried out where necessary.

3.2 New WebTAG Guidance Sensitivity Test

- 3.2.1 The DCO submission transport modelling and appraisal has been developed in accordance with then definitive WebTAG guidance (last updated in August 2012). However revised WebTAG guidance became definitive at the end of January 2014 after the Scheme DCO submission. This included a number of changes that were published in Draft Units in October 2013. The new WebTAG guidance has been reorganized and was released on a new website. It describes the new guidance as being 'retrenched' which it is understood means it is simplified. Sometimes the new guidance is referred to as WebTAG2.

- 3.2.2 The main changes that need to be addressed with the new WebTAG guidance are due to changes in parameter values and additional sensitivity testing of ranges for the values. Changes in values include new Values of Time (VOT) and growth rates for working and non-working trip purposes. Car business VOTs have been reduced by about 20%. Non-business VOTs have increased by about 5% and now increase in line with GDP per capita (previous assumption was they increased by 0.8 of the GDP per capita increase). In addition, due to the findings of the latest research on these values, there is a requirement to test changes in base values by +/-25%.
- 3.2.3 There are also changes to fuel costs, CO2 emissions factors and CO2 values which would have a relatively small impact but are taken into account in the sensitivity test analysis.
- 3.2.4 These new parameter values that became definitive in WebTAG2 were used to produce a revised economic appraisal.
- 3.2.5 In addition, to comply with WebTAG2 guidance on new VOT parameters, tests were undertaken with variations of +/-25% for either the working or non-working base VOTs.
- 3.2.6 The new guidance includes a unit on proportionate updating of appraisal. This requires agreement of the sponsoring authority, which in this case requires DfT and NCC agreement. Following discussions it was agreed that base model calibration and validation is checked with new WebTAG parameters. Also 2032DS forecasts will be re-run with new parameters and forecast assignments are compared against the DCO.
- 3.2.7 These tests, assumptions and appraisal required are summarised in Table 3.1 below.

Table 3.1: Summary of Requirements – New WebTAG Guidance

Scenario	Modelling required	Appraisal required	Additional requirements
Existing DCO scheme with WebTAG2 revised parameters for economic appraisal	No	Economic and safety appraisal with revised parameters	None
DCO Scheme with +/- 25% to base VOTs (four tests)	No	Economic appraisal with revised base VOTs	None
Base validation check with new WebTAG2 parameters	Revised VOT parameters used in base model re-assignment	Comparison of assignment validation with DCO	As agreed with DfT
Forecasts with new WebTAG2 parameters	Revised growth in VOT used in re-forecast using DIADEM for 2032DS	Compare resulting forecast assignment with DCO submission	As agreed with DfT

3.3 Low and High Growth Scenario Sensitivity Tests

3.3.1 The current DCO submission is based on central growth forecasts and there is a WebTAG requirement to assess the uncertainty in growth by carrying out low and high growth forecasts. Table 3.2 summarises the key assumptions and appraisal required.

Table 3.2: Summary of Requirements – Low and High Growth

Scenario	Modelling required	Appraisal required	Additional requirements
Existing DCO scheme with low growth	Revised forecast reference growth demand matrices for 2017 and 2032. Run through demand model for 2017 and 2032 DM and DS.	Economic appraisal. Safety appraisal. Traffic forecast changes with DCO	None
Existing DCO scheme with high growth	Revised forecast reference growth demand matrices for 2017 and 2032. Run through demand model for 2017 and 2032 DM and DS.	Economic appraisal. Safety appraisal. Traffic forecast changes with DCO	None

3.4 Postwick Scheme in the Do Minimum Sensitivity Test

3.4.1 The DCO submission appraisal included the proposed improvement at Postwick as part of the NDR Scheme. The Postwick Hub Scheme was subject to an Public Inquiry in mid-2013 and the Orders have since been approved by the Secretaries of State in January 2014, coincident with the DCO submission, and full approval was granted in April 2014. This sensitivity test therefore assesses the economic benefits of the remainder of the NDR Scheme in isolation from the Postwick improvements. It also looks at the operational performance of Postwick junctions in 2032. Table 3.3 summarises key assumptions and appraisal required.

Table 3.3: Summary of Requirements – Postwick Scheme in the DM

Scenario	Modelling required	Appraisal carried out	Additional requirements
DCO scheme with the Postwick improvement included within the Do Minimum.	Recoding of the DM network to include the Postwick Scheme. Running recoded DM network and DCO reference matrices through demand model for 2017 and 2032.	Economic and safety appraisal. Traffic forecast changes with DCO Operational assessment of Postwick junctions	Revised costs required for scheme to exclude Postwick Improvement costs.

3.5 Dependent Development Sensitivity Tests

3.5.1 The DCO submission appraisal was based on full spatial allocation of JCS development for both with and without the scheme scenarios. This means that

the performance of the Scheme is assessed with the full JCS development allocation which is expected to represent the maximum Scheme impact. However, in the without Scheme scenario it could be argued that the full spatial allocation could not be achieved although growth is still required to be controlled to similar growth across the GNDP area (known as controlled to NTEM or TEMPRO). An approach to dealing with this is set out in WebTAG2 A2-3 by dealing with the development that can be unlocked by the Scheme as dependent development. In the context of the approval that has been confirmed for the Postwick scheme then the development that can be considered as dependent is that development that would be unlocked by NDR in addition to that unlocked by Postwick. These sensitivity tests therefore assume that certain developments are dependent only on the NDR scheme (i.e. over and above those unlocked by Postwick). Table 3.4 summarises key assumptions and the appraisals required.

Table 3.4: Summary of Requirements – Dependent Development Scenario

Scenario	Modelling required	Appraisal required	Additional requirements
Existing DCO scheme with dependent development growth scenario.	Develop dependent development matrices for 2032 (there are no NDR dependent developments in 2017). Run DM (with Postwick included in DM) and DS networks with dependent development matrices through demand model for 2032.	Economic appraisal using a fixed reference demand, and appraisal using a dependent development approach. Safety appraisal. Calculation of Planning Gain, Transport External Costs and GVA. Traffic forecast changes with DCO Operational assessment of NDR and Postwick junctions	Revised costs required for scheme to exclude Postwick Improvement costs.
Scenario as above but with developer link roads removed* from 2017 DM (with Postwick included) and DS networks	Run 2017 DM and DS networks with DCO 2017 reference matrices (there are no NDR dependent developments in 2017)	Economic appraisal using a fixed reference demand, and appraisal using a dependent development approach. Safety appraisal. Calculation of Transport External Costs	Revised costs required for scheme to exclude Postwick Improvement costs. Planning Gain and GVA from above 2032 assignments from above

Notes *In the scenario where the dependent development is not implemented then the corresponding developer link roads would not exist. Therefore the tests have been carried out with and without the developer link roads.

3.5.2 In accordance with dependent development guidance set out in WebTAG A2-3, the economic appraisal was carried out in two parts, as follows:

- Assessment of the NDR transport scheme in isolation.
- Assessment of the development benefits associated with dependent developments.

- 3.5.3 The former is calculated with reference traffic levels that exclude the development that is dependent upon the completion of the NDR.
- 3.5.4 Benefits of land use development assuming the implementation of the transport intervention are equal to the Planning Gain (PG) arising from the development less the Transport Externality Cost (TEC) and Other Externalities (OE). Here the TEC is produced by the extra congestion for existing transport users, whilst the OE refers to the loss or gain in amenity value of the land compared to its existing use.
- 3.5.5 The TEC can be positive when the land use development imposes costs on existing users in the absence of a transport scheme improvement, but with an improvement in place it is likely to be negative, especially when the trips are constrained to NTEM. This occurs as the TECs with the specified land use development and the transport improvement are lower than with wider distributed development implied by NTEM without the dependent development. Put another way, with the implementation of the NDR Scheme the transport externalities are lower with the spatially allocated NDR dependent developments than with a wider distribution of developments. This outcome is consistent with the WebTAG A2-3 guidance.
- 3.5.6 NDR dependent housing and business developments are summarised in Table 3.5 below. All these developments are located in the Broadland district.

Table 3.5: Summary of NDR Dependent Housing and Business Developments – 2017 to 2032

Development type	Development	Units/m2	Additional details
Housing	Hellesdon Golf Course	729	
	Hellesdon Hospital	225	
	Drayton	151	
	Spixworth	39	
	Rackheath Eco Community*	3,070	
	Brundall	111	
	Biofield	144	
	Sprowston	45	
	Horsham	38	
	Salhouse	14	
	West of North Walsham Road (Beyond Green)*	1,000	
	Between Wroxham and North Walsham Road (Beyond Green)*	1,100	
	Between Salhouse and Wroxham Road (W House Farm)	680	
	Between Plumstead and Salhouse Road	280	
Business	Rackheath Eco Community*	87,500m2	B1/B2/B8

Development type	Development	Units/m2	Additional details
	Airport*	105,000m2	B1/B2/B8

Notes: *A conservative assumption was made to calculate planning gain benefits for Rackheath Eco Community and Beyond Green housing developments only. Both business developments are considered for planning gain in addition to GVA calculations.

3.5.7 The transport scheme will enable the commercial developments at the above locations to take place which will contribute GVA to the local economy as a result of additional jobs. GVA benefits of JCS developments are reported in detail in DCO Document Reference 10.3. For the purpose of this sensitivity test GVA benefits of dependent business developments are directly available from above report.

4 Revised Scheme Costs with Postwick in DM

4.1.1 Revised scheme costs with Postwick costs excluded were provided by NCC and summary costs are given below in Table 4.1. Costs were adjusted as per Document Reference 5.7. The adjusted costs were used in the sensitivity test scenarios where Postwick Scheme is in the DM.

Table 4.1: Summary Costs of NDR Excluding Postwick Costs

Cost type	Cost (£m) in 2013Q1 prices	
	DCO Scheme	NDR only
<i>Investment costs</i>		
Construction	110.2	88.5
Land	22.0	21.9
Preparation	7.8	8.3
Supervision	1.3	0.9
Total investment Cost	141.3	119.6
<i>Other costs</i>		
Maintenance	27.8	24.2
Operation	15.9	14.5

Notes: These are initial costs before adjusting for construction price inflation and optimism bias

5 New WebTAG Guidance Sensitivity Test Results

5.1 Flow Analysis Results

5.1.1 Base flow calibration and validation results with new WebTAG parameters are compared with DCO results in Table 5.1 to Table 5.4. The comparison indicates that the results are very similar.

Table 5.1: Summary of Screenline Flow Calibration Results (All Vehicles)

Criteria	Cases	AM	IP	PM	Target
Total screenline within 5% of observed	15/ 16 IP	12 (13)	12 (11)	13 (13)	All or nearly all screenlines
Total screenline flow GEH<4	15/ 16 IP	13 (12)	14 (16)	14 (13)	All or nearly all screenlines
Individual link flows (proximity)	171	91% (91%)	98% (98%)	94% (94%)	>85% of cases
Individual link flows GEH<5	171	85% (86%)	93% (94%)	91% (90%)	>85% of cases

Notes: Values in (xx) refer to corresponding DCO values

Table 5.2: Summary of Screenline Flow Calibration Results (Cars)

Criteria	Cases	AM	IP	PM	Target
Total screenline within 5% of observed	15/ 16 IP	14 (14)	13 (13)	13 (14)	All or nearly all screenlines
Total screenline flow GEH<4	15/ 16 IP	14 (14)	14 (16)	15 (14)	All or nearly all screenlines
Individual link flows (proximity)	171	93% (93%)	98% (98%)	97% (96%)	>85% of cases
Individual link flows GEH<5	171	87% (87%)	95% (95%)	92% (92%)	>85% of cases

Notes: Values in (xx) refer to corresponding DCO values

Table 5.3: Summary of Screenline Flow Validation Results (All Vehicles)

Criteria	Cases	AM	IP	PM	Target
Total screenline within 5% of observed	6	4 (4)	4 (4)	5 (5)	All or nearly all screenlines
Total screenline flow GEH<4	6	4 (4)	5 (5)	5 (5)	All or nearly all screenlines
Individual link flows (proximity)	58	84% (84%)	84% (84%)	83% (84%)	>85% of cases
Individual link flows GEH<5	58	84% (81%)	78% (78%)	86% (86%)	>85% of cases

Notes: Values in (xx) refer to corresponding DCO values

Table 5.4: Summary of Screenline Flow Validation Results (Cars)

Criteria	Cases	AM	IP	PM	Target
Total screenline within 5% of observed	6	5 (5)	5 (4)	4 (5)	All or nearly all screenlines
Total screenline flow GEH<4	6	5 (5)	5 (5)	5 (5)	All or nearly all screenlines
Individual link flows (proximity)	58	88% (86%)	86% (84%)	83% (84%)	>85% of cases
Individual link flows GEH<5	58	86% (86%)	79% (81%)	84% (86%)	>85% of cases

Notes: Values in (xx) refer to corresponding DCO values

5.1.2 Base journey time validation results with new WebTAG parameters are compared with DCO results in Table 5.5. Again the comparison indicates that the results are very similar.

Table 5.5: Journey Time Validation Summary

Time period	Number of routes	Number achieving validation criteria	Percentage achieving validation criteria
AM Peak	22	17 (17)	77% (77%)
Inter Peak	22	22 (22)	100% (100%)
PM Peak	22	17 (17)	77% (77%)

Notes: Values in (xx) refer to corresponding DCO values

5.1.3 Based on revised flow calibration and validation results and journey time validation results, it can be concluded that new WebTAG parameters do not have a significant impact on base year calibration and validation.

5.1.4 The revised base model was then used with DCO reference forecast matrices but with updated networks for revised generalised cost parameters (based on new WebTAG parameters) to run demand model for 2032DS.

5.1.5 In Table 5.6 below a comparison of AADT figures is made between the Updated VOT assignment and the DCO submission assignment. There is a small decrease on the majority of the NDR links, with a small increase at A71, which is the NDR link between Plumstead Road and Salhouse Road. The changes overall suggest that using the revised VOTs in the modelling would produce similar forecast traffic flows on the NDR and thus similar Scheme impacts.

Table 5.6: NDR Locations AADT Comparison

Location	Link	Direction	Updated VOT	DCO Submission	Difference	% Difference
A66	Holt Road - Cromer Road Link	WB/EB	28,500	30,400	-1900	-6%
A67	Cromer Road - Airport Link	NEB/SWB	28,200	29,800	-1600	-5%
A68	Airport - North Walsham Road Link	WB/EB	28,200	29,800	-1600	-5%
A69	North Walsham Road - Wroxham Road Link	WB/EB	38,500	39100	-600	-2%
A70	Wroxham Road - Salhouse Road Link	NWB/SEB	42,800	43900	-1100	-3%
A71	Salhouse Road - Plumstead Road Link	NWB/SEB	46,600	46000	600	1%
A72	Plumstead Road - Postwick Hub Link	NB/SB	46,200	46400	-200	0%
A73	Postwick Hub - A47 Link	NB/SB	41,800	42900	-1100	-3%
A79	Fakenham Road - Fir Covert Road Link	NEB/SWB	15,900	16500	-600	-4%
A90	Fir Covert Road - Reepham Road Link	NEB/SWB	19,400	20800	-1400	-7%
A91	Reepham Road - Holt Road Link	WB/EB	24,600	26400	-1800	-7%

5.2 Safety Analysis Results

5.2.1 Accident benefits were calculated using the same approach reported in Document Reference 5.7. Table 5.7 reports summary accident benefits using local accident rates for this sensitivity tests.

5.2.2 For the purpose of WebTAG sensitivity test only parameters related to accident casualty costs and compound growth rates have been changed compared to DCO. Both these are lower in the latest WebTAG. As a result the accident benefit valuation reduces substantially although there are no changes to number of personal injury accidents or casualty numbers saved by the Scheme.

Table 5.7: Accident Benefits of WebTAG Sensitivity Test

60 Year Appraisal Period		Scenario	
		DCO	WebTAG
Do Minimum			
Number of PIAs		70,984	70,984
Casualties	Fatal	1,890	1,890
	Serious	12,597	12,597
	Slight	91,490	91,490
Accident Costs		5,999,332	4,833,201
Do Something			
Number of PIAs		69,944	69,944
Casualties	Fatal	1,898	1,898
	Serious	12,488	12,488
	Slight	90,226	90,226
Accident Costs		5,958,113	4,806,333
Accident Benefits			
Number of PIA savings		1,041	1,041
Casualties	Fatal	-7	-7
	Serious	109	109
	Slight	1,263	1,263
Accident Savings		41,219	26,868

Notes: All monetary values are expressed in £000's in 2010 prices discounted to 2010

5.3 Economic Analysis Results

5.3.1 Table 5.8 below compares monetised costs and benefits including accident benefits for new WebTAG parameters sensitivity test against the DCO scheme.

Table 5.8: Analysis of Monetised Costs and Benefits – New WebTAG Parameters

Item	Accidents included (£000)	
	DCO	New WebTAG
Accidents (not assessed by TUBA)*	41,219	26,868
Greenhouse Gases	-22,756	-23,153
Economic Efficiency: Consumer Users (Commuting)	51,164	63,007
Economic Efficiency: Consumer Users (Other)	380,623	438,270
Economic Efficiency: Business Users and Providers	267,797	220,621
Wider Public Finances (Indirect Taxation Revenues)	55,270	65,187
Present Value of Benefits (PVB)	773,317	790,800
Broad Transport Budget Present Value of Costs (PVC)	185,542	185,542

Item	Accidents included (£000)	
	DCO	New WebTAG
OVERALL IMPACTS		
Net Present Value (NPV)	587,775	605,258
Benefit to Cost Ratio (BCR)	4.168	4.262

Notes: All monetary values are expressed in 2010 prices discounted to 2010 and calculated using TUBA1.9.3.
*Detailed summary results can be found in Section 6. The lower conservative accident benefit is included based upon the use of local accident data, as explained in section 7 of Reference Document 5.7.

5.3.2 The results show that the Present Value of Benefits (PVB) for this sensitivity test is estimated to be £791m (inclusive of accident benefits), outweighing the £186m Present Value of Costs (PVC).

5.3.3 The Benefit Cost Ratio (BCR) of the scheme for this sensitivity test is 4.26 including accidents. Under the DfT's value for money criteria, this represents a Very High value for money category.

5.3.4 Table 5.9 below compares summary economic appraisal results including wider impacts and journey time reliability for new WebTAG parameters sensitivity test against the DCO scheme.

Table 5.9: Summary of Economic Appraisal including Wider Benefits – New WebTAG Parameters

Item	Scenario also including WEBs and JTR (£000)	
	DCO	New WebTAG
Present Value of Benefits (PVB)	989,063	1,004,921
Present Value of Costs (PVC)	185,542	185,542
Net Present Value (NPV)	803,521	819,379
Benefit to Cost Ratio (BCR)	5.331	5.416

Notes: All monetary values are in £000's and expressed in 2010 prices discounted to 2010

5.3.5 The BCR for this sensitivity test is improved further to 5.42 once journey time reliability benefits (£28m) and wider economic benefits (£186m) are included in the appraisal. These additional benefits amount to £214m (2010 prices discounted to 2010). The inclusion of these benefits increases the BCR to a higher level within the Very High value for money category.

5.3.6 Table 5.10 below summarises monetised costs and benefits including accident benefits of four sensitivity test results for +/-25% VOT.

Table 5.10: Analysis of Monetised Costs and Benefits – VOT Sensitivity Tests

Item	Accidents included (£000)			
	Non-work VOT -25%	Non-work VOT +25%	Work VOT -25%	Work VOT +25%
Accidents (not assessed by TUBA)*	26,868	26,868	26,868	26,868

Item	Accidents included (£000)			
	Non-work VOT -25%	Non-work VOT +25%	Work VOT -25%	Work VOT +25%
Greenhouse Gases	-23,153	-23,153	-23,153	-23,153
Economic Efficiency: Consumer Users (Commuting)	44,615	81,399	63,007	63,007
Economic Efficiency: Consumer Users (Other)	348,285	528,847	438,270	438,270
Economic Efficiency: Business Users and Providers	220,621	220,621	175,006	266,291
Wider Public Finances (Indirect Taxation Revenues)	65,187	65,187	65,187	65,187
Present Value of Benefits (PVB)	682,423	899,769	745,185	836,470
Broad Transport Budget Present Value of Costs (PVC)	185,542	185,542	185,542	185,542
OVERALL IMPACTS				
Net Present Value (NPV)	496,881	714,227	559,643	650,928
Benefit to Cost Ratio (BCR)	3.678	4.849	4.016	4.508

Notes: All monetary values are expressed in 2010 prices discounted to 2010 and calculated using TUBA1.9.3.
*Detailed summary results can be found in Section 6. The lower conservative accident benefit is included based upon the use of local accident data, as explained in section 7 of Reference Document 5.7.

5.3.7 The Benefit Cost Ratio (BCR) of the scheme varies between 3.68 and 4.85 including accidents for these sensitivity tests. Under the DfT's value for money criteria, these represent High / Very High value for money categories.

5.3.8 Table 5.11 below provides summary economic appraisal results including wider impacts and journey time reliability for +/-25% VOT sensitivity tests.

Table 5.11: Summary of Economic Appraisal including Wider Benefits – VOT Sensitivity Tests

Item	Scenario also including WEBs and JTR (£000)			
	Non-work VOT -25%	Non-work VOT +25%	Work VOT -25%	Work VOT +25%
Present Value of Benefits (PVB)	881,218	1,125,384	952,360	1,056,344
Present Value of Costs (PVC)	185,542	185,542	185,542	185,542
Net Present Value (NPV)	695,676	939,842	766,818	870,802
Benefit to Cost Ratio (BCR)	4.749	6.065	5.133	5.693

Notes: All monetary values are in £000's and expressed in 2010 prices discounted to 2010

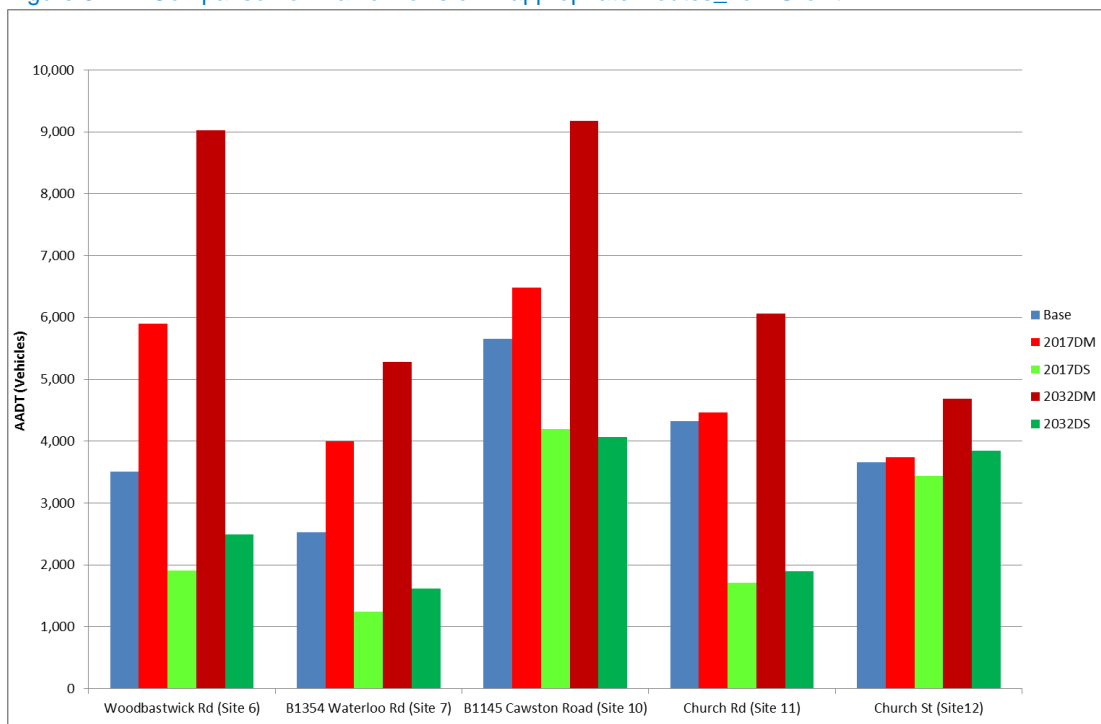
5.3.9 The BCRs range between 4.75 and 6.07 once journey time reliability benefits and wider economic benefits are included in the appraisal. The inclusion of these benefits increases the BCR to a higher level within the Very High value for money category.

6 Low and High Growth Sensitivity Test Results

6.1 Flow Analysis Results

6.1.1 Low growth scenario results in reduced traffic levels over the network. However even with low growth traffic flows on inappropriate routes would increase substantially without the Scheme. Figure 6.1 below shows that for the low growth scenario the Scheme will produce substantial traffic reductions on inappropriate routes.

Figure 6.1: Comparison of Traffic Flows on Inappropriate Routes_Low Growth



6.1.2 Traffic flow analysis plots for low growth scenario are shown in Figure 10.1 to Figure 10.5 of Appendix A. This comparison shows a reasonable distribution of decreased growth across the network in all forecast years and time periods as expected.

6.1.3 Traffic flow analysis plots for high growth scenario are shown in Figure 10.6 to Figure 10.10 of Appendix A. This comparison shows a reasonable distribution of increased growth across the network in all forecast years and time periods, as expected.

6.2 Safety Analysis Results

6.2.1 Low and High growth COBAs are based on same accident parameters as the DCO. The only change is the corresponding flows. The results in Table 6.1 indicate that number of personal injury accidents and casualty numbers decrease or increase for low and high growth scenarios respectively (hence the accident costs) for both DM and DS scenarios as expected. The difference between the figures for low growth produce a similar level of savings to that for the DCO submission, but this difference increases with high growth, though the savings are very much of a similar order.

Table 6.1: Accident Benefits of Low and High Sensitivity Test Scenarios

60 Year Appraisal Period		Scenario		
		DCO	Low	High
Do Minimum				
Number of PIAs		70,984	65,448	76,449
Casualties	Fatal	1,890	1,739	2,041
	Serious	12,597	11,594	13,596
	Slight	91,490	84,389	98,495
Accident Costs		5,999,332	5,537,051	6,456,500
Do Something				
Number of PIAs		69,944	64,415	75,501
Casualties	Fatal	1,898	1,746	2,050
	Serious	12,488	11,486	13,498
	Slight	90,226	83,128	97,353
Accident Costs		5,958,113	5,495,141	6,422,172
Accident Benefits				
Number of PIA savings		1,041	1,033	948
Casualties	Fatal	-7	-7	-9
	Serious	109	108	98
	Slight	1,263	1,261	1,142
Accident Savings		41,219	41,910	34,328

Notes: All monetary values are expressed in £000's in 2010 prices discounted to 2010

6.3 Economic Analysis Results

6.3.1 Table 6.2 below compares monetised costs and benefits including accident benefits for low and high growth sensitivity tests against the DCO scheme.

Table 6.2: Analysis of Monetised Costs and Benefits – Low and High Growth

Item	Accidents included (£000)		
	Low growth	DCO	High growth
Accidents (not assessed by TUBA)*	41,910	41,219	34,328
Greenhouse Gases**	-23,060	-22,756	-25,145
Economic Efficiency: Consumer Users (Commuting)	43,164	51,164	63,031
Economic Efficiency: Consumer Users (Other)	337,245	380,623	410,054
Economic Efficiency: Business Users and Providers	233,031	267,797	299,450
Wider Public Finances (Indirect Taxation Revenues)	56,286	55,270	60,879
Present Value of Benefits (PVB)	688,576	773,317	842,597
Broad Transport Budget Present Value of Costs (PVC)	182,798	185,542	187,910
OVERALL IMPACTS			
Net Present Value (NPV)	505,778	587,775	654,687
Benefit to Cost Ratio (BCR)	3.767	4.168	4.484

Notes: All monetary values are expressed in 2010 prices discounted to 2010
 *Detailed summary results can be found in Section 6. The lower conservative accident benefit is included based upon the use of local accident data, as explained in section 7 of Reference Document 5.7,
 **Greenhouse gas impacts were calculated using TUBA1.9.2 since there was a bug in TUBA 1.9.1

6.3.2 The results show that overall benefits are reduced with low growth and increased with high growth which is the usual outcome of low and high growth sensitivity tests. The Benefit Cost Ratios (BCR) of the scheme are 3.77 and 4.48 including accidents for low and high growth scenarios respectively. Under the DfT's value for money criteria, these represent High / Very High value for money categories respectively.

6.3.3 Table 6.3 below compares summary economic appraisal results including wider impacts and journey time reliability for low and growth sensitivity tests against the DCO scheme.

Table 6.3: Summary of Economic Appraisal including Wider Benefits – Low and High Growth

Item	Scenario also including WEBs and JTR (£000)		
	Low growth	DCO	High growth
Present Value of Benefits (PVB)	867,854	989,063	1,063,924
Present Value of Costs (PVC)	182,798	185,542	187,910
Net Present Value (NPV)	685,056	803,521	876,014
Benefit to Cost Ratio (BCR)	4.748	5.331	5.662

Notes: All monetary values are in £000's and expressed in 2010 prices discounted to 2010

6.3.4 The BCRs are improved further to 4.75 and 5.66 respectively for low and high growth once journey time reliability benefits and wider economic benefits are

included in the appraisal. The inclusion of these benefits increases the BCRs to higher levels within the Very High value for money category.

7 Postwick Scheme in the Do Minimum Sensitivity Test Results

7.1 Flow Analysis Results

7.1.1 Traffic flow analysis plots for Postwick in DM scenario are shown in Figure 10.6 to Figure 10.15 of Appendix A. AADT flow comparisons between DCO DM and Postwick in DM indicate that changes are localised to Postwick area and there are very small changes on the wider network.

7.2 Operational Analysis Results

7.2.1 Table 7.1 to Table 7.3 compare maximum RFC/DoS, maximum queue and delay for Postwick junctions between DCO DS and Postwick in DM scenario for 2032 AM and PM peaks. It should be noted that the comparison is between a DS scenario (DCO DS) and a DM scenario (Postwick scheme in Do Minimum, referred to as Postwick in DM in the tables below). A direct comparison of the two DM scenarios is not possible because the new Postwick junctions do not exist in DCO DM. The results indicate that there are some differences in junction operational performance between these two scenarios mainly because of the absence of NDR in Postwick in DM scenario.

Table 7.1: Junction Operational Assessment Results: DCO DS / Postwick in DM – 2032 Max RFC/DoS

Junction	AM		PM	
	DCO DS	Postwick in DM	DCO DS	Postwick in DM
Online junctions				
Business Park	0.87	0.56	0.95	0.44
Postwick junctions				
Broadland Gate	0.95	0.76	0.55	0.63
Peachman Way	1.01	0.91	0.67	0.95
Postwick North West	0.88	0.98	1.06	1.13
Postwick North East	1.02	0.29	0.69	0.50
Oaks Lane	0.75	0.57	0.34	0.30
Park and Ride*	94.8%	94.8%	120.0%	118.7%

Notes: *This is a signalised junction while all other junctions are roundabouts/priority junction
 The Ratio of Flow to Capacity (RFC) output from ARCADY/PICADY is the primary measure of a junction arm performance of a roundabout/priority junction. RFC less than 0.85 indicates that a junction arm operates within capacity. RFC greater than 0.85 but less than 1.0 indicates that a junction arm is over its desired capacity but below theoretical capacity. Any RFC greater than 1.0 indicates that a junction arm is in excess of its theoretical capacity. Degree of Saturation (DoS) output from LINSIG is the primary measure of performance of a signalised junction. DoS less than 90% indicates that a junction arm operates within capacity. DoS greater than 90% but less than 100% indicates that a junction arm is over its desired capacity but below theoretical capacity. Any DoS greater than 100% indicates that a junction arm is in excess of theoretical capacity.

Table 7.2: Junction Operational Assessment Results: DCO DS / Postwick in DM – 2032 Max Queue (PCUs)

Junction	AM		PM	
	DCO DS	Postwick in DM	DCO DS	Postwick in DM
Online junctions				
Business Park	7	1	17	1
Postwick junctions				
Broadland Gate	13	3	1	2
Peachman Way	31	9	2	13
Postwick North West	7	19	19	26
Postwick North East	45	0	2	1
Oaks Lane	3	1	1	0
Park and Ride*	24	23	57	53

Notes: *This is a signalised junction while all other junctions are roundabouts/priority junction

Table 7.3: Junction Operational Assessment Results: DCO DS / Postwick in DM – 2032 Max Delay (sec/PCU)

Junction	AM		PM	
	DCO DS	Postwick in DM	DCO DS	Postwick in DM
Online junctions				
Business Park	14	3	23	3
Postwick junctions				
Broadland Gate	34	10	5	6
Peachman Way	71	26	7	44
Postwick North West	20	61	166	228
Postwick North East	74	3	7	4
Oaks Lane	21	11	7	7
Park and Ride*	115	83	383	366

Notes: *This is a signalised junction while all other junctions are roundabouts/priority junction

7.2.2 Most junctions tend to perform better in the Postwick in DM Scenario. This is due to the Postwick junctions being used to access this area and not to also perform the function of a feeder route for NDR as in the DCO DS. This is particularly evident for Postwick North East junction. The more western Postwick junctions however (Peachman Way and Postwick North West) attract significant traffic without the NDR in place.

7.2.3 The results show that in the AM peak, all junctions perform within their theoretical capacity in the Postwick in the DM scenario with overall queues and delays being lower than in the DCO DS scenario.

7.2.4 The results also show that in the PM peak, the same two junctions as in the DCO DS are operating above their theoretical capacity. For the remaining junctions, the results are mixed with the eastern junctions showing a better

performance and the western junctions showing a worse performance than in the DCO DS scenario.

7.3 Safety Analysis Results

7.3.1 Postwick in the DM safety analysis results in Table 7.4 indicate that there would be a small increase in the number of personal injury accidents and the casualty types hence overall there are more benefits compared to the DCO Scheme submission analysis. It should be noted here that Postwick in the DM accident costs are based on the reference JCS matrices as per DCO DM.

Table 7.4: Accident Benefits of Postwick in DM Sensitivity Test Scenario

60 Year Appraisal Period		Scenario	
		DCO	Postwick in DM
Do Minimum			
Number of PIAs		70,984	71,004
Casualties	Fatal	1,890	1,896
	Serious	12,597	12,623
	Slight	91,490	91,510
Accident Costs		5,999,332	6,009,164
Do Something			
Number of PIAs		69,944	69,944
Casualties	Fatal	1,898	1,898
	Serious	12,488	12,488
	Slight	90,226	90,226
Accident Costs		5,958,113	5,958,113
Accident Benefits			
Number of PIA savings		1,041	1,060
Casualties	Fatal	-7	-2
	Serious	109	135
	Slight	1,263	1,284
Accident Savings		41,219	51,051

Notes: All monetary values are expressed in £000's in 2010 prices discounted to 2010

7.4 Economic Analysis Results

7.4.1 Table 7.5 below compares monetised costs and benefits including accident benefits for Postwick in DM sensitivity test against the DCO scheme.

Table 7.5: Analysis of Monetised Costs and Benefits – Postwick in DM

Item	Accidents included (£000)	
	DCO	Postwick in DM
Accidents (not assessed by TUBA)*	41,219	51,051
Greenhouse Gases**	-22,756	-22,349
Economic Efficiency: Consumer Users (Commuting)	51,164	51,806
Economic Efficiency: Consumer Users (Other)	380,623	419,949
Economic Efficiency: Business Users and Providers	267,797	297,406
Wider Public Finances (Indirect Taxation Revenues)	55,270	54,256
Present Value of Benefits (PVB)	773,317	852,119
<hr/>		
Broad Transport Budget Present Value of Costs (PVC)	185,542	161,046
<hr/>		
OVERALL IMPACTS		
Net Present Value (NPV)	587,775	691,073
Benefit to Cost Ratio (BCR)	4.168	5.291

Notes: All monetary values are expressed in 2010 prices discounted to 2010
 *Detailed summary results can be found in Section 6. The lower conservative accident benefit is included based upon the use of local accident data, as explained in section 7 of Reference Document 5.7.
 **Greenhouse gas impacts were calculated using TUBA1.9.2 since there was a bug in TUBA 1.9.1

7.4.2 The results show that the Present Value of Benefits (PVB) is estimated to be £852m (inclusive of accident benefits), outweighing the £161m Present Value of Costs (PVC).

7.4.3 The Benefit Cost Ratio (BCR) of the scheme is increased to 5.29 including accidents. Under the DfT's value for money criteria, this represents a Very High value for money category.

7.4.4 Table 7.6 below compares summary economic appraisal results including wider impacts and journey time reliability for Postwick in DM sensitivity test against the DCO scheme.

Table 7.6: Summary of Economic Appraisal including Wider Benefits – Postwick in DM

Item	Scenario also including WEBs and JTR (£000)	
	DCO	Postwick in DM
Present Value of Benefits (PVB)	989,063	1,090,480
Present Value of Costs (PVC)	185,542	161,046
Net Present Value (NPV)	803,521	929,434
Benefit to Cost Ratio (BCR)	5.331	6.771

Notes: All monetary values are in £000's and expressed in 2010 prices discounted to 2010

7.4.5 The BCR is improved further to 6.77 once journey time reliability benefits (£30m) and wider economic benefits (£208m) are included in the appraisal.

These additional benefits amount to £238m (2010 prices discounted to 2010). The inclusion of these benefits increases the BCR to a higher level within the Very High value for money category.

8 Dependent Development Sensitivity Test Results

8.1 Flow Analysis Results

8.1.1 Traffic flow analysis plots for two dependent development sensitivity test scenarios are shown in Figure 10.16 to Figure 10.25 of Appendix A.

8.1.2 In Table 8.1 below a comparison of AADT figures is made between the dependent development assignment and the DCO submission assignment. The changes overall suggest that dependent development sensitivity test would produce similar forecast traffic flows on the NDR and thus similar Scheme impacts.

Table 8.1: NDR Locations AADT Comparison

Location	Link	Direction	Dependent dev	DCO Submission	Difference	% Difference
A66	Holt Road - Cromer Road Link	WB/EB	30,200	30,400	-200	-1%
A67	Cromer Road - Airport Link	NEB/SWB	28,200	29,800	-1,600	-5%
A68	Airport - North Walsham Road Link	WB/EB	28,200	29,800	-1,600	-5%
A69	North Walsham Road - Wroxham Road Link	WB/EB	37,700	39,100	-1,400	-4%
A70	Wroxham Road - Salhouse Road Link	NWB/SEB	45,400	43,900	1,500	3%
A71	Salhouse Road - Plumstead Road Link	NWB/SEB	43,800	46,000	-2,200	-5%
A72	Plumstead Road - Postwick Hub Link	NB/SB	44,700	46,400	-1,700	-4%
A73	Postwick Hub - A47 Link	NB/SB	42,600	42,900	-300	-1%
A79	Fakenham Road - Fir Covert Road Link	NEB/SWB	16,500	16,500	0	0%
A90	Fir Covert Road - Reepham Road Link	NEB/SWB	20,700	20,800	-100	0%
A91	Reepham Road - Holt Road Link	WB/EB	26,800	26,400	400	2%

8.2 Operational Analysis Results

8.2.1 The dependent development scenario provides an alternative growth when Postwick Hub is in place. More details on this scenario can be found in Section 3. Table 8.2 to Table 8.4 compare maximum RFC/DoS, maximum queue and delay for online NDR and Postwick junctions between DCO and dependent development scenario (developer links included) for 2032DS AM

and PM peaks. The results indicate that there is no substantial difference in junction operational performance between these two scenarios.

8.2.2 The flows used in the DS operational assessments refer to the DM dependent development reference matrices assigned onto DS networks. These will provide an alternative development scenario where only Postwick Hub released developments are spatially allocated.

Table 8.2: Junction Operational Assessment Results_Dependent Development – 2032 Max RFC/DoS

Junction	AM		PM	
	DCO	Dependent dev	DCO	Dependent dev
Online junctions				
Fakenham Road	0.52	0.52	0.52	0.52
Fir Covert Road	0.55	0.53	0.51	0.55
Reepham Road	0.57	0.59	0.64	0.66
Drayton Lane	1.09	1.13	0.96	0.96
Holt Road/Drayton Lane	0.51	0.55	0.44	0.48
Cromer Road South	0.86	0.66	0.97	0.94
Cromer Road North	0.98	0.82	0.61	0.63
Airport	0.87	0.85	0.79	0.68
North Walsham Road	1.10	1.01	0.83	0.78
Wroxham Road	0.99	0.97	0.95	1.01
Salhouse Road	0.95	0.96	0.97	0.93
Plumstead Road North	0.40	0.29	0.40	0.50
Plumstead Road South	0.98	0.96	0.88	0.91
Business Park	0.87	0.78	0.95	0.92
Postwick junctions				
Broadland Gate	0.95	0.98	0.55	0.49
Peachman Way	1.01	1.03	0.67	0.61
Postwick North West	0.88	0.89	1.06	1.10
Postwick North East	1.02	1.03	0.69	0.73
Oaks Lane	0.75	0.72	0.34	0.37
Park and Ride*	94.8%	93.3%	120.0%	121.7%

Notes: *This is a signalised junction while all other junctions are roundabouts/priority junction

The Ratio of Flow to Capacity (RFC) output from ARCADY/PICADY is the primary measure of a junction arm performance of a roundabout/priority junction. RFC less than 0.85 indicates that a junction arm operates within capacity. RFC greater than 0.85 but less than 1.0 indicates that a junction arm is over its desired capacity but below theoretical capacity. Any RFC greater than 1.0 indicates that a junction arm is in excess of its theoretical capacity.

Degree of Saturation (DoS) output from LINSIG is the primary measure of performance of a signalised junction. DoS less than 90% indicates that a junction arm operates within capacity. DoS greater than 90% but less than 100% indicates that a junction arm is over its desired capacity but below theoretical capacity. Any DoS greater than 100% indicates that a junction arm is in excess of theoretical capacity.

Table 8.3: Junction Operational Assessment Results_Dependent Development – 2032 Max Queue (PCUs)

Junction	AM		PM	
	DCO	Dependent dev	DCO	Dependent dev
Online junctions				
Fakenham Road	1	1	1	1
Fir Covert Road	1	1	1	1
Reepham Road	1	1	2	2
Drayton Lane	39	53	13	13
Holt Road/Drayton Lane	1	1	1	1
Cromer Road South	6	2	20	13
Cromer Road North	18	4	7	2
Airport	6	6	4	2
North Walsham Road	53	25	5	4
Wroxham Road	28	19	10	40
Salhouse Road	15	18	13	9
Plumstead Road North	1	0	1	1
Plumstead Road South	26	18	7	9
Business Park	7	3	17	10
Postwick junctions				
Broadland Gate	13	21	1	1
Peachman Way	31	44	2	2
Postwick North West	7	7	19	23
Postwick North East	45	53	2	3
Oaks Lane	3	3	1	1
Park and Ride	24	21	57	61

Notes: *This is a signalised junction while all other junctions are roundabouts/priority junction

Table 8.4: Junction Operational Assessment Results_Dependent Development – 2032 Max Delay (sec)

Junction	AM		PM	
	DCO	Dependent dev	DCO	Dependent dev
Online junctions				
Fakenham Road	3	4	4	4
Fir Covert Road	7	7	7	7
Reepham Road	9	11	7	7
Drayton Lane	170	215	59	63
Holt Road/Drayton Lane	5	5	5	5
Cromer Road South	15	6	45	30
Cromer Road North	56	13	38	10
Airport	12	11	8	5
North Walsham Road	170	88	22	14
Wroxham Road	43	31	38	55
Salhouse Road	39	28	70	51
Plumstead Road North	5	4	4	6

Junction	AM		PM	
	DCO	Dependent dev	DCO	Dependent dev
Plumstead Road South	36	25	11	13
Business Park	14	8	23	47
Postwick junctions				
Broadland Gate	34	49	5	4
Peachman Way	71	94	7	7
Postwick North West	20	19	166	193
Postwick North East	74	83	7	8
Oaks Lane	21	19	7	7
Park and Ride	115	98	383	402

Notes: *This is a signalised junction while all other junctions are roundabouts/priority junction

8.2.3 Though some of the priority junctions and roundabouts are over capacity, further tests indicated that a slight adjustment of flare/ entry width can bring junction performance to an acceptable level. Such a change, where sufficient land is available, could be implemented by the highways authority should monitoring show increased delays at these junctions.

8.2.4 Postwick P&R signal junction would work above its theoretical capacity on the Yarmouth Road arm in 2032DS PM peak. Comparing these results with those reported for existing roundabout in Document Reference 5.5, however, represents a significant improvement on the Yarmouth Road arm.

8.3 Safety Analysis Results

8.3.1 These results have been produced for two scenarios, one with and one without developer link roads included. Table 8.5 shows that the two scenarios produce slightly different accident benefits compared to DCO. These scenarios include Postwick in the DM and are based on different matrices as described in Section 3.

Table 8.5: Accident Benefits of Dependent Development Sensitivity Test Scenarios

60 Year Appraisal Period		Scenario		
		DCO	Dep dev_dev links included	Dep dev_dev links excluded
		Do Minimum		
Number of PIAs		70,984	71,577	71,501
Casualties	Fatal	1,890	1,909	1,906
	Serious	12,597	12,716	12,698
	Slight	91,490	92,236	92,133
Accident Costs		5,999,332	6,052,206	6,042,491
		Do Something		

Number of PIAs		69,944	70,195	70,195
Casualties	Fatal	1,898	1,899	1,899
	Serious	12,488	12,515	12,514
	Slight	90,226	90,503	90,503
Accident Costs		5,958,113	5,971,656	5,971,037
Accident Benefits				
Number of PIA savings		1,041	1,382	1,306
Casualties	Fatal	-7	10	7
	Serious	109	201	184
	Slight	1,263	1,733	1,630
Accident Savings		41,219	80,550	71,454

Notes: All monetary values are expressed in £000's in 2010 prices discounted to 2010

8.4 Economic Analysis Results

8.4.1 Table 8.6 below compares monetised costs and benefits including accident benefits for the dependent development sensitivity tests against the DCO Scheme. It should be noted that dependent development benefits relates to NDR in isolation.

Table 8.6: Analysis of Monetised Costs and Benefits – Dependent Development (NDR in Isolation)

Item	Accidents included (£000)		
	DCO	Developer links included	Developer links excluded
Accidents (not assessed by TUBA)*	41,219	80,550	71,454
Greenhouse Gases**	-22,756	-26,011	-26,293
Economic Efficiency: Consumer Users (Commuting)	51,164	37,823	38,890
Economic Efficiency: Consumer Users (Other)	380,623	389,813	391,528
Economic Efficiency: Business Users and Providers	267,797	225,078	226,759
Wider Public Finances (Indirect Taxation Revenues)	55,270	62,057	63,523
Present Value of Benefits (PVB)	773,317	769,310	765,861
Broad Transport Budget Present Value of Costs (PVC)	185,542	161,668	161,882
OVERALL IMPACTS			
Net Present Value (NPV)	587,775	607,642	603,979
Benefit to Cost Ratio (BCR)	4.168	4.759	4.731

Notes: All monetary values are expressed in 2010 prices discounted to 2010

*Detailed summary results can be found in Section 6. The lower conservative accident benefit is included based upon the use of local accident data, as explained in section 7 of Reference Document 5.7.

**Greenhouse gas impacts were calculated using TUBA1.9.2 since there was a bug in TUBA 1.9.1

8.4.2 The Benefit Cost Ratio (BCR) of the scheme is 4.76 and 4.73 (including accidents) for developer links included and excluded scenarios respectively.

Under the DfT's value for money criteria, these represent Very High value for money category.

8.4.3 Table 8.7 below compares summary economic appraisal results including wider impacts and journey time reliability for dependent development sensitivity test again when the transport scheme is assessed in isolation against the DCO scheme.

Table 8.7: Summary of Economic Appraisal including Wider Benefits – Dependent Development (NDR in Isolation)

Item	Scenario also including WEBs and JTR (£000)		
	DCO	Developer links included	Developer links excluded
Present Value of Benefits (PVB)	989,063	968,674	969,650
Present Value of Costs (PVC)	185,542	161,668	161,882
Net Present Value (NPV)	803,521	807,006	807,768
Benefit to Cost Ratio (BCR)	5.331	5.992	5.990

Notes: All monetary values are in £000's and expressed in 2010 prices discounted to 2010

8.4.4 The BCRs are improved further to 5.99 in both instances once journey time reliability benefits and wider economic benefits are included in the appraisal. The inclusion of these benefits increases the BCRs to higher levels within the Very High value for money category.

8.4.5 As discussed in the previous section there are additional development benefits for this scenario. These are reported below and would increase the scheme benefits in total by £1,146m in terms of TECs and £422m in terms of GVA benefits in 2010 prices discounted to 2010 for both scenarios.

8.4.6 GVA benefits for NDR dependent business developments are reported in Table 8.8 below. These were direct extractions just for dependent business developments from Document Reference 10.3 of the DCO submission. Total GVA of the dependent business developments is £422.4m in 2010 prices discounted to 2010.

Table 8.8: GVA Benefits of NDR Dependent Developments

Year	GVA (£m)			Total
	Rackheath Eco Town	Airport Site 3	Airport Industrial State	
2018	1.6	1.3	0	2.9
2019	3.1	2.4	0.1	5.6
2020	4.3	3.4	0.1	7.8
2021	5.4	4.3	0.1	9.8
2022	6.4	5.1	0.1	11.6
2023	7.3	5.8	0.1	13.2

Year	GVA (£m)			Total
	Rackheath Eco Town	Airport Site 3	Airport Industrial State	
2024	8	6.4	0.2	14.6
2025	8.6	6.9	0.2	15.7
2026	9.1	7.3	0.2	16.6
2027	9.6	7.6	0.2	17.4
2028	9.9	7.9	0.2	18
2029	10.2	8.1	0.2	18.5
2030	10.5	8.3	0.2	19
2031	10.6	8.5	0.2	19.3
2032	10.7	8.5	0.2	19.4
2033	10.8	8.6	0.2	19.6
2034	10.8	8.6	0.2	19.6
2035	10.2	8.1	0.2	18.5
2036	9.6	7.7	0.2	17.5
2037	9.1	7.2	0.2	16.5
2038	8.6	6.8	0.2	15.6
2039	8.1	6.4	0.2	14.7
2040	7.6	6.1	0.1	13.8
2041	7.2	5.7	0.1	13
2042	6.8	5.4	0.1	12.3
2043	6.4	5.1	0.1	11.6
2044	6.1	4.8	0.1	11
2045	5.7	4.5	0.1	10.3
2046	5.4	4.3	0.1	9.8
2047	5.1	4	0.1	9.2
Total	232.8	185.1	4.5	422.4

Notes: All monetary values are expressed in 2010 prices discounted to 2010, directly copied from Table A-5 of Document Reference 10.3 of the DCO submission

8.4.7 Planning gain has been calculated for the Eco Town, Airport and Beyond Green developments assuming that the total development areas reported below will be unlocked on non-previously developed land in 2032 and there is a linear development profile from 2017 to 2032. Planning gain benefits for NDR dependent developments are reported in Table 8.9. The total net planning gain of the dependent developments is £121m in 2010 prices discounted to 2010.

Table 8.9: Planning Gain Benefits of NDR Dependent Developments

Site	Development type	Total development area (ha)	Value of developed work (£000)	Value of land in existing use (£000)	Net externalities (£000)	Net planning gain (£000)
Eco	Residential	141	1,600	19	838	104,739

Site	Development type	Total development area (ha)	Value of developed work (£000)	Value of land in existing use (£000)	Net externalities (£000)	Net planning gain (£000)
Town	Business	25	1,187	19	838	8,240
Airport	Business	30	1,187	19	838	9,888
Beyond Green	Residential	105	1,600	19	838	77,653
Total planning gain (£000s in 2010 prices, undiscounted)						200,520
Total planning gain (£m in 2010 prices discounted to 2010)						121

8.4.8 Transport external costs of NDR dependent developments are reported in Table 8.10 and Table 8.11 for the two scenarios. TEC was calculated for a 30 year period from 2017 to 2046 using two transport model runs namely, without the new developments but with the transport intervention and with the new developments and with the transport intervention. The negative result for TEC occurs because a transport intervention is being provided to cater for the development traffic, and both scenarios are controlled to NTEM.

Table 8.10: Transport External Costs of NDR Dependent Developments_developer links included

Scenario	User Time (£000s)	User Charges (£000)	Vehicle Operating Costs (£000)	Operator Revenues (£000)	CO2 Emissions (£000)
With the new developments and with transport intervention	50,907,354	1,907,360	36,905,802	-3,786,646	-5,191,720
Without the new developments but with the transport intervention	51,235,324	1,953,564	36,998,622	-3,878,372	-5,201,374
Development only costs	500,778	37,386	229,282	-74,240	-34,102
TEC (£000s)	-828,748	-83,590	-322,102	165,966	43,756
TEC total (£m)	-1,025				

Notes: All monetary values are expressed in 2010 prices discounted to 2010

Table 8.11: Transport External Costs of NDR Dependent Developments_developer links excluded

Scenario	User Time (£000s)	User Charges (£000)	Vehicle Operating Costs (£000)	Operator Revenues (£000)	CO2 Emissions (£000)
With the new developments and with transport intervention	50,906,846	1,907,442	36,910,506	-3,786,796	-5,192,058
Without the new developments but with the transport intervention	51,234,812	1,953,638	37,003,316	-3,878,528	-5,201,712
Development only costs	500,778	37,386	229,282	-74,240	-34,102
TEC (£000s)	-828,744	-83,582	-322,092	165,972	43,756
TEC total (£m)	-1,025				

Notes: All monetary values are expressed in 2010 prices discounted to 2010

8.4.9 Derivation of total dependent development benefits of NDR dependent developments are reported in Table 8.12. It should be noted that as the TECs are negative and they are subtracted from the planning gain, this results in positive total benefits for the developments.

Table 8.12: Derivation of Total Development Benefits of NDR Dependent Developments

Item	Benefits (£m)	
	Developer links included	Developer links excluded
Planning Gain	121	121
Transport External Costs	-1,025	-1,025
Other Externalities*	0	0
Total Development Benefits	1,146	1,146

Notes: All monetary values are expressed in 2010 prices discounted to 2010, *assumed zero

9 Conclusion

- 9.1.1 The series of sensitivity tests has been undertaken primarily to test the robustness of the economic appraisal of the Scheme to changes in parameters, forecast assumptions and methodology. The traffic flow forecasts of the Scheme in these test scenarios have also been reviewed and where appropriate operational performance has been assessed.
- 9.1.2 The submission showed that the DCO Scheme would deliver a benefit-to-cost ratio (BCR) of 4.17 (inclusive of accident benefits) and a BCR of 5.33 when WEBs and JTR are included. Both of these represent very high value for money (BCR above 4) according to DfT's VfM criteria.
- 9.1.3 The sensitivity test results indicate that benefit-to-cost ratio (BCR) ranges from 3.68 to 5.36 (inclusive of accident benefits) and 4.75 to 6.86 when WEBs and JTR are included. Both of these represent high/very high value for money (BCR above 3/4) for all the sensitivity test scenarios according to DfT's VfM criteria. It is therefore concluded that the transport benefits reported in the submission are robust and that the Scheme would deliver high or very high value for money.
- 9.1.4 In addition to the transport benefits the testing using the dependent development methodology shows that the completion of the NDR would deliver very high development benefits amounting to £1,146m. In addition the business development dependent on completion of the NDR could realise £422m of GVA benefits, though these should not simply be added to development benefits.

10 Appendices

10.1 Appendix A – Flow Diagrams

- 10.1.1 Figure 10.2 to Figure 10.6 contain traffic flow information for low growth scenario. Figure 10.6 to Figure 10.10 contain traffic flow information for high growth scenario.
- 10.1.2 Figure 10.11 to Figure 10.15 contain traffic flow information for Postwick in DM scenario. There are no changes to DS traffic flows compared to the DCO Scheme.
- 10.1.3 Figure 10.16 to Figure 10.20 contain traffic flow information for dependent development with developer link roads included and Figure 10.21 to Figure 10.25 contain traffic flow information for dependent development with developer link roads excluded. The flows for DS here refer to the DM dependent development reference matrices assigned onto DS networks. These provide an alternative development scenario where only developments unlocked by Postwick Hub are spatially allocated.

Figure 10.1: AADT Traffic Flows Western Section_Low Growth Scenario

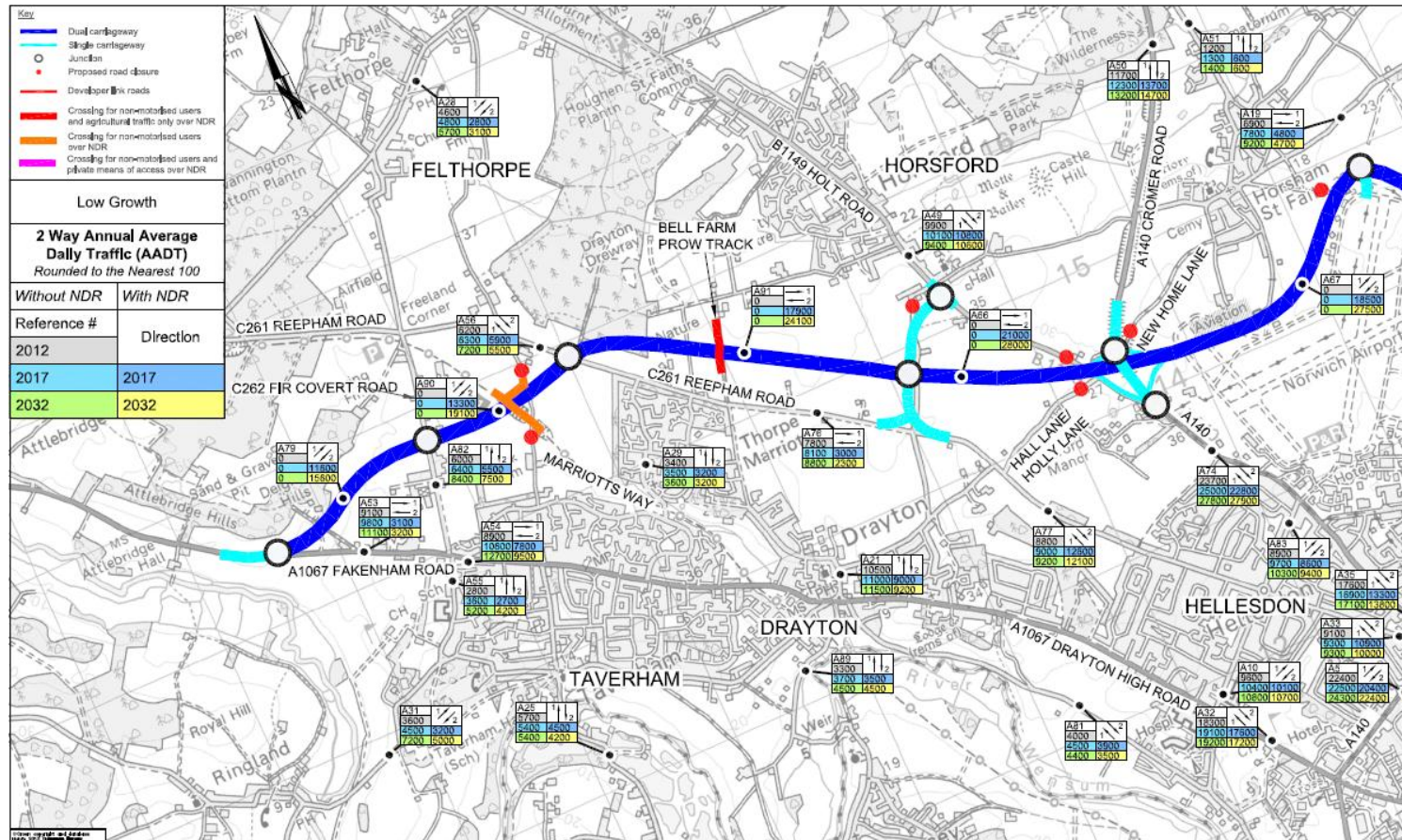


Figure 10.2: AADT Traffic Flows Eastern Section_Low Growth Scenario

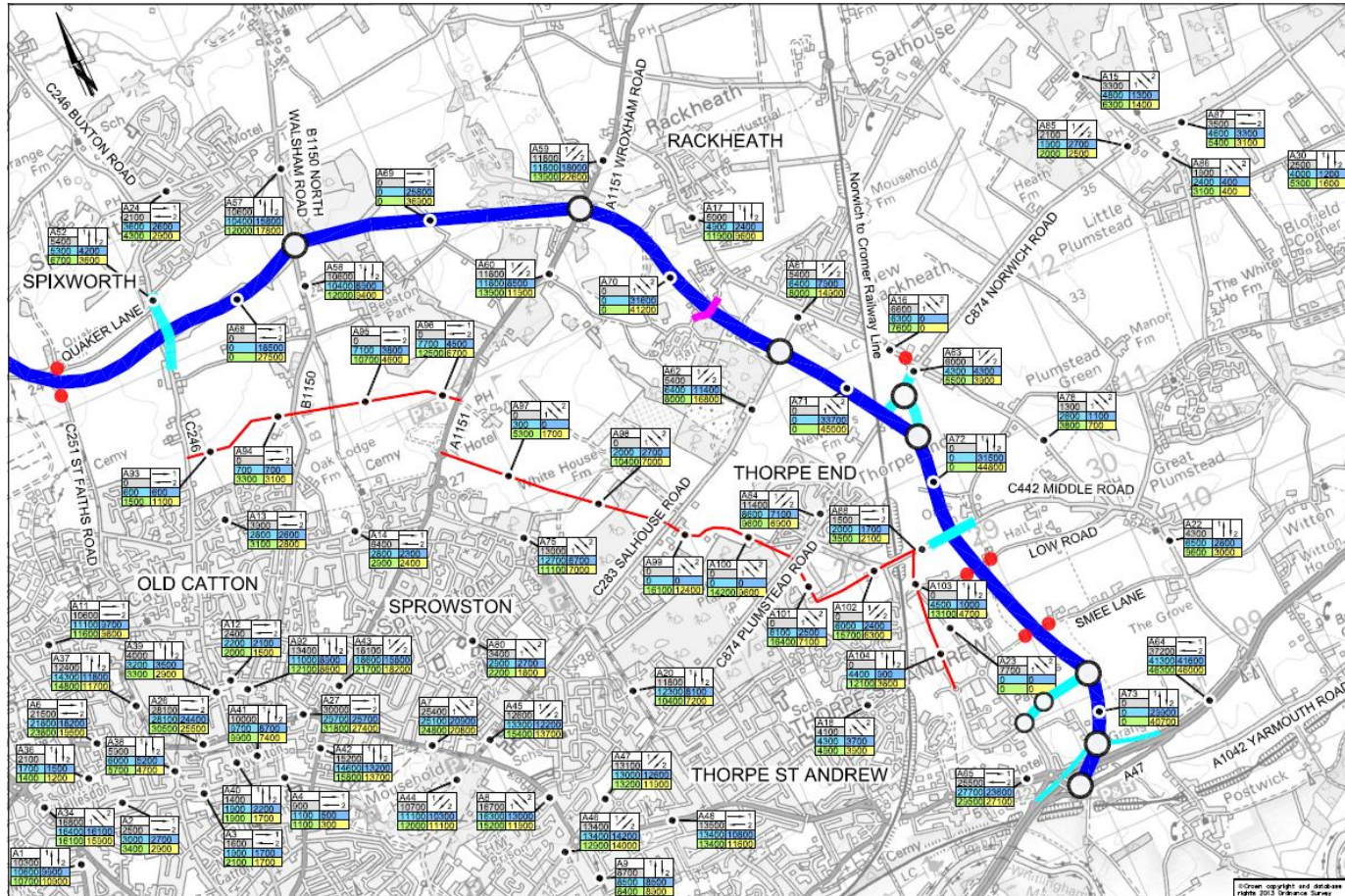


Figure 10.3: AADT Traffic Flows Wensum Valley Section_Low Growth Scenario

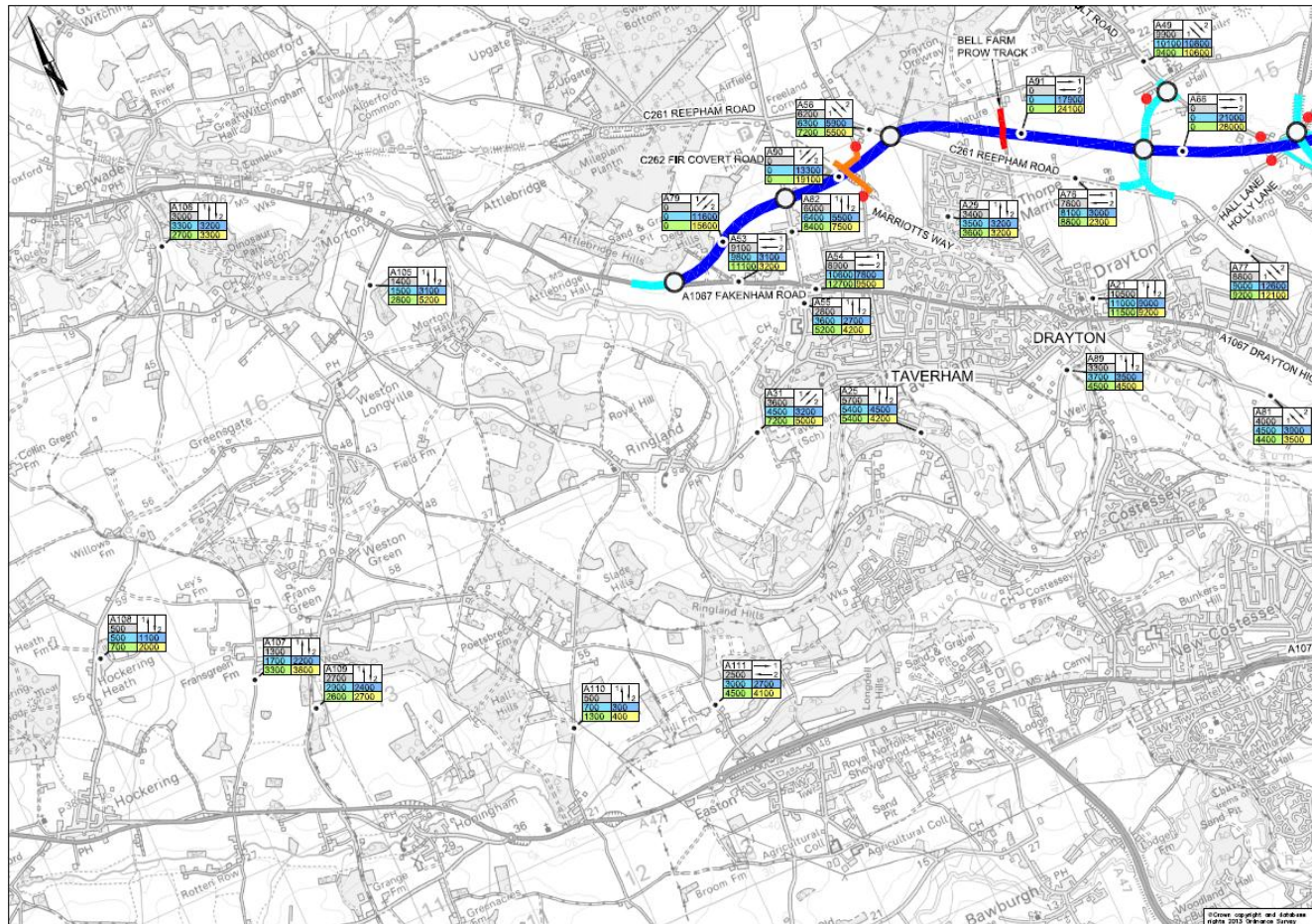


Figure 10.4: Strategic Traffic Movements_Low Growth Scenario

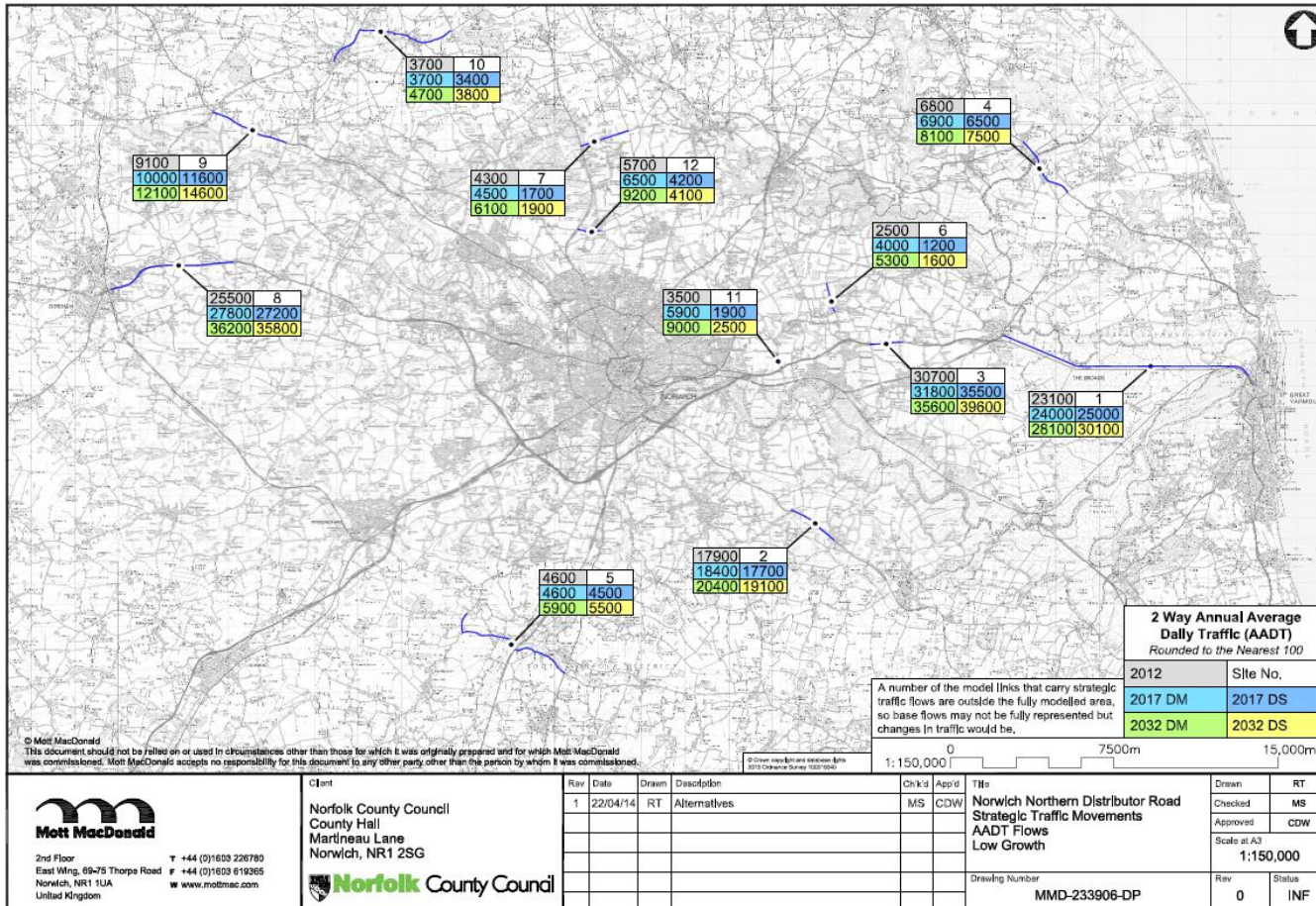


Figure 10.5: City Centre Traffic Impact Low Growth Scenario

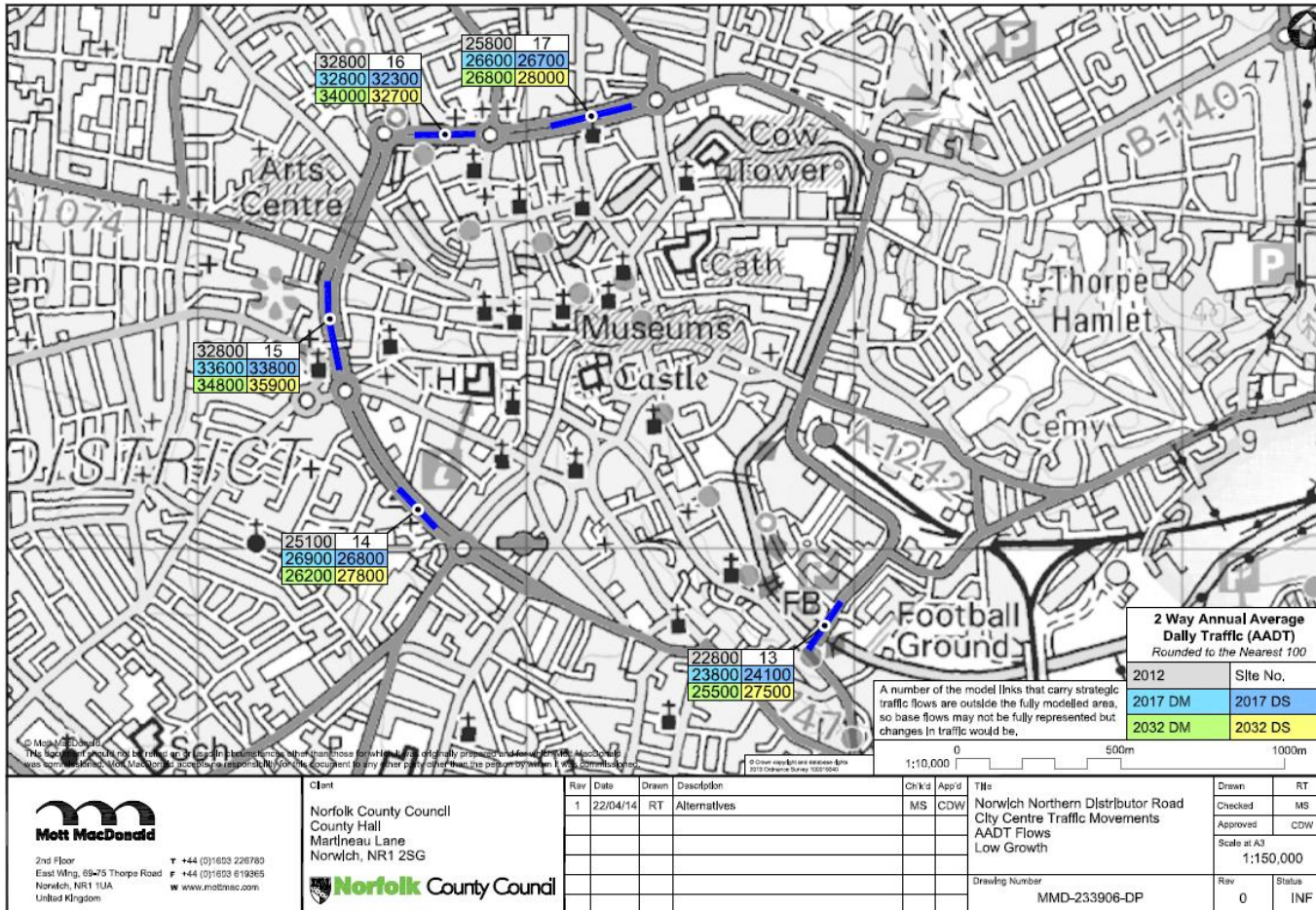


Figure 10.6: AADT Traffic Flows Western Section_High Growth Scenario

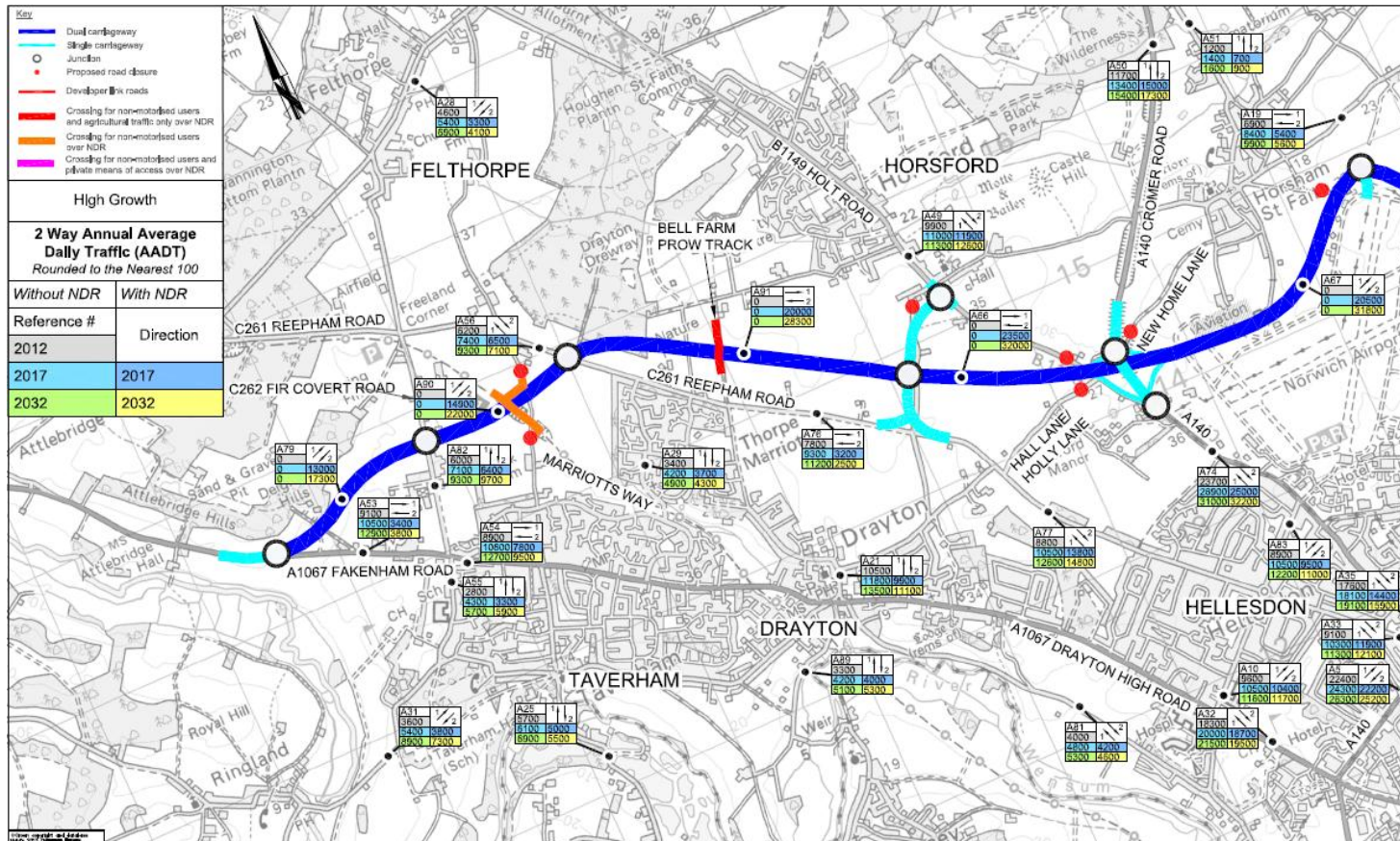


Figure 10.7: AADT Traffic Flows Eastern Section_High Growth Scenario

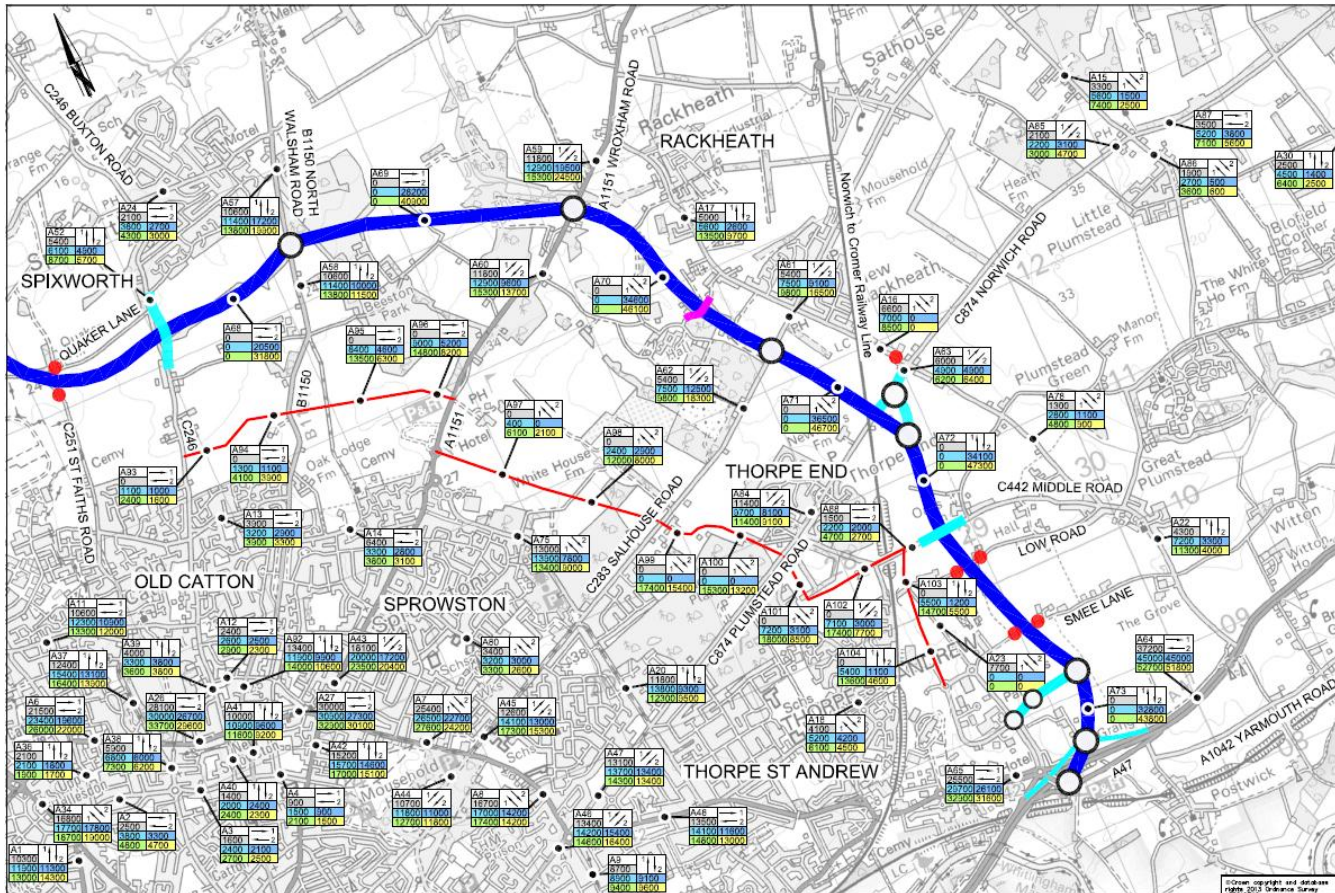


Figure 10.8: AADT Traffic Flows Wensum Valley Section_High Growth Scenario

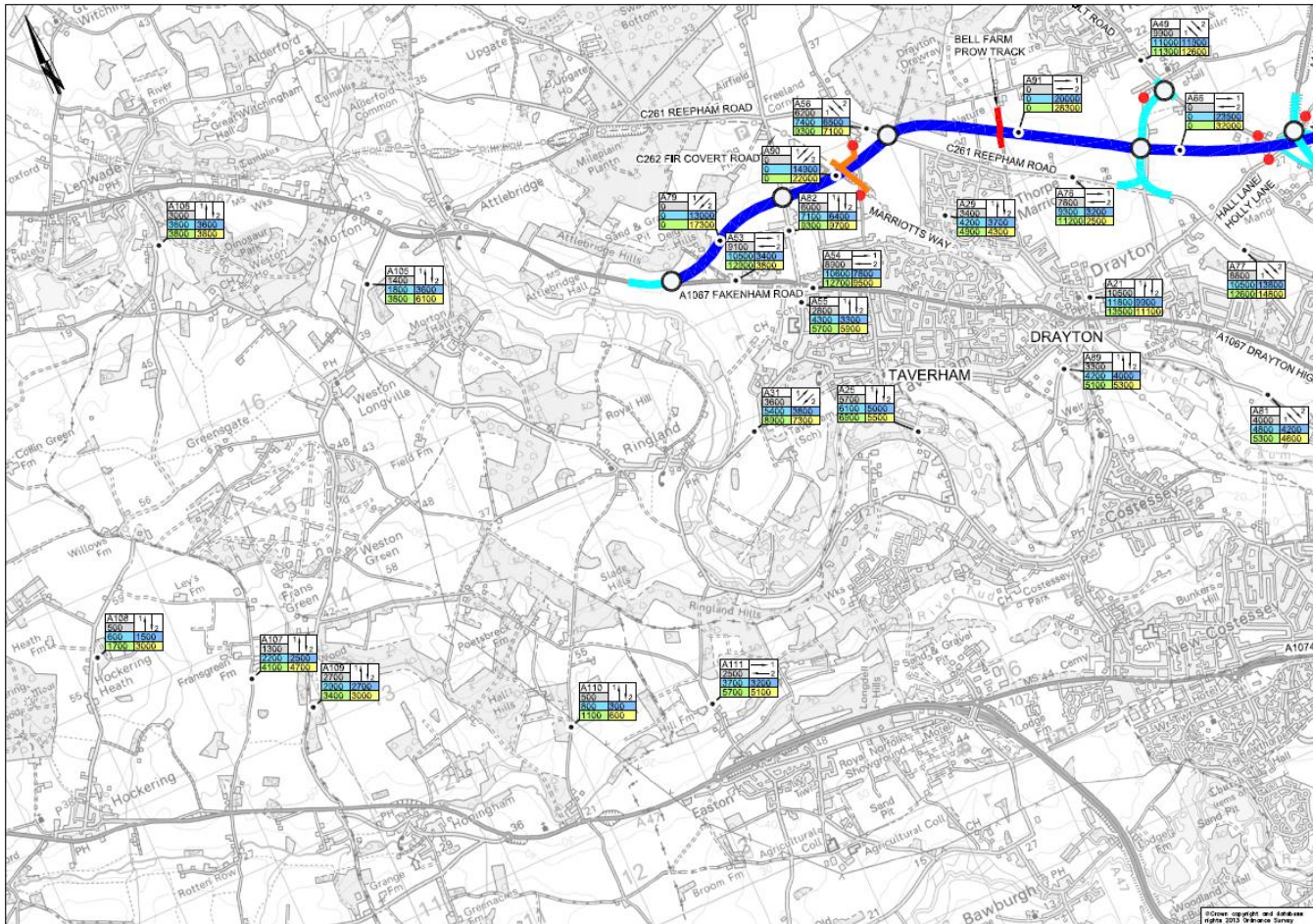


Figure 10.9: Strategic Traffic Movements_High Growth Scenario

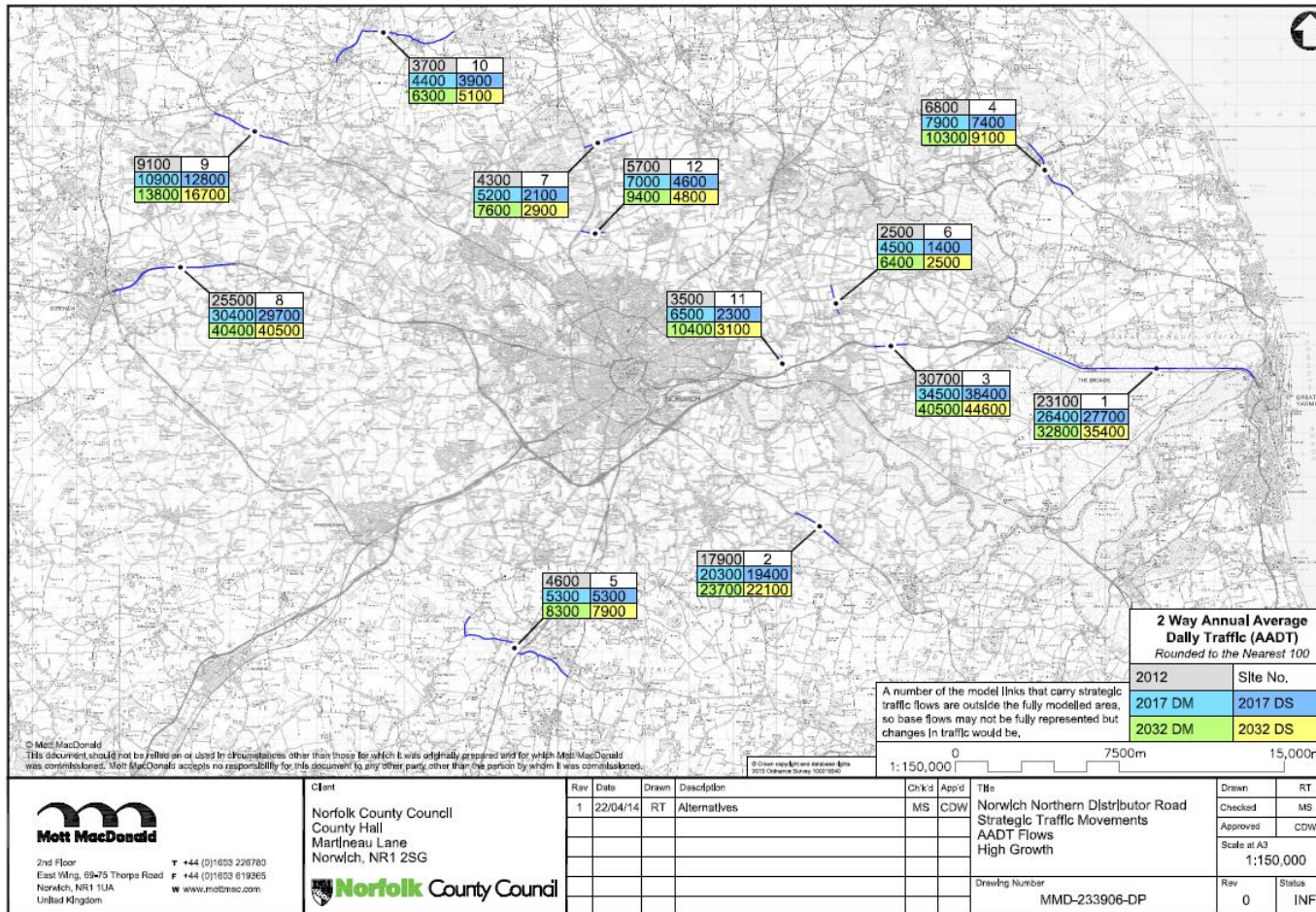


Figure 10.10: City Centre Traffic Impact_High Growth Scenario

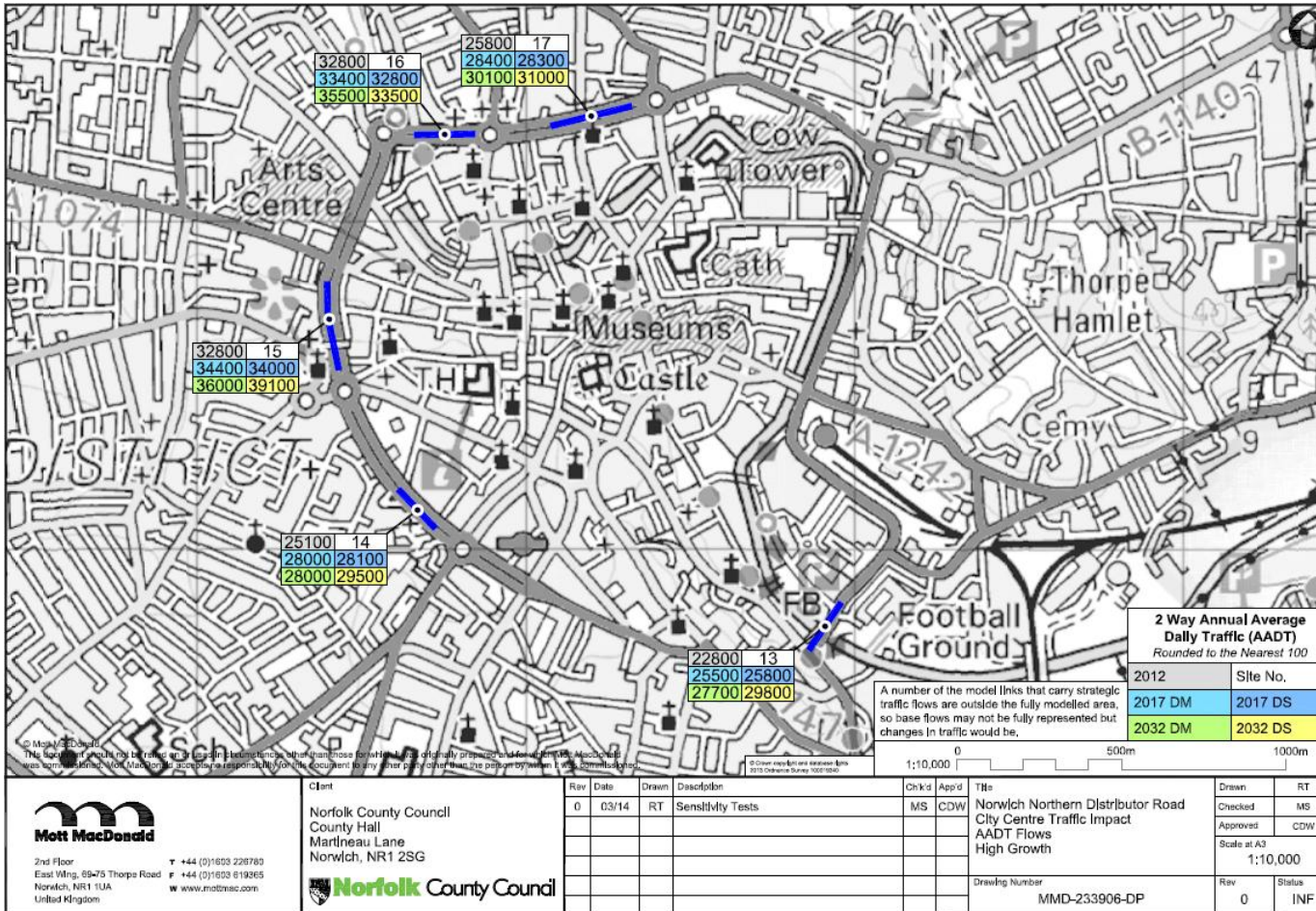


Figure 10.11: AADT Traffic Flows Western Section_Postwick in DM Scenario

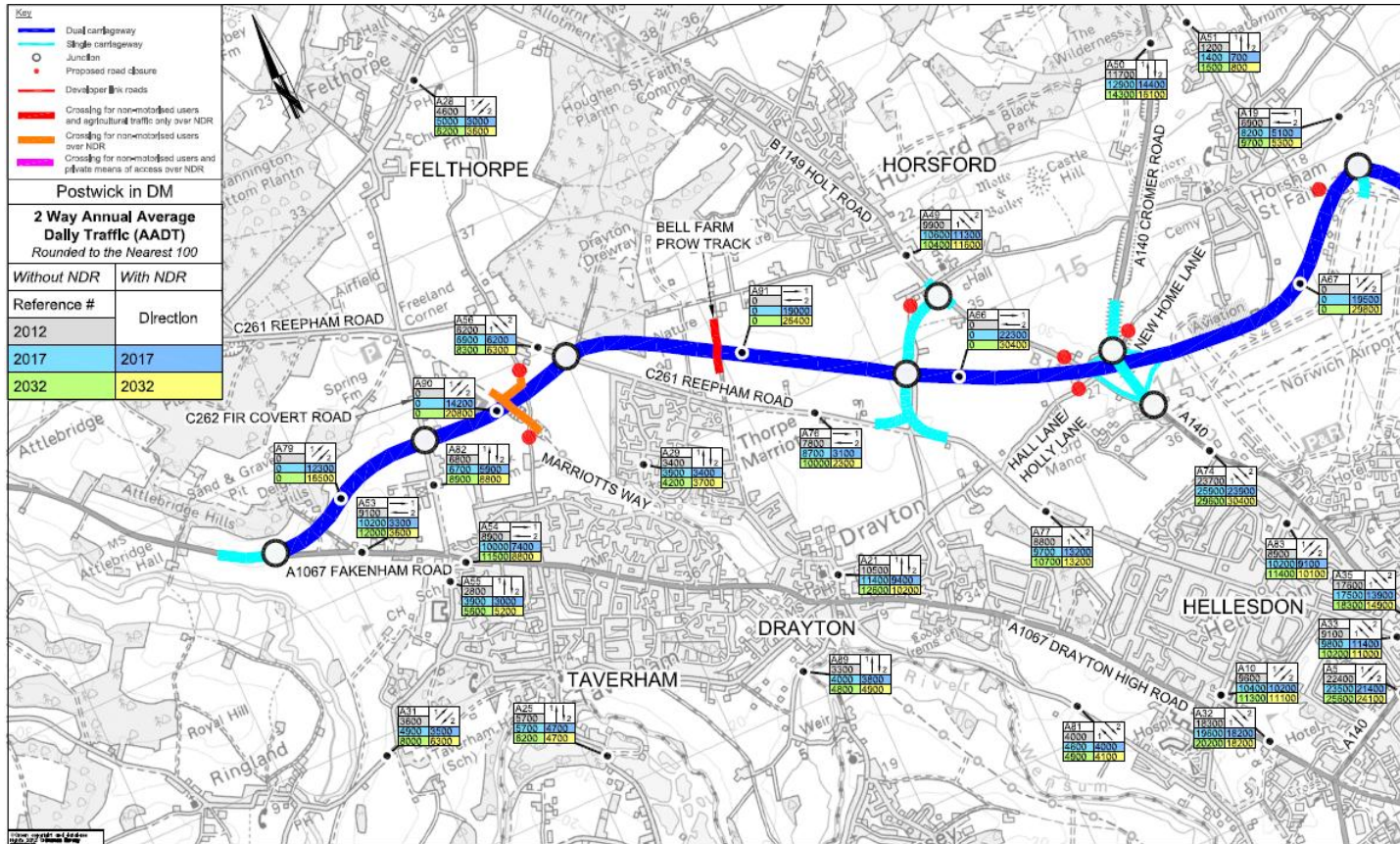


Figure 10.12: AADT Traffic Flows Eastern Section_Postwick in DM Scenario

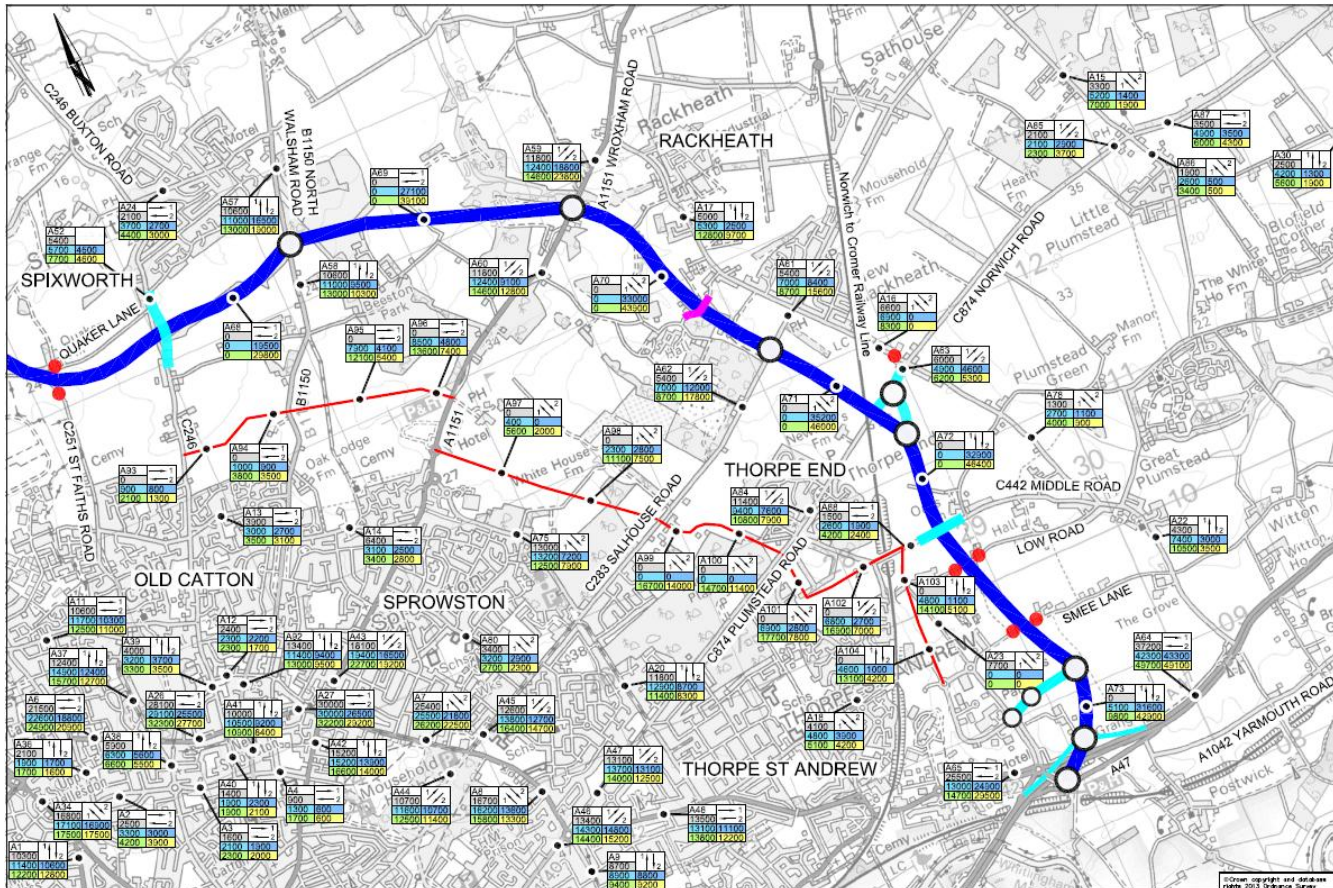


Figure 10.13: AADT Traffic Flows Wensum Valley Section_Postwick in DM Scenario

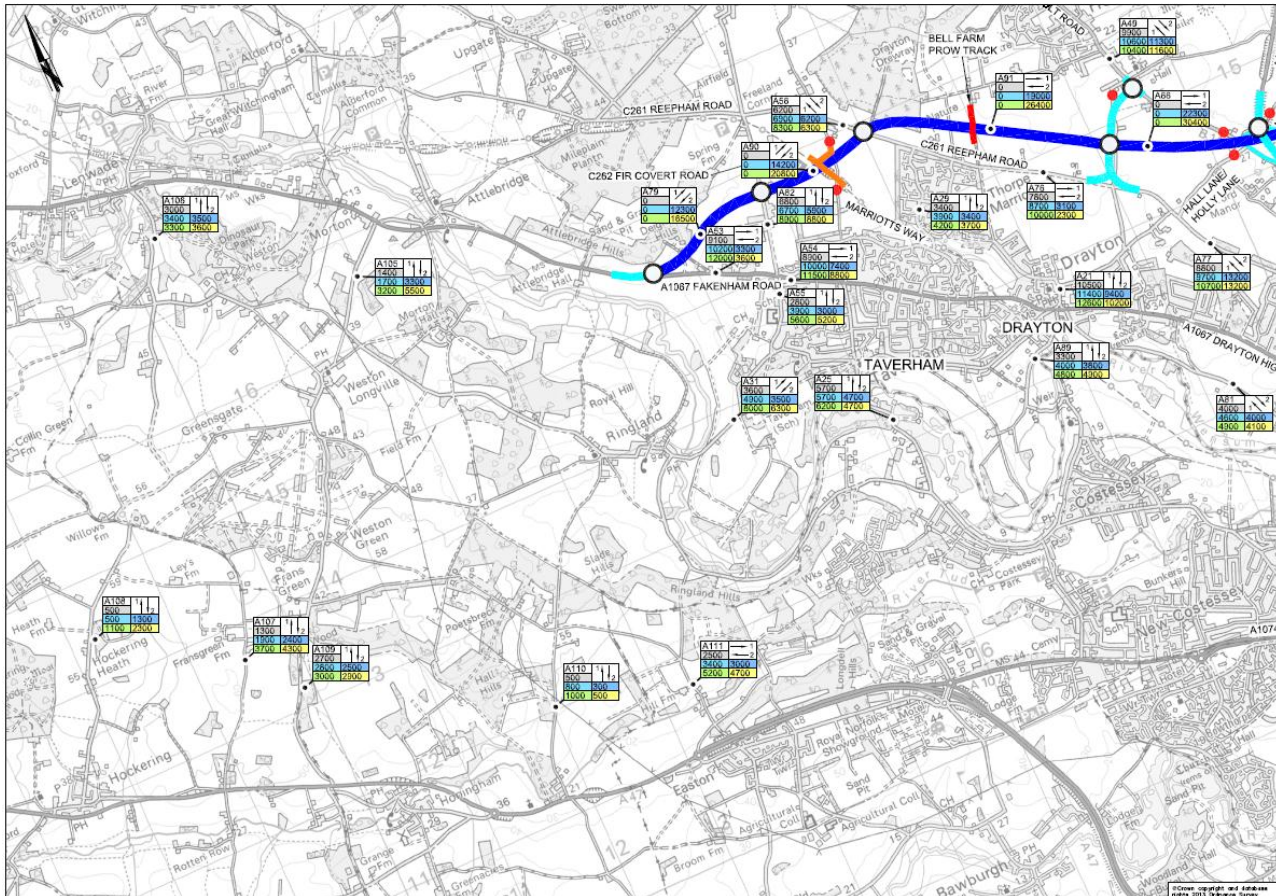


Figure 10.14: Strategic Traffic Movements_Postwick in DM Scenario

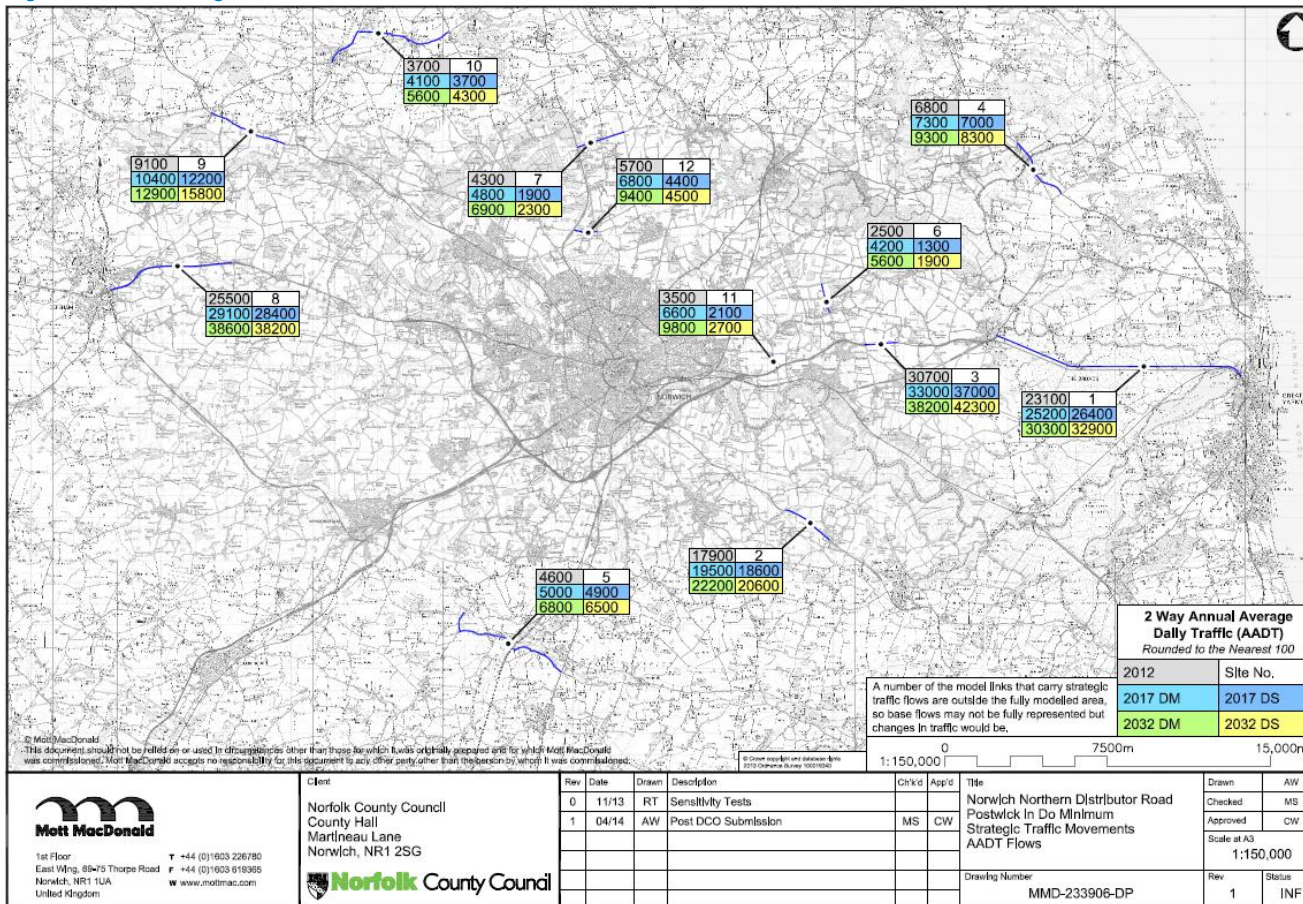


Figure 10.15: City Centre Traffic Impact_Postwick in DM Scenario

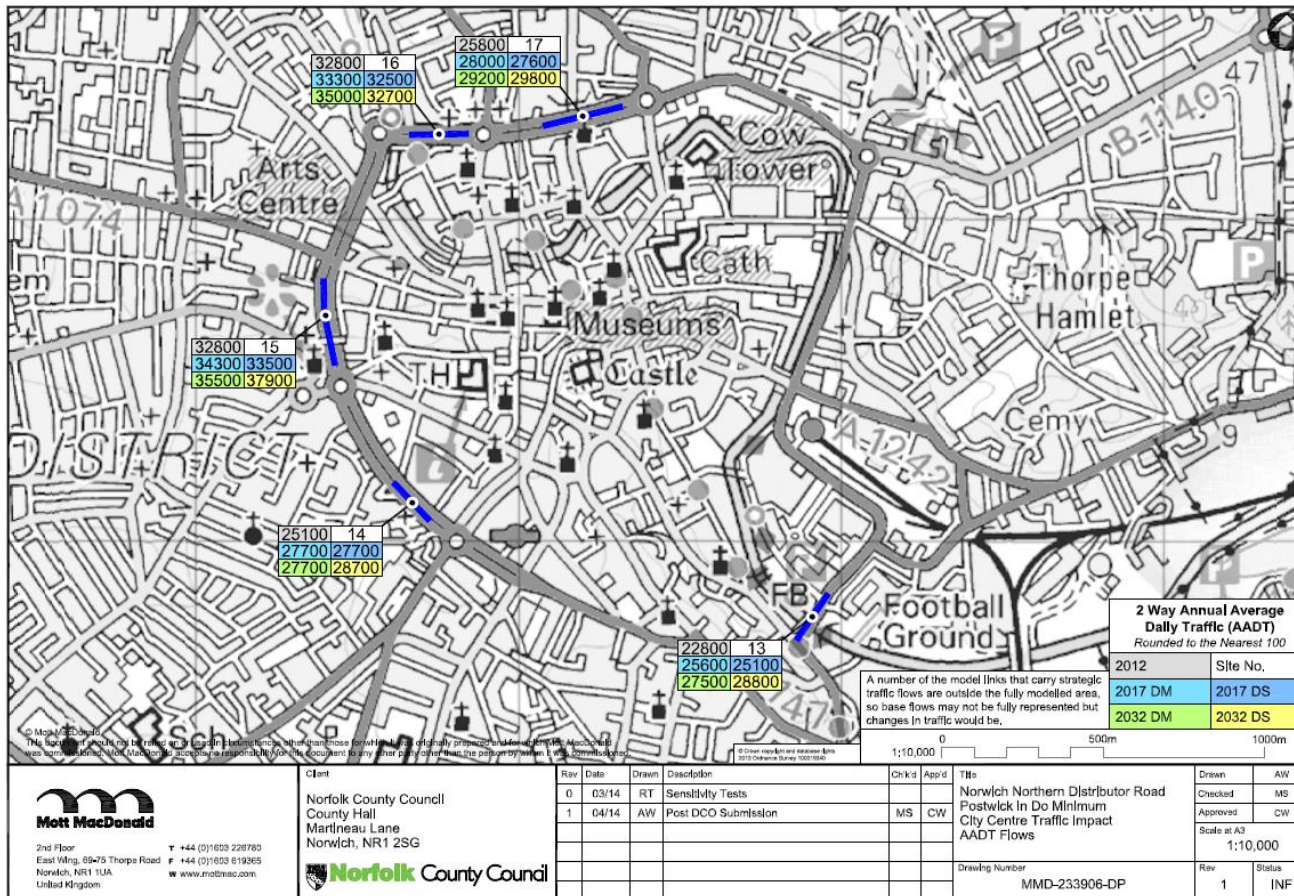


Figure 10.16: AADT Traffic Flows Western Section_ Dependent Development with Developer Links Included Scenario

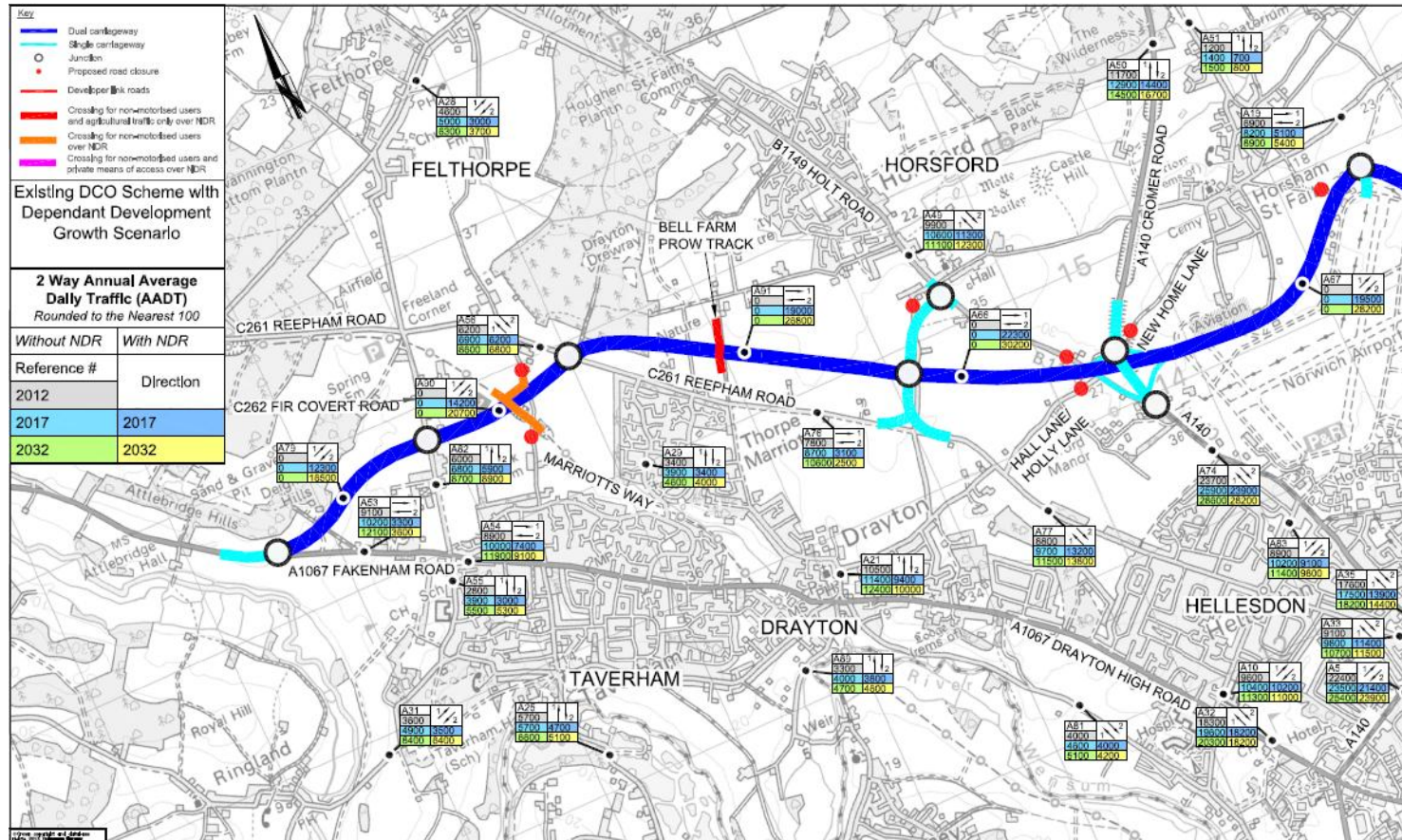


Figure 10.18: AADT Traffic Flows Wensum Valley Section_Dependent Development with Developer Links Included Scenario

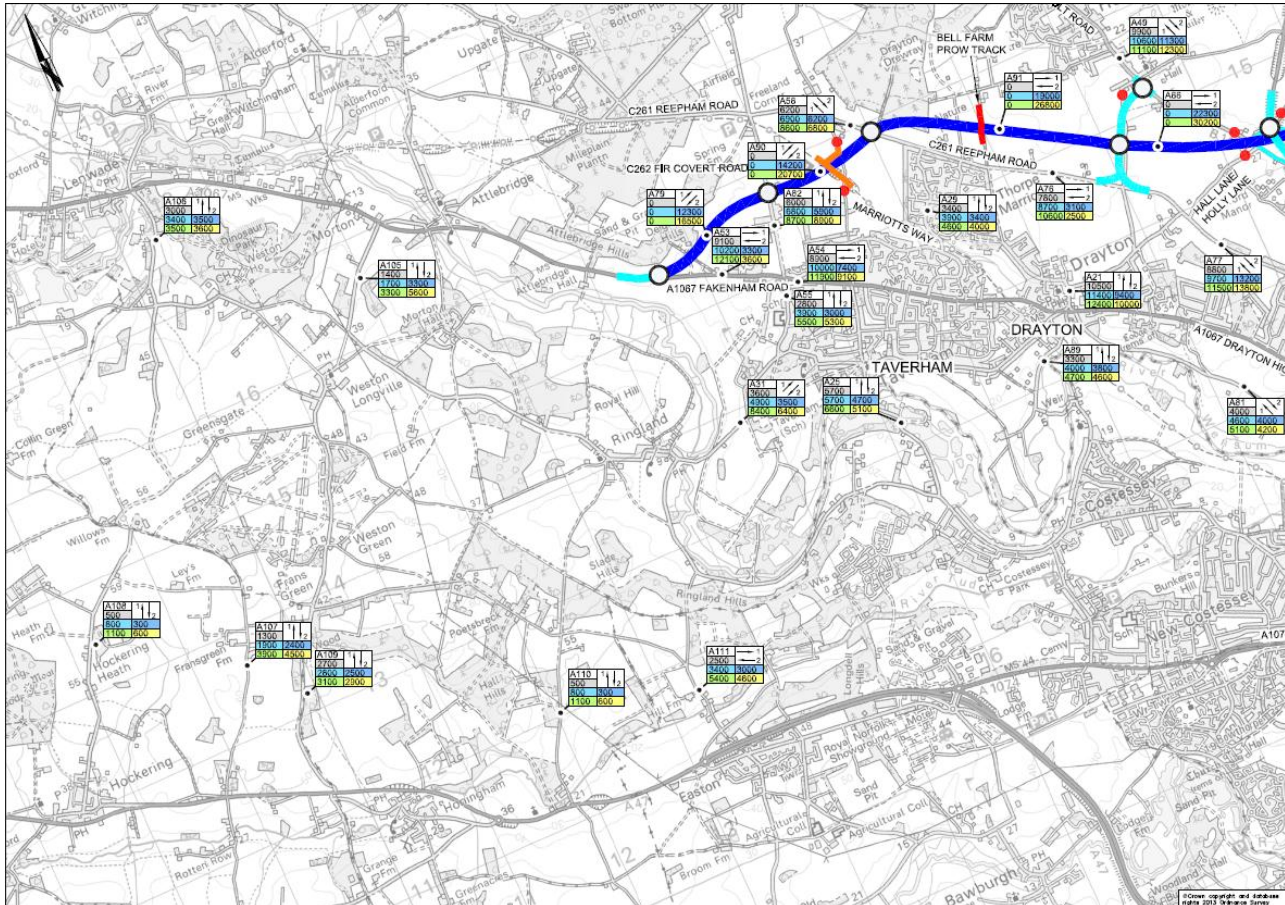


Figure 10.19: Strategic Traffic Movements_Dependent Development with Developer Links Included Scenario

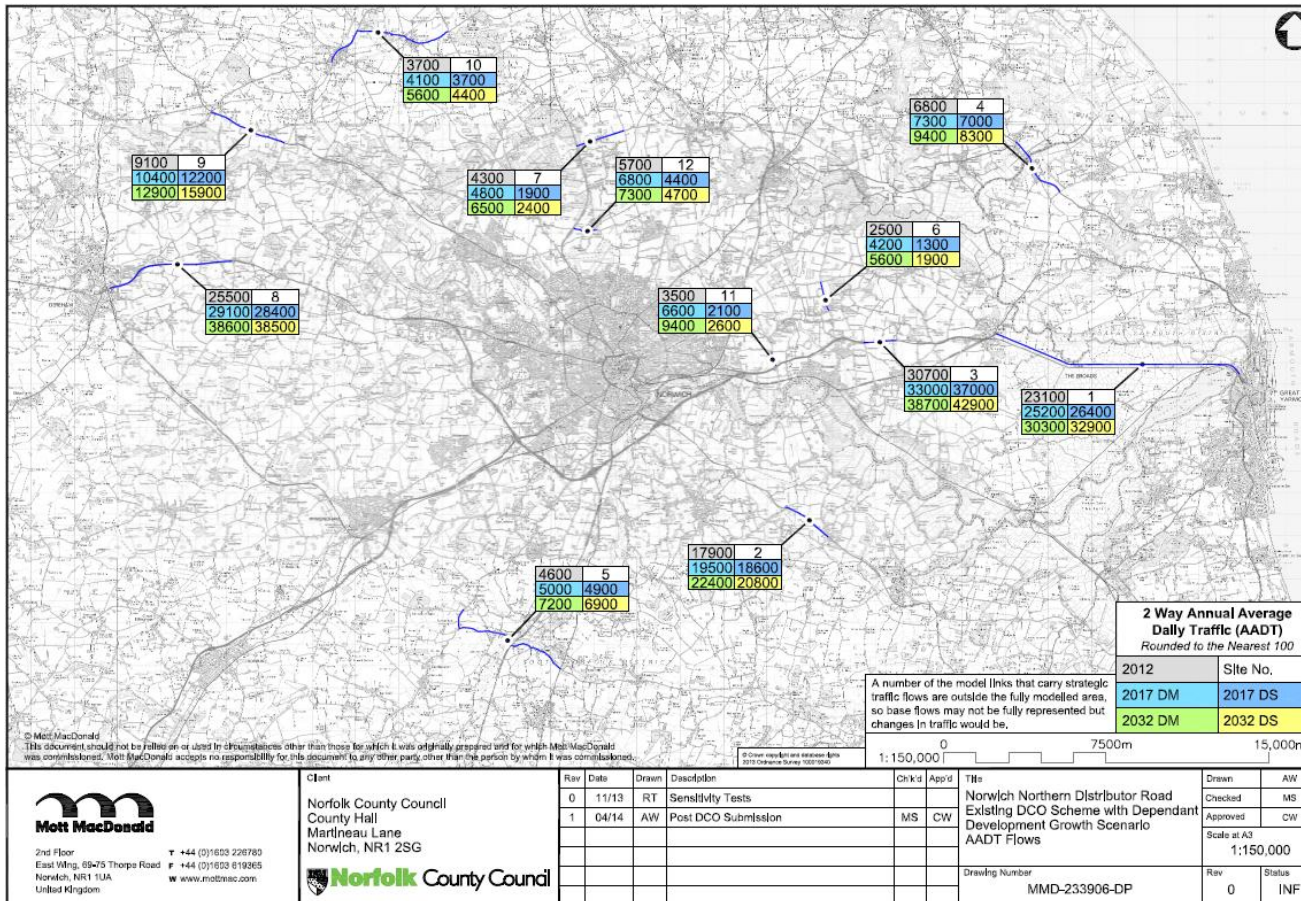


Figure 10.20: City Centre Traffic Impact Dependent Development with Developer Links Included Scenario

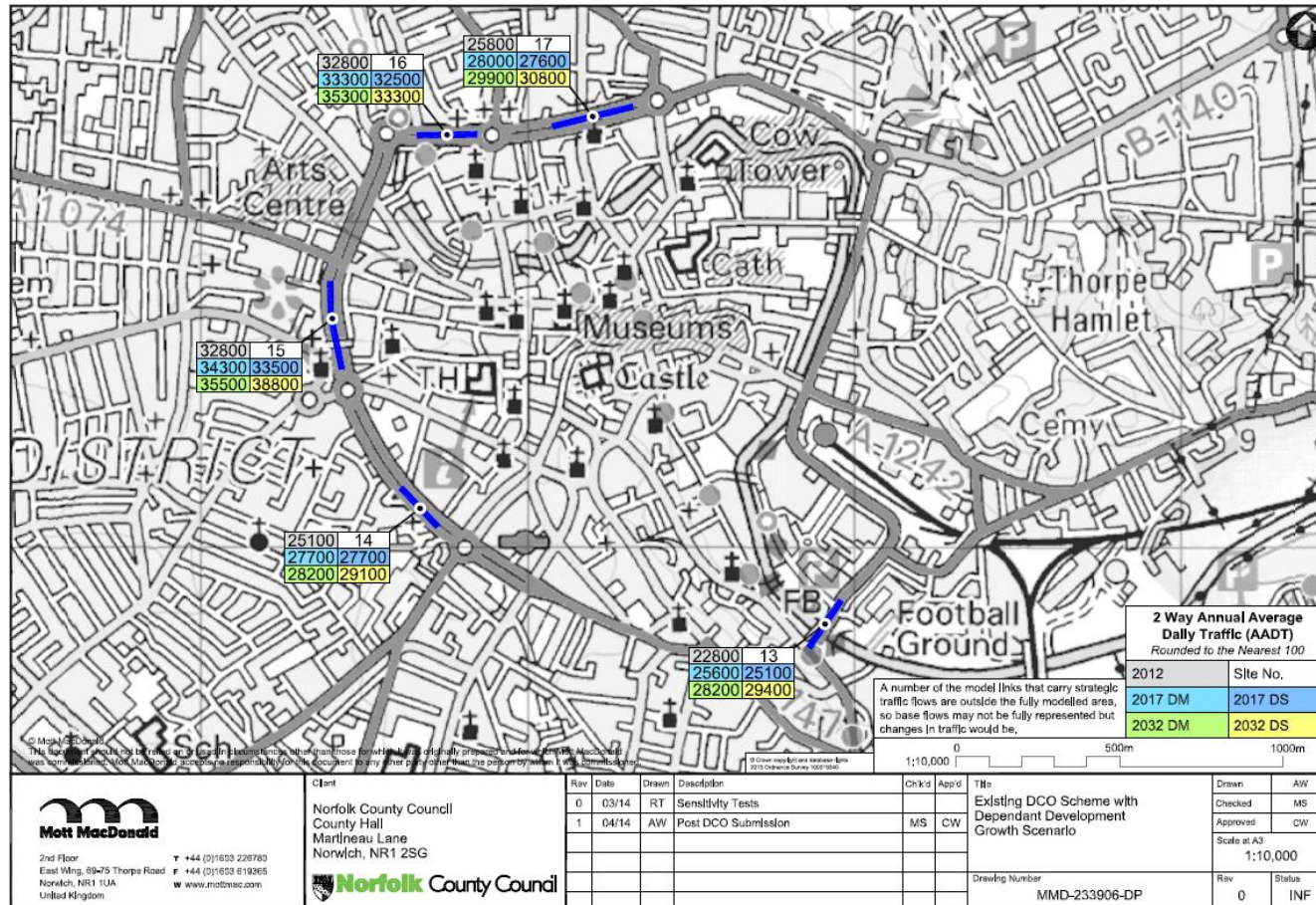


Figure 10.21: AADT Traffic Flows Western Section_Dependent Development with Developer Links Excluded Scenario

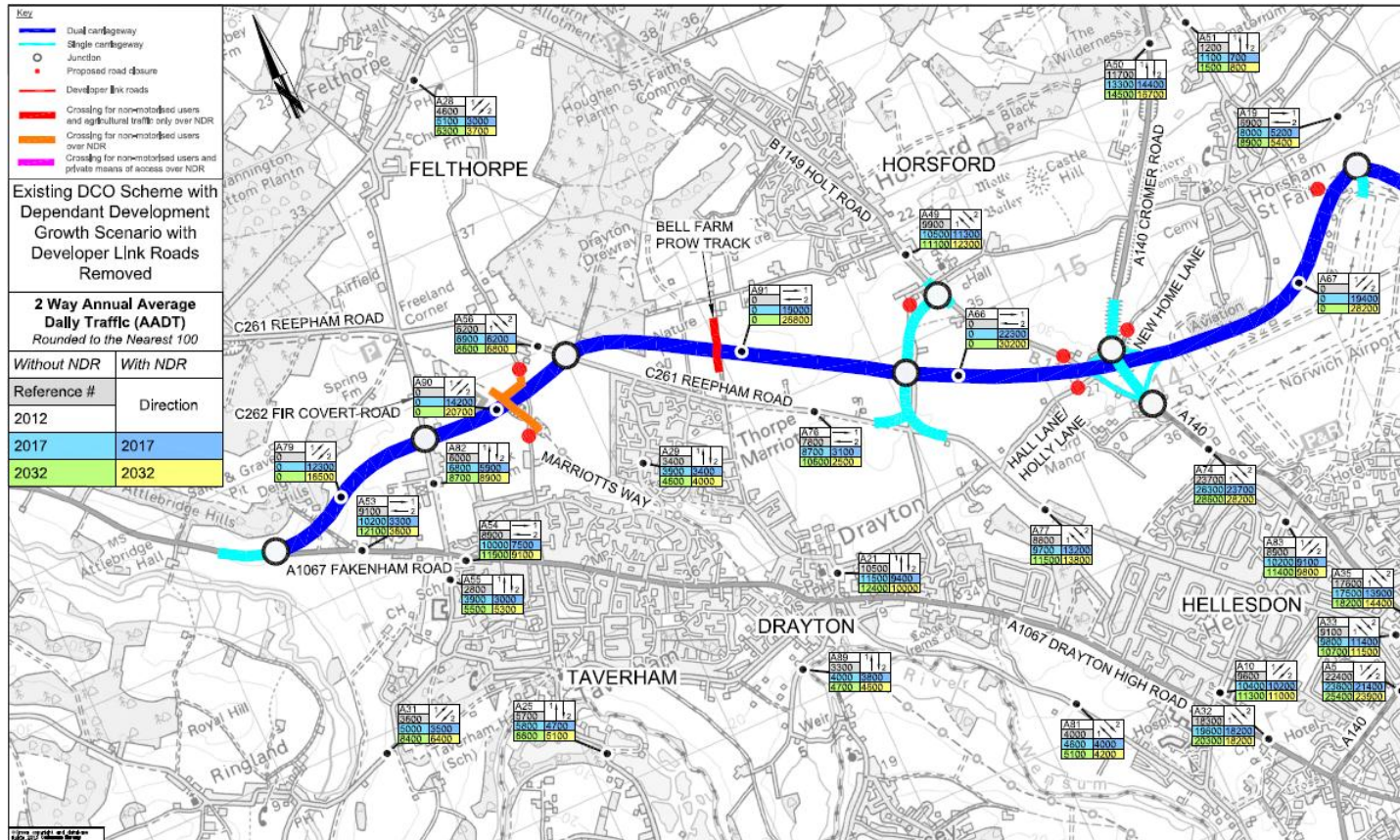


Figure 10.22: AADT Traffic Flows Eastern Section_Dependent Development with Developer Links Excluded Scenario

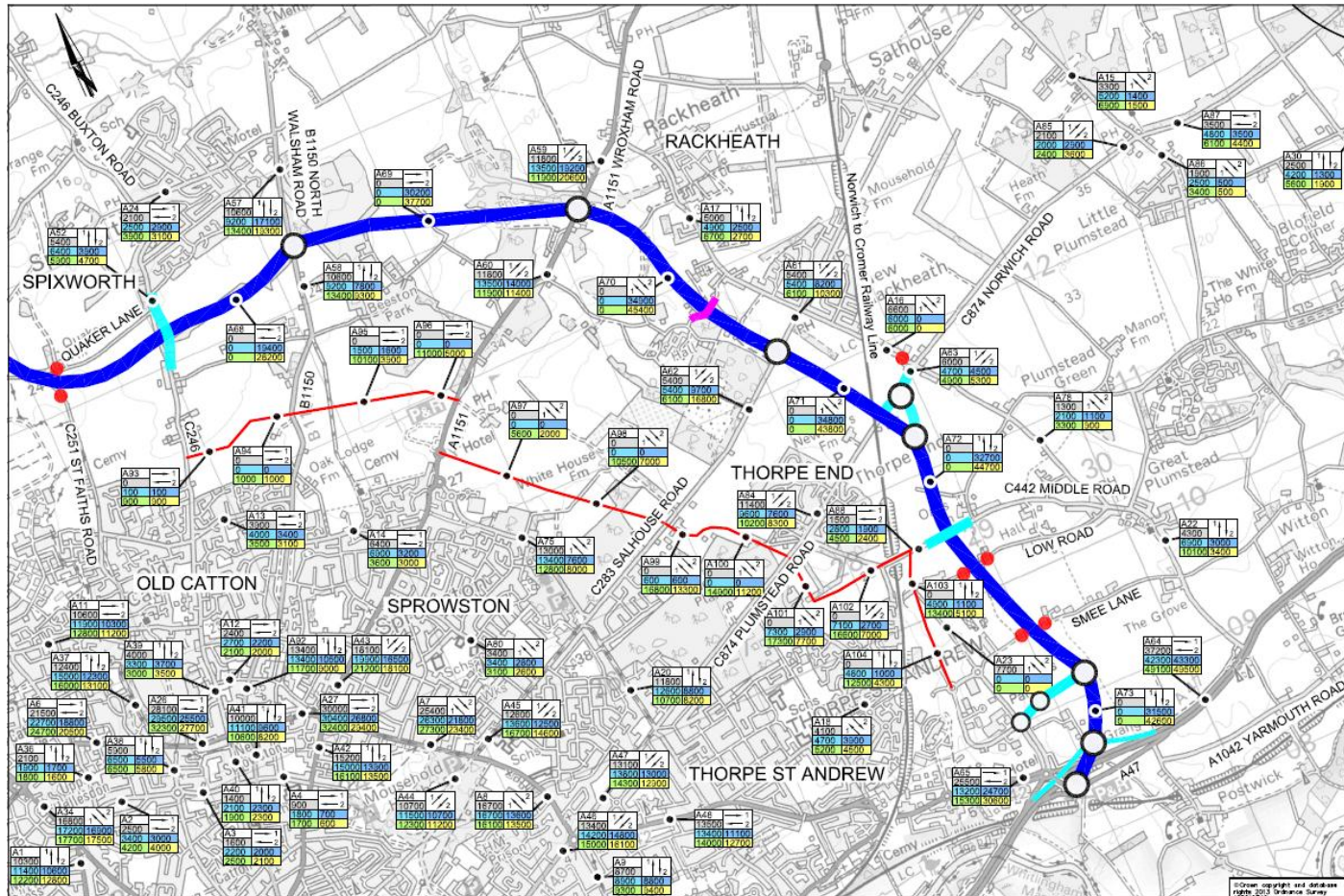


Figure 10.23: AADT Traffic Flows Wensum Valley Section_ Dependent Development with Developer Links Excluded Scenario

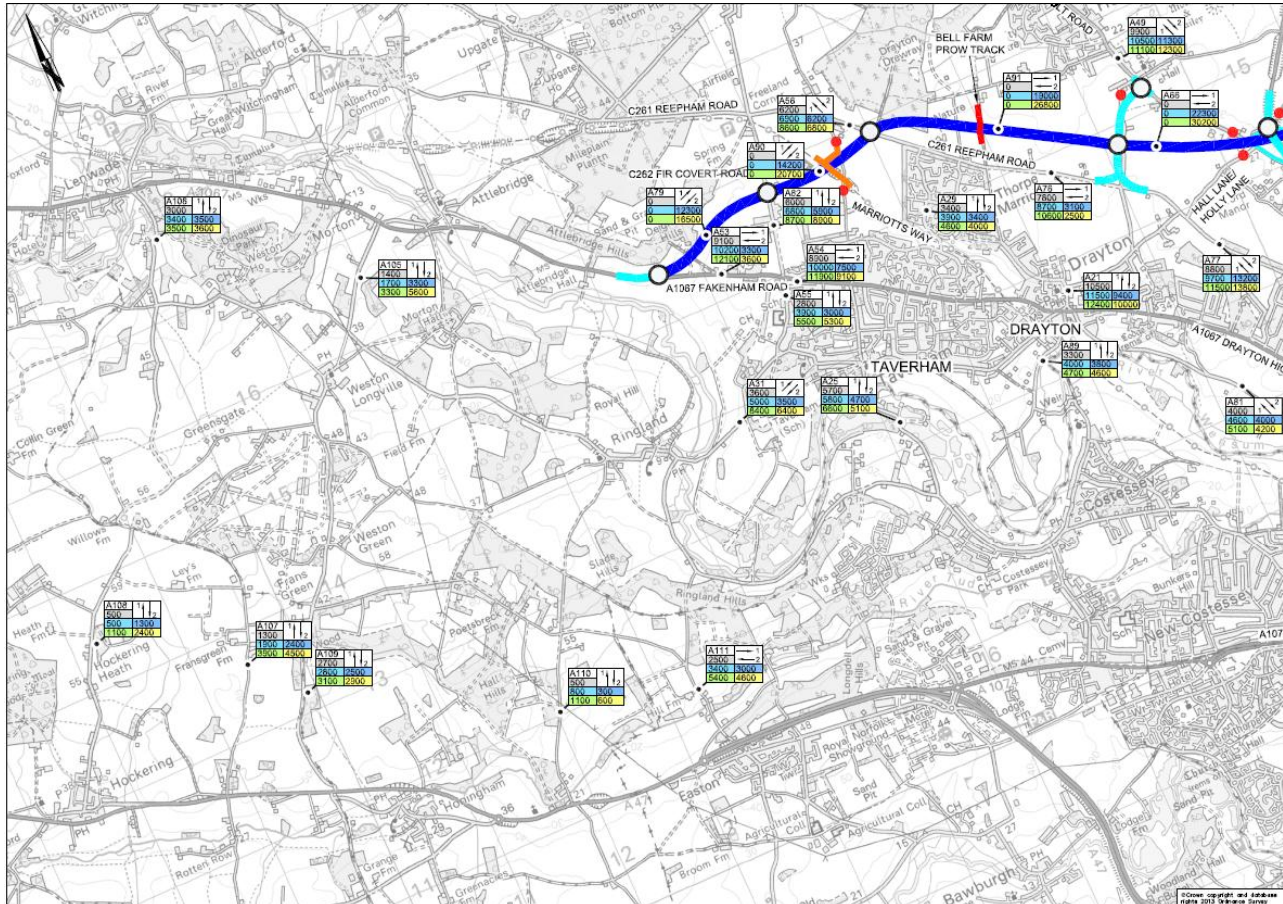


Figure 10.24: Strategic Traffic Movements _ Dependent Development with Developer Links Excluded Scenario

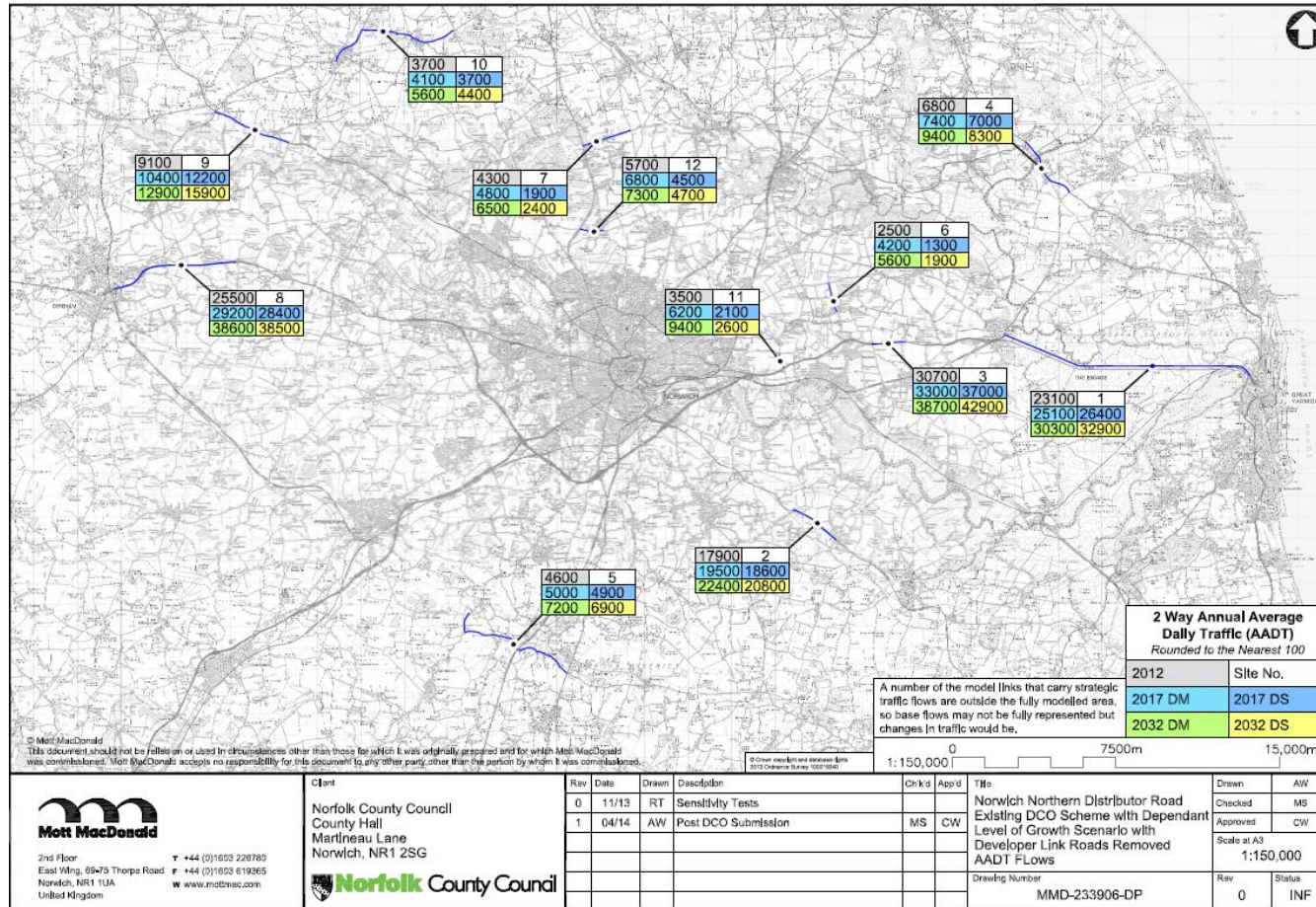
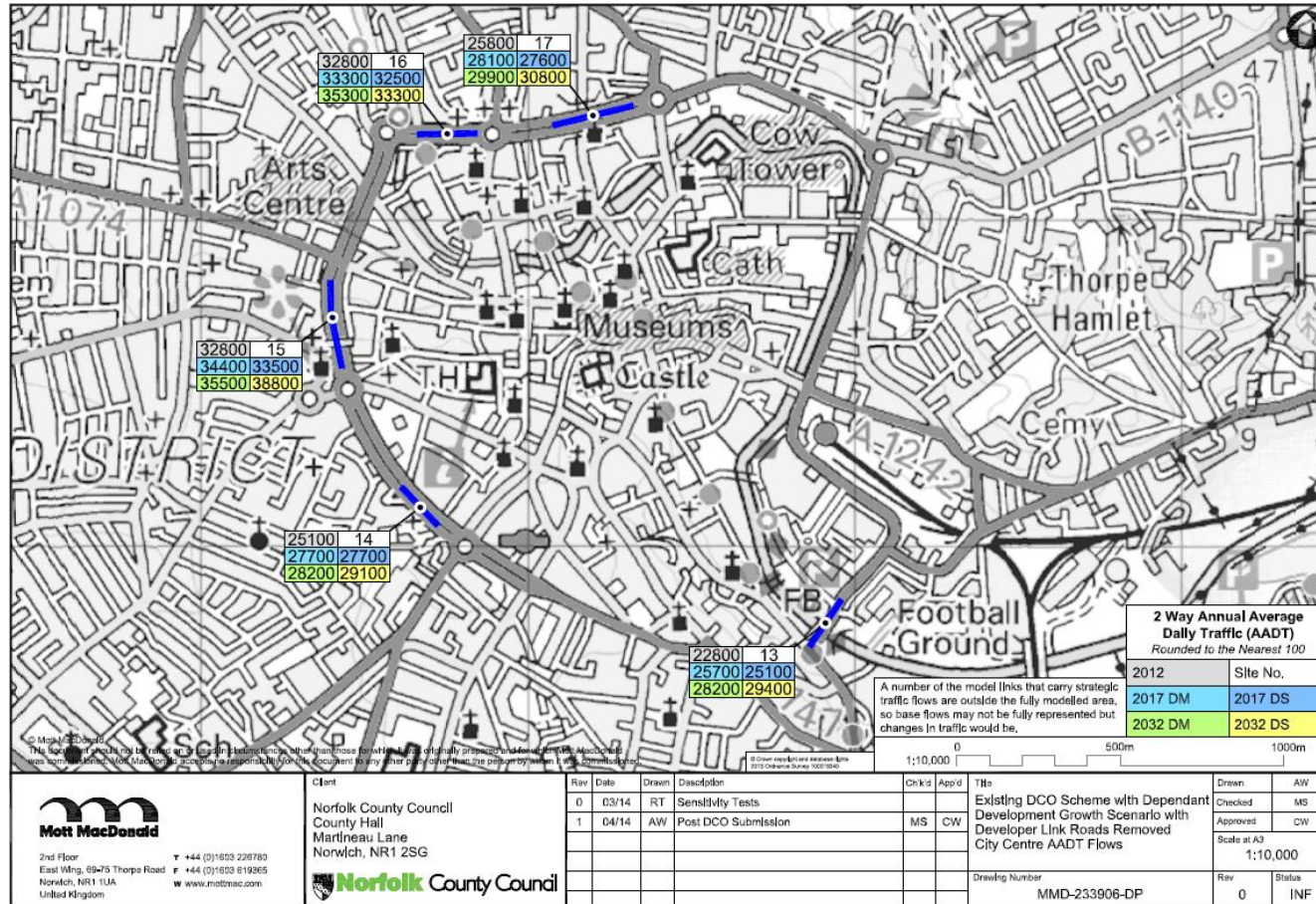


Figure 10.25: City Centre Traffic Impact_ Dependent Development with Developer Links Excluded Scenario



11 Abbreviations

AADT	Annual Average Daily Traffic
ARCADY	Assessment of Roundabout Capacity and Delay software
AST	Appraisal Summary Table
ATC	Automatic Traffic Count
B1/B2/B8	Development categories: business (including office) / general industrial / storage and distribution
BAFB	The Best And Final funding Bid submitted by Norfolk County Council to the Department for Transport in 2011 for the combined Postwick and NDR schemes
BCIS	Building Cost Information Service
BCR	Benefit Cost Ratio
BGBP	Broadland Gate Business Park development
COBA	Cost Benefit Appraisal – software released by the Department of Transport that has been used to undertake an accident appraisal
DfT	Department for Transport
DIADEM	Dynamic Integrated Assignment and Demand Modelling - software released by the Department for Transport
DM	Do Minimim
DMRB	Design Manual for Roads and Bridges – a Highways Agency publication setting out guidance and good practice for design and appraisal of road schemes
DS	Do Something
EB	Employer's Business
GAP	Minimum gap (in seconds) accepted by a vehicle which gives way at priority junctions or traffic signals. Also a measure of Wardrop equilibrium assignment convergence
GAPR	As GAP above in relation to junctions but for entry onto roundabouts
GDP	Gross Domestic Product
GEH	A comparison statistic named after GE Havers
GIS	Geographic Information System - designed to capture, store, manipulate, analyse, manage, and present all types of geographical data
GNDP	Greater Norwich Development Partnership
GPS	Global Positioning System
GVA	Gross Value Added
HA	Highways Agency
HB	Home Based (trips)
HBEB	Home Based Employers' Business (trips)
HBO	Home Based Other (trips)
HBW	Home Based Work (commuter trips)
HGV	Heavy Goods Vehicle
IP	Inter-peak

JT	Journey Time
JCS	Joint Core Strategy
JTR	Journey Time Reliability
LGV	Light Goods Vehicle
LINSIG	Traffic signal analysis software
LMVR	Local Model Validation Report
MCC	Manual Classified Count (for a link)
MCTC	Manual Classified Turning Counts
ME	Matrix Estimation
NATS	Norwich Area Transportation Strategy
NCC	Norfolk County Council
NDR	Norwich Northern Distributor Road
NHB	Non-Home Based (trips)
NHBEB	Non-home-based Employer's Business
NHBO	Non-home-based Other
NPV	Net Present Value – given by subtracting the Present Value Costs (PVC) from Present Value Benefits (PVB)
NTEM	National Trip End Model – a database containing trip-end, journey mileage, car ownership and population/workforce planning data
NTM	National Transport Model
NTS	National Travel Survey
OD	Origin Destination
OE	Other Externalities
OGV	Other Goods Vehicle (sometimes called HGV)
OGV1	A sub-category of OGV. Includes all rigid vehicles over 3.5 tonnes gross vehicle weight with two or three axles
OGV2	A sub-category of OGV. Includes all rigid vehicles with four or more axles and all articulated vehicles
OP	Off-peak
PA	Production Attraction
PCU	Passenger Car Unit
PDL	Previously Developed Land
PG	Planning Gain
PIA	Personal Injury Accident
PPK	Pence Per Kilometre
PPM	Pence Per Minute
PT	Public Transport
PVB	Present Value Benefits – the stream of benefits over the appraisal period (60 years) that are converted to 2010 prices and discounted to 2010 to give a 'present value'
PVC	Present Value Costs – the costs of the scheme over the construction period as well as maintenance and operational costs that are converted to 2010 prices and discounted to 2010 to give a 'present

	value'
PYV	Present Year Validation
P&R	Park and Ride
QRA	Quantified Risk Assessment
RFC	Ratio of Flow to Capacity
RPI	Retail Price Index
RSI	Road Side Interview
RTF	Road Transport Forecasts
SATME2	Matrix estimation module of the SATURN software
SATURN	Simulation – Assignment model of Traffic on Urban Road Networks software
SRN	Strategic Road Network
TA	Transport Assessment
TEC	Transport Externality Cost
TRADS	Traffic flow Data System – the Highways Agency’s database of traffic count data
TRICS	National Trip Generation database
TEMPRO	Trip End Model presentation Program is software released by the Department for Transport to allow detailed analysis of NTEM data
TUBA	Transport User Benefit Appraisal – software released by the Department for Transport that is used to assess transport user benefits of transport schemes
VDM	Variable Demand Modelling
VfM	Value for Money
VISUM	Transport modelling software used (in this case) for public transport modelling
VOC	Vehicle Operating Costs
VOT	Value Of Time
WEBS	Wider Economic Benefits
WebTAG	Web-based Transport Appraisal Guidance produced by the Department for Transport
WITA	Wider Impacts in Transport Appraisal

12 Glossary

Assignment	A process of loading a trip matrix onto routes through a network that accounts for travel costs on the network in identifying the optimum route choice for every trip
Buffer network	The external part of a highway network in which travel is represented by speed/ flow relationships or cruise speeds
Calibration	A process of adjusting the model input data or model parameters to improve the model and its validation
Convergence	An equilibrium between model outputs, in assignment between the flows and travel costs and in demand models between the demand and the costs from the supply model
Cost matrix	A table of travel costs for journeys that may include travel time, operating costs and charges such as tolls or fares
Cruise speeds	Average travel speed along a network link
Demand model	See variable demand model
Demand segment	Travel demand is divided into a number of segments for the purposes of applying different demand modelling procedures. The division is usually by trip purpose and whether the trips are home-based or non-home-based
DMRB	Design Manual for Roads and Bridges – a Highways Agency publication setting out guidance and good practice for design and appraisal of road schemes
Dependent development	Housing or commercial development that can only proceed with the implementation of a transport intervention
Discounting	Discounting is a technique used to compare costs and benefits that occur in different time periods. It is based on the principle known as time preference that people prefer goods and services now rather than later. This preference for goods and services now rather than later applies to both individuals and society. By applying a discount rate, streams of costs and benefits are reduced to their present values.
Do Minimum	The forecast scenario without the proposed transport scheme, but that includes committed transport network improvements and developments
Do Something	The Do Minimum network but with the proposed transport scheme and developments added
Generalised cost	A combination of time and money costs (operating costs and charges) that are expressed in time or money units which are used to represent the total travel costs for a journey within the assignment or demand models
Journey purpose	Trips are divided into different travel purposes, usually work (or commute), employers' business and other. These trip purposes have different generalised costs applied and different demand model responses
Matrix estimation	A process used to adjust an initial or 'prior' matrix so that the resulting assignment of the adjusted matrix matches count data as closely as possible
Network	A mathematical representation of a transport network in a supply-side assignment model, either a highway network which represents vehicle travel, or a public transport network that represents bus and rail services
Speed / flow relationships	Relationship between traffic speed and traffic flow on a network link

Reference trip matrix	A forecast reference matrix based on applying growth from national (or other) datasets, but before the application of adjustments due to the impact of how travel costs will change with growth in travel
User classes	Trips are aggregated into several user classes for the purposes of assignment. These usually represent different types of vehicle (e.g. car, HGV) and different trip purposes
Trip matrix	A table representing travel in a model area between land areas or zones
Validation	A process of comparing the model data with independent data
Variable demand modelling	A model that forecasts changes in travel behaviour such as trip frequency, choice of mode, time of travel and trip distribution
Zone	An area of land or development which is used in a transport model to aggregate individual households or commercial premises into a manageable number of units that can be used to represent journey patterns in the study area. Usually the zone size will be relatively small in the study area, but progressively larger further away from it.

The Norfolk County Council (Norwich Northern Distributor Road (A1067 to A47(T))) Order

5.12 Traffic and Economic Appraisal of NDR Alternatives

Planning Act 2008

Infrastructure Planning

The Infrastructure Planning (Applications: Prescribed Forms and Procedure)
Regulations 2009


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1 Key Summary

- 1.1.1 Funding approval for the Norwich Northern Distributor Road (NDR) was sought in 2011 through the Department for Transport's (DfT) Development Pool process. A business case was developed and submitted in accordance with the guidance in the Treasury Green Book. Ministerial decisions were made in December 2011 to award funding.
- 1.1.2 The NDR is a project of national significance which requires a Development Consent Order (DCO) under the Planning Act 2008. The submission was made in January 2014.
- 1.1.3 The Transport Assessment for the Scheme is set out in submission Document Ref. 5.5. This included an operational assessment of the Scheme design with traffic forecasts based on the full implementation of JCS, as set out in the Traffic Forecasting Report Document Ref. 5.6. The forecasts were based on the transport model described in the Highway and Public Transport Local Model Validation Reports (Document Refs. 5.9 and 5.10). The transport assessment concluded that the Scheme design is considered to be the best possible balance between relieving the existing network whilst ensuring acceptable conditions on this new part of the network.
- 1.1.4 The Economic Appraisal Report (Document Ref. 5.7) shows that the Scheme would deliver very high value for money (VfM), the Benefit Cost Ratio (BCR) value exceeding 4, according to DfT's VfM criteria. In addition the Land Use and Economic Development Report (Document Ref. 10.3) sets out the substantial benefits of jobs, GVA and infrastructure investment that the Scheme would help to bring to the City.
- 1.1.5 Traffic and economic assessments for four of the Alternatives listed in Section 3.10.13 of the Environmental Statement (Document Ref 6.1) have been carried out using the latest version of the Transport Model (Alternative 4 was not tested as its traffic impacts and economic appraisal would be very similar to the DCO Scheme). These assessments provide comparative quantitative information on the same basis as that provided for the Scheme in the Traffic Forecasting Report (Document Ref 5.6) and the Economic Appraisal Report (Document Ref 5.7). The results assessments are presented in this report.
- 1.1.6 **The DCO Scheme** delivers a BCR of 4.17 (inclusive of accident benefits) and a BCR of 5.33 when WEBs and JTR are included. Both of these represent very high value for money (BCR above 4) according to DfT's VfM criteria.

- 1.1.7 **Alternative 1** (single carriageway NDR) provides the required transport connections, but the lower standard means that there would be a poorer operational performance compared with the DCO Scheme. The forecast traffic flows on a number of the single carriageway links are forecast to be substantially higher than the economic flow range upper limit in TA46/97 of 13,000 AADT for a single carriageway road in the opening year. This reduces the attractiveness of the route for some journeys so that there is less relief of existing routes. The analysis shows less relief on inappropriate routes and for cross city traffic using the Outer Ring Road. The economic appraisal shows a much lower level of benefits than the DCO Scheme resulting in a BCR of 2.42 with accidents and 2.67 with JTR benefits and WEBs included.
- 1.1.8 **Alternative 2** (dual carriageway NDR between Postwick Junction and A140) will not provide the connectivity for journeys west of the A140 and thus will not relieve roads and communities to the west of the A140. In some cases there would be traffic increases, especially on a minor road Hall Lane between the A140 Cromer Road junction and the A1067 which is an inappropriate route for the forecast increases in traffic. The economic appraisal shows a lower level of benefits than the DCO Scheme due to the lack of improved transport connections west of the A140 with a BCR of 3.81 including accidents. The benefits are increased with the inclusion of JTR and WEBs to give a BCR of 4.11, but the level of these additional benefits is much lower than calculated for the DCO Scheme due to the poorer connectivity provided by the Alternative.
- 1.1.9 **Alternative 3** (single / dual carriageway NDR) provides the required transport connections, but the lower standard west of the A140 Cromer Road means that there would be a poorer operational performance compared with the DCO Scheme. The forecast traffic flow on the Holt Road – Cromer Road single carriageway link is forecast to be substantially higher than the economic flow range upper limit in TA46/97 of 13,000 AADT for a single carriageway road in the opening year. This together with the A140 at grade junction reduces the attractiveness of the route for some journeys so that there is less relief of existing routes. The analysis shows less relief on inappropriate routes in the northwest sector. The economic appraisal shows a lower level of benefits than the DCO Scheme resulting in a BCR of 3.68 with accidents and 4.84 with JTR benefits and WEBs included.
- 1.1.10 **Alternative 5** (developer link roads) singularly fails to reduce traffic on inappropriate routes and relieve the existing network. Whilst the Alternative includes the city centre traffic management measures the reductions of cross

city centre traffic are much smaller compared with the DCO Scheme, especially for trips crossing the Outer Ring Road Cordon. The junction analyses show that North Walsham Road and Wroxham Road junctions would operate substantially over their theoretical capacity with long queues and delays, with delays of over 10 minutes at North Walsham Road Junction in the 2032 AM peak and 5 minutes in the 2032 PM peak. On these grounds the developer link roads would not operate satisfactorily and they would cause particularly severe difficulties in implementing the proposed shared use high street-type design envisaged in the development proposals. The delays would also mean that the Alternative would fail to meet the improved transport connectivity objective for the Scheme. The economic appraisal results highlight that the performance of Alternative 5 is especially poor and does not offer good value for money. The Alternative produces economic disbenefits as any benefits of the extended link roads are outweighed by the reduced performance due to overcapacity and due to the effects of introducing city centre traffic management measures without significant traffic relief being provided by the Alternative. The calculated BCR is -11.42 with accidents included and even worse with JTR and WEBs giving -20.34 although the BCR is not a meaningful term when the benefits are negative.

1.1.11 The table below provides a summary of the economic appraisal results.

Scenario	Brief Description	BCR (including accidents)	BCR (also including WEBs and JTR)
DCO Scheme		4.17	5.33
<i>Alternatives</i>			
Alternative 1	Single carriageway NDR	2.42	2.67
Alternative 2	NDR terminating at A140	3.81	4.11
Alternative 3	Dual NDR to A140 and single west of A140	3.68	4.84
Alternative 5	Developer links extending in place of NDR	-11.42	-20.34

Notes: A detailed description of Alternatives can be found in DCO Document Reference 6.1

1.1.12 In addition to the Alternatives tested, an option comprising significant improvements to public transport provision has been appraised, and details of this are presented in Appendix B. The results indicate that such an option would not meet the Scheme objectives or deliver good value for money. The calculated BCR is -34.42 with accidents included and even worse with JTR and WEBs giving -46.22, although the BCR is not a meaningful term when the benefits are negative.

2 Introduction

2.1 Background

- 2.1.1 Mott MacDonald (MM) has been appointed by Norfolk County Council (NCC) to assist with the development and appraisal of the Norwich Northern Distributor Road, known as the NDR or referred to as the Scheme.
- 2.1.2 The Scheme would be a dual carriageway all-purpose strategic distributor road, to be classified as the A1270 Principal Road, which would link the A1067 Fakenham Road near Attlebridge, to the A47(T) Trunk Road at Postwick. This will be over a length of approximately 20.4km.
- 2.1.3 The NDR is a project of national significance which requires a Development Consent Order (DCO) under the Planning Act 2008 and this formal planning process began in early 2013. It is currently anticipated that the process will be completed in time for the Scheme to start construction in 2015 and to be opened in 2017.
- 2.1.4 This document is one of a number that support the DCO, each of which has its own unique document reference number, and should therefore be read in conjunction with the other documentation. The proposed layout of the NDR is shown in the General Arrangement Plans contained in Document Ref. 2.6, whilst the full needs case for the NDR is explained in the Statement of Reasons (Document Ref. 4.1) and the Environmental Statement (Document Ref. 6.1).
- 2.1.5 Funding approval for the NDR was sought in 2011 through the Department for Transport's (DfT) Development Pool process. A business case was developed and submitted in accordance with the guidance in the Treasury Green Book. Ministerial decisions were made in December 2011 to award funding.
- 2.1.6 The NDR DCO submission was submitted on 8th January 2014 and has been accepted for examination by the planning inspectorate on 4th February 2014.

2.2 Purpose and Layout of Report

- 2.2.1 This report provides traffic and economic assessments for four of the Alternatives listed in Section 3.10.13 of the Environmental Statement (Document Ref 6.1). The assessments have used the latest version of the Transport Model and comparative quantitative information is set out on the

same basis as that provided for the Scheme in the Traffic Forecasting Report (Document Ref 5.6) and the Economic Appraisal Report (Document Ref 5.7).

2.2.2 The report sets out to provide:

- A review of the traffic impact of the Alternative and, where appropriate, operational assessments.
- An assessment of the safety impact using COBA.
- An assessment of economic benefits for consumer and business users from Alternatives based on the variable demand model (VDM) forecasts and the likely expenditure profile during the assessment period where appropriate.
- An assessment of the scheme Value for Money (VfM) under these Alternatives based on the corresponding VDM model outputs and the latest available costs of the Alternatives. The Guidance on Value for Money describes the criteria used to determine the VfM of various types of schemes.

2.2.3 The methodology used to produce the economic appraisal is described in detail in DCO submission Document Ref. 5.7. This methodology was retained for these Alternative tests.

2.2.4 This report contains the following sections after the current introductory section:

- Section 3 – describes the methodology and the details of the Alternatives;
- Section 4 – contains scheme costs of Alternatives;
- Section 5 to 8 – includes traffic, operational, safety and economic assessment results of each Alternative assessed;
- Section 9 – presents conclusions from the Alternative appraisals.

2.2.5 Supporting information is included in Appendices in Section 10. Appendix B contains the results for the assessment of an option that includes significant improvements to public transport provision.

2.2.6 Sections 11 and 12 contain Abbreviations and Glossary.

3 Methodology and Description of Alternatives

3.1 Methodology

- 3.1.1 The DCO submission appraisal was based on an updated NATS transport model rebased to 2012 with variable demand forecasts for the NDR proposed opening year of 2017 and design year of 2032. The forecasts assumed full JCS growth both with and without the Scheme. The DCO Scheme comprised both NDR and Postwick.
- 3.1.2 For this testing of the Alternatives the same transport model and forecast assumptions were used as applied to the appraisal of the DCO Scheme in the submission.
- 3.1.3 For each Alternative economic and safety appraisals have been carried out. As with the DCO submission, the economic appraisal calculates TUBA benefits, wider economic benefits (using WITA) and journey time reliability benefits. Safety appraisal was based on COBA.
- 3.1.4 The costs of the Alternatives are shared between local authority, central government and private sector as appropriate depending on the Alternative.
- 3.1.5 In addition a review of traffic impacts of each Alternative has been carried out and, where appropriate, operational assessment of key junctions has been undertaken. Analysis of cross city traffic has been undertaken for the two cases where this would be most affected, for Alternatives 1 and 5.
- 3.1.6 The following assumptions are made for the analysis of all the Alternatives:
- The Do Minimum for each Alternative will be identical to that for the DCO submission.
 - All Alternative schemes include Postwick and the proposed city centre measures.
 - All assignments are based on full JCS traffic as reference demand.
 - Each Alternative will be subject to variable demand modelling so the reference demand will be adjusted according to the forecast travel costs due to each Alternative.

3.2 Alternatives to the DCO Scheme

3.2.1 Alternatives to the DCO Scheme have been examined and more details on these can be found in Document Reference 6.1. Table 3.1 summarises key assumptions and the appraisal required; the Alternative numbering system corresponds with Document Reference 6.1.

Table 3.1: Summary of Requirements – Alternatives to the DCO Scheme

Alternative	Modelling required	Appraisal required
Alt1 – single carriageway standard along the entire DCO alignment	Coding DS highway network and running through demand model for 2017 and 2032	Economic and safety appraisal. Traffic forecast changes with DCO Operational assessment of key junctions
Alt2 – NDR terminating at A140	Coding DS highway network and running through demand model for 2017 and 2032	Economic and safety appraisal. Traffic forecast changes with DCO Operational assessment of key junctions
Alt3 – NDR dual carriageway to A140 then single carriageway west of A140	Coding DS highway network and running through demand model for 2017 and 2032	Economic and safety appraisal. Traffic forecast changes with DCO Operational assessment of key junctions
Alt 4 – Single carriageway NDR between Fir Covert Road and A1067	This Alternative is a relatively small change from the DCO Scheme and therefore has not been retested.	-
Alt5 – Developer link roads extending to A140 in place of NDR	Coding DS network and running through demand model for 2017 and 2032	Economic and safety appraisal. Traffic forecast changes with DCO Operational assessment of key developer junctions

3.2.2 Document Reference 6.1 contains plans of the highway Alternatives and indicative diagrams are shown in the AADT diagrams in the Appendices to this report.

4 Costs of Alternatives

4.1.1 The costs for the Alternatives have been provided by NCC and are summarised in Table 4.1 below. Costs for Alternatives 1, 2 and 3 are allocated to central and local governments while the costs for Alternative 5 are allocated to local government and private sector. It is assumed that developer links will be adopted by the local highway authority once completed, hence maintenance and operation costs will pass to the local authority.

Table 4.1: Summary Costs of Alternatives

Cost type	Cost (£m) in 2013Q1 prices				
	DCO Scheme	Alt1	Alt2	Alt3	Alt5
<i>Investment costs</i>					
Construction	110.2	90.4	82.3	102.8	37.7
Land	22.0	19.4	14.7	20.7	2.4
Preparation	7.8	9.0	8.2	10.3	3.8
Supervision	1.3	1.1	1.0	1.2	0.4
Total investment Cost	141.3	119.9	106.2	135.0	44.3
<i>Other costs</i>					
Maintenance	27.8	12.3	16.8	20.7	5.5
Operation	15.9	15.2	10.9	15.2	1.4

Notes: These are initial costs before adjusting for construction price inflation and optimism bias

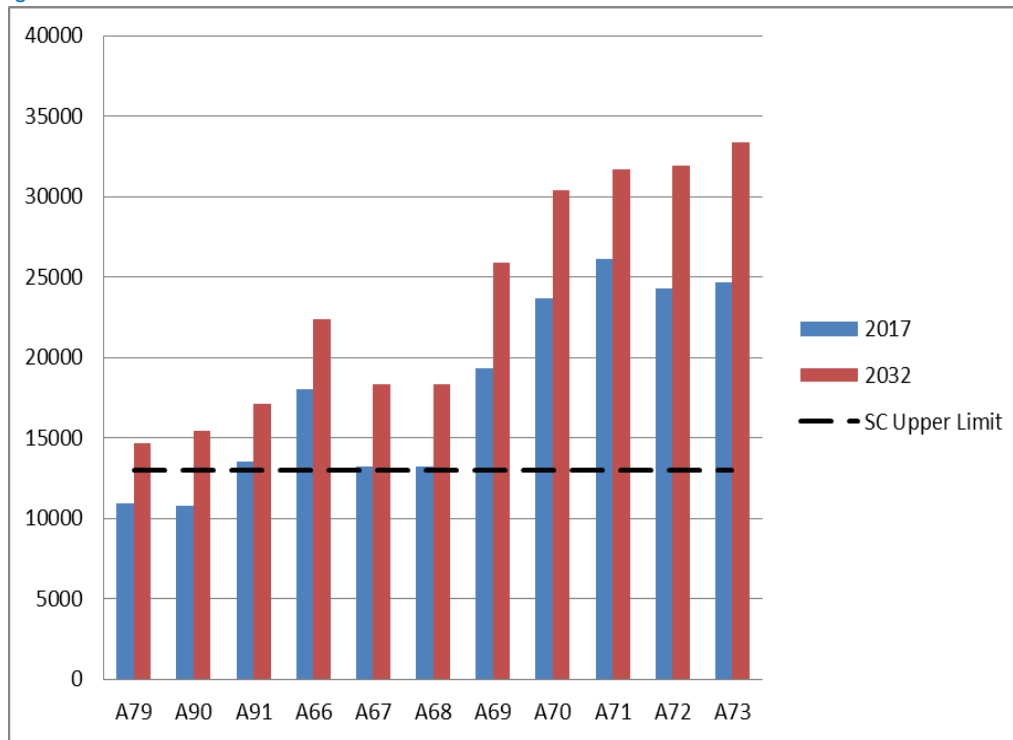
4.1.2 Costs were adjusted as per Document Reference 5.7 before inputting into TUBA. It should also be noted that the profiles of costs in calendar years input into TUBA for all the Alternatives were derived by assuming a similar proportionate profile to that used for the DCO scheme.

5 Traffic and Economic Assessment Results for Alternative 1 (single carriageway NDR)

5.1 Traffic Analysis Results

5.1.1 Figure 5.1 shows the forecast AADTs for the single carriageway sections of Alternative 1 between locations A79 and A72, as well as for the Postwick business park link A73 which is a dual carriageway standard.

Figure 5.1: Alternative 1 AADT on Online Sections



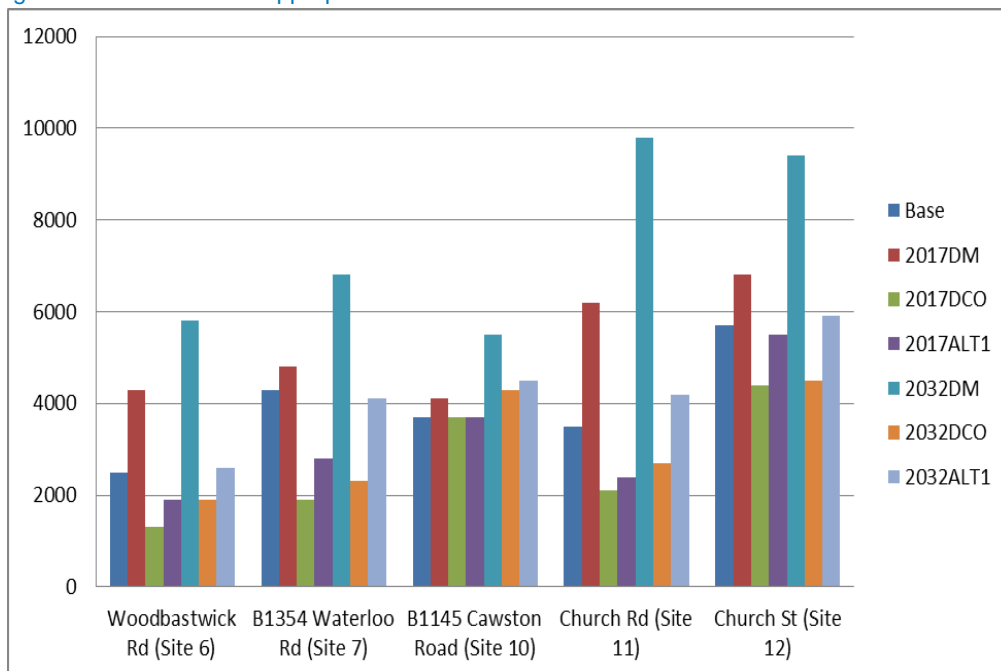
Notes: A79: Fakenham Road - Fir Covert Road Link, A90: Fir Covert Road - Reepham Road Link, A91: Reepham Road - Holt Road Link, A66: Holt Road - Cromer Road Link, A67: Cromer Road - Airport Link, A68: Airport - North Walsham Road Link, A69: North Walsham Road - Wroxham Road Link, A70: Wroxham Road - Salhouse Road Link, A71: Salhouse Road - Plumstead Road Link, A72: Plumstead Road - Postwick Hub Link and A73: Postwick Hub - A47 Link.

5.1.2 The traffic forecasts for the Alternative 1 online sections vary between 10,900 AADT at the western end (at the A1067) and 24,700 towards the eastern end (at Postwick/the A47) in the opening year of 2017. Most of the sections contain traffic flows close to or higher than the economic flow range upper limit in TA46/97 of 13,000 AADT for a single carriageway road in the opening year. Whilst Alternative 1 will meet the transport connections objective, the lower standard means that there would be a poorer operational performance

of Alternative 1 compared with the DCO scheme due to over capacity of the single carriageway and thus reduced attractiveness, so that a proportion of traffic will remain on the existing network. A significant traffic increase (an average increase of 1/3 of the 2017 AADT level) is also forecast between 2017 and 2032 and all the sections would have a poorer operational performance in 2032.

5.1.3 Figure 5.2 shows traffic levels on inappropriate routes with Alternative 1.

Figure 5.2: Traffic on Inappropriate Routes – Alternative 1



5.1.4 This shows that Alternative 1 is not capable of reducing traffic levels at these locations to the same degree as the DCO Scheme. The Woodbastwick Road and Church Road routes are, for example, forecast to have reductions in two way AADT flows of 2,400 (56%) and 3,800 (61%) respectively in 2017 in comparison with the traffic flows that would otherwise occur in the 'Do Minimum' scenario. In 2032 the reduction is 3,200 (55%) and 5,600 (57%) respectively. In the DCO scenario the reductions would be higher at these two sites: 3,000 (70%) and 4,100 (66%) in 2017 and 3,900 (67%) and 7,100 (72%) in 2032 respectively.

5.1.5 Table 5.2 below shows city centre through traffic across three cordons. More details on these cordons can be found in Document Reference 5.6. The table shows that traffic crossing the city centre Inner Ring Road cordons is reduced

by a similar degree with Alternative 1 compared with the DCO Scheme. This is achieved by the combination of the city centre measures that are assumed to be implemented in both cases as well as the NDR route providing relief for strategic through movements. However the city centre traffic crossing the outer cordon is reduced significantly more with the DCO Scheme, with the single carriageway Alternative 1 being a less attractive route for some journeys that would continue to use the Outer Ring Road.

Table 5.1: City Centre Through Traffic (AADT)

Cordon*	2012		2017			2032	
		DM	DCO Scheme	ALT1	DM	DCO Scheme	ALT1
Inner Ring Road Inner Cordon			6,787	6,985		4,726	4,734
	9,477	8,159	(-17%)	(-14%)	9,236	(-49%)	(-49%)
Inner Ring Road Outer Cordon			78,369	78,469		80,352	80,325
	77,825	82,152	(-5%)	(-4%)	88,368	(-9%)	(-9%)
Outer Ring Road Outer Cordon			63,421	65,784		66,780	69,664
	68,117	73,691	(-14%)	(-11%)	79,151	(-16%)	(-12%)

Notes: *More details on Cordons can be found in Document Reference 5.6

5.1.6 Graphical presentations of these results are shown in Figure 5.3 and Figure 5.4. This illustrates that Alternative 1’s fulfilment of the Scheme objectives is limited by the attractiveness of its single carriageway.

Figure 5.3: Through Traffic Crossing Cordons in 2017 – Alternative 1

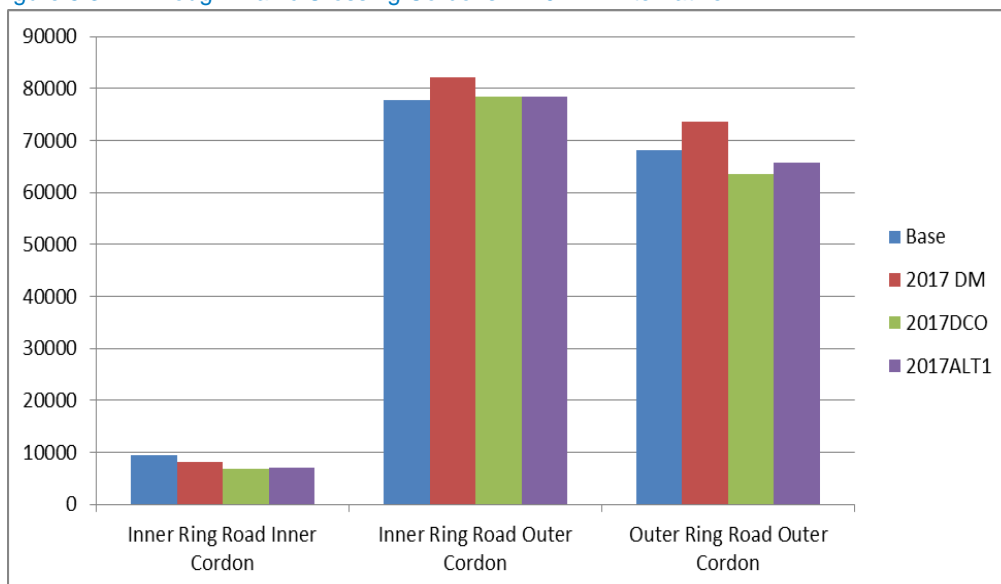
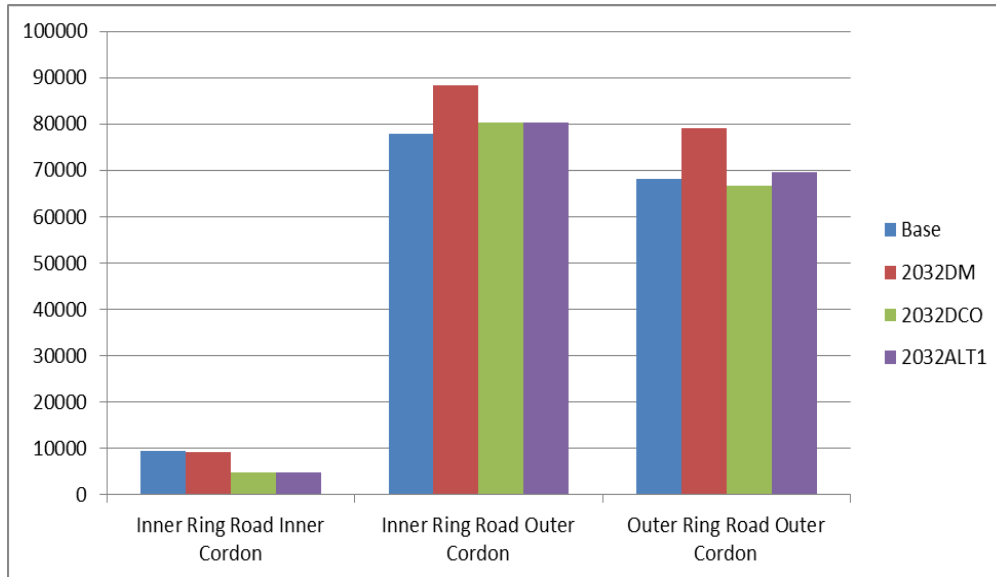


Figure 5.4: Through Traffic Crossing Cordon in 2032 – Alternative 1



5.2 Junction Analyses

5.2.1 Table 5.2 to Table 5.4 compare maximum RFC/DoS values, queues and delays for online NDR and Postwick junctions between the DCO Scheme and Alternative 1 for 2032DS AM and PM peaks. Overall the results are not dissimilar to those of the DCO submission. The single carriageway with flaring to two lanes at junctions as tested within Alternative 1 leads to a significantly lower amount of traffic attracted to the NDR and its side roads with reductions of over 25% in traffic for example on Drayton Road.

5.2.2 The results show that between Fakenham Road and North Walsham Road, the attraction of NDR is reduced to a level that leads to the junctions performing better in Alternative 1 than in the DCO scenario. Cromer Road junction however is not directly comparable, with the junction in Alternative 1 comprising an at-grade roundabout and the DCO Scheme providing a grade-separated junction. For Wroxham Road and Salhouse Road junctions, the results show that despite the lane reduction along the NDR, these two junctions are still sufficiently attractive to lead to results in excess of theoretical capacity in 2032.

5.2.3 The layout of the Business Park junction in Alternative 1 is the same as in the DCO with the north-south ahead filter lane along the NDR and the left filter lane from NDR to Broadland Gate Link in place, with the only change being the NDR southbound approach being one lane rather than two lanes. Due to

the reduction in flows, the junction therefore operates significantly better in Alternative 1.

Table 5.2: Junction Operational Assessment Results_Alternative 1 – 2032 Max RFC/DoS

Junction	AM		PM	
	DCO Scheme	Alternative 1	DCO Scheme	Alternative 1
Online junctions				
Fakenham Road	0.52	0.52	0.52	0.48
Fir Covert Road	0.55	0.52	0.51	0.55
Reepham Road	0.57	0.58	0.64	0.54
Drayton Lane	1.09	0.81	0.96	0.80
Holt Road/Drayton Lane	0.51	0.50	0.44	0.43
Cromer Road South	0.86	-	0.97	-
Cromer Road North	0.98	-	0.61	-
Cromer Road	-	0.77	-	0.86
Airport	0.87	0.58	0.79	0.54
North Walsham Road	1.10	0.82	0.83	0.83
Wroxham Road	0.99	1.01	0.95	0.95
Salhouse Road	0.95	1.03	0.97	1.04
Plumstead Road North	0.40	0.34	0.40	0.16
Plumstead Road South	0.98	0.97	0.88	0.85
Business Park	0.87	0.56	0.95	0.57

Notes: The Ratio of Flow to Capacity (RFC) output from ARCADY/PICADY is the primary measure of a junction arm performance of a roundabout/priority junction. RFC less than 0.85 indicates that a junction arm operates within capacity. RFC greater than 0.85 but less than 1.0 indicates that a junction arm is over its desired capacity but below theoretical capacity. Any RFC greater than 1.0 indicates that a junction arm is in excess of its theoretical capacity.

Degree of Saturation (DoS) output from LINSIG is the primary measure of performance of a signalised junction. DoS less than 90% indicates that a junction arm operates within capacity. DoS greater than 90% but less than 100% indicates that a junction arm is over its desired capacity but below theoretical capacity. Any DoS greater than 100% indicates that a junction arm is in excess of theoretical capacity.

Table 5.3: Junction Operational Assessment Results_Alternative 1 – 2032 Max Queue (PCUs)

Junction	AM		PM	
	DCO Scheme	Alternative 1	DCO Scheme	Alternative 1
Online junctions				
Fakenham Road	1	1	1	1
Fir Covert Road	1	1	1	1
Reepham Road	1	1	2	1
Drayton Lane	39	4	13	4
Holt Road/Drayton Lane	1	1	1	1
Cromer Road South	6	-	20	-
Cromer Road North	18	-	7	-
Cromer Road	-	3	-	6
Airport	6	1	4	1
North Walsham Road	53	4	5	5

Junction	AM		PM	
	DCO Scheme	Alternative 1	DCO Scheme	Alternative 1
Wroxham Road	28	28	10	13
Salhouse Road	15	43	13	43
Plumstead Road North	1	1	1	0
Plumstead Road South	26	20	7	5
Business Park	7	1	17	1

Table 5.4: Junction Operational Assessment Results_Alternative 1 – 2032 Max Delay (sec)

Junction	AM		PM	
	DCO Scheme	Alternative 1	DCO Scheme	Alternative 1
Online junctions				
Fakenham Road	3	4	4	4
Fir Covert Road	7	6	7	5
Reepham Road	9	6	7	6
Drayton Lane	170	17	59	12
Holt Road/Drayton Lane	5	5	5	4
Cromer Road South	15	-	45	-
Cromer Road North	56	-	38	-
Cromer Road	-	10	-	14
Airport	12	5	8	4
North Walsham Road	170	13	22	13
Wroxham Road	43	72	38	37
Salhouse Road	39	91	70	99
Plumstead Road North	5	4	4	4
Plumstead Road South	36	42	11	13
Business Park	14	4	23	6

5.3 Safety Analysis Results

5.3.1 Table 5.5 show that there would be a fewer personal injury accidents saved compared with the DCO Scheme submission analysis. An important change is a significant increase in fatalities and no savings in serious casualties. Consequently overall the cost benefit analysis for Alternative 1 shows a small accident disbenefit of £0.842m.

Table 5.5: Accident Benefits – Alternative 1

60 Year Appraisal Period		Scenario	
		DCO Scheme	Alternative 1
Do Minimum			
Number of PIAs		70,984	70,984
Casualties	Fatal	1,890	1,890
	Serious	12,597	12,597
	Slight	91,490	91,490
Accident Costs		5,999,332	5,999,332
Do Something			
Number of PIAs		69,944	70,044
Casualties	Fatal	1,898	1,926
	Serious	12,488	12,598
	Slight	90,226	90,206
Accident Costs		5,958,113	6,000,174
Accident Benefits			
Number of PIA savings		1,041	940
Casualties	Fatal	-7	-36
	Serious	109	-1
	Slight	1,263	1,284
Accident Savings		41,219	-842

Notes: All monetary values are expressed in £000's in 2010 prices discounted to 2010

5.4 Economic Analysis Results

5.4.1 Table 5.6 below compares monetised costs and benefits including accident benefits for Alternative 1 against the DCO scheme.

Table 5.6: Analysis of Monetised Costs and Benefits – Alternative 1

Item	Accidents included (£000)	
	DCO Scheme	Alternative 1
Accidents (not assessed by TUBA)*	41,219	-842
Greenhouse Gases**	-22,756	-14,117
Economic Efficiency: Consumer Users (Commuting)	51,164	12,026
Economic Efficiency: Consumer Users (Other)	380,623	241,290
Economic Efficiency: Business Users and Providers	267,797	87,850
Wider Public Finances (Indirect Taxation Revenues)	55,270	34,895
Present Value of Benefits (PVB)	773,317	361,102
<hr/>		
Broad Transport Budget Present Value of Costs (PVC)	185,542	149,386
<hr/>		
OVERALL IMPACTS		

Item	Accidents included (£000)	
	DCO Scheme	Alternative 1
Net Present Value (NPV)	587,775	211,716
Benefit to Cost Ratio (BCR)	4.168	2.417

Notes: All monetary values are expressed in 2010 prices discounted to 2010
 *Detailed summary results can be found in Section 6. The lower conservative accident benefit is included based upon the use of local accident data, as explained in section 7 of Reference Document 5.7
 **Greenhouse gas impacts were calculated using TUBA1.9.2 since there was a bug in TUBA 1.9.1

5.4.2 The results show that the Present Value of Benefits (PVB) of Alternative 1 is estimated to be £361m (inclusive of accident benefits), outweighing the £149m Present Value of Costs (PVC).

5.4.3 The Benefit Cost Ratio (BCR) of Alternative 1 is 2.42 including accidents. Under the DfT's value for money criteria, this represents a high value for money category.

5.4.4 Table 5.7 below compares summary economic appraisal results including wider impacts and journey time reliability for Alternative 1 against the DCO scheme.

Table 5.7: Summary of Economic Appraisal including Wider Benefits – Alternative 1

Item	Scenario also including WEBs and JTR (£000)	
	DCO Scheme	Alternative 1
Present Value of Benefits (PVB)	989,063	399,456
Present Value of Costs (PVC)	185,542	149,386
Net Present Value (NPV)	803,521	250,070
Benefit to Cost Ratio (BCR)	5.331	2.674

Notes: All monetary values are in £000's and expressed in 2010 prices discounted to 2010

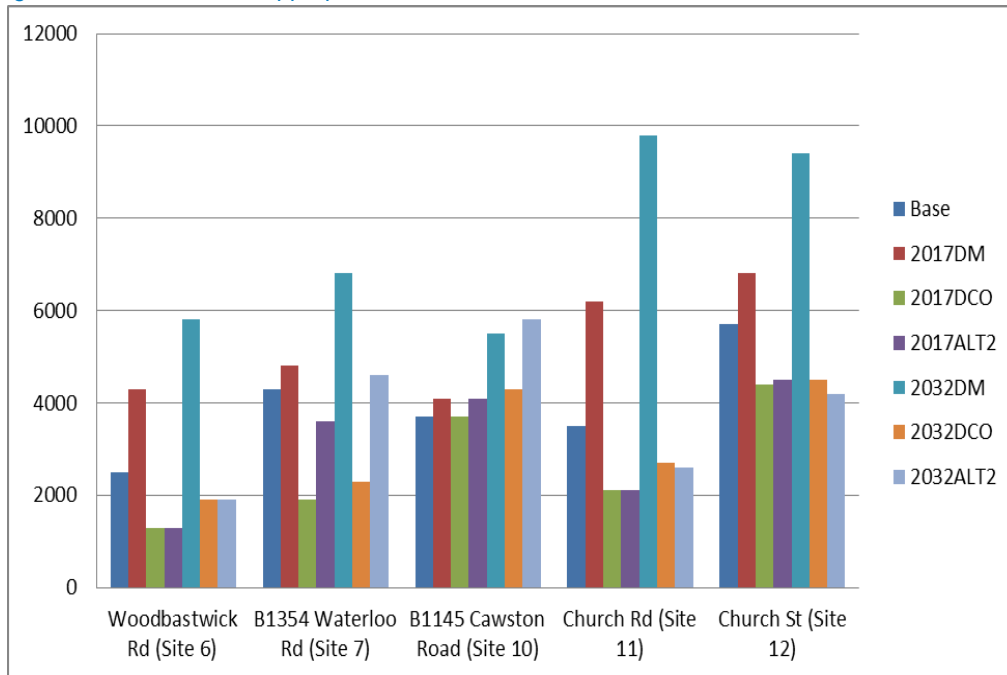
5.4.5 The Alternative 1 BCR is improved further to 2.67 once journey time reliability benefits (£2m) and wider economic benefits (£37m) are included in the appraisal, although these are substantially lower than the additional benefits for the DCO Scheme (£28m for JTR and £187m for WEBs). These additional benefits for Alternative 1 amount to £39m (2010 prices discounted to 2010). The inclusion of these benefits increases the BCR of Alternative 1 to a higher level within the high value for money category. However comparison with DCO scheme shows that Alternative 1 provides much lower BCR.

6 Traffic and Economic Assessment Results for Alternative 2 (dual carriageway NDR between Postwick Junction and A140)

6.1 Traffic Analysis Results

6.1.1 Figure 6.1 shows traffic levels on inappropriate routes with Alternative 2.

Figure 6.1: Traffic on Inappropriate Routes – Alternative 2



6.1.2 As shown in the above graph with Alternative 2, traffic conditions in the northwest sector (sites 7 and 10) will not be relieved as much as those in the northeast sector. The Waterloo Road route is, for example, forecast to have a reduction in two way AADT flow of 1,200 (25%) in 2017 in comparison with the traffic flow that otherwise would occur in the 'Do Minimum' scenario. In 2032 the reduction is 2,200 (32%). By contrast, in the DCO scenario, the reduction on the same site is 2,900 (60%) in 2017 and 4,500 (66%) in 2032 respectively.

6.1.3 Alternative 2 will not provide any relief to roads and communities to the west of the A140, and in some cases there would be increases. As an example the traffic levels on School Road in Drayton are forecast to increase from an AADT level in 2017 in the Do Minimum of 11,400 to 12,400 with Alternative 2.

Similarly in 2032 the traffic level in the Do Minimum of 12,600 AADT would increase to 13,400.

6.2 Junction Analysis

6.2.1 The key junction to consider in this case is the A140 Cromer Road junction which is grade separated in the DCO Scheme but provides an at grade terminal roundabout for Alternative 2; all other junctions on Alternative 2 are identical to the DCO Scheme junctions. Table 6.1 to Table 6.3 compare maximum RFC values, queues and delays for Cromer Road junctions between the DCO Scheme and Alternative 2 for 2032DS AM and PM peaks. The results show that the junction would operate within its theoretical capacity. The form of the junction is significantly different in Alternative 2 compared with the DCO Scheme and the results are therefore not directly comparable. However, RFC values and the levels of maximum queues and delays are similar in both scenarios.

Table 6.1: Junction Operational Assessment Results_Alternative 2 – 2032 Max RFC

Junction	AM		PM	
	DCO Scheme	Alternative 2	DCO Scheme	Alternative 2
Online junctions				
Cromer Road South	0.86	-	0.97	-
Cromer Road North	0.98	-	0.61	-
Cromer Road	-	0.96	-	0.89

Notes: See notes for Table 5.1 for more information on RFC

Table 6.2: Junction Operational Assessment Results_Alternative 2 – 2032 Max Queue (PCUs)

Junction	AM		PM	
	DCO Scheme	Alternative 2	DCO Scheme	Alternative 2
Online junctions				
Cromer Road South	6	-	20	-
Cromer Road North	18	-	7	-
Cromer Road	-	15	-	7

Table 6.3: Junction Operational Assessment Results_Alternative 2 – 2032 Max Delay (sec)

Junction	AM		PM	
	DCO Scheme	Alternative 2	DCO Scheme	Alternative 2
Online junctions				
Cromer Road South	15	-	45	-
Cromer Road North	56	-	38	-
Cromer Road	-	51	-	17

6.3 Safety Analysis Results

6.3.1 Alternative 2 safety analysis results in Table 6.4 shows that there would be fewer injury accident savings but with a change in the severity split overall of the casualty savings then there would be slightly higher safety economic benefits compared with the DCO Scheme.

Table 6.4: Accident Benefits – Alternative 2

60 Year Appraisal Period		Scenario	
		DCO Scheme	Alternative 2
Do Minimum			
Number of PIAs		70,984	70,984
Casualties	Fatal	1,890	1,890
	Serious	12,597	12,597
	Slight	91,490	91,490
Accident Costs		5,999,332	5,999,332
Do Something			
Number of PIAs		69,944	70,101
Casualties	Fatal	1,898	1,885
	Serious	12,488	12,465
	Slight	90,226	90,351
Accident Costs		5,958,113	5,951,053
Accident Benefits			
Number of PIA savings		1,041	883
Casualties	Fatal	-7	6
	Serious	109	132
	Slight	1,263	1,139
Accident Savings		41,219	48,279

Notes: All monetary values are expressed in £000's in 2010 prices discounted to 2010

6.4 Economic Analysis Results

6.4.1 Table 6.5 below compares monetised costs and benefits including accident benefits for Alternative 2 against the DCO scheme.

Table 6.5: Analysis of Monetised Costs and Benefits – Alternative 2

Item	Accidents included (£000)	
	DCO Scheme	Alternative 2
Accidents (not assessed by TUBA)*	41,219	48,279

Item	Accidents included (£000)	
	DCO Scheme	Alternative 2
Greenhouse Gases**	-22,756	-17,981
Economic Efficiency: Consumer Users (Commuting)	51,164	17,438
Economic Efficiency: Consumer Users (Other)	380,623	273,670
Economic Efficiency: Business Users and Providers	267,797	143,940
Wider Public Finances (Indirect Taxation Revenues)	55,270	44,045
Present Value of Benefits (PVB)	773,317	509,391
<hr/>		
Broad Transport Budget Present Value of Costs (PVC)	185,542	133,695
<hr/>		
OVERALL IMPACTS		
Net Present Value (NPV)	587,775	375,696
Benefit to Cost Ratio (BCR)	4.168	3.810

Notes: All monetary values are expressed in 2010 prices discounted to 2010

*Detailed summary results can be found in Section 6. The lower conservative accident benefit is included based upon the use of local accident data, as explained in section 7 of Reference Document 5.7

**Greenhouse gas impacts were calculated using TUBA1.9.2 since there was a bug in TUBA 1.9.1

6.4.2 The results show that the Present Value of Benefits (PVB) of Alternative 2 is estimated to be £509m (inclusive of accident benefits), outweighing the £134m Present Value of Costs (PVC). However the benefits are lower than those for the DCO Scheme reflecting the lack of improved transport connections west of the A140 Cromer Road and the Airport.

6.4.3 The Benefit Cost Ratio (BCR) of Alternative 2 is 3.81 including accidents. Under the DfT's value for money criteria, this represents a high value for money category.

6.4.4 Table 6.6 below compares summary economic appraisal results including wider impacts and journey time reliability for Alternative 2 against the DCO scheme.

Table 6.6: Summary of Economic Appraisal including Wider Benefits – Alternative 2

Item	Scenario also including WEBs and JTR (£000)	
	DCO Scheme	Alternative 2
Present Value of Benefits (PVB)	989,063	549,983
Present Value of Costs (PVC)	185,542	133,695
Net Present Value (NPV)	803,521	416,288
Benefit to Cost Ratio (BCR)	5.331	4.114

Notes: All monetary values are in £000's and expressed in 2010 prices discounted to 2010

6.4.5 The Alternative 2 BCR is improved further to 4.11 once journey time reliability benefits (£9m) and wider economic benefits (£31m) are included in the

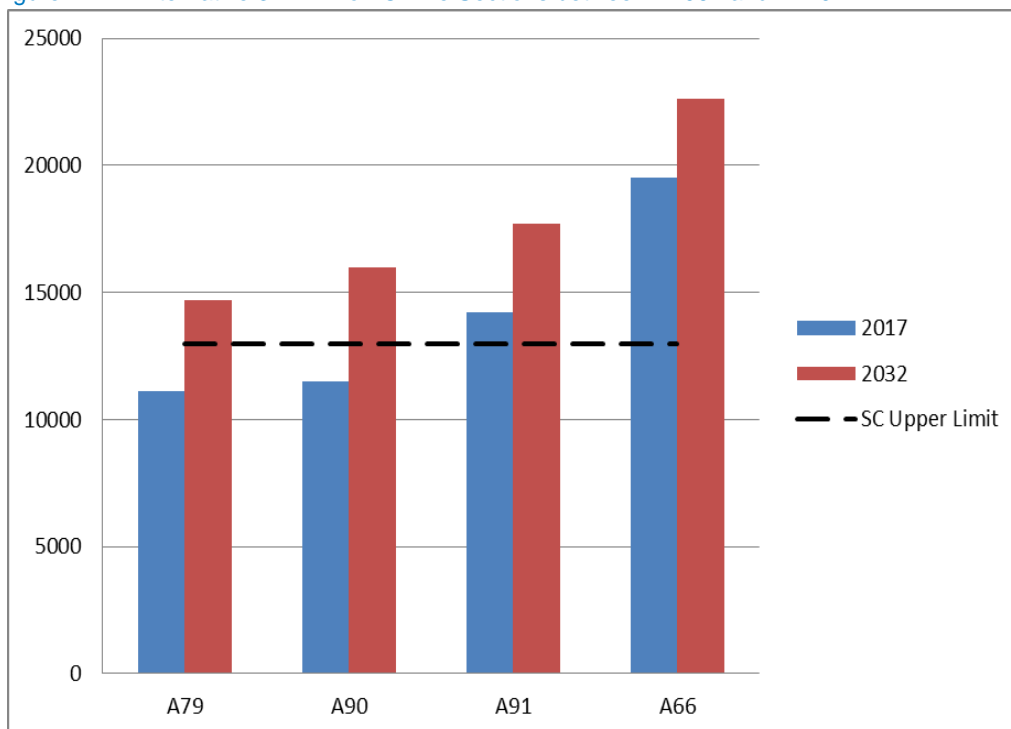
appraisal, although these are substantially lower than the additional benefits for the DCO Scheme (£28m for JTR and £187m for WEBs). These additional benefits for Alternative 2 amount to £40m (2010 prices discounted to 2010). The inclusion of these benefits increases the BCR from the High to the Very High value for money category.

7 Traffic and Economic Assessment Results for Alternative 3 (single / dual carriageway NDR)

7.1 Traffic Analysis Results

7.1.1 Figure 7.1 below shows the forecast Alternative 3 AADTs on the NDR single carriageway sections between A1067 and A140.

Figure 7.1: Alternative 3 AADT on Online Sections between A1067 and A140



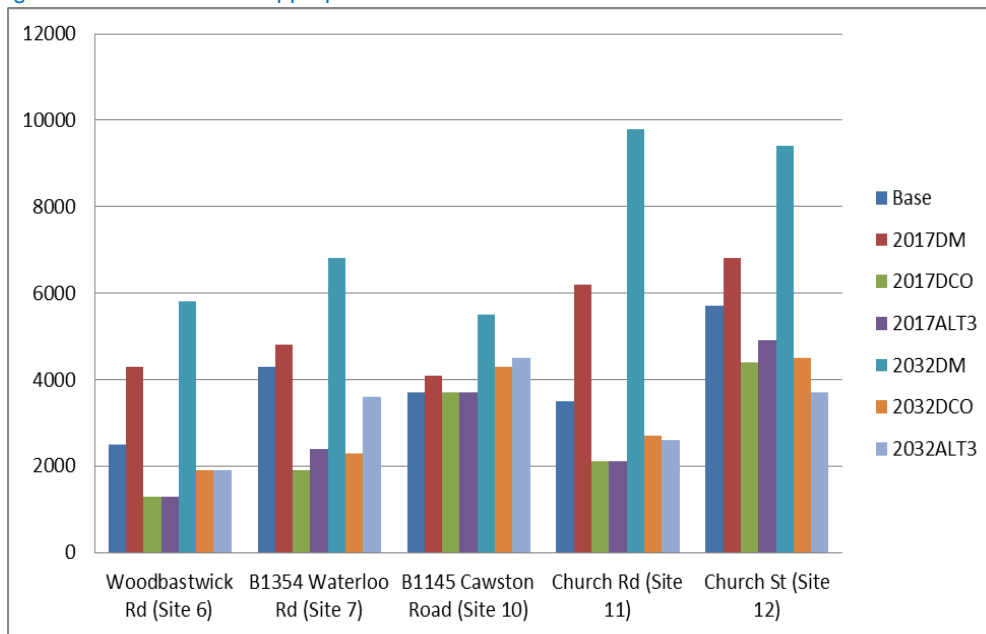
Notes: A79: Fakenham Road - Fir Covert Road Link, A90: Fir Covert Road - Reepham Road Link, A91: Reepham Road - Holt Road Link and A66: Holt Road - Cromer Road Link

7.1.2 The traffic forecasts on the single carriageway sections of Alternative 3 vary between 11,500 AADT between Fakenham Road and Fir Covert Road at the western end of the NDR and 19,500 AADT west of the A140 in the 2017 opening year. Traffic levels on Reepham Road – Holt Road link and Holt Road – Cromer Road link are higher than the economic flow range upper limit in TA46/97 of 13,000 AADT for a single carriageway road. In addition the Alternative requires a roundabout junction with the A140 Cromer Road to provide a safe transition between the single and dual carriageway sections of the Alternative. This would cause additional delays compared with the DCO Scheme and previous work concluded that the roundabout would need to be

upgraded by 2032 to a signal controlled hamburger-type junction in order to function effectively. Whilst Alternative 3 will meet the transport connections objective, the lower standard of the western section and the A140 junction means that there would be a poorer operational performance of Alternative 3 compared with the DCO scheme due to over capacity of the single carriageway and thus reduced attractiveness, such that a proportion of traffic will remain on the existing network. It can also be seen that further traffic increases are forecast for these locations between 2017 and 2032.

7.1.3 Figure 7.2 shows traffic levels on inappropriate routes with Alternative 3.

Figure 7.2: Traffic on Inappropriate Routes – Alternative 3



7.1.4 As shown in the above figure traffic conditions in the northwest sector (sites 7 and 10) will not be relieved as much as those in the northeast sector with Alternative 3. This trend is similar to the Alternative 2 but with more relief in this case. Taking Waterloo Road route as an example, it is forecast to experience a reduction in two way AADT flow of 2,400 (50%) in 2017 in comparison with the traffic flow that would otherwise would occur in the 'Do Minimum' scenario. In 2032 the reduction is 3,200 (47%). By contrast, in the DCO scenario, the reduction on the same site is 2,900 (60%) in 2017 and 4,500 (66%) in 2032 respectively.

Alternative 3 will provide relief to roads and communities to the west of the A140, but to a lesser degree than the DCO Scheme. The traffic levels on School Road in Drayton are forecast to reduce from an AADT level in 2017 in

the Do Minimum of 11,400 to 10,100 with Alternative 3 (9,400 with the DCO Scheme). Similarly in 2032 the traffic level in the Do Minimum of 12,600 AADT would reduce to 10,500 (10,200 with the DCO Scheme).

7.2 Junction Analyses

7.2.1 Table 7.1 to Table 7.3 compare maximum RFC/DoS values, queues and delays for online NDR junctions to the west of A140 between the DCO Scheme and Alternative 3 for 2032DS AM and PM peaks. The results show that the junctions generally perform very slightly better in Alternative 3 than in the DCO Scheme. This is due to the overall attractiveness of NDR being reduced due to it being a single carriageway to the west of A140 which results in slightly lower flows all along its length. The reductions in traffic flows on the junctions shown in Table 7.1 are however smaller in Alternative 3 than in Alternative 1 where the whole length of the NDR is single carriageway. Accordingly, the differences in results between Alternative 3 and the DCO Scheme are smaller than those for Alternative 1 compared with the DCO Scheme.

Table 7.1: Junction Operational Assessment Results_Alternative 3 – 2032 Max RFC/DoS

Junction	AM		PM	
	DCO Scheme	Alternative 3	DCO Scheme	Alternative 3
Online junctions				
Fakenham Road	0.52	0.52	0.52	0.49
Fir Covert Road	0.55	0.54	0.51	0.59
Reepham Road	0.57	0.63	0.64	0.57
Drayton Lane	1.09	0.92	0.96	0.90
Holt Road/Drayton Lane	0.51	0.49	0.44	0.44
Cromer Road South	0.86	-	0.97	-
Cromer Road North	0.98	-	0.61	-
Cromer Road*	-	0.91	-	0.71

Notes: *Some arms of this roundabout are signalised in 2032, this junction therefore has been assessed in LINSIG
See notes for Table 5.1 for more information on RFC and DoS

Table 7.2: Junction Operational Assessment Results_Alternative 3 – 2032 Max Queue (PCUs)

Junction	AM		PM	
	DCO Scheme	Alternative 3	DCO Scheme	Alternative 3
Online junctions				
Fakenham Road	1	1	1	1
Fir Covert Road	1	1	1	1
Reepham Road	1	2	2	1
Drayton Lane	39	10	13	8

Junction	AM		PM	
	DCO Scheme	Alternative 3	DCO Scheme	Alternative 3
Holt Road/Drayton Lane	1	1	1	1
Cromer Road South	6	-	20	-
Cromer Road North	18	-	7	-
Cromer Road*	-	17	-	11

Notes: *Some arms of this roundabout are signalised in 2032

Table 7.3: Junction Operational Assessment Results_Alternative 3 – 2032 Max Delay (sec)

Junction	AM		PM	
	DCO Scheme	Alternative 3	DCO Scheme	Alternative 3
Online junctions				
Fakenham Road	3	4	4	4
Fir Covert Road	7	6	7	6
Reepham Road	9	6	7	7
Drayton Lane	170	31	59	23
Holt Road/Drayton Lane	5	5	5	5
Cromer Road South	15	-	45	-
Cromer Road North	56	-	38	-
Cromer Road*	-	38	-	28

Notes: *Some arms of this roundabout are signalised in 2032

7.3 Safety Analysis Results

7.3.1 Alternative 3 safety analysis results in Table 7.4 show that there would be a slight reduction in the number of personal injury accidents compared with the DCO Scheme submission analysis. However there is an increase in fatal and serious injury casualty types due to part of the scheme being a single carriageway standard. Hence overall there is a slight reduction in safety economic benefits compared with the DCO Scheme.

Table 7.4: Accident Benefits – Alternative 3

60 Year Appraisal Period	Scenario	
	DCO Scheme	Alternative 3
Do Minimum		
Number of PIAs	70,984	70,984
Casualties	Fatal	1,890
	Serious	12,597
	Slight	91,490
Accident Costs	5,999,332	5,999,332
Do Something		

Number of PIAs		69,944	69,866
Casualties	Fatal	1,898	1,901
	Serious	12,488	12,493
	Slight	90,226	90,055
Accident Costs		5,958,113	5,960,100
Accident Benefits			
Number of PIA savings		1,041	1,118
Casualties	Fatal	-7	-11
	Serious	109	104
	Slight	1,263	1,435
Accident Savings		41,219	39,232

Notes: All monetary values are expressed in £000's in 2010 prices discounted to 2010

7.4 Economic Analysis Results

7.4.1 Table 7.5 below compares monetised costs and benefits including accident benefits for Alternative 3 against the DCO scheme.

Table 7.5: Analysis of Monetised Costs and Benefits – Alternative 3

Item	Accidents included (£000)	
	DCO Scheme	Alternative 3
Accidents (not assessed by TUBA)*	41,219	39,232
Greenhouse Gases**	-22,756	-20,815
Economic Efficiency: Consumer Users (Commuting)	51,164	26,483
Economic Efficiency: Consumer Users (Other)	380,623	306,744
Economic Efficiency: Business Users and Providers	267,797	212,603
Wider Public Finances (Indirect Taxation Revenues)	55,270	51,107
Present Value of Benefits (PVB)	773,317	615,354
<hr/>		
Broad Transport Budget Present Value of Costs (PVC)	185,542	167,205
<hr/>		
OVERALL IMPACTS		
Net Present Value (NPV)	587,775	448,149
Benefit to Cost Ratio (BCR)	4.168	3.680

Notes: All monetary values are expressed in 2010 prices discounted to 2010

*Detailed summary results can be found in Section 6. The lower conservative accident benefit is included based upon the use of local accident data, as explained in section 7 of Reference Document 5.7

**Greenhouse gas impacts were calculated using TUBA1.9.2 since there was a bug in TUBA 1.9.1

7.4.2 The results show that the Present Value of Benefits (PVB) of Alternative 3 is estimated to be £615m (inclusive of accident benefits), outweighing the £167m Present Value of Costs (PVC).

7.4.3 The Benefit Cost Ratio (BCR) of Alternative 3 is 3.68 including accidents. Under the DfT's value for money criteria, this represents a High value for money category.

7.4.4 Table 7.6 below compares summary economic appraisal results including wider impacts and journey time reliability for Alternative 3 against the DCO Scheme.

Table 7.6: Summary of Economic Appraisal including Wider Benefits – Alternative 3

Item	Scenario also including WEBs and JTR (£000)	
	DCO Scheme	Alternative 3
Present Value of Benefits (PVB)	989,063	809,516
Present Value of Costs (PVC)	185,542	167,205
Net Present Value (NPV)	803,521	642,311
Benefit to Cost Ratio (BCR)	5.331	4.841

Notes: All monetary values are in £000's and expressed in 2010 prices discounted to 2010

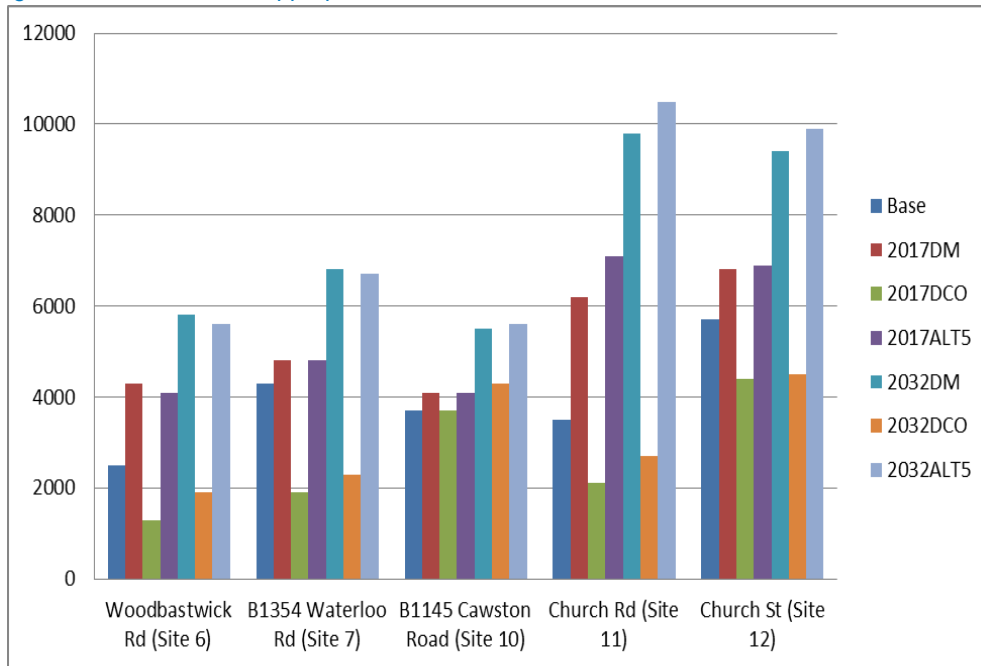
7.4.5 The BCR of Alternative 3 is improved further to 4.84 once journey time reliability benefits (£16m) and wider economic benefits (£178m) are included in the appraisal. These are lower than the additional benefits for the DCO Scheme (£28m for JTR and £187m for WEBs), but not to the same degree as the other Alternatives that have been tested in this report. These additional benefits amount to £194m (2010 prices discounted to 2010). The inclusion of these benefits increases the BCR to a higher level within the very high value for money category. However comparison with the DCO scheme shows that Alternative 3 provides an overall lower BCR.

8 Traffic and Economic Assessment Results for Alternative 5 (developer link roads)

8.1 Traffic Analysis Results

8.1.1 Figure 8.1 shows traffic levels on inappropriate routes for Alternative 5.

Figure 8.1: Traffic on Inappropriate Routes – Alternative 5



8.1.2 As shown in the above figure the traffic levels on the inappropriate routes would remain as high as in the Do Minimum or even increase. The Church Road and Church St routes are, for example, forecast to have a slight increase in two way AADT flows of 900 (15%) and 100 (1%) respectively in 2017 in comparison with the traffic flows in the 'Do Minimum' scenario. In 2032 the increase is 700 (7%) and 500 (5%) respectively. By contrast, in the DCO scenario, the reduction on these two sites are 4,100 (66%) and 2,400 (35%) in 2017 and 7,100 (72%) and 4,900 (52%) in 2032 respectively. These figures demonstrate the Alternative 5 is not capable of reducing traffic on these inappropriate routes and would singularly fail to meet this scheme objective.

8.1.3 Table 8.1 below shows city centre through traffic across three cordons. More details on these cordons can be found in Document Reference 5.6. The table shows that traffic crossing the city centre Inner Ring Road cordons is reduced

by a smaller degree with Alternative 5 compared with the DCO Scheme, mostly achieved by the city centre measures that are assumed to be implemented in both cases. However the city centre traffic crossing the outer cordon is reduced by a relatively small amount with Alternative 5 when compared with the reductions achieved by the DCO Scheme and thus there would be significant increases in this traffic over existing levels on the Outer Ring Road with Alternative 5 whereas with the DCO Scheme they are forecast to reduce.

Table 8.1: City Centre Through Traffic (AADT)

Cordon*	2012		2017			2032	
		DM	DCO Scheme	ALT5	DM	DCO Scheme	ALT5
Inner Ring Road Inner Cordon	9,477	8,159	6,787 (-17%)	7,467 (-8%)	9,236	4,726 (-49%)	4,970 (-46%)
Inner Ring Road Outer Cordon	77,825	82,152	78,369 (-5%)	81,058 (-1%)	88,368	80,352 (-9%)	83,413 (-6%)
Outer Ring Road Outer Cordon	68,117	73,691	63,421 (-14%)	70,119 (-5%)	79,151	66,780 (-16%)	76,613 (-3%)

Notes: *More details on Cordons can be found in Document Reference 5.6

8.1.4 A graphical presentation of these results are shown in Figure 8.2 and Figure 8.3.

Figure 8.2: Through Traffic Crossing Cordons in 2017 – Alternative 5

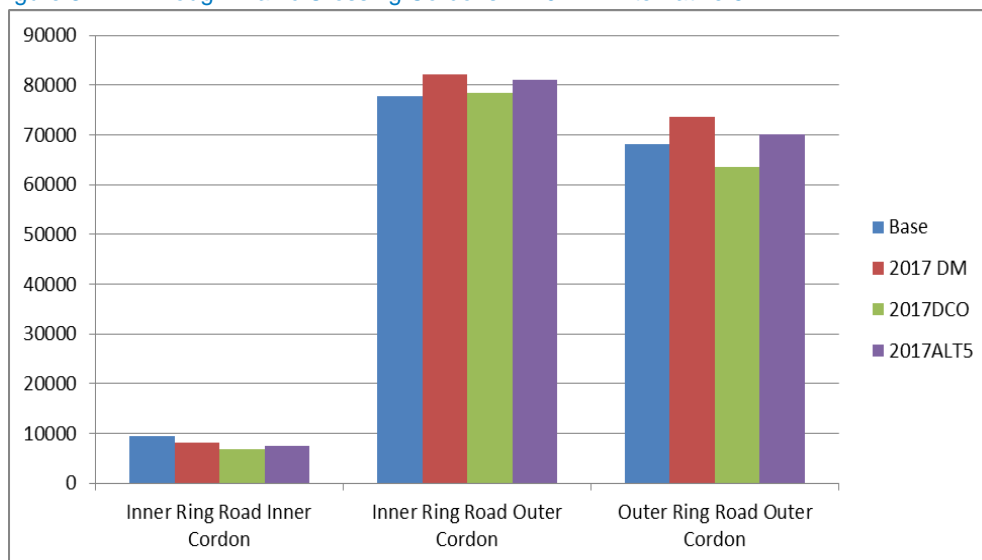
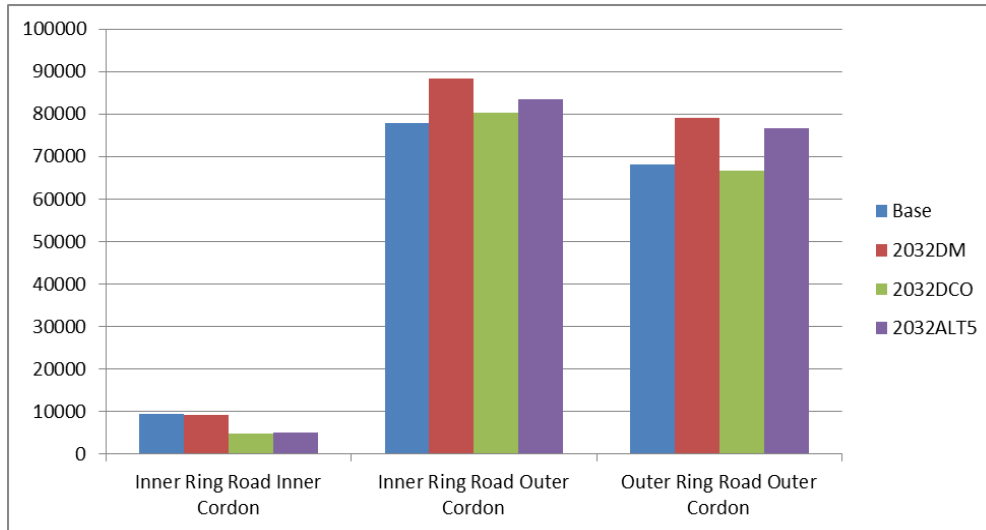


Figure 8.3: Through Traffic Crossing Cordon in 2032 – Alternative 5



8.2 Junction Analyses

8.2.1 Table 8.2 to Table 8.4 compare maximum DoS values, queues and delays for key developer link road signal-controlled junctions between the DCO Scheme and Alternative 5 for 2032DS AM and PM peaks. The results show that the junctions of Spixworth Main Street and St Faith Main Street (new or modified junctions in Alternative 5 so there are not comparable DCO Scheme results) would operate within desirable capacity in Alternative 5. However the junctions of North Walsham Road and Wroxham Road (coded with the developer’s proposals) would operate substantially over their theoretical capacity with long queues and delays, with delays of over 10 minutes at North Walsham Road Junction in the 2032 AM peak, and 5 minutes in the 2032 PM peak. On these grounds the developer link roads would not operate satisfactorily and they would cause particularly severe difficulties in implementing the proposed shared use high street-type design envisaged in the development proposals. The delays would also mean that the Alternative would fail to meet the improved transport connectivity objective for the Scheme.

Table 8.2: Junction Operational Assessment Results_Alternative 5 – 2032 Max DoS

Junction	AM		PM	
	DCO Scheme	Alternative 5	DCO Scheme	Alternative 5
Developer junctions				
Spixworth Main Street*	-	85.3%	-	70.8%
St Faith Main Street*	-	81.7%	-	78.5%
North Walsham Road	92.4%	142.6%	73.6%	125.2%
Wroxham Road	77.7%	131.7%	76.6%	116.2%

Notes: All these are signalised junctions, *These refer to modified/new junctions in Alt5

See notes for Table 5.1 for more information on DoS

Table 8.3: Junction Operational Assessment Results_Alternative 5 – 2032 Max Queue (PCUs)

Junction	AM		PM	
	DCO Scheme	Alternative 5	DCO Scheme	Alternative 5
Developer junctions				
Spixworth Main Street	-	8	-	5
St Faith Main Street	-	5	-	9
North Walsham Road	22	149	13	67
Wroxham Road	16	84	18	77

Notes: All these are signalised junctions, *These refer to modified/new junctions in Alt5

Table 8.4: Junction Operational Assessment Results_Alternative 5 – 2032 Max Delay (sec)

Junction	AM		PM	
	DCO Scheme	Alternative 5	DCO Scheme	Alternative 5
Developer junctions				
Spixworth Main Street	-	97	-	48
St Faith Main Street	-	58	-	47
North Walsham Road	75	656	54	346
Wroxham Road	89	547	91	379

Notes: All these are signalised junctions, *These refer to modified/new junctions in Alt5

8.3 Safety Analysis Results

8.3.1 Alternative 5 safety analysis results in Table 8.5 show that there would be a small number of personal injury accidents saved but that the changes in the numbers of casualties would result overall in safety economic dis-benefits.

Table 8.5: Accident Benefits – Alternative 5

60 Year Appraisal Period		Scenario	
		DCO Scheme	Alternative 5
Do Minimum			
Number of PIAs		70,984	70,984
Casualties	Fatal	1,890	1,890
	Serious	12,597	12,597
	Slight	91,490	91,490
Accident Costs		5,999,332	5,999,332
Do Something			
Number of PIAs		69,944	70,949
Casualties	Fatal	1,898	1,896
	Serious	12,488	12,618
	Slight	90,226	91,463
Accident Costs		5,958,113	6,008,510
Accident Benefits			
Number of PIA savings		1,041	35
Casualties	Fatal	-7	-6
	Serious	109	-21
	Slight	1,263	27
Accident Savings		41,219	-9,178

Notes: All monetary values are expressed in £000's in 2010 prices discounted to 2010

8.4 Economic Analysis Results

8.4.1 Table 8.6 below compares monetised costs and benefits including accident benefits for Alternative 5 against the DCO scheme.

Table 8.6: Analysis of Monetised Costs and Benefits – Alternative 5

Item	Accidents included (£000)	
	DCO Scheme	Alternative 5
Accidents (not assessed by TUBA)*	41,219	-9,178
Greenhouse Gases**	-22,756	-1,943
Economic Efficiency: Consumer Users (Commuting)	51,164	-26,732
Economic Efficiency: Consumer Users (Other)	380,623	58,284
Economic Efficiency: Business Users and Providers	267,797	-302,306
Wider Public Finances (Indirect Taxation Revenues)	55,270	3,420
Present Value of Benefits (PVB)	773,317	-278,455
<hr/>		
Broad Transport Budget Present Value of Costs (PVC)	185,542	24,382
<hr/>		
OVERALL IMPACTS		

Item	Accidents included (£000)	
	DCO Scheme	Alternative 5
Net Present Value (NPV)	587,775	-302,837
Benefit to Cost Ratio (BCR)	4.168	-11.421

Notes: All monetary values are expressed in 2010 prices discounted to 2010
 * Detailed summary results can be found in Section 6. The lower conservative accident benefit is included based upon the use of local accident data, as explained in section 7 of Reference Document 5.7
 **Greenhouse gas impacts were calculated using TUBA1.9.2 since there was a bug in TUBA 1.9.1

8.4.2 The results show that the Present Value of Benefits (PVB) of Alternative 5 is estimated to be £-278m (inclusive of accident benefits). A significant factor in this are the private sector costs of -£44m for the developer link roads which TUBA allocates as negative benefits rather than costs to public accounts as they are private sector funded. The Alternative also produces transport efficiency economic disbenefits as any benefits of the extended link roads are outweighed by the reduced performance due to overcapacity and due to the effects of introducing city centre traffic management measures without significant traffic relief being provided by the Alternative. Set against these PVB results is the £24m Present Value of Costs (PVC) to public accounts.

8.4.3 The Benefit Cost Ratio (BCR) of the scheme is -11.42 including accidents and does not represent good value for money.

8.4.4 Table 8.7 below compares summary economic appraisal results including wider impacts and journey time reliability for Alternative 5 against the DCO scheme.

Table 8.7: Summary of Economic Appraisal including Wider Benefits – Alternative 5

Item	Scenario also including WEBs and JTR (£000)	
	DCO Scheme	Alternative 5
Present Value of Benefits (PVB)	989,063	-495,814
Present Value of Costs (PVC)	185,542	24,382
Net Present Value (NPV)	803,521	-520,196
Benefit to Cost Ratio (BCR)	5.331	-20.335

Notes: All monetary values are in £000's and expressed in 2010 prices discounted to 2010

8.4.5 The BCR of Alternative 5 deteriorates even further to -20.34 once journey time reliability benefits (£-30m) and wider economic benefits (£-187m) are included in the appraisal. These additional dis-benefits amount to £-217m (2010 prices discounted to 2010). The inclusion of these dis-benefits result in a further deterioration of the BCR although it should be noted that the BCR is not a meaningful term when the benefits are negative.

- 8.4.6 The economic appraisal results highlight that the performance of Alternative 5 is especially poor and does not offer good value for money. It should be noted however that the appraisal has not attempted to assess any development benefits that may arise with the link roads.

9 Conclusions

- 9.1.1 **The DCO Scheme** delivers a benefit-to-cost ratio (BCR) of 4.17 (inclusive of accident benefits) and a BCR of 5.33 when WEBs and JTR are included. Both of these represent very high value for money (BCR above 4) according to DfT's VfM criteria.
- 9.1.2 **Alternative 1** (single carriageway NDR) provides the required transport connections, but the lower standard means that there would be a poorer operational performance compared with the DCO Scheme. The forecast traffic flows on a number of the single carriageway links are forecast to be substantially higher than the economic flow range upper limit in TA46/97 of 13,000 AADT for a single carriageway road in the opening year. This reduces the attractiveness of the route for some journeys so that there is less relief of existing routes. The analysis shows less relief on inappropriate routes and for cross city traffic using the Outer Ring Road. The economic appraisal shows a much lower level of benefits than the DCO Scheme resulting in a BCR of 2.42 with accidents and 2.67 with JTR benefits and WEBs included.
- 9.1.3 **Alternative 2** (dual carriageway NDR between Postwick Junction and A140) will not provide the connectivity for journeys west of the A140 and thus will not relieve roads and communities to the west of the A140. In some cases there would be traffic increases, especially on a minor road Hall Lane between the A140 Cromer Road junction and the A1067 which is inappropriate route for the forecast increases in traffic. The economic appraisal shows a lower level of benefits than the DCO Scheme due to the lack of improved transport connections west of the A140 with a BCR of 3.81 including accidents. The benefits are increased with the inclusion of JTR and WEBs to give a BCR of 4.11, but the level of these additional benefits is much lower than calculated for the DCO Scheme due to the poorer connectivity provided by the Alternative.
- 9.1.4 **Alternative 3** (single / dual carriageway NDR) provides the required transport connections, but the lower standard west of the A140 Cromer Road means that there would be a poorer operational performance compared with the DCO Scheme. The forecast traffic flow on the Holt Road – Cromer Road single carriageway link is forecast to be substantially higher than the economic flow range upper limit in TA46/97 of 13,000 AADT for a single carriageway road in the opening year. This together with the A140 at grade junction reduces the attractiveness of the route for some journeys so that there is less relief of existing routes. The analysis shows less relief on inappropriate routes in the

northwest sector. The economic appraisal shows a lower level of benefits than the DCO Scheme resulting in a BCR of 3.68 with accidents and 4.84 with JTR benefits and WEBs included.

- 9.1.5 **Alternative 4** (single / dual carriageway NDR) has not been retested as it provides a small change to the DCO Scheme and therefore the traffic impacts and economic appraisal would be similar.
- 9.1.6 **Alternative 5** (developer link roads) singularly fails to reduce traffic on inappropriate routes and relieve the existing network. Whilst the Alternative includes the city centre traffic management measures the reductions of cross city centre traffic are much smaller compared with the DCO Scheme, especially for trips crossing the Outer Ring Road Cordon. The junction analyses show that North Walsham Road and Wroxham Road junctions would operate substantially over their theoretical capacity with long queues and delays, with delays of over 10 minutes at North Walsham Road Junction in the 2032 AM peak, and 5 minutes in the 2032 PM peak. On these grounds the developer link roads would not operate satisfactorily and they would cause particularly severe difficulties in implementing the proposed shared use high street-type design envisaged in the development proposals. The delays would also mean that the Alternative would fail to meet the improved transport connectivity objective for the Scheme. The economic appraisal results highlight that the performance of Alternative 5 is especially poor and does not offer good value for money. The Alternative produces economic disbenefits as any benefits of the extended link roads are outweighed by the reduced performance due to overcapacity and due to the effects of introducing city centre traffic management measures without significant traffic relief being provided by the Alternative. The calculated BCR is -11.42 with accidents included and even worse with JTR and WEBs giving -20.34 although the BCR is not a meaningful term when the benefits are negative.

10 Appendices

10.1 Appendix A – Traffic Flow Diagrams

10.1.1 Figure 10.1 to Figure 10.20 contain traffic flow information for Alternatives.

Figure 10.1: AADT Traffic Flows Western Section Alternative 1

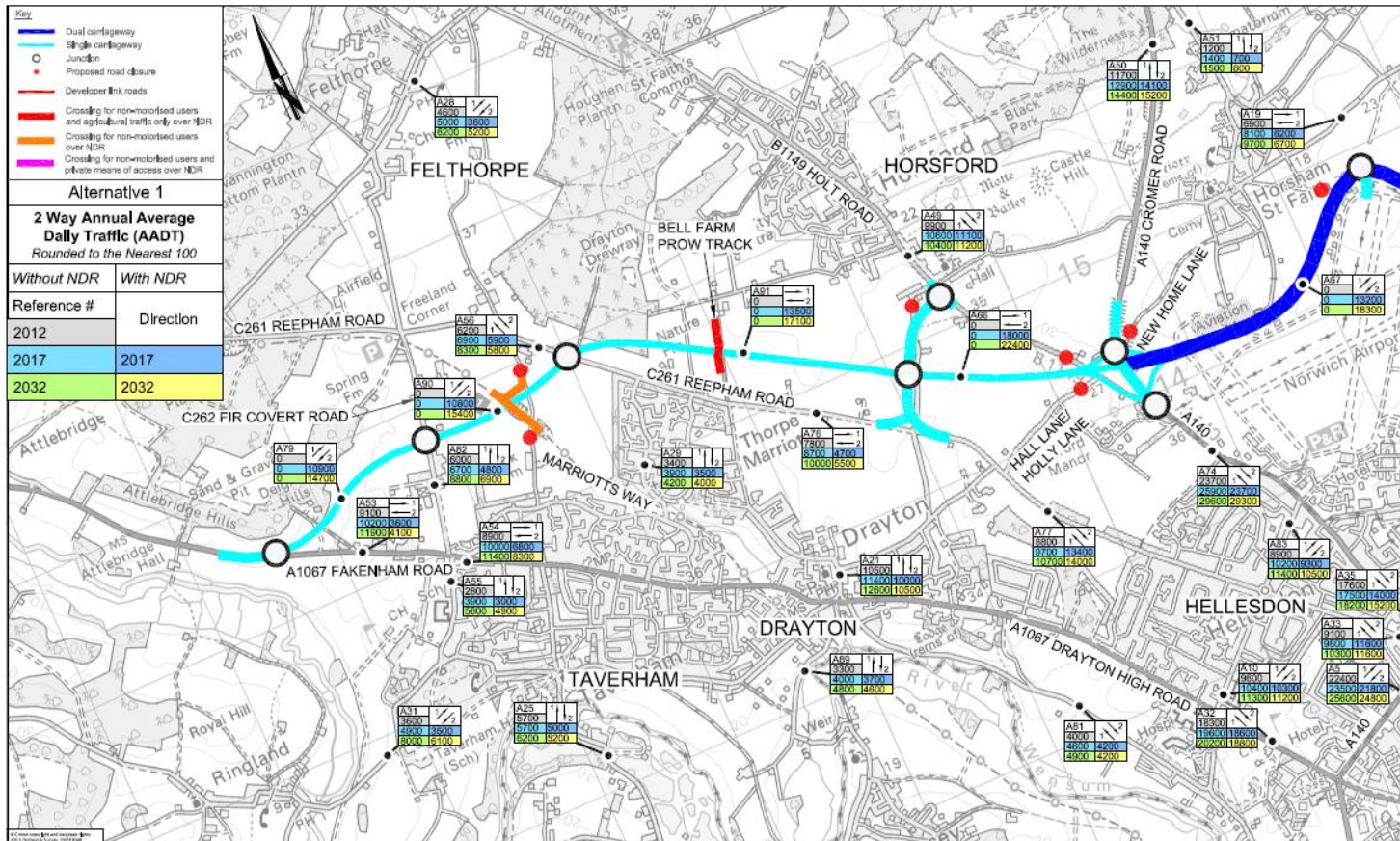


Figure 10.2: AADT Traffic Flows Eastern Section_Alternative 1

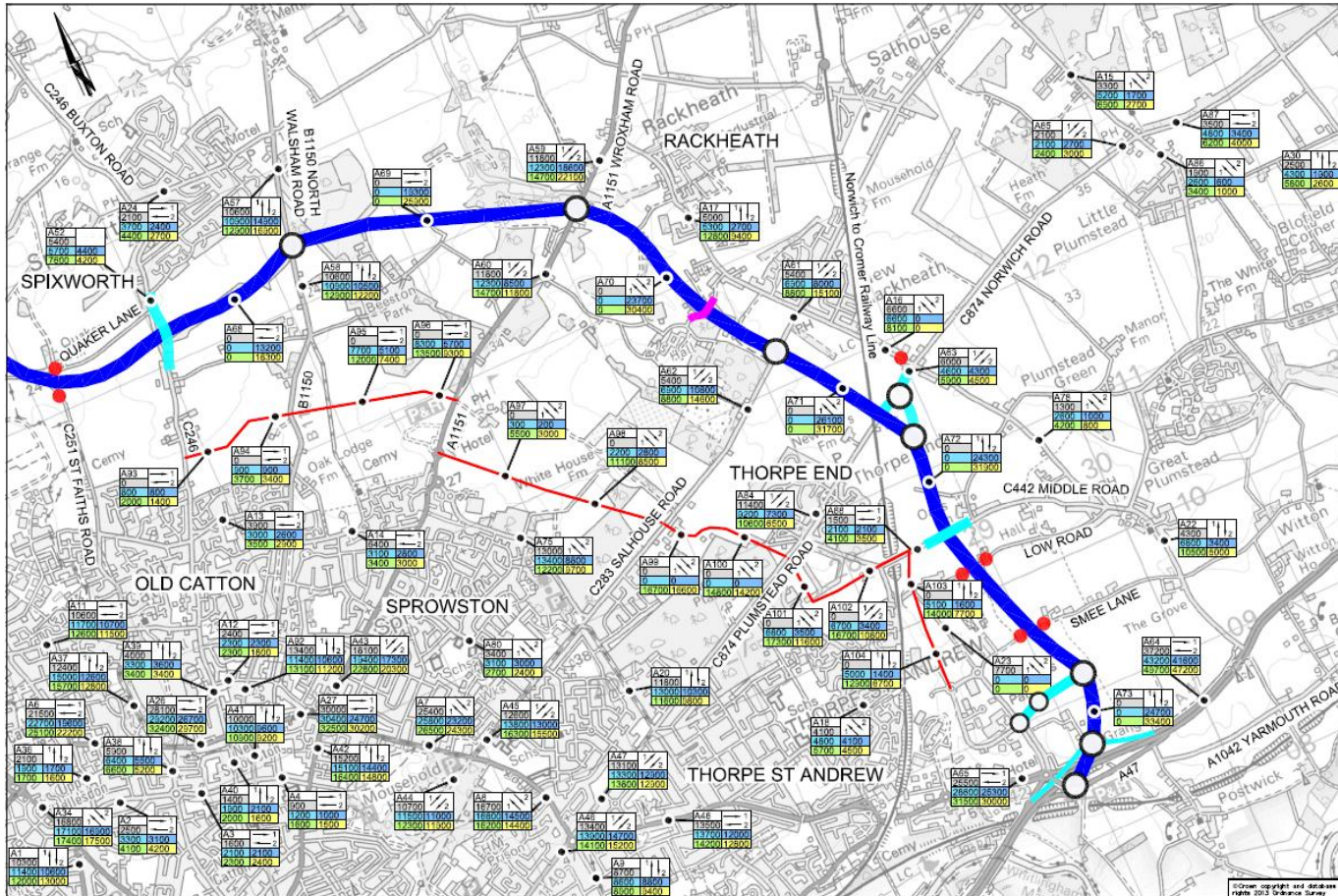


Figure 10.3: AADT Traffic Flows Wensum Valley Section_Alternative 1



Figure 10.4: Strategic Traffic Movements_Altitude 1

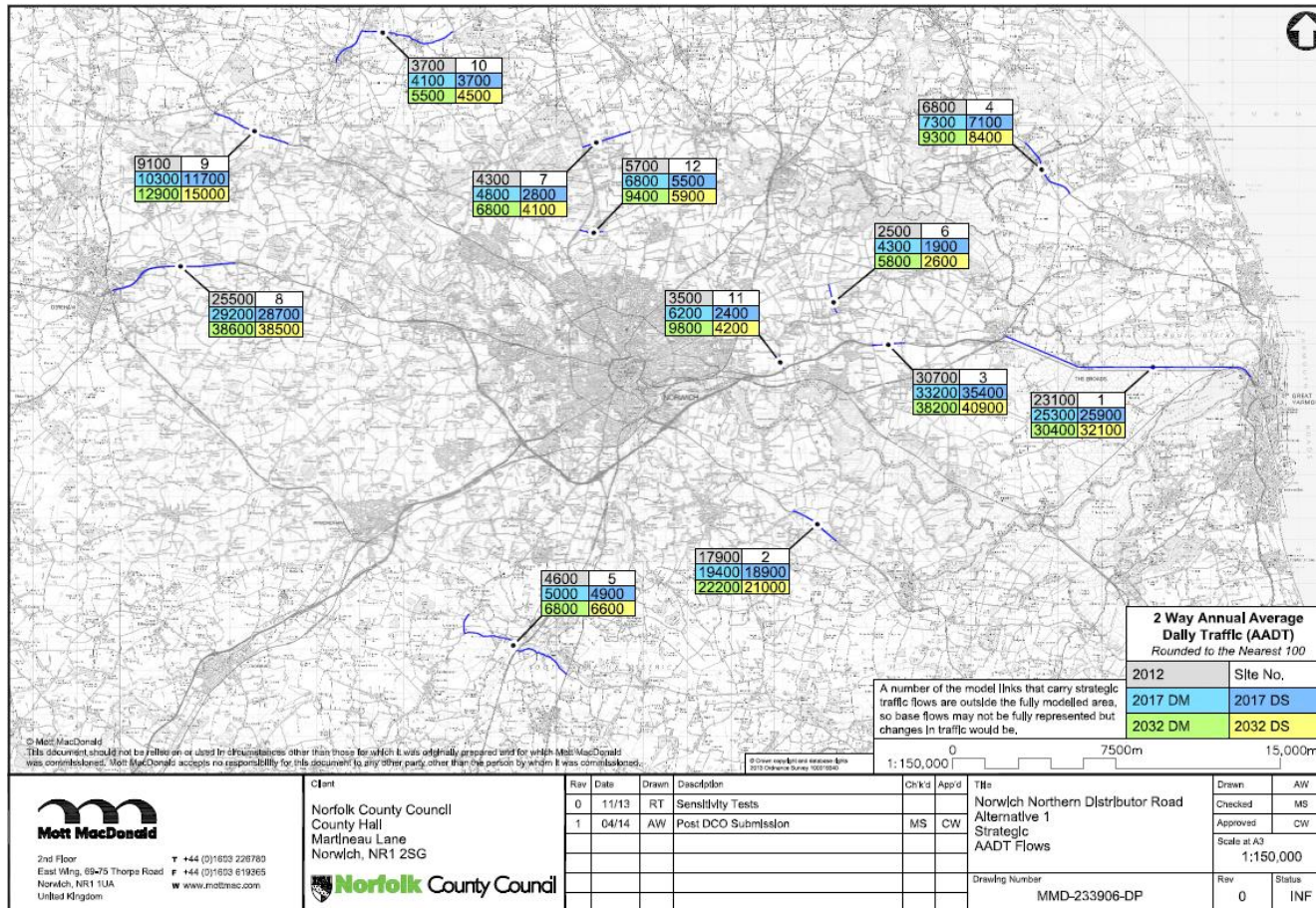


Figure 10.5: City Centre Traffic Impact Alternative 1

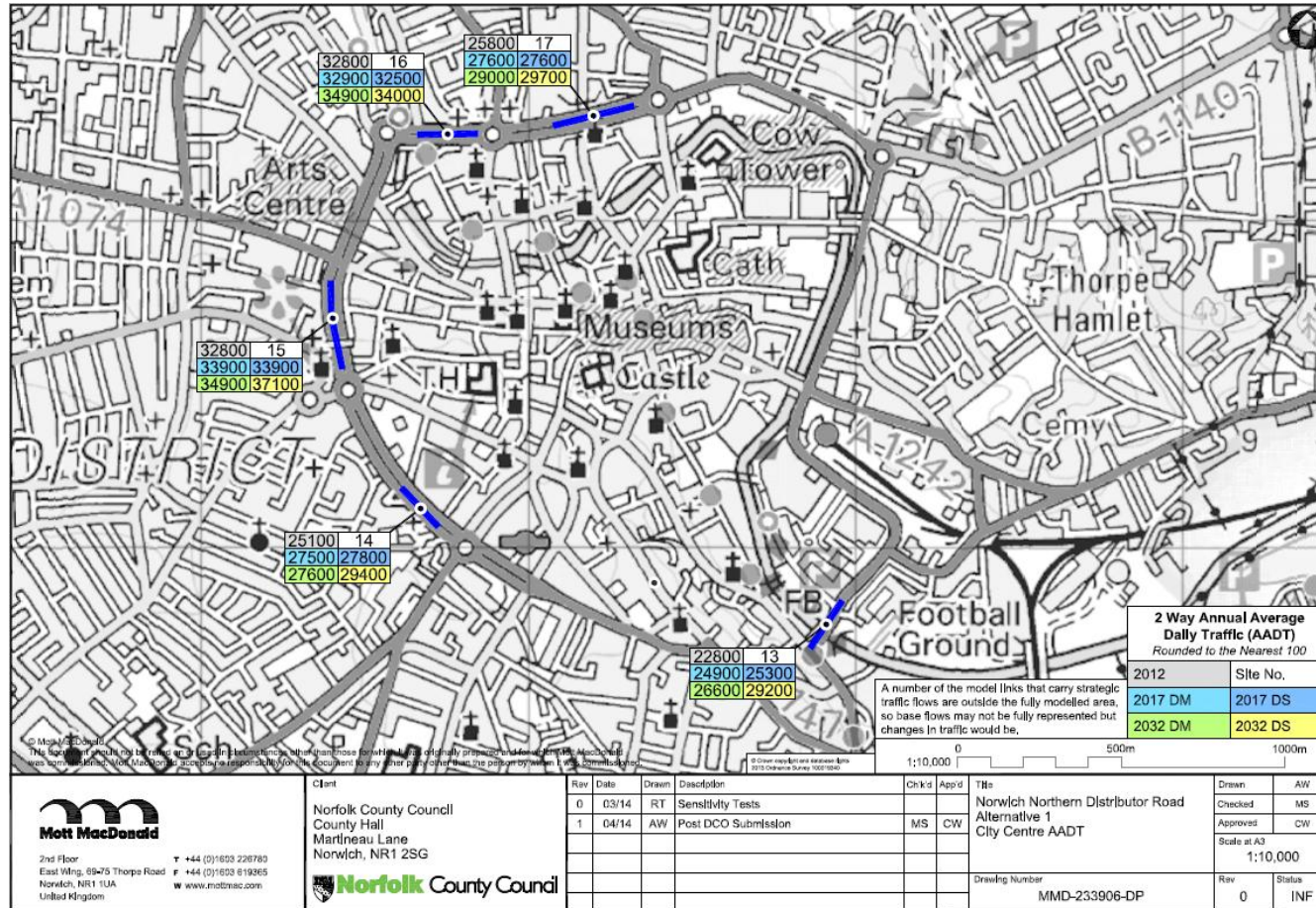


Figure 10.6: AADT Traffic Flows Western Section_Alternative 2

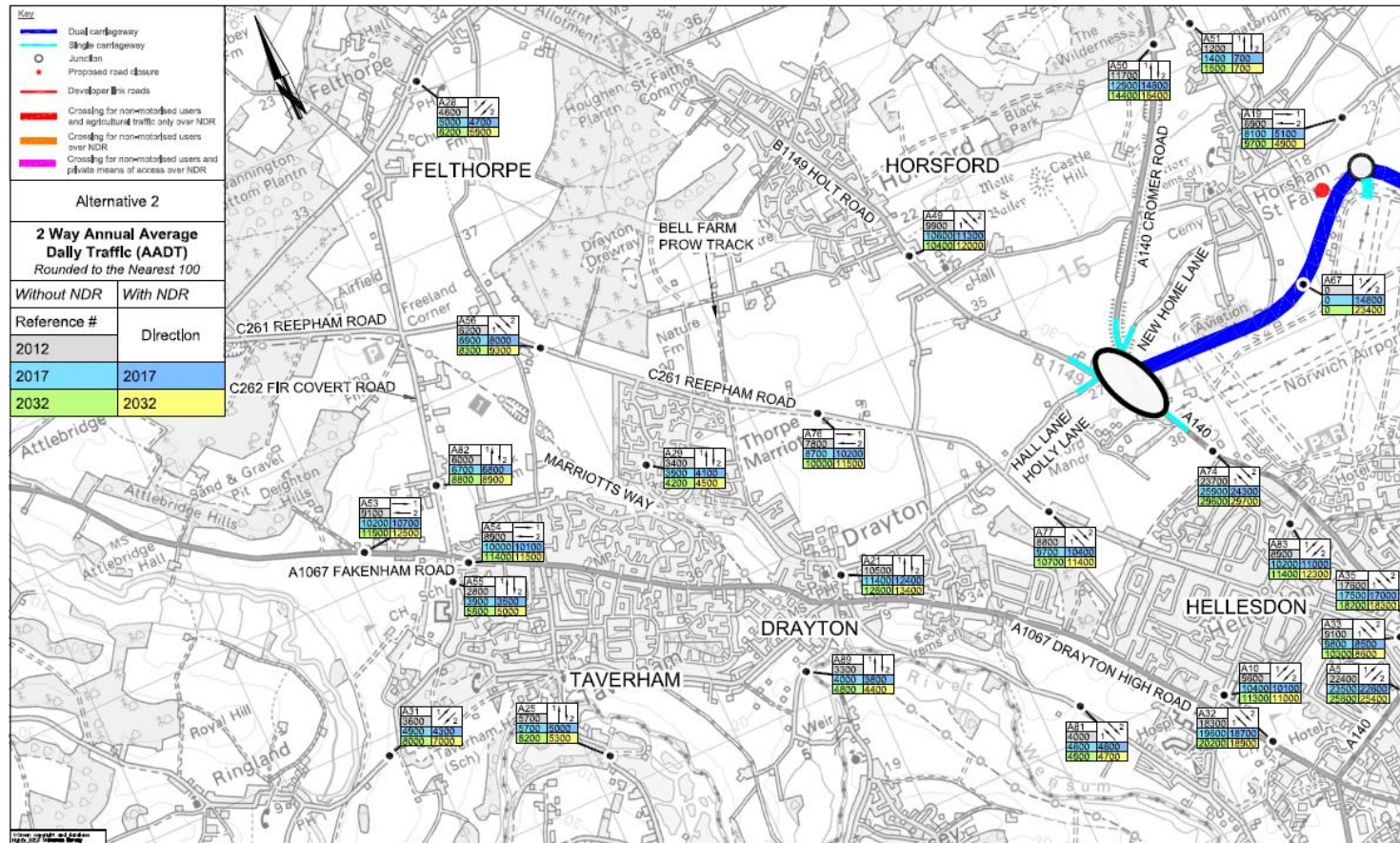


Figure 10.7: AADT Traffic Flows Eastern Section_Alternative 2

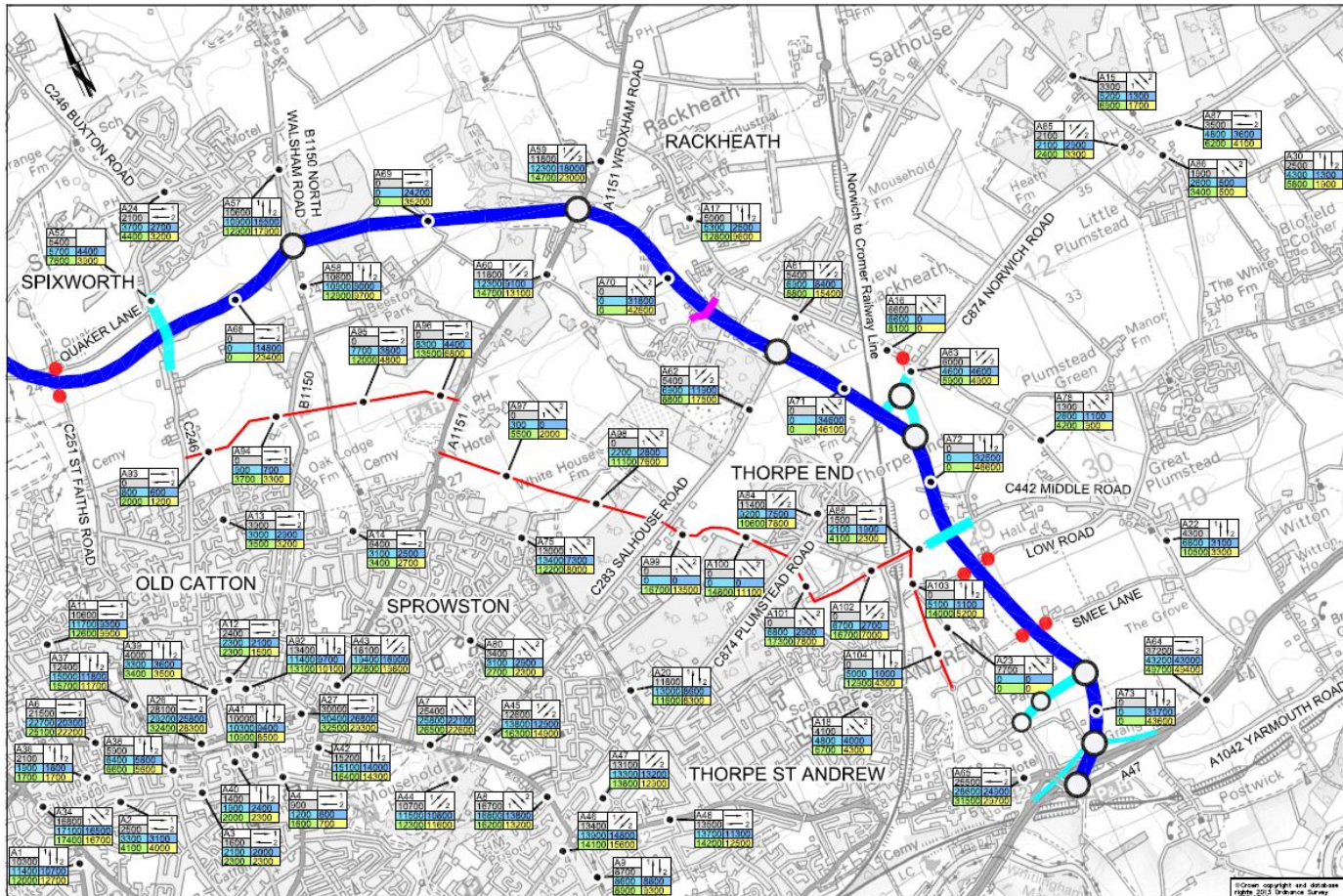


Figure 10.8: AADT Traffic Flows Wensum Valley Section_Alternative 2



Figure 10.9: Strategic Traffic Movements_Altitude 2

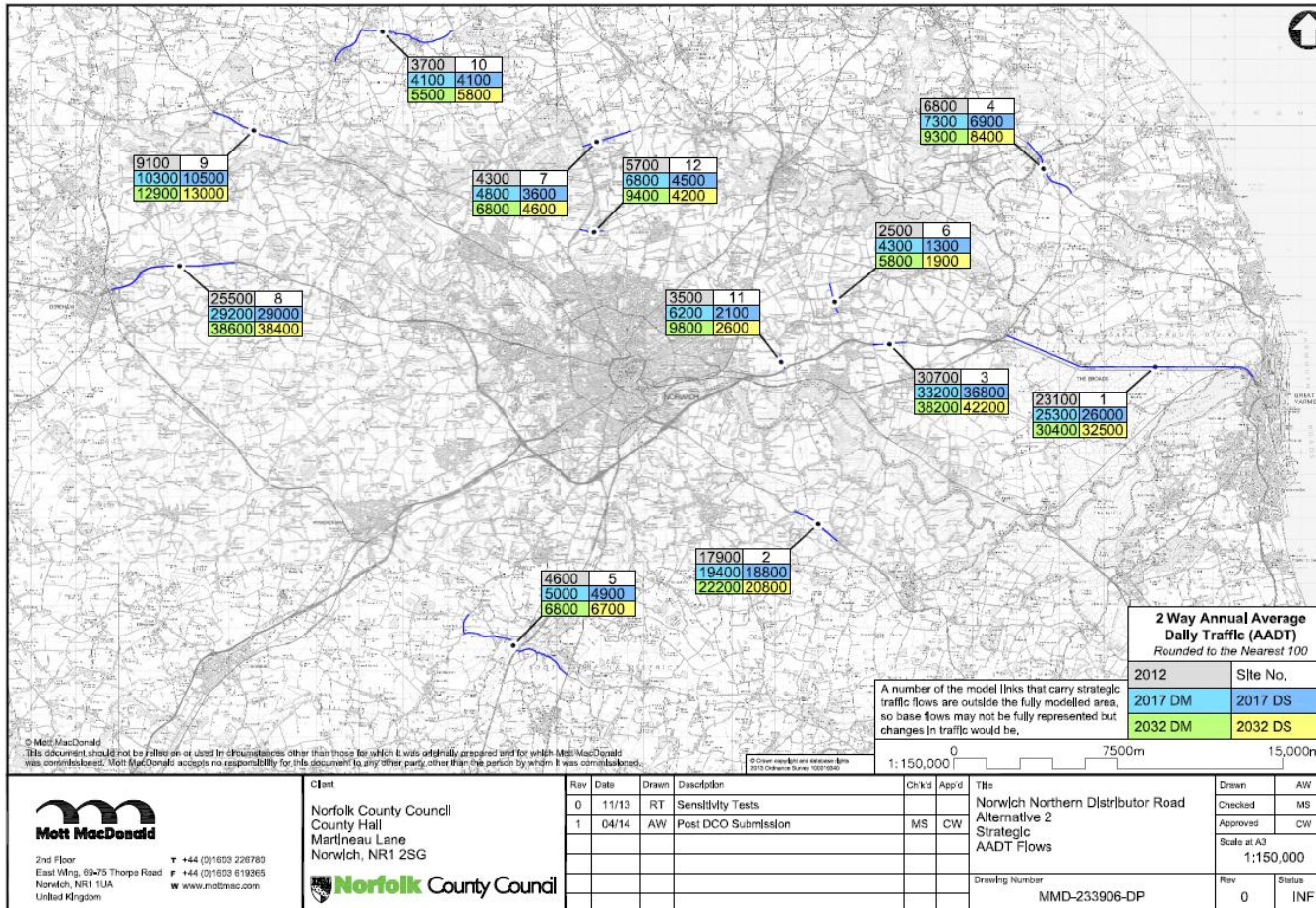


Figure 10.10: City Centre Traffic Impact Alternative 2

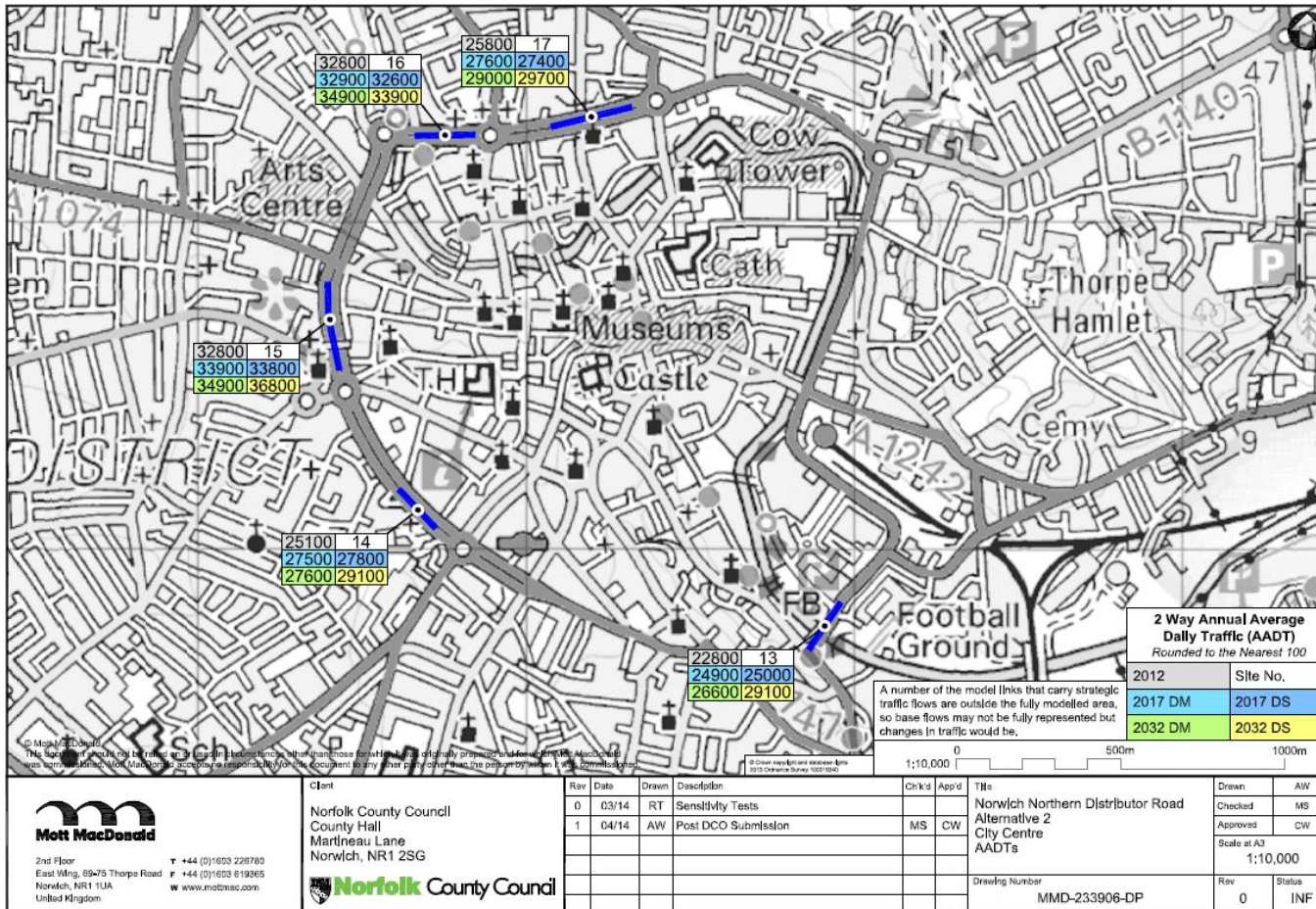


Figure 10.11: AADT Traffic Flows Western Section Alternative 3

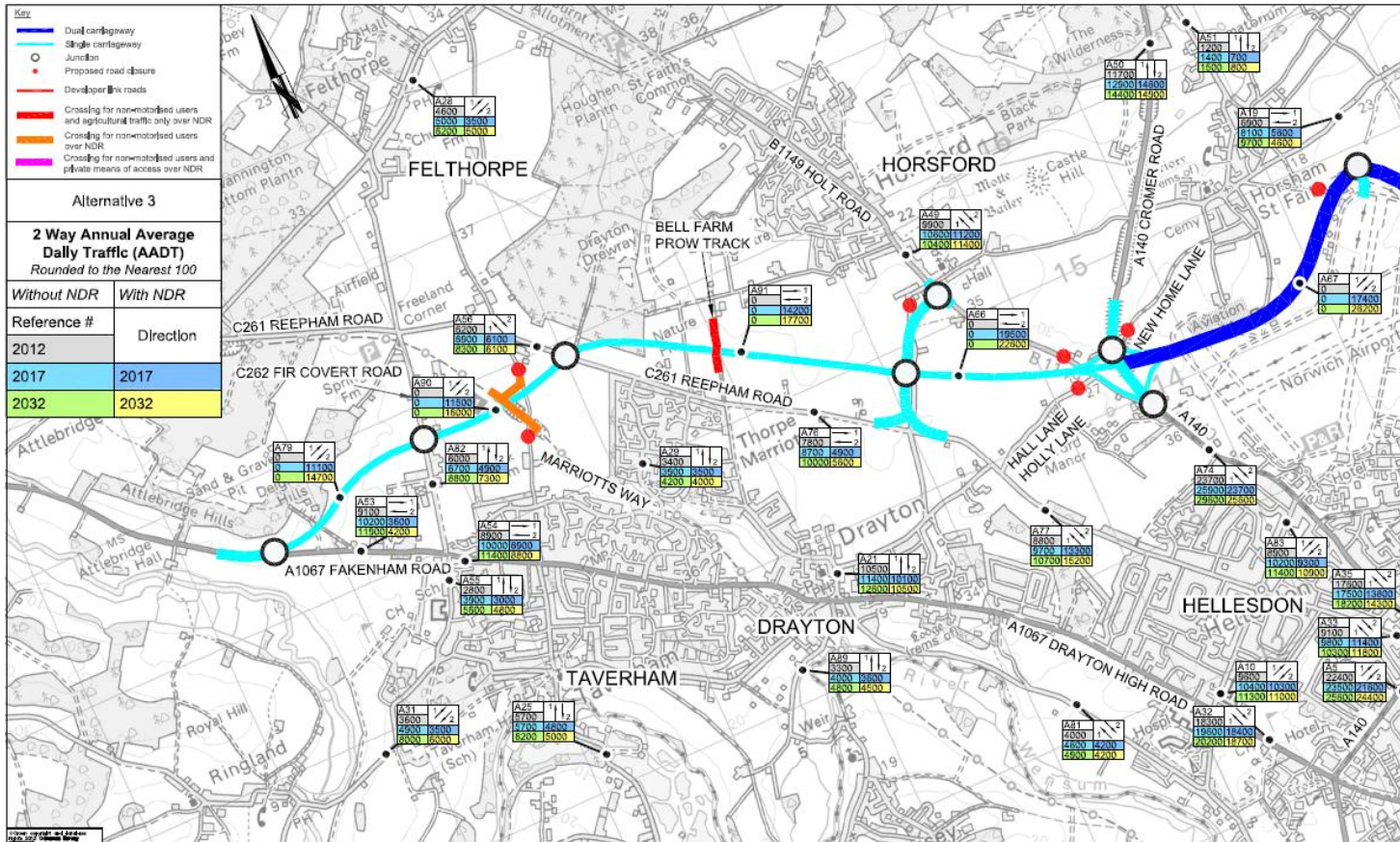


Figure 10.12: AADT Traffic Flows Eastern Section_Alternative 3

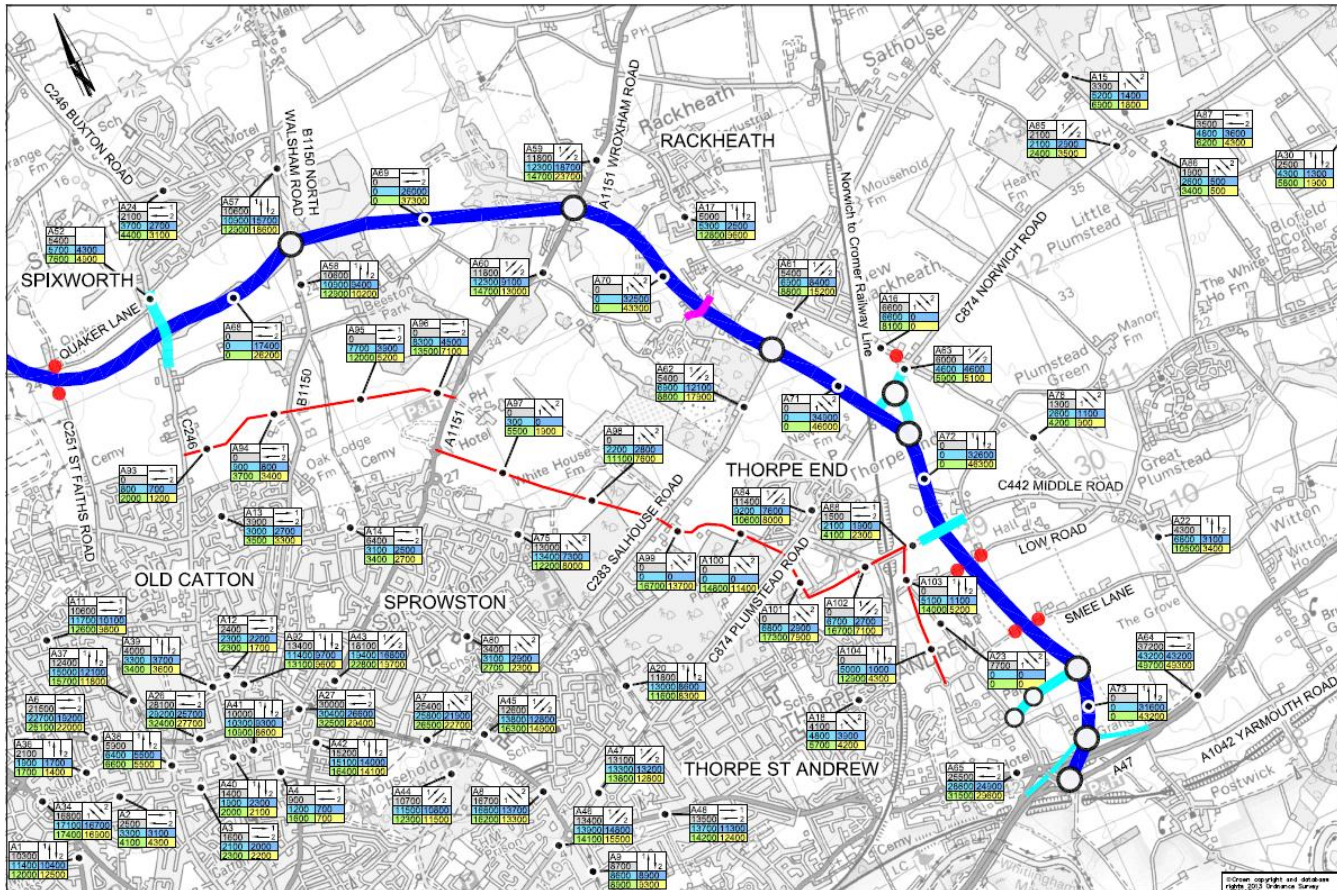


Figure 10.13: AADT Traffic Flows Wensum Valley Section_Alternative 3



Figure 10.14: Strategic Traffic Movements_Altitude 3

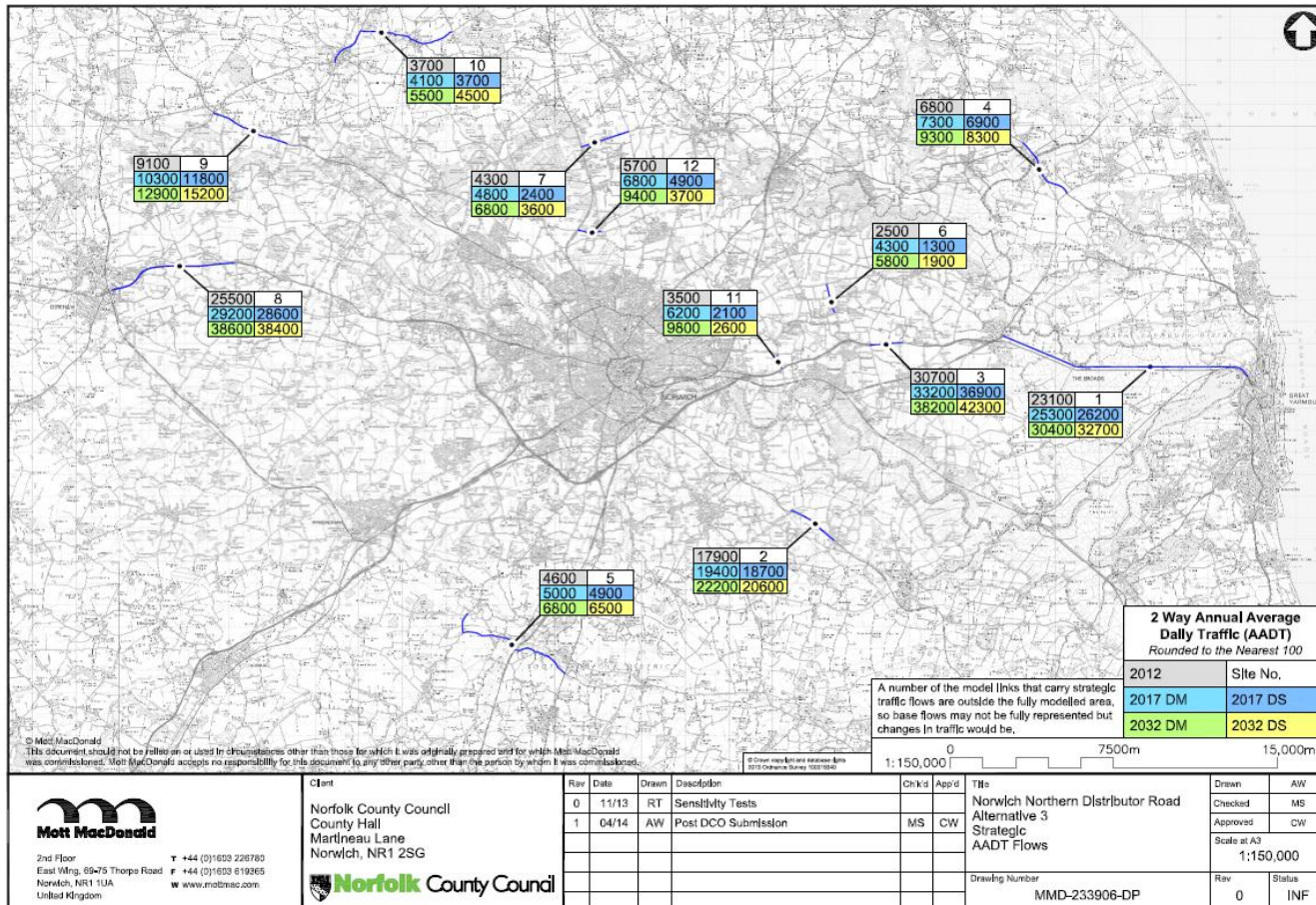


Figure 10.15: City Centre Traffic Impact Alternative 3

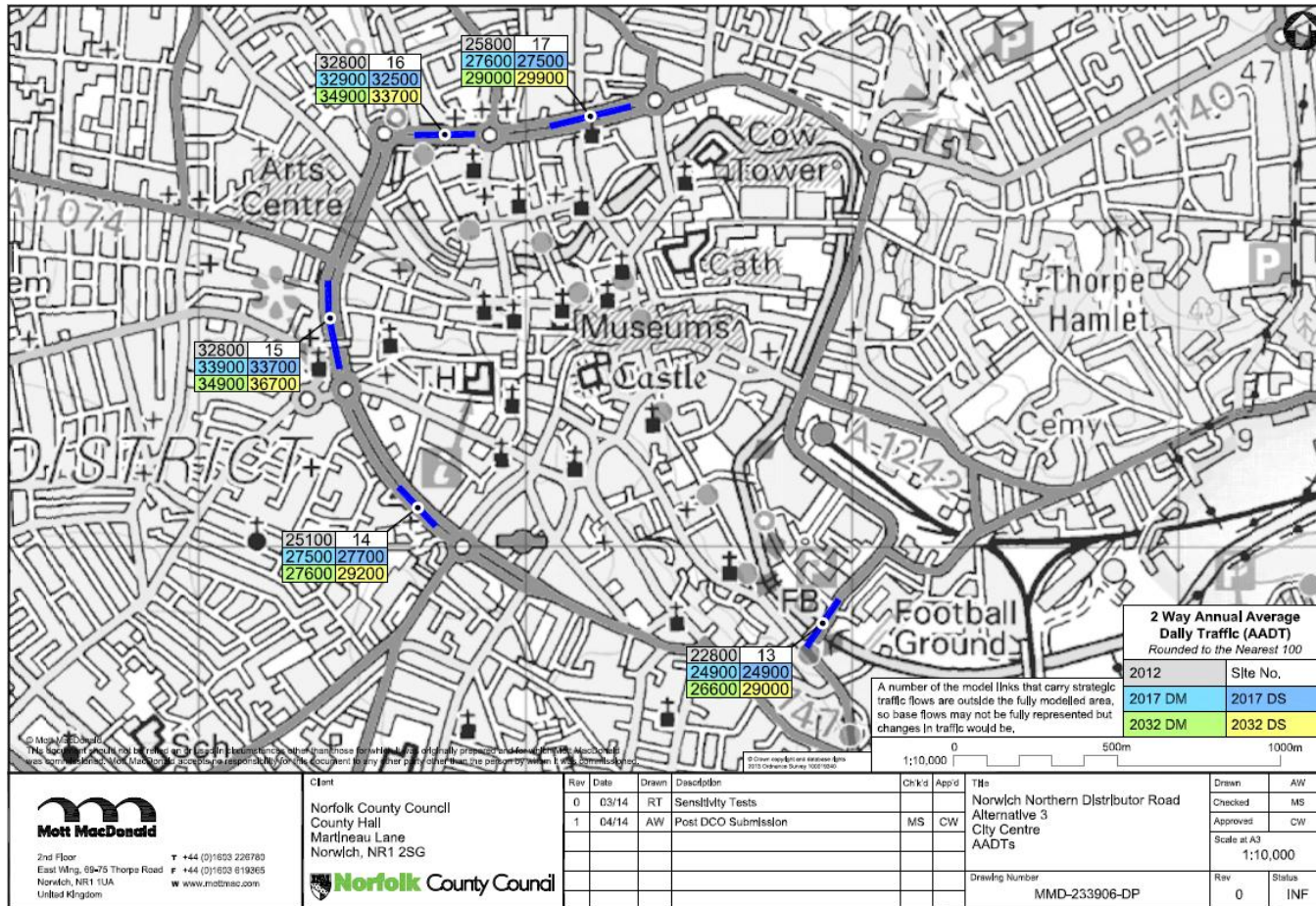


Figure 10.16: AADT Traffic Flows Western Section Alternative 5



Figure 10.17: AADT Traffic Flows Eastern Section_Alternative 5

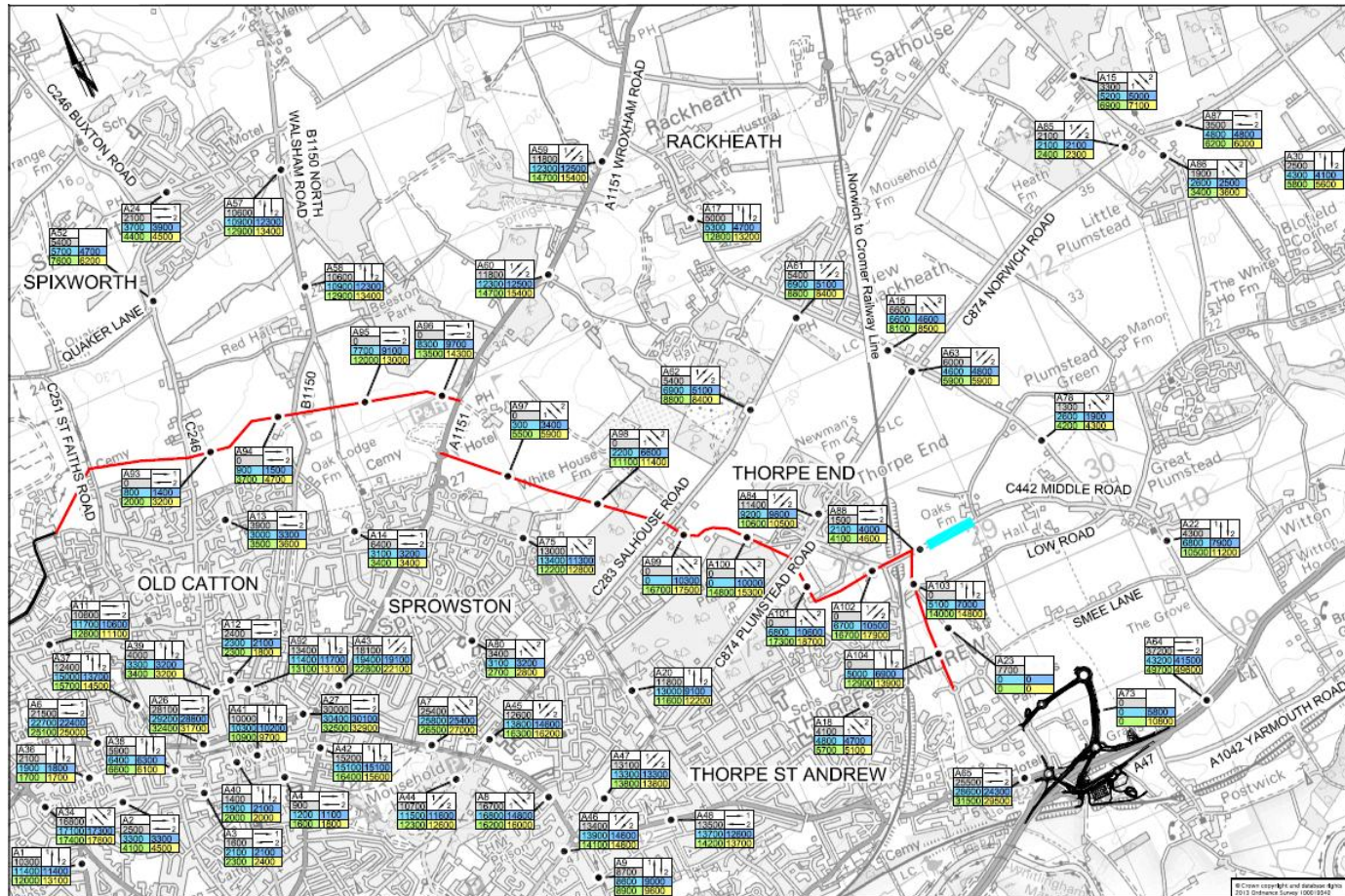


Figure 10.18: AADT Traffic Flows Wensum Valley Section_Alternative 5



Figure 10.19: Strategic Traffic Movements_Altitude 5

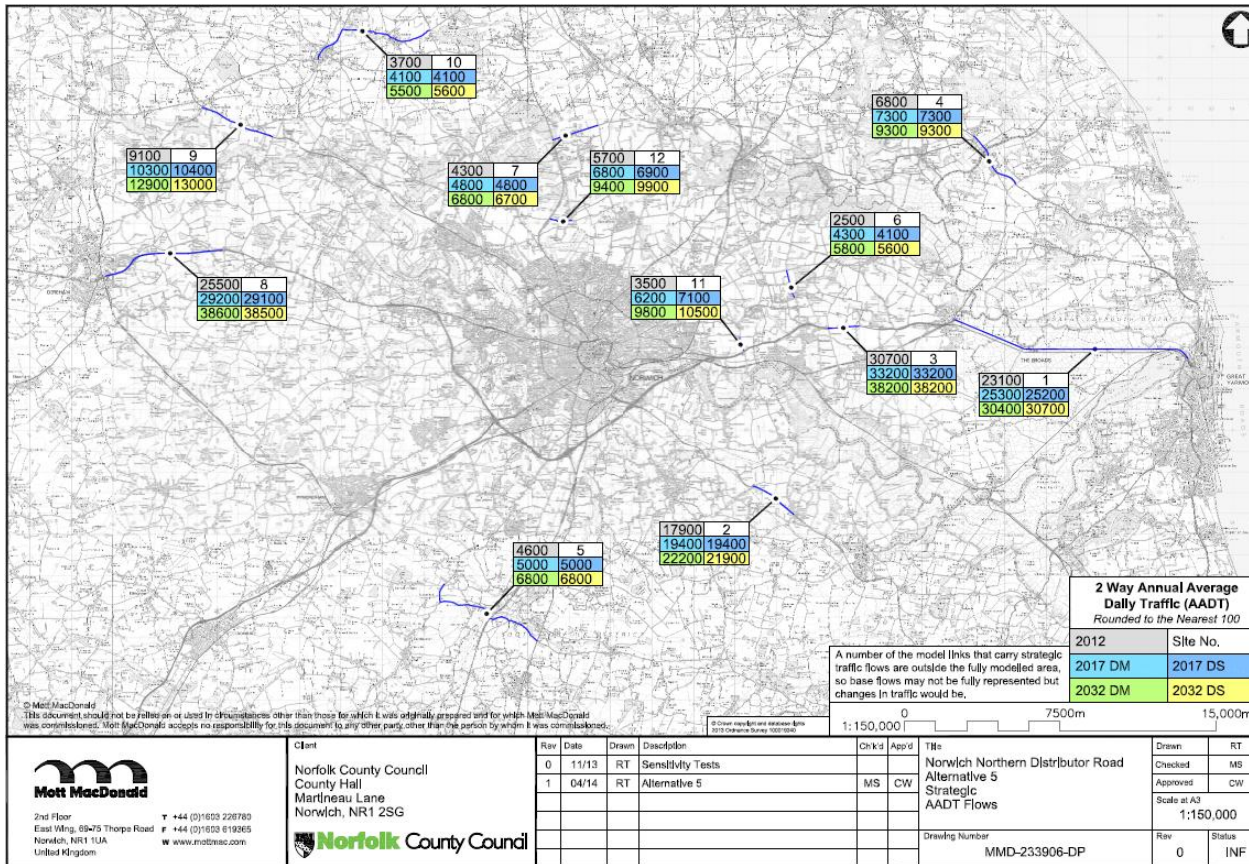
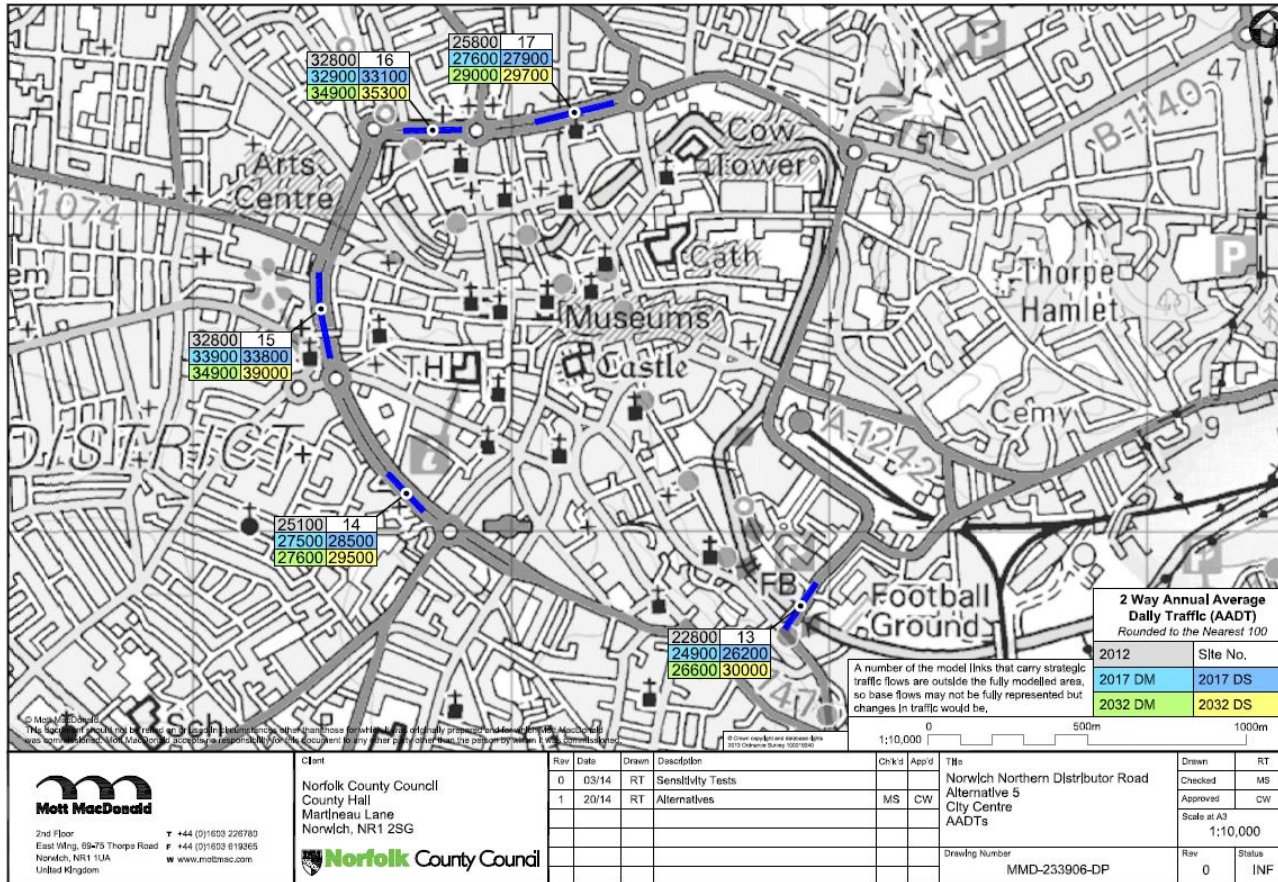


Figure 10.20: City Centre Traffic Impact_Altitude 5



10.2 Appendix B – Public Transport (PT) Option

Methodology

10.2.1 The DCO submission appraisal was based on an updated NATS transport model rebased to 2012 with variable demand forecasts for the NDR proposed opening year of 2017 and design year of 2032. The forecasts assumed full JCS growth both with and without the Scheme. The DCO Scheme comprised both NDR and Postwick.

10.2.2 In addition to the Alternatives tested, an option comprising significant improvements to public transport provision has been assessed. This PT Option comprises significant service improvements as well as quality enhancements and it has been combined with the extended developer link roads defined in Alternative 5.

10.2.3 The same transport model and forecast assumptions were used as applied to the appraisal of the DCO Scheme in the submission and the Alternatives.

10.2.4 Traffic and economic appraisals have been carried out for the PT Option. As with the DCO submission, the economic appraisal calculates TUBA benefits, wider economic benefits (using WITA) and journey time reliability benefits. The safety appraisal was based on COBA.

10.2.5 The costs of the PT Option are shared between the local authority and private sector, as appropriate.

10.2.6 A review of traffic impacts of the PT Option has been carried out and, where appropriate, operational assessment of key junctions has been undertaken.

10.2.7 The following assumptions are made for the analysis:

- The Do Minimum for the PT Option will be identical to that for the DCO Scheme submission.
- The PT Option includes the improvement at Postwick, the proposed city centre measures and the extended developer link roads defined in Alternative 5.
- All assignments are based on full JCS traffic as reference demand.
- The PT Option will be subject to variable demand modelling so the reference demand will be adjusted according to the forecast travel costs. This allows for trips switching between the modelled modes of transport.

Description of the PT Option

10.2.8 Table 10.1 summarises key assumptions and the appraisal required for the PT Option.

Table 10.1: Summary of the PT Option

Option	Modelling Required	Appraisal Required
PT Option (including developer link roads extending to A140 in place of NDR)	<p>Coding DS PT and highway networks and running through demand model for 2017 and 2032</p> <p>Assume 10min frequency throughout the day (0700-1900) for both core and BRT buses. No changes to fare structure. Assumed generalised time savings of 5min and 3.8min for BRT and core buses respectively for soft measures (see Table 3.2 for more details).</p>	<p>Economic and safety appraisal.</p> <p>Traffic forecast changes with DCO</p> <p>Operational assessment of key developer junctions</p> <p>Network performance assessment compared with the DCO scheme</p>

10.2.9 The PT Option contains new Bus Rapid Transit (BRT) services and improvements to core bus routes. These routes are shown in Figure 10.21. In both cases the services are assumed to operate with a high frequency of every 10 minutes. For core bus routes existing services are recoded with the higher frequency, but the BRT services are assumed to be entirely additional to the existing public transport network. A new orbital bus is also added and assumed to operate with a high frequency of every 10 minutes and has a route via extended developer link roads between the Airport P&R and Postwick P&R and stops at major development locations. In total the service improvements would require around an additional 120 buses to be provided by the operators.

10.2.10 The developer link roads and junctions have been coded with proposed highway layouts set out in the developers planning application information.

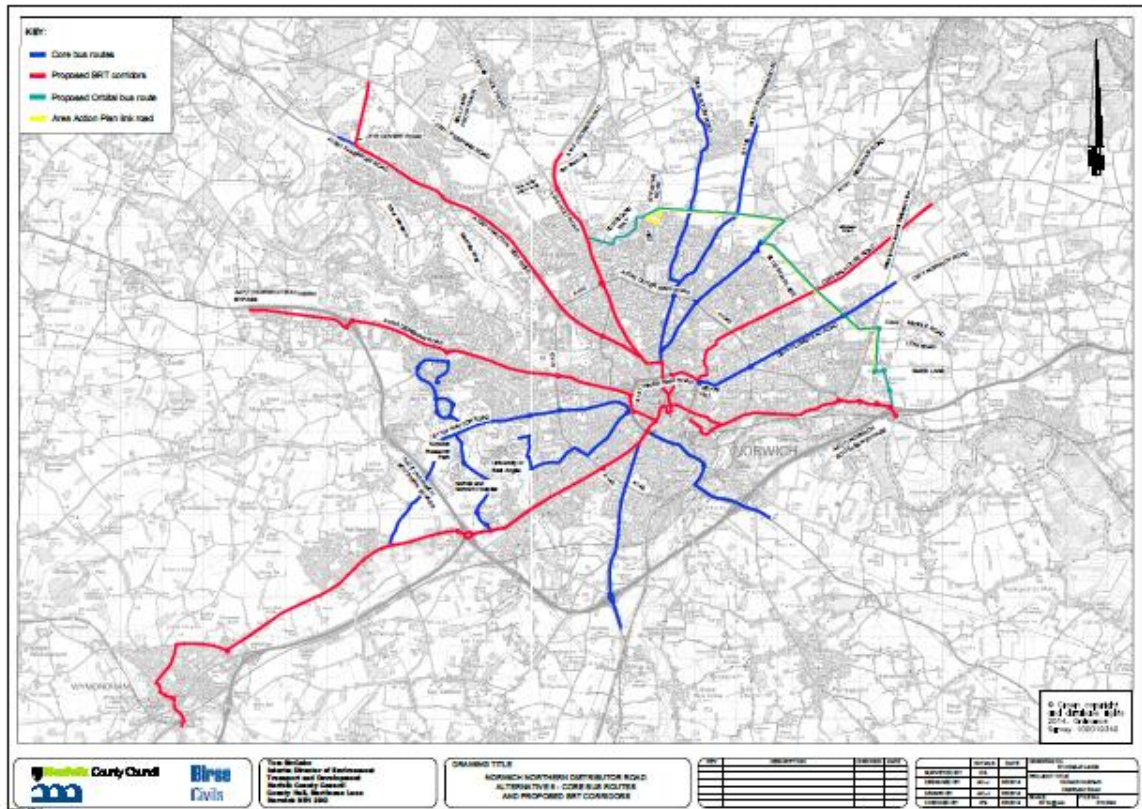
10.2.11 For the PT Option quality improvements are represented using generalised cost savings, in accordance with latest WebTAG guidance. Table 10.2 below shows the assumed generalised time savings for quality improvements for BRT, Core and orbital route buses. The individual savings are those recommended in WebTAG M3.2.

Table 10.2: Generalised Time Savings Assumed for Soft Quality Improvements

Soft Measure	WebTAG Savings* (mins)			Proposed Improvements?		Savings Assumed (mins)	
	Bus users	Car users	Overall	Core/Orbital bus	BRT	Core/Orbital bus	BRT
Audio Announcements	1.22			Yes	Yes	1.22	1.22
Climate Control	1.24			No	Yes	-	1.24
New Interchange Facilities	1.27			Yes	Yes	1.27	1.27
On-Screen Displays	1.90	0.89	1.29	Yes	Yes	1.29	1.29
Total savings						3.78	5.02

Notes: *WebTAG M3.2 Table M3.2.1

Figure 10.21: BRT and Core Bus Routes of the PT Option



PT Option Costs

10.2.12 The PT Option is assumed to include Alternative 5 with the extended developer link roads, so the costs comprise both the link roads and the PT services. The developer link roads in Alternative 5 allow for the orbital bus service to be defined.

10.2.13 The costs for the PT Option have been provided by NCC and are summarised in Table 10.3 below. Costs for the PT Option are allocated to both local government and private sector. It is assumed that the developer link roads will be adopted by the local highway authority once completed, hence the maintenance and operation costs will pass to the local authority. Otherwise the costs of implementing the link roads and expanding the bus fleet to provide the additional buses for the proposed service enhancements is allocated to the private sector.

Table 10.3: Summary Costs of the PT Option

Cost Type	Cost (£m) in 2013Q1 Prices	
	DCO Scheme	PT Option
<i>Investment costs</i>		
Construction	110.2	37.7
Land	22.0	2.4
Preparation	7.8	3.8
Supervision	1.3	0.4
Total investment Cost	141.3	44.3
<i>Other costs</i>		
Maintenance	27.8	5.5
Operation	15.9	1.4
Cost of buses*		1,211.9

Notes: These are initial costs before adjusting for construction price inflation and optimism bias

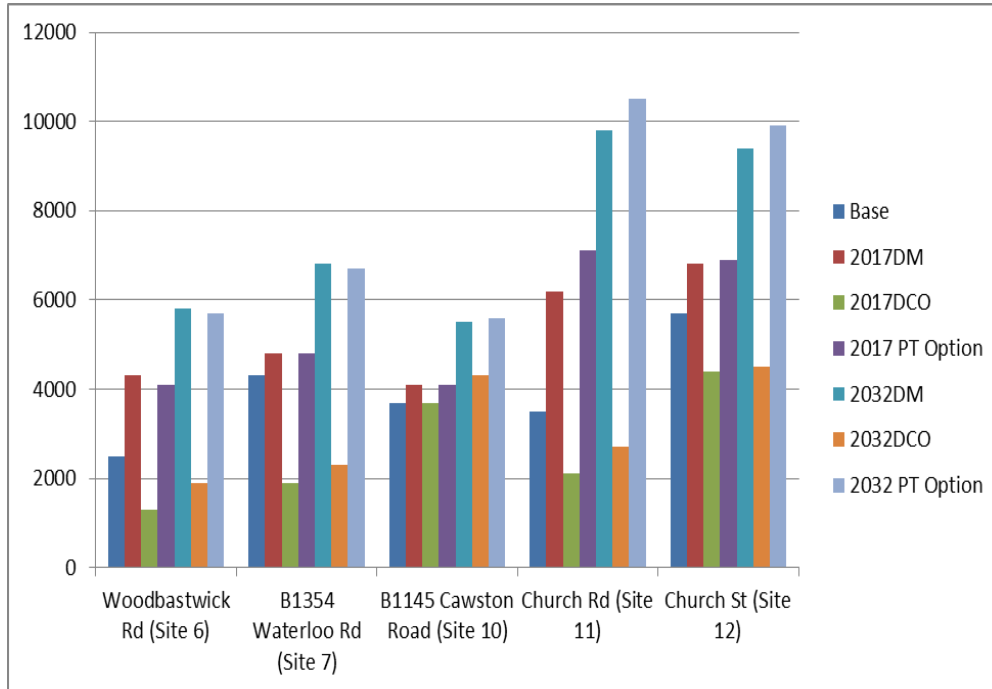
*These include cost of buying buses, maintenance and operation costs. From the total cost mentioned above (£1211.9m), £1,084.5m of this is due to BRT and core bus operating costs over the 60 year appraisal period, the remainder is for bus procurement and maintenance.

10.2.14 Costs were adjusted as per Document Reference 5.7 before inputting into TUBA. It should also be noted that the profiles of construction costs in calendar years input into TUBA for the PT Option were derived by assuming a similar profile to that used for the DCO Scheme.

Traffic Analysis Results

10.2.15 Figure 10.22 shows traffic levels on inappropriate routes for PT Option.

Figure 10.22: Traffic on Inappropriate Routes – PT Option



10.2.16 As shown in the above figure the traffic levels on the inappropriate routes would remain as high as in the Do Minimum or even increase with the PT Option. The Church Road and Church St routes are, for example, forecast to have a slight increase in two way AADT flows of 900 (15%) and 100 (1%) respectively in 2017 in comparison with the traffic flows in the 'Do Minimum' scenario. In 2032 the increase is 700 (7%) and 500 (5%) respectively. By contrast, in the DCO scenario, the reduction on these two sites are 4,100 (66%) and 2,400 (35%) in 2017 and 7,100 (72%) and 4,900 (52%) in 2032 respectively. These figures demonstrate that the PT Option is not capable of reducing traffic on inappropriate routes.

10.2.17 Table 10.4 below contains city centre through traffic across three cordons. More details on these cordons can be found in Document Reference 5.6. The table shows that traffic crossing the city centre Inner Ring Road cordons is reduced by a smaller degree with the PT Option compared with the DCO Scheme, mostly achieved by the city centre measures that are assumed to be implemented in both cases. However the city centre traffic crossing the outer cordon is reduced by a relatively small amount with the PT Option when compared with the reductions achieved by the DCO Scheme and thus there would be significant increases in this traffic over existing levels on the Outer Ring Road with the PT Option whereas with the DCO Scheme they are forecast to reduce.

Table 10.4: City Centre Through Traffic (AADT) for PT Option

Cordon*	2012		2017			2032		
		DM	DCO	PT Option	DM	DCO	PT Option	
Inner Ring Road Inner Cordon			6,787	7,428		4,726	5,025	
	9,477	8,159	(-17%)	(-9%)	9,236	(-49%)	(-46%)	
Inner Ring Road Outer Cordon			78,369	81,105		80,352	83,606	
	77,825	82,152	(-5%)	(-1%)	88,368	(-9%)	(-5%)	
Outer Ring Road Outer Cordon			63,421	70,117		66,780	76,584	
	68,117	73,691	(-14%)	(-5%)	79,151	(-16%)	(-3%)	

Notes: *More details on Cordons can be found in Document Reference 5.6

10.2.18 Graphical presentations of these results are shown in Figure 10.23 and Figure 10.24.

Figure 10.23: Through Traffic Crossing Cordons in 2017 – PT Option

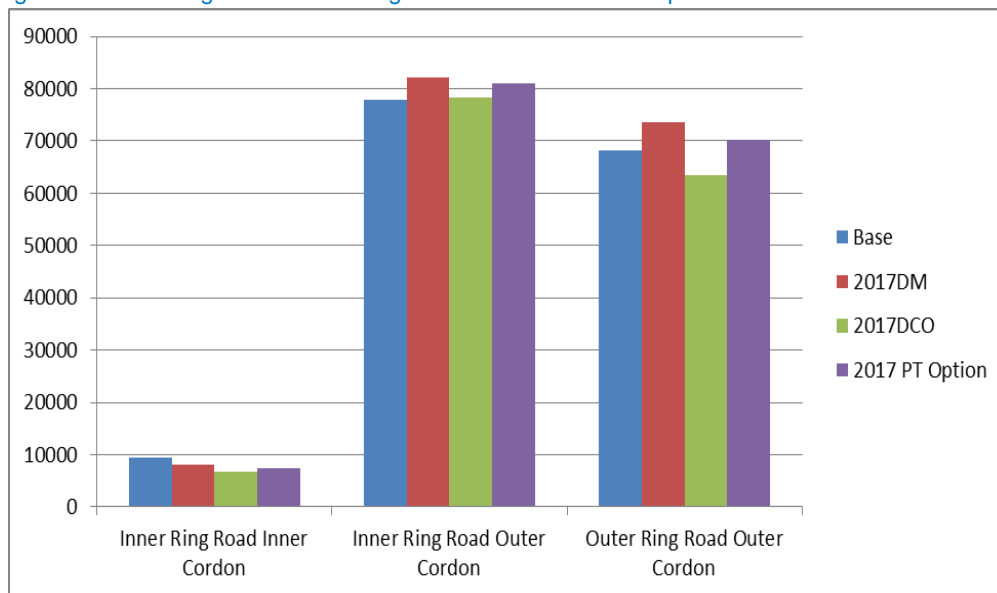
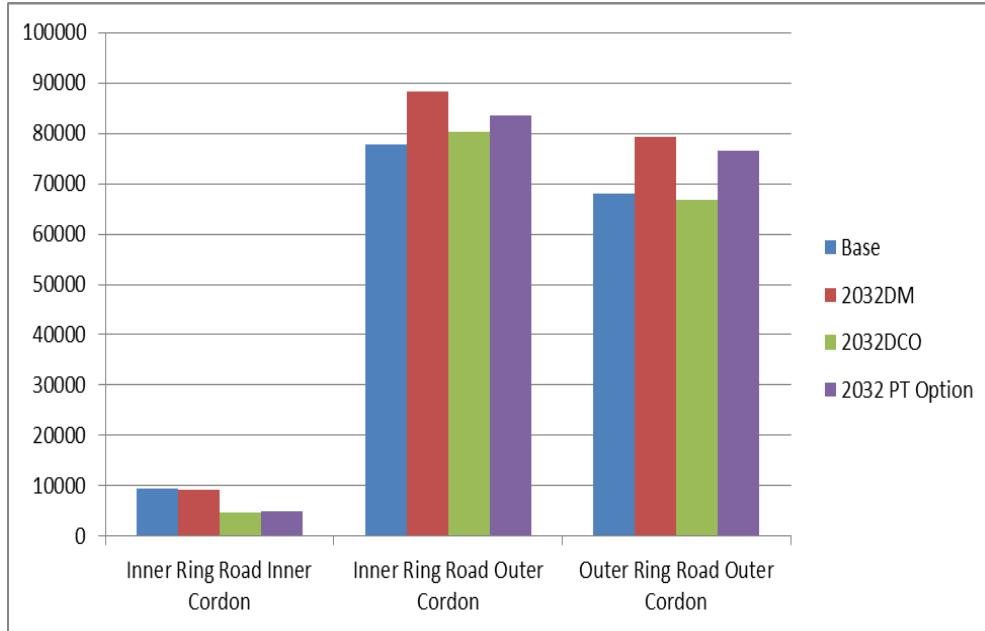


Figure 10.24: Through Traffic Crossing Cords in 2032 – PT Option



Junction Analyses

10.2.19 Table 10.5 to Table 10.7 compare maximum DoS, maximum queue and delay for key developer link junctions between the DCO Scheme and the PT Option for 2032DS AM and PM peaks. The results show that the junctions of Spixworth Main Street and St Faith Main Street (new or modified junctions in the PT Option so they are not comparable with the DCO Scheme results) would operate within desirable capacity in the PT Option. However the junctions of North Walsham Road and Wroxham Road (coded with the developer’s proposals) would operate substantially over their theoretical capacity with long queues and delays, with delays of over 9 minutes in the 2032 AM peak, and 4 minutes in the 2032 PM peak at these two junctions. On these grounds the developer link roads would not operate satisfactorily and they would cause particularly severe difficulties in implementing the proposed shared use high street-type design envisaged in the development proposals. The delays would also mean that the PT Option would fail to meet the improved transport connectivity objective for the Scheme.

Table 10.5: Junction Operational Assessment Results_PT Option – 2032 Max DoS

Junction	AM		PM	
	DCO	PT Option	DCO	PT Option
Developer junctions				
Spixworth Main Street*	-	84.3%	-	64.1%
St Faith Main Street*	-	81.3%	-	77.6%
North Walsham Road	92.4%	135.7%	73.6%	111.4%
Wroxham Road	77.7%	133.3%	76.6%	110.7%

Notes: All these are signalised junctions, *These refer to modified/new junctions in PT Option

Degree of Saturation (DoS) output from LINSIG is the primary measure of performance of a signalised junction. DoS less than 90% indicates that a junction arm operates within capacity. DoS greater than 90% but less than 100% indicates that a junction arm is over its desired capacity but below theoretical capacity. Any DoS greater than 100% indicates that a junction arm is in excess of theoretical capacity.

Table 10.6: Junction Operational Assessment Results_PT Option – 2032 Max Queue (PCUs)

Junction	AM		PM	
	DCO	PT Option	DCO	PT Option
Developer junctions				
Spixworth Main Street*	-	7	-	5
St Faith Main Street*	-	5	-	8
North Walsham Road	22	144	13	53
Wroxham Road	16	88	18	62

Notes: All these are signalised junctions, *These refer to modified/new junctions in PT Option

Table 10.7: Junction Operational Assessment Results_PT Option – 2032 Max Delay (sec)

Junction	AM		PM	
	DCO	PT Option	DCO	PT Option
Developer junctions				
Spixworth Main Street*	-	80	-	47
St Faith Main Street*	-	57	-	46
North Walsham Road	75	565	54	269
Wroxham Road	89	566	91	258

Notes: All these are signalised junctions, *These refer to modified/new junctions in PT Option

Safety Analysis Results

10.2.20 The PT Option safety analysis results in Table 10.8 show that there would be a small number of personal injury accidents saved but that the changes in the numbers of casualties would result overall in safety economic dis-benefits.

Table 10.8: Accident Benefits – PT Option

60 Year Appraisal Period		Scenario	
		DCO	PT Option
Do Minimum			
Number of PIAs		70,984	70,984
Casualties	Fatal	1,890	1,890
	Serious	12,597	12,597
	Slight	91,490	91,490
Accident Costs		5,999,332	5,999,332
Do Something			
Number of PIAs		69,944	70,957
Casualties	Fatal	1,898	1,898
	Serious	12,488	12,624
	Slight	90,226	91,479
Accident Costs		5,958,113	6,011,050
Accident Benefits			
Number of PIA savings		1,041	27
Casualties	Fatal	-7	-8
	Serious	109	-27
	Slight	1,263	11
Accident Savings		41,219	-11,718

Notes: All monetary values are expressed in £000's in 2010 prices discounted to 2010

Economic Analysis Results

10.2.21 Table 10.9 below compares monetised costs and benefits including accident benefits for PT Option against the DCO scheme.

Table 10.9: Analysis of Monetised Costs and Benefits – PT Option

Item	Accidents Included (£000)	
	DCO	PT Option
Accidents (not assessed by TUBA)*	41,219	-11,718
Greenhouse Gases**	-22,756	-5,431
Economic Efficiency: Consumer Users (Commuting)	51,164	-38,950
Economic Efficiency: Consumer Users (Other)	380,623	-52,941
Economic Efficiency: Business Users and Providers	267,797	-827,699
Wider Public Finances (Indirect Taxation Revenues)	55,270	20,803
Present Value of Benefits (PVB)	773,317	-915,936
Broad Transport Budget Present Value of Costs (PVC)	185,542	26,611
OVERALL IMPACTS		

Item	Accidents Included (£000)	
	DCO	PT Option
Net Present Value (NPV)	587,775	-942,547
Benefit to Cost Ratio (BCR)	4.168	-34.419

Notes: All monetary values are expressed in 2010 prices discounted to 2010
 *Detailed summary results can be found in Section 6. The lower conservative accident benefit is included based upon the use of local accident data, as explained in section 7 of Reference Document 5.7
 **Greenhouse gas impacts were calculated using TUBA1.9.2 since there was a bug in TUBA 1.9.1

10.2.22 The results show that the Present Value of Benefits (PVB) of the PT Option is estimated to be £-916m (inclusive of accident benefits). A major factor in this is the private sector costs which TUBA allocates as negative benefits rather than costs to public accounts as they are private sector funded. This includes the costs of the developer link roads and the additional bus services which amount to -£502. The PT Option also produces transport efficiency economic disbenefits as any benefits of the extended link roads and the bus services are outweighed by the reduced performance due to overcapacity and due to the effects of introducing city centre traffic management measures without significant traffic relief being provided by the PT Option. Set against these PVB results is the £27m Present Value of Costs (PVC) to public accounts.

10.2.23 The Benefit Cost Ratio (BCR) of PT Option is -34.42 including accidents which does not represent good value for money.

10.2.24 Table 10.10 below compares summary economic appraisal results including wider impacts and journey time reliability for PT Option against the DCO scheme.

Table 10.10: Summary of Economic Appraisal including Wider Benefits – PT Option

Item	Scenario also including WEBs and JTR (£000)	
	DCO	PT Option
Present Value of Benefits (PVB)	989,063	-1,230,045
Present Value of Costs (PVC)	185,542	26,611
Net Present Value (NPV)	803,521	-1,256,656
Benefit to Cost Ratio (BCR)	5.331	-46.223

Notes: All monetary values are in £000's and expressed in 2010 prices discounted to 2010

10.2.25 The BCR of the PT Option deteriorates even further to -46.22 once journey time reliability benefits (£-30m) and wider economic benefits (£-284m) are included in the appraisal. These additional dis-benefits amount to £-314m (2010 prices discounted to 2010). The inclusion of these dis-benefits result in

a more negative BCR although it should be noted that the BCR is not a meaningful term when the benefits are negative.

- 10.2.26 The economic appraisal results highlight that the performance of the PT Option is especially poor and does not offer good value for money. It should be noted however that the appraisal has not attempted to assess any development benefits that may arise with the link roads.

Conclusion

- 10.2.27 **PT Option** (PT improvements and developer link roads) fails to reduce traffic on inappropriate routes and relieve the existing network. Whilst it includes the improvements to PT services and city centre traffic management measures the reductions of cross city centre traffic are much smaller compared with the DCO Scheme, especially for trips crossing the Outer Ring Road Cordon. The junction analyses show that the junctions between the developer link roads and North Walsham Road and Wroxham Road would operate substantially over their theoretical capacity with long queues and delays, with delays of over 9 minutes in the 2032 AM peak and 4 minutes in the 2032 PM peak. On these grounds the developer link roads would not operate satisfactorily and they would cause particularly severe difficulties in implementing the proposed shared use high street-type design envisaged in the development proposals. The delays would also mean that the PT Option would fail to meet the improved transport connectivity objective for the Scheme. The economic appraisal results highlight that the performance of the PT Option is especially poor and does not offer good value for money. The Option produces transport efficiency economic disbenefits as any benefits of the extended link roads and the improvements to PT are outweighed by the reduced performance due to overcapacity and due to the effects of introducing city centre traffic management measures without significant traffic relief being provided by the Option. The calculated BCR is -34.42 with accidents included and even worse with JTR and WEBs giving -46.22, although the BCR is not a meaningful term when the benefits are negative.

11 Abbreviations

AADT	Annual Average Daily Traffic
ARCADY	Assessment of Roundabout Capacity and Delay software
AST	Appraisal Summary Table
ATC	Automatic Traffic Count
B1/B2/B8	Development categories: business (including office) / general industrial / storage and distribution
BAFB	The Best And Final funding Bid submitted by Norfolk County Council to the Department for Transport in 2011 for the combined Postwick and NDR schemes
BCIS	Building Cost Information Service
BCR	Benefit Cost Ratio
BGBP	Broadland Gate Business Park development
COBA	Cost Benefit Appraisal – software released by the Department of Transport that has been used to undertake an accident appraisal
DfT	Department for Transport
DIADEM	Dynamic Integrated Assignment and Demand Modelling - software released by the Department for Transport
DM	Do Minimum
DMRB	Design Manual for Roads and Bridges – a Highways Agency publication setting out guidance and good practice for design and appraisal of road schemes
DS	Do Something
EB	Employer's Business
GAP	Minimum gap (in seconds) accepted by a vehicle which gives way at priority junctions or traffic signals. Also a measure of Wardrop equilibrium assignment convergence
GAPR	As GAP above in relation to junctions but for entry onto roundabouts
GDP	Gross Domestic Product
GEH	A comparison statistic named after GE Havers
GIS	Geographic Information System - designed to capture, store, manipulate, analyse, manage, and present all types of geographical data
GNDP	Greater Norwich Development Partnership
GPS	Global Positioning System
GVA	Gross Value Added
HA	Highways Agency
HB	Home Based (trips)
HBEB	Home Based Employers' Business (trips)
HBO	Home Based Other (trips)
HBW	Home Based Work (commuter trips)
HGV	Heavy Goods Vehicle
IP	Inter-peak

JT	Journey Time
JCS	Joint Core Strategy
JTR	Journey Time Reliability
LGV	Light Goods Vehicle
LINSIG	Traffic signal analysis software
LMVR	Local Model Validation Report
MCC	Manual Classified Count (for a link)
MCTC	Manual Classified Turning Counts
ME	Matrix Estimation
NATS	Norwich Area Transportation Strategy
NCC	Norfolk County Council
NDR	Norwich Northern Distributor Road
NHB	Non-Home Based (trips)
NHBEB	Non-home-based Employer's Business
NHBO	Non-home-based Other
NPV	Net Present Value – given by subtracting the Present Value Costs (PVC) from Present Value Benefits (PVB)
NTEM	National Trip End Model – a database containing trip-end, journey mileage, car ownership and population/workforce planning data
NTM	National Transport Model
NTS	National Travel Survey
OD	Origin Destination
OE	Other Externalities
OGV	Other Goods Vehicle (sometimes called HGV)
OGV1	A sub-category of OGV. Includes all rigid vehicles over 3.5 tonnes gross vehicle weight with two or three axles
OGV2	A sub-category of OGV. Includes all rigid vehicles with four or more axles and all articulated vehicles
OP	Off-peak
PA	Production Attraction
PCU	Passenger Car Unit
PDL	Previously Developed Land
PG	Planning Gain
PIA	Personal Injury Accident
PPK	Pence Per Kilometre
PPM	Pence Per Minute
PT	Public Transport
PVB	Present Value Benefits – the stream of benefits over the appraisal period (60 years) that are converted to 2010 prices and discounted to 2010 to give a 'present value'
PVC	Present Value Costs – the costs of the scheme over the construction period as well as maintenance and operational costs that are converted to 2010 prices and discounted to 2010 to give a 'present

	value'
PYV	Present Year Validation
P&R	Park and Ride
QRA	Quantified Risk Assessment
RFC	Ratio of Flow to Capacity
RPI	Retail Price Index
RSI	Road Side Interview
RTF	Road Transport Forecasts
SATME2	Matrix estimation module of the SATURN software
SATURN	Simulation – Assignment model of Traffic on Urban Road Networks software
SRN	Strategic Road Network
TA	Transport Assessment
TEC	Transport Externality Cost
TRADS	Traffic flow Data System – the Highways Agency’s database of traffic count data
TRICS	National Trip Generation database
TEMPRO	Trip End Model presentation Program is software released by the Department for Transport to allow detailed analysis of NTEM data
TUBA	Transport User Benefit Appraisal – software released by the Department for Transport that is used to assess transport user benefits of transport schemes
VDM	Variable Demand Modelling
VfM	Value for Money
VISUM	Transport modelling software used (in this case) for public transport modelling
VOC	Vehicle Operating Costs
VOT	Value Of Time
WEBS	Wider Economic Benefits
WebTAG	Web-based Transport Appraisal Guidance produced by the Department for Transport
WITA	Wider Impacts in Transport Appraisal

12 Glossary

Assignment	A process of loading a trip matrix onto routes through a network that accounts for travel costs on the network in identifying the optimum route choice for every trip
Buffer network	The external part of a highway network in which travel is represented by speed/ flow relationships or cruise speeds
Calibration	A process of adjusting the model input data or model parameters to improve the model and its validation
Convergence	An equilibrium between model outputs, in assignment between the flows and travel costs and in demand models between the demand and the costs from the supply model
Cost matrix	A table of travel costs for journeys that may include travel time, operating costs and charges such as tolls or fares
Cruise speeds	Average travel speed along a network link
Demand model	See variable demand model
Demand segment	Travel demand is divided into a number of segments for the purposes of applying different demand modelling procedures. The division is usually by trip purpose and whether the trips are home-based or non-home-based
DMRB	Design Manual for Roads and Bridges – a Highways Agency publication setting out guidance and good practice for design and appraisal of road schemes
Dependent development	Housing or commercial development that can only proceed with the implementation of a transport intervention
Discounting	Discounting is a technique used to compare costs and benefits that occur in different time periods. It is based on the principle known as time preference that people prefer goods and services now rather than later. This preference for goods and services now rather than later applies to both individuals and society. By applying a discount rate, streams of costs and benefits are reduced to their present values.
Do Minimum	The forecast scenario without the proposed transport scheme, but that includes committed transport network improvements and developments
Do Something	The Do Minimum network but with the proposed transport scheme and developments added
Generalised cost	A combination of time and money costs (operating costs and charges) that are expressed in time or money units which are used to represent the total travel costs for a journey within the assignment or demand models
Journey purpose	Trips are divided into different travel purposes, usually work (or commute), employers' business and other. These trip purposes have different generalised costs applied and different demand model responses
Matrix estimation	A process used to adjust an initial or 'prior' matrix so that the resulting assignment of the adjusted matrix matches count data as closely as possible
Network	A mathematical representation of a transport network in a supply-side assignment model, either a highway network which represents vehicle travel, or a public transport network that represents bus and rail services
Speed / flow relationships	Relationship between traffic speed and traffic flow on a network link

Reference trip matrix	A forecast reference matrix based on applying growth from national (or other) datasets, but before the application of adjustments due to the impact of how travel costs will change with growth in travel
User classes	Trips are aggregated into several user classes for the purposes of assignment. These usually represent different types of vehicle (e.g. car, HGV) and different trip purposes
Trip matrix	A table representing travel in a model area between land areas or zones
Validation	A process of comparing the model data with independent data
Variable demand modelling	A model that forecasts changes in travel behaviour such as trip frequency, choice of mode, time of travel and trip distribution
Zone	An area of land or development which is used in a transport model to aggregate individual households or commercial premises into a manageable number of units that can be used to represent journey patterns in the study area. Usually the zone size will be relatively small in the study area, but progressively larger further away from it.

The Norfolk County Council (Norwich Northern Distributor Road (A1067 to A47(T))) Order

Proposed Minor Change to the Application for Development Consent: Drayton Lane (south)

Planning Act 2008

Infrastructure Planning

The Infrastructure Planning (Applications: Prescribed Forms and Procedure)
Regulations 2009

PINS Reference Number: TR010015

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1 THE APPLICATION

- 1.1. This document is submitted in relation to the application for a Development Consent Order by Norfolk County Council to the Secretary of State, under the Planning Act 2008.
- 1.2. The application is for the Norfolk County Council (Norwich Northern Distributor Road (A1067 to A47(T))) Order, to grant development consent for the construction of a new highway running west to east, to south, between the A1067 Fakenham Road and the A47 Trunk Road at Postwick, including improvements to the existing highway network to the north and north east of Norwich.
- 1.3. This document comprises part of Norfolk County Council's proposals to make minor amendments to the form of the Norwich Northern Distributor Road which it has applied for.

2 INTRODUCTION

- 2.1. On 7 of January 2014, Norfolk County Council (NCC) submitted an application for development consent (the 'application') to the Planning Inspectorate for the Norwich Northern Distributor Road (NDR). The application was accepted for examination on 4 February 2014.
- 2.2. As a result of on-going discussion and engagement with local residents, the Police and Drayton Parish Council, NCC would like to make a minor change to the application in relation to the proposed closure of Drayton Lane (south) at its junction with Reepham Road.
- 2.3. The proposed change would remove the proposed closure of Drayton Lane (south) at its junction with Reepham Road so as to keep Drayton Lane (south) open, and therefore retaining the existing road layout west of Reepham Road.
- 2.4. The Department for Communities and Local Government document *Planning Act 2008: Guidance for the examination of applications for development consent* (paras. 105 to 107, p. 21) recognises that applicants may need to change a proposal after an application has been accepted for examination. The proposed change is not considered to result in a materially different project and this point is considered further in relevant sections of this report.
- 2.5. This proposed change would address local residents', Drayton Parish Council and Police concerns raised in connection with highway safety on Reepham Road, Hall Lane and their junctions. It is considered that the change will provide a more acceptable solution for the local community and road users in general.
- 2.6. This document demonstrates that the proposed change to the application is minor and does not materially affect the scheme which is the subject of the DCO application. NCC has undertaken engagement with the principal parties potentially affected by the proposed change, and has taken their representations into account.
- 2.7. This document is structured as follows:
 - a) Section 3 introduces the proposed modification to the original application Scheme
 - b) Section 4 summarises the need for the changes

- c) Section 5 explains the process of stakeholder engagement undertaken.
- d) Section 6 assesses the engineering and buildability effects of the proposed changes.
- e) Section 7 assesses the environmental effects of the proposed changes.
- f) Section 8 assesses the traffic, safety and economics effects of the proposed changes.
- g) Section 9 concludes the document, summarising the need and the impacts of the proposed change

3 THE PROPOSED MODIFICATION TO THE SCHEME

3.1. Description of proposed changes

- 3.1.1. As proposed in the application, the C282 Reepham Road would be realigned to form a T-junction with the new Link Road from the Drayton Lane Roundabout (on the NDR). As part of the proposed junction arrangement, the application proposed to stop up the C261 Drayton Lane (south) with the construction of a cul-de-sac turning head at its south westerly point of stopping up.
- 3.1.2. The proposed change would remove the stopping up and the construction of the cul-de-sac on Drayton Lane (south), keeping Drayton Lane (south) open with the construction of a T-junction with the improved/realigned C261 Reepham Road.
- 3.1.3. The proposed change is shown in drawings R1C150-MP-5157 and R1C150-MP-5158 included in Appendix A.

3.2. Proposed changes to the application documents

- 3.2.1. The proposed changes to the Scheme would require the following amendments to application documents. Following acceptance of the change by the Planning Inspectorate, NCC proposes to submit revised versions of any application documents which the Planning Inspectorate considers necessary, and in accordance with a timetable to be agreed. It may be, for instance, that other changes are required to the draft DCO early in the examination period, and it would be sensible for the below changes to be made at the same time as those, rather than submitting two versions of the draft DCO in relatively quick succession.

3.3. Works descriptions

- 3.3.1. The proposed change would involve minor amendments to the Draft DCO (Application Document 3.1) as indicated in the tables below.

Table 3.1 Schedule 1 Authorised Development - Work No. 7(vii) (page 44 of application draft DCO):

Application text	Proposed change
<i>"(vii) the improvement of the C282 Drayton Lane (south), on its west side, by the construction of a cul-de-sac turning head at its south westerly point of stopping up, to the south of the C261 Reepham Road"</i>	Text deleted entirely – subsequent numbering and cross reference in Work No. 7 to be updated accordingly.

Table 3.2 Schedule 1 Authorised Development - Work No. 7(x) (page 45 of application draft DCO):

Application text	Proposed change
<i>the construction of a cycle track (with a right of way on foot), over a length of stopped up C282 Drayton Lane (South), between the C282 Drayton Lane (South) and the C261 Reepham Road;</i>	Text deleted entirely – subsequent numbering and cross reference in Work No. 7 to be updated accordingly.

Table 3.3 Schedule 2 Requirements – List of Works Plans within Table in Requirement no. 4 (page 58 of application draft DCO):

Application text	Proposed change
<i>R1C093-R1-5002, R1C093-R1-5003, R1C093-R1-5004, R1C093-R1-5005, R1C093-R1-5006, R1C093-R1-5007, R1C093-R1-5008, R1C093-R1-5009, R1C093-R1-50010, R1C093-R1-50011, R1C093-R1-50012, R1C093-R1-50013</i>	R1C093-R1-5002, R1C093-R1-5003, R1C093-R1-5004, R1C093-R1-5005A, R1C093-R1-5006, R1C093-R1-5007, R1C093-R1-5008, R1C093-R1-5009, R1C093-R1-5010, R1C093-R1-5011, R1C093-R1-5012, R1C093-R1-5013

Table 3.4 Schedule 2 Requirements – List of General Arrangement Plans within Table in Requirement no. 4 (page 58 of application draft DCO):

Application text	Proposed change
<i>R1C093-R1-5015, R1C093-R1-5016, R1C093-R1-5017, R1C093-R1-5018, R1C093-R1-5019, R1C093-R1-5020,</i>	R1C093-R1-5015, R1C093-R1-5016, R1C093-R1-5017, R1C093-R1-5018A, R1C093-R1-5019, R1C093-R1-5020,

<i>R1C093-R1-5021, R1C093-R1-5022, R1C093-R1-5023, R1C093-R1-5024, R1C093-R1-5025, R1C093-R1-5026</i>	R1C093-R1-5021, R1C093-R1-5022, R1C093-R1-5023, R1C093-R1-5024, R1C093-R1-5025, R1C093-R1-5026
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Table 3.5 Preamble Schedule 2 Requirements – List of General Arrangement Plans within Table in Requirement no. 4 (page 58 of application draft DCO):

Application text	Proposed change
<i>R1C093-R1-5015, R1C093-R1-5016, R1C093-R1-5017, R1C093-R1-5018, R1C093-R1-5019, R1C093-R1-5020, R1C093-R1-5021, R1C093-R1-5022, R1C093-R1-5023, R1C093-R1-5024, R1C093-R1-5025, R1C093-R1-5026</i>	R1C093-R1-5015, R1C093-R1-5016, R1C093-R1-5017, R1C093-R1-5018A, R1C093-R1-5019, R1C093-R1-5020, R1C093-R1-5021, R1C093-R1-5022, R1C093-R1-5023, R1C093-R1-5024, R1C093-R1-5025, R1C093-R1-5026

Table 3.6 Schedule 3 Streets Subject to Permanent Alternation of Layout (page 69 of application draft DCO):

Application text	Proposed change
<i>C282 Drayton Lane (South)</i>	(i) <i>An increase in width, together with associated carriageway tie-in works, on its west side, from a point 2 metres south of its junction with the C261 Reepham Road, southwards for 26 metres, so as to provide a turning head at the southerly point of the stopped up C282 Drayton Lane (South), to the south of the C261 Reepham Road.</i>
	Text deleted entirely.

Table 3.7 Schedule 6 Streets to be Stopped Up: Part 1 Streets for which a substitute is to be provided, and other new streets to be provided (page 88 of application draft DCO):

Application text				
Street Plans (Sheet 4 of 12)/ East of Bell Farm Track to Drayton Lane (Cont'd)	In the Parishes of Horsford, and Drayton In the District of Broadland In the County of Norfolk	C282 Drayton Lane (South)	A length: From its junction with the C261 Reepham Road, generally southwards for a distance of 2 metres.	S* (Cycle Track with a right of way on foot) * Substitute Street for non-motorised vehicular traffic

Proposed change				
Street Plans (Sheet 4 of 12)/ East of Bell Farm Track to Drayton Lane (Cont'd)	In the Parishes of Horsford, and Drayton In the District of Broadland In the County of Norfolk	-	-	S – Not Used

Table 3.8 Schedule 6 Streets to be Stopped Up: Part 2 Private access for which a substitute is to be provided and other new means of access to be provided (page 101 of application draft DCO):

Application text			Proposed change		
PMA 24	Field access to farmland of Manor Farm, from	X20	PMA 24 – Not Used	-	X20 – Not Used

	the C282 Drayton Lane (South), at a point 14 metres generally south of its junction with the C621 Reepham Road, westwards for a distance of 2 metres.				
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3.4. Plans/drawings/sections

3.4.1. The proposed change would involve minor amendments to the plans/drawings/sections submitted as part of the DCO application as indicated in Table 3.9 below.

Table 3.9 Plans/drawing/sections

Title	Sheet	Drawing number	Status
Reference: 2.1 Location Plan			
'Plan number R1C093-R1-5000' replaced with 'Plan number R1C093-R1-5000A' and which removes the closure of Drayton Lane (south) identification.			
Reference: 2.2 Land Plans			
'Plan Number DCO-LP-04 Plan Revision: 0' replaced with 'Plan Number DCO-LP-04A Plan Revision: A' and which has an area of land from Plot 4/30 deleted, and former Plot 4/31 deleted, from the plan.			
Reference: 2.3 Work Plans			
'Plan number R1C093-R1-5005' replaced with 'Plan number R1C093-R1-5005A' to reflect the amended DCO boundary.			
Reference: 2.4 Street Plans			

'Plan Number DCO-SP-04 Plan Revision: 0' replaced with 'Plan Number DCO-SP-04A Plan Revision: A' and which shows the amended Street and Access provisions identified in the above amendments.

Reference: 2.6 General Arrangement Plans

'Plan number R1C093-R1-5018' replaced with 'Plan number R1C093-R1-5018A' which shows the amended Street and Access provisions identified in the above amendments.

3.5. Book of Reference

3.5.1. The proposed change would involve the minor amendments to the Book of Reference (Application Document 4.3) as indicated in Table 3.10 below:

Table 3.10 Book of Reference

	Proposed change
<i>Part 1</i> <i>Plot 4/30</i> <i>Page XX</i>	The area measurement included in the description included in the 'Extent, description and situation of the land or right' column, in Part 1, is reduced from '3,999 square metres' to '3669 square metres'
<i>Part 1</i> <i>Plot 4/31</i> <i>Page XX</i>	All details included in the 'Owners or reputed owners'; 'Lessees or reputed lessees'; 'Tenants or reputed tenants (other than lessees)'; and 'Occupiers', columns are deleted; The details included in the 'Extent, description and situation of the land or right' column are substituted with the words 'Not used'

3.6. Statement of Reasons

3.6.1. The proposed change would involve minor amendments to the Statement of Reasons (Application Document 4.1), as shown in the table below.

Table 3.11 Statement of reasons

	Proposed change
<i>Appendix 1: Table 1</i> <i>Page 60</i>	Delete plot 4/31 from Work No.7
<i>Appendix 1: Table 1A</i>	Delete plot 4/31 from "Required for new highway (Non-NDR)

Page 64	
Appendix 2: Paragraph 37	Delete "4/31" from paragraph heading
Page 83	

3.7. Reports/statements

3.7.1. The proposed change would involve minor amendments to the NDR Traffic Forecasting report (Application Document 5.6) and Economic Appraisal Report (Application Document 5.7) as shown in the tables below.

Table 3.12 NDR Traffic Forecasting Report: Application Document ref. 5.6 Volume 3 Appendix I

Application	Proposed change
Traffic flow plot Figure I.1	Replace with revised Figure 6.4 in the technical report in Appendix E
Data in Tables I.3 and I.5	Replace with new data contained in Table 6.1 and Table 6.2 in the technical report in Appendix E

Table 3.13 Economic Appraisal Report Application Document ref. 5.7

Application	Proposed change / New Text
<i>(page 7) para 1.1.4 "The economic appraisal results show that the NDR is likely to deliver present value of benefits (including TUBA transport user benefits and COBA accident benefits) of £773m over a 60 year appraisal period in 2010 prices discounted to 2010. This compares with present value costs of £186m."</i>	The economic appraisal results show that the NDR is likely to deliver present value of benefits (including TUBA transport user benefits and COBA accident benefits) of £783m over a 60 year appraisal period in 2010 prices discounted to 2010. This compares with present value costs of £186m.
<i>(page 7) para 1.1.5 "Additional benefits in relation to wider economic impacts (WEBs) and journey time reliability (JTR) amount to a further £216m in 2010 prices discounted to 2010 which</i>	Additional benefits in relation to wider economic impacts (WEBs) and journey time reliability (JTR) amount to a further £221m in 2010 prices discounted to 2010 which improve the value for

<p><i>improve the value for money assessment of the Scheme. The table below shows a summary of the economic appraisal results for the NDR."</i></p> <table border="1"> <thead> <tr> <th></th> <th>Scenario including Accidents</th> <th>Scenario also including WEBS and JTR</th> </tr> </thead> <tbody> <tr> <td>Present Value of Benefits (PVB)</td> <td>773,317</td> <td>989,063</td> </tr> <tr> <td>Present Value of Costs (PVC)</td> <td>185,542</td> <td>185,542</td> </tr> <tr> <td>Net Present Value (NPV)</td> <td>587,775</td> <td>803,521</td> </tr> <tr> <td>Benefit to Cost Ratio (BCR)</td> <td>4.168</td> <td>5.331</td> </tr> </tbody> </table>		Scenario including Accidents	Scenario also including WEBS and JTR	Present Value of Benefits (PVB)	773,317	989,063	Present Value of Costs (PVC)	185,542	185,542	Net Present Value (NPV)	587,775	803,521	Benefit to Cost Ratio (BCR)	4.168	5.331	<p>money assessment of the Scheme. The table below shows a summary of the economic appraisal results for the NDR.</p> <table border="1"> <thead> <tr> <th></th> <th>Scenario including Accidents</th> <th>Scenario also including WEBS and JTR</th> </tr> </thead> <tbody> <tr> <td>Present Value of Benefits (PVB)</td> <td>783,315</td> <td>1,003,786</td> </tr> <tr> <td>Present Value of Costs (PVC)</td> <td>185,508</td> <td>185,508</td> </tr> <tr> <td>Net Present Value (NPV)</td> <td>597,807</td> <td>818,278</td> </tr> <tr> <td>Benefit to Cost Ratio (BCR)</td> <td>4.223</td> <td>5.411</td> </tr> </tbody> </table>		Scenario including Accidents	Scenario also including WEBS and JTR	Present Value of Benefits (PVB)	783,315	1,003,786	Present Value of Costs (PVC)	185,508	185,508	Net Present Value (NPV)	597,807	818,278	Benefit to Cost Ratio (BCR)	4.223	5.411
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<p><i>(page 7) para 1.1.6 "The scheme delivers a benefit-to-cost ratio (BCR) of 4.17 (inclusive of accident benefits) and a BCR of 5.33 when WEBS and JTR are included. Both of these represent very high value for money (BCR above 4) according to DfT's VfM criteria."</i></p>	<p>The scheme delivers a benefit-to-cost ratio (BCR) of 4.22 (inclusive of accident benefits) and a BCR of 5.41 when WEBS and JTR are included. Both of these represent very high value for money (BCR above 4) according to DfT's VfM criteria.</p>																														
<p><i>(page 27) para 5.2.1 "The results of the assessment of user benefits and user charges are shown in the TEE table of TUBA output file which is presented in Table 5.1. All values quoted are in 2010 prices, discounted to 2010. The TEE</i></p>	<p>The results of the assessment of user benefits and user charges are shown in the TEE table of TUBA output file which is presented in Table 5.1. All values quoted are in 2010 prices, discounted to 2010. The TEE table shows that the</p>																														

<i>table shows that the NDR scheme achieves total transport economic efficiency benefits of about £700m in the 60 year assessment period."</i>	NDR scheme achieves total transport economic efficiency benefits of about £708m in the 60 year assessment period.
<i>(page 28) Table 5.1 Transport Economic Efficiency (TEE)</i>	Replace with Table 6.9 of technical report in Appendix E
<i>(page 30) Table 5.3 Analysis of Monetised Costs and Benefits</i>	Replace with revised numbers from Table 4.5 of technical report in Appendix E
<i>(page 30) para 5.4.2 "The results show that the Present Value of Benefits (PVB) is estimated to be £773m (inclusive of accident benefits), outweighing the £186m Present Value of Costs (PVC)."</i>	The results show that the Present Value of Benefits (PVB) is estimated to be £783m (inclusive of accident benefits), outweighing the £186m Present Value of Costs (PVC).
<i>(page 30) para 5.4.3 "The Benefit Cost Ratio (BCR) of the scheme is 4.17 including accidents. Under the DfT's value for money criteria, this represents a Very High value for money category."</i>	The Benefit Cost Ratio (BCR) of the Scheme with is 4.22 including accidents. Under the DfT's value for money criteria, this represents a Very High value for money category.
<i>(page 30) para 5.5.1 "The BCR is improved further to 5.33 once journey time reliability benefits (£28m) and wider economic benefits (£187m) are included in the appraisal as can be seen from Table 5.4 below. More details on wider economic impacts and journey time reliability can be found in Sections 8 and 9 respectively. These additional benefits amount to £216m (2010 prices discounted to 2010). The inclusion of these benefits increases the BCR to a higher level within the Very High value for money category."</i>	The BCR is improved further to 5.41 once journey time reliability benefits (£29m) and wider economic benefits (£192m) are included in the appraisal as can be seen from Table 5.4 below. More details on wider economic impacts and journey time reliability can be found in Sections 8 and 9 respectively. These additional benefits amount to £221m (2010 prices discounted to 2010). The inclusion of these benefits increases the BCR to a higher level within the Very High value for money category.
<i>(page 31) Table 5.4: Summary of Economic Appraisal including Wider Benefits</i>	Replace with revised numbers in Table 4.6 of technical report in Appendix E
<i>(page 32) Table 6.1: Total User Benefit by Time Period</i>	Replace with revised numbers in Table 6.10 of technical report in Appendix E

<i>(page 36) Table 6.3: Net User Benefits by Time Saving Bands (£000)</i>	No change compared to DCO
<i>(page 36) Table 6.4: Net User Benefits by Distance Bands (£000)</i>	No change compared to DCO
<i>(page 32) para 6.3.2 "73% of benefits are due to time savings of more than 2 minutes, and approximately 44% are longer than 5 minutes. The allocation of user benefits to distance bands, shows that longer trips into or around the city account for the majority of the scheme's generated benefits, reflecting its function of providing ease of access to the A47(T) trunk road, providing alternative route for cross city trips and providing benefit to other longer journeys into the city."</i>	No change compared to DCO
<i>(page 37) Table 6.5: Total User Benefits as a Proportion of Total User Costs</i>	No change compared to DCO
<i>(page 41) para 7.6.2 "The reduction in accidents represents £41.2m of monetary benefits in 2010 prices and discounted to 2010."</i>	The reduction in accidents represents £43.4m of monetary benefits in 2010 prices and discounted to 2010.
<i>(page 42) Table 7.1: Accident Assessment with Local Accident Rates</i>	Replace with revised numbers in Table 4.4 of technical report in Appendix E
<i>(page 42) para 7.6.4 "The reduction in accidents represents £205.7m of monetary benefits in 2010 prices and discounted to 2010."</i>	The analysis using default COBA rates has not been repeated for the Drayton lane modification as the method using the local rates has been taken as a more conservative estimate of benefits in the main appraisal
<i>(page 43) para 7.6.5 "The different assessments yield quite different results in terms of:</i> <i>• The level of benefit reported. When COBA default rates are used, the overall benefits are £205.7m and significantly greater than local rates</i>	7.6.5 The different assessments yield quite different results in terms of: • The level of benefit reported. When COBA default rates are used, the overall benefits are £205.7m and significantly greater than local rates

<p>case, which reports benefits of £41.2m.</p> <ul style="list-style-type: none"> • The impact on casualties. Whilst both assessments lead to an overall reduction in casualties, it can be seen that the application of local rates in the assessment leads to an increase of seven fatalities, whilst using default rates leads to a decrease of 21." 	<p>case, which reports benefits of £43.4m.</p> <ul style="list-style-type: none"> • The impact on casualties. Whilst both assessments lead to an overall reduction in casualties, it can be seen that the application of local rates in the assessment leads to an increase of seven fatalities, whilst using default rates leads to a decrease of 21.
<p>(page 47) para 8.3.1 "Summarised below are wider economic benefits calculated using the DfT's WITA software (version 1.1). Table 8.1 shows that agglomeration benefits make up the bulk of the £187m total wider benefit impacts."</p>	<p>8.3.1 Summarised below are wider economic benefits calculated using the DfT's WITA software (version 1.1). Table 8.1 shows that agglomeration benefits make up the bulk of the £192m total wider benefit impacts.</p>
<p>(page 48) Table 8.1: Summary Wider Economic Benefits of NDR</p>	<p>Replace with revised numbers in Table 6.12 of technical report in Appendix E</p>
<p>(page 48) para 8.3.3 "The estimated benefits of £187m for wider economic impacts feed into the overall VfM consideration."</p>	<p>8.3.3 The estimated benefits of £192m for wider economic impacts feed into the overall VfM consideration.</p>
<p>(page 51) para 9.4.2 "Table 9.1 below shows reliability benefits of around £28m (in 2010 prices discounted to 2010) for the 60 year appraisal period. This is equivalent to around 4% of the time benefits generated by the scheme."</p>	<p>9.4.2 Table 9.1 below shows reliability benefits of around £29m (in 2010 prices discounted to 2010) for the 60 year appraisal period. This is equivalent to around 4% of the time benefits generated by the scheme.</p>
<p>(page 51) Table 9.1: NDR Reliability Benefits</p>	<p>Replace with revised numbers in Table 6.13 of technical report in Appendix E</p>
<p>(page 53) Table 10.1: Summary of Economic Appraisal (£000's)</p>	<p>Replace with revised numbers in Table 4.6 of technical report in Appendix E</p>
<p>(page 53) para 10.1.4 "The BCR of 4.17 represents Very High value for money under the DfT's VfM criteria. The PVB includes accident benefits but does not include wider economic benefits or</p>	<p>10.1.4 The BCR of 4.22 represents Very High value for money under the DfT's VfM criteria. The PVB includes accident benefits but does not include wider economic benefits or journey time</p>

<i>journey time reliability benefits. When these are included the BCR increases to 5.33."</i>	reliability benefits. When these are included the BCR increases to 5.41.
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3.8. Environmental statement

3.8.1. The proposed change would involve minor amendments to the Environmental Statement (Application Document 6.1) as shown in the table below.

Table 3.14 Environmental Statement Volume 1 Table 2.9 Road Closures (page 30)

Application text	Proposed change
<i>C282 Drayton Lane – a 892 metres length from its junction with the C261 Reepham Road: Chainage 5350</i>	Text deleted

4 NEED FOR PROPOSED CHANGES

- 4.1. Early iterations of the scheme design prior to 2013 had both Hall Lane (North) and Drayton Lane (South) junctions with Reepham Road open. However, following discussions with Drayton Parish Council it was agreed that design would be changed to close Drayton Lane (south) in order to reduce traffic through the centre of Drayton. Written representations have been made by local residents voicing objections to this closure were received before and through the formal statutory pre-application consultation. NCC considered the different views and at the time of making the application, decided to close Drayton Lane (south) as part of the NDR scheme.
- 4.2. A number of meetings have been held between NCC, Drayton Parish Council, members of the local community representing the views of Hall Lane and Reepham Road, and the local County Councillor. At these meetings local residents raised, in their opinion, fundamental concerns regarding the current NDR proposals for Drayton. These concerns relate mainly to the proposed main route between the NDR and Drayton being via the Reepham Road, Hall Lane (North) and their junction, and in particular the closure of Drayton Lane (south) at its junction with Reepham Road.
- 4.3. The 54 households (87 residents) of Drayton Hall Park, Hall Lane (represented by the chairman of the residents association) have also expressed strong objections to the closure of Drayton Lane (south) and have expressed concerns about safety issues with Reepham Road, Hall Lane and their junction being used as the main route between Drayton and the NDR.
- 4.4. The issues raised by local residents and the community are summarised in Appendix B.
- 4.5. In response to the concerns raised by the local community, Parish Council and the Police, NCC tested a number of alternatives to keep Drayton Lane (south) open using the NDR's strategic transport model and also carried out a Stage 1 Road Safety Audit on the options.
- 4.6. The Road Safety Audit submission, Report and Designers Response is included as Appendix C.
- 4.7. The Road Safety Audit concluded that a roundabout at either the junction of Drayton Lane or Hall Lane (north) with Reepham Road would be a safer option for these junctions if either of the roads were to be closed. However the installation of a roundabout is likely to generate more traffic through the

centre of Drayton. This increase is considered by NCC to conflict with the concept of the NDR, which is to reduce traffic within communities where possible.

- 4.8. The results of this work were discussed with the local residents and Drayton Parish Council. The outcome from the discussions was that the local community's preference was a roundabout at the Reepham Road/Drayton Lane (south) junction and Hall Lane (North) being closed. There was an agreement to seek a modification to the scheme that would keep the junctions of Reepham Road with both Drayton Lane (south) and Hall Lane (north) open, which would retain the current road layout. The proposed modification provides a safer and more acceptable solution for the local community and road users with only a slight increase in forecast traffic on School Road south of Hall Lane compared to the current scheme.
- 4.9. The local community has made it clear to NCC that they would strongly object to the NDR scheme as applied for.
- 4.10. In consultation with representatives from the local community, the Parish Council and the Police, NCC is proposing to implement traffic calming measures on Hall Lane and to introduce a speed limit on Drayton Lane (south). These measures are not part of the NDR scheme and are proposed to be implemented irrespective of whether the NDR goes ahead. They are currently planned to address existing local concerns about traffic flows, HGV use, speed, safety and accidents in this location. Whilst these measures do not form part of the NDR scheme for which an application has been made, they have been taken into account in arriving at the forecast traffic flows discussed in Section 8 of this report.

5 STAKEHOLDER ENGAGEMENT

- 5.1. NCC has undertaken a targeted consultation on the potential scheme change to ensure that relevant stakeholders and the local community were given an opportunity to consider it and comment.
- 5.2. A letter, dated 27 March 2014, setting out NCC proposals was sent to a consultation area that was agreed with the relevant Parishes and District Council and included those considered to be most likely to be impacted by the proposed change. Consultees included Parish and District councils, 63 stakeholders and land owners as well as 4312 residential and business addresses. A copy of the letter and the drawing showing the area of consultation (**R1C093-R1-4801**) is included in Appendix D.
- 5.3. 45 responses were received by the end of the consultation on the Friday 25 April 2014 and can be summarised as follows;
- 5 Councils in favour of keeping the junction open (including Broadland District Council, Hellesdon, Drayton, Horsford & Felthorpe Parish Councils)
 - 1 response from the Norfolk Constabulary in favour of keeping the junction open
 - 27 Individual responses in favour of keeping the junction open
 - 1 response representing 54 households in favour of keeping the junction open
 - 6 Contained no comment relating to closure
 - 3 Against keeping the junction open
 - 2 For keeping open if a roundabout provided instead of the proposed junction.
- 5.4. A number of responses also raised concerns about the impact of the proposals (both with or without the closure) on Hall Lane, in particular the safety at the junctions with Reephams Road or Drayton Lane (south).
- 5.5. NCC has considered the responses, alongside its continued discussions with the local community, and given the support as mentioned above considers that it should seek to make the change to the NDR scheme proposed in this report.

6 ENGINEERING AND BUILDABILITY EFFECTS

6.1. Design and Geometry

- 6.1.1. The proposed change would remove the closure of the existing section of Drayton Lane (South) at its junction with Reepham Road. The layout of the bellmouth of Drayton Lane (south) would remain as the current existing layout. Drayton Lane (north) would remain closed therefore the existing junction arrangement would change from a crossroads to a simple T-junction.

6.2. Structures

- 6.2.1. The proposed change would have no impact on existing or proposed structures.

6.3. Non Motorised Users

- 6.3.1. The NMU provision would remain unchanged on the north side of Reepham Road, however the removal of the stopping up of Drayton Lane (south) would result in the loss of a suitable route for the use by pedestrians/cyclists and horse riders along the potential minor road.

6.4. Drainage

- 6.4.1. The proposed change would have no impact on the drainage design.

6.5. Public Utilities

- 6.5.1. There is no impact on the existing public utilities as a result of the proposed change.

6.6. Private Means of Access

- 6.6.1. The proposed change would remove the closure of Drayton Lane (south) at Reepham Road, therefore the need for a combined turning head and field access would be removed. The existing field access from Drayton Lane (south) will be retained.

6.7. Construction

- 6.7.1. The proposed change would have a minimal impact on the Scheme construction works - the existing Drayton Lane (south) junction with Reepham Road would remain as per the existing layout, and therefore works to stop up the existing junction mouth would not be required.

7 ENVIRONMENTAL EFFECTS

- 7.1. This section describes the potential environmental effects of the proposed minor changes to the scheme to keep Drayton Lane (south) open compared to the scheme which is the subject of the DCO application.
- 7.2. The environmental impacts associated with the proposed change to keep Drayton Lane (south) open during construction and the operational environment associated with the removal of the Drayton Lane Closure are listed in the tables below:
- 7.3. **Table 7.1:** Construction Environmental Impacts Associated with the Removal of Drayton Lane Closure

Closure of Drayton Lane as Proposed within the ES	Removal of Drayton Lane Closure compared with ES
Groundwater	No significant change
Surface Water	No significant change
Flora and Fauna	No significant change
Geology	No significant change
Soils	No significant change
Motorised Users	Large adverse temporary impact reduced
Landscape	No significant change
Non-Motorised users	Slight adverse due to loss of potential segregated cycle route
Air Quality	No significant change
Noise	No significant change

- 7.4. **Table 7.2:** Operational Environmental Associated with the Removal of Drayton Lane Closure

Closure of Drayton Lane as Proposed within the ES	Removal of Drayton Lane Closure compared with ES
Groundwater	No significant change
Surface Water	No significant change
Flora and Fauna	No significant change
Geology	No significant change
Soils	No significant change
Motorised Users	The removal of the closure will result in slight increases in forecast traffic on the NDR (east), School Road (south of Hall Lane), Drayton Lane

	and Costessey Lane and reductions of traffic on NDR (west) Reepham Road and Hall Lane. Traffic calming on Hall Lane, between School Road and Reepham Road may impact on traffic speeds, however, the changes will not have significant impacts on road users overall.
Landscape	No significant change
Non-Motorised users	Slight adverse due to loss of potential segregated cycle route.
Air Quality	The overall numbers of vehicles in the area will not change and threshold limits for Air Quality will not be approached. The impacts are not significant.
Noise	There will be noise associated with changes to traffic movements, however there are no sensitive receptors along Drayton Lane where the most significant changes occur (0 to 5700 vehicles per day) in addition the road is in use at the present time. Therefore it is anticipated there will be no significant impacts.

8 TRAFFIC, SAFETY AND ECONOMIC EFFECTS

- 8.1. A traffic, safety and economic appraisal was undertaken in April 2014 to assess the impacts of the Drayton Lane (south) modification.
- 8.2. The variable demand model (VDM) forecasts, which make allowance for traffic generation, redistribution and mode choice effects arising from the introduction of the Scheme, have been prepared for the NDR proposed opening year of 2017 and the design year of 2032. These were used in the assessment of the possible modification to Drayton Lane (south).
- 8.3. The modelling shows that the main traffic impact of keeping Drayton Lane (south) open at its junction with Reepham Road, compared with the currently submitted Scheme, is a change in traffic movements from Hall Lane (north) to Drayton Lane (south). The model suggests that there is also a reduction through Drayton on School Road, but that there is not quite the same reduction with Drayton Lane (south) kept open.
- 8.4. The key changes in Annual Average Daily Traffic (AADT) flows with the Drayton Lane (south) modification compared to the submitted Scheme are set out in section 4.2 of the full report by Mott MacDonald contained in Appendix E. This report also contains full details of the operational assessment of junctions, safety appraisal and economic appraisal.
- 8.5. Operational analysis results show that the junctions on Reepham Road with Drayton Lane (south), Hall Lane (north) and the link to the NDR will operate within desirable capacity in forecast years even with all traffic movements uplifted by an additional 10-20% in sensitivity tests. It is therefore concluded that the modification would be acceptable in operational terms.
- 8.6. A cost benefit accident analysis has been undertaken for the modified network. This shows that there would be fewer serious and slight casualties as a result of the shorter journey distance for traffic travelling between Drayton and Horsford and the NDR, including taking account of the effect of the traffic management measures noted above.
- 8.7. The economic analysis shows that with the modification the Benefit Cost Ratio (BCR) will increase slightly to 4.22 (inclusive of accident benefits) and 5.41 when wider economic benefits and journey time reliability are included. Both of these represent very high value for money (BCR above 4) according to the Department for Transport's Value for Money criteria. It is not expected

that the modification would have any impact on the economic development analysis.

9 CONCLUSION

- 9.1. The proposed change is minor, does not materially affect the Scheme and does not result in any materially worse or different environmental effects.
- 9.2. The responses received from the targeted consultation for the proposed change indicates a majority of responses including Broadland District Council, Horsford Parish Council, Drayton Parish Council, Hellesdon Parish Council and Felthorpe Parish Council support the proposed change.
- 9.3. The proposed change would address a number of local residents, Drayton Parish Council and Police concerns raised in connection with highway safety on both Reepham Road, Hall Road and their junction and it is considered that the change will provide a safer and more acceptable solution for the local community and road users in general.

The Norfolk County Council (Norwich Northern Distributor Road (A1067 to A47(T))) Order

Proposed Minor Change to the Application for Development Consent: Broad Lane / Plumstead Road PMA

Planning Act 2008

Infrastructure Planning

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

PINS Reference Number: TR010015

Document Reference: 5.14

Regulation Number: 5(2)(q)

Author: Norfolk County Council

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0	02 nd May 2014	Revision for submission

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Appendices

Appendix A: The proposed change

Appendix B: Example consultation letter

1 THE APPLICATION

- 1.1. This document is submitted in relation to the application for a Development Consent Order by Norfolk County Council to the Secretary of State, under the Planning Act 2008.
- 1.2. The application is for the Norfolk County Council (Norwich Northern Distributor Road (A1067 to A47(T))) Order, to grant development consent for the construction of a new highway running west to east, to south, between the A1067 Fakenham Road and the A47 Trunk Road at Postwick, including improvements to the existing highway network to the north and north east of Norwich.
- 1.3. This document comprises part of Norfolk County Council's proposal to make minor amendments to the form of the Norwich Northern Distributor Road which it has applied for.

2 INTRODUCTION

- 2.1. On 7 of January 2014, Norfolk County Council (NCC) submitted an application for development consent (the 'application') to the Planning Inspectorate for the Norwich Northern Distributor Road (NDR). The application was accepted for examination on 4 February 2014.
- 2.2. As a result of on-going discussion and engagement with local landowners, NCC would like to make a minor change to the application in relation to the proposed Private Means of Access (PMA) track between Broad Lane and Plumstead Road.
- 2.3. The proposed change would remove the proposed PMA track as shown R1C093-R1-5160 included in Appendix A.
- 2.4. The Department for Communities and Local Government document *Planning Act 2008: Guidance for the examination of applications for development consent* (paras. 105 to 107, p. 21) recognises that applicants may need to change a proposal after an application has been accepted for examination. The proposed change is not considered to result in a materially different project, and this point is considered further in relevant sections of this report.
- 2.5. This proposed change would reflect local landowner concerns about potential security issues surrounding use of the PMA track.
- 2.6. This document demonstrates that the proposed change to the application is minor and not material and does not materially affect the scheme which is the subject of the DCO application. NCC has undertaken targeted engagement with the principal parties potentially affected by the changes and has taken their representations into account.
- 2.7. This document is structured as follows:
 - a) Section 3 introduces the proposed modification to the original application published Scheme
 - b) Section 4 summarises the need for the changes.
 - c) Section 5 explains the process of stakeholder engagement undertaken.
 - d) Section 6 assesses the engineering and buildability effects of the proposed changes.

- e) Section 7 assesses the environmental effects of the proposed changes.
- f) Section 8 assesses the traffic, safety and economics effects of the proposed changes.
- g) Section 9 provides the conclusion to this report

3 THE PROPOSED MODIFICATION TO THE SCHEME

3.1. Description of proposed changes

- 3.1.1. As proposed in the application a new PMA track was to be provided from the improved C258 Broad Lane, where a turning head is to be provided opposite 'Leighton House' running south westerly and then south easterly to the C874 Plumstead Road. As the land required to provide this track was to be acquired from a fuel allotment charity, and as such is special category land, replacement land was to be acquired and transferred to the charity.
- 3.1.2. The proposed modification would remove the PMA track. The proposed stopping up of the Broad Lane and Plumstead Road junction is not affected by the proposed change and remains part of the application scheme.
- 3.1.3. The use of the land now to be acquired from the fuel allotment charity has implications on the need for provision of replacement land. The proposed modification includes the removal of the replacement land provision.
- 3.1.4. The proposed modification includes the provision of a new field access into the land which was previously identified to be acquired as replacement land.

3.2. Proposed changes to the application documents

- 3.2.1. The proposed modification would amend the following application documents as shown in the tables below. Following acceptance of the change by the Planning Inspectorate, NCC proposes to submit revised versions of any application documents which the Planning Inspectorate considers necessary, and in accordance with a timetable to be agreed. It may be, for instance, that other changes are required to the draft DCO early in the examination period, and it would be sensible for the below changes to be made at the same time as those, rather than submitting two versions of the draft DCO in relatively quick succession.
- 3.2.2. The proposed change would involve minor amendments to the Draft DCO (Application Document 3.1) as indicated in the tables below.

Table 3.1 Preamble (page 7 of application draft DCO):

Application text	Proposed change
<i>The Secretary of State is satisfied, in accordance with section 131(3)(a) and section 131(4) of the 2008 Act, that the fuel allotment first replacement land and fuel allotment second replacement land will be given for the fuel allotment land and that such replacement land will vest in the prospective seller and subject to the same rights, trusts and incidents as attach to the fuel allotment land.</i>	The Secretary of State is satisfied, in accordance with section 131(5) of the 2008 Act, that the fuel allotment land is required for the widening or drainage of an existing highway and that the giving of exchange land is unnecessary, whether in the interests of persons, if any, entitled to rights of common or in the interest of the public.

Table 3.2 Article 2 Interpretation (page 8 of application draft DCO):

Application text	Proposed change
<i>"fuel allotment first replacement land" means that land numbered as plot 10/41 in the book of reference and which is so numbered and shown delineated, and coloured green and stippled black on the land plans;</i>	Text deleted entirely
<i>"fuel allotment second replacement land" means that land numbered as plot 10/42 in the book of reference and which is so numbered and shown delineated, and hatched orange and green and stippled black on the land plans;</i>	Text deleted entirely

Table 3.3 Article 32 Special Category Land (page 31 of application draft DCO):

Application text	Proposed change
32.—(1) <i>On the giving of notice by the undertaker to the relevant planning authority pursuant to this paragraph and subject to the undertaker having first complied with paragraph (1) of requirement 24 (Alternative Route for Marriott's Way), the Marriott's Way open space land shall vest in the undertaker and shall be discharged from all rights, trusts and incidents to which it was</i>	32.—(1) On the giving of notice by the undertaker to the relevant planning authority pursuant to this paragraph and subject to the undertaker having first complied with paragraph (1) of requirement 24 (Alternative Route for Marriott's Way), the Marriott's Way open space land shall vest in the undertaker and shall be discharged from all rights, trusts and incidents to which it was

previously subject.

(2) Prior to the opening of the NDR classified road for public use the undertaker must obtain certification from the relevant planning authority that a scheme for the provision of the Marriott's Way replacement open space land as open space has been implemented to its satisfaction, and on the provision of such certificate the Marriott's Way replacement open space land shall vest in the persons in whom the Marriott's Way open space land was vested immediately before it was vested in the undertaker and shall be subject to the same rights, trusts and incidents as attached to the Marriott's Way open space land.

(3) The fuel allotment land shall not vest in the undertaker until the undertaker has acquired the fuel allotment first replacement land and the relevant planning authority has certified that a scheme for the provision of the fuel allotment first replacement land as fuel allotment land has been implemented to its satisfaction.

(4) On the requirement of paragraph (3) being satisfied, the fuel allotment first replacement land shall vest in the persons in whom the fuel allotment land was vested immediately before it was vested in the undertaker and shall be subject to the same rights, trusts and incidents as attached to the fuel allotment land, and the fuel allotment land shall be discharged from all rights, trusts and incidents to which it was previously subject.

(5) On the giving of notice by the undertaker to the relevant planning authority pursuant to this paragraph, such notice to be given no later than the date that is three months after the date of the opening of the NDR classified road for

previously subject.

(2) Prior to the opening of the NDR classified road for public use the undertaker must obtain certification from the relevant planning authority that a scheme for the provision of the Marriott's Way replacement open space land as open space has been implemented to its satisfaction, and on the provision of such certificate the Marriott's Way replacement open space land shall vest in the persons in whom the Marriott's Way open space land was vested immediately before it was vested in the undertaker and shall be subject to the same rights, trusts and incidents as attached to the Marriott's Way open space land.

(3) As from the date on which this Order becomes operative or the date on which the fuel allotment land, or any part of it, is acquired by or vested in the undertaker, whichever is the later, the fuel allotment land shall be discharged from all rights, trusts and incidents to which it was previously subject.

<p><i>public use, the fuel allotment second replacement land shall vest in the persons in whom the fuel allotment land was vested immediately before it was vested in the undertaker and shall be subject to the same rights, trusts and incidents as attached to the fuel allotment land.</i></p>	
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Table 3.4 Schedule 1 Authorised Development - Work No. 18(viii) (page 52 of application draft DCO):

Application text	Proposed change
<p><i>the construction of a private means of access track, from the improved C258 Broad Lane, where a turning head is to be provided opposite 'Leighton House', running in a south westerly, then south easterly, direction to junction with the C874 Plumstead Road;</i></p>	<p>Text deleted entirely – subsequent numbering and cross references in Work No. 18 to be updated accordingly.</p>

Table 3.5 Schedule 2 Requirements – List of Works Plans within Table in Requirement no. 4 (page 58 of application draft DCO):

Application text	Proposed change
<p><i>R1C093-R1-5002, R1C093-R1-5003, R1C093-R1-5004, R1C093-R1-5005, R1C093-R1-5006, R1C093-R1-5007, R1C093-R1-5008, R1C093-R1-5009, R1C093-R1-50010, R1C093-R1-50011, R1C093-R1-50012, R1C093-R1-50013</i></p>	<p>R1C093-R1-5002, R1C093-R1-5003, R1C093-R1-5004, R1C093-R1-5005, R1C093-R1-5006, R1C093-R1-5007, R1C093-R1-5008, R1C093-R1-5009, R1C093-R1-5010, R1C093-R1-5011A, R1C093-R1-5012A, R1C093-R1-5013</p>

Table 3.6 Schedule 2 Requirements – List of General Arrangement Plans within Table in Requirement no. 4 (page 58 of application draft DCO):

Application text	Proposed change
<p><i>R1C093-R1-5015, R1C093-R1-5016, R1C093-R1-5017, R1C093-R1-5018, R1C093-R1-5019, R1C093-R1-5020, R1C093-R1-5021, R1C093-R1-5022, R1C093-R1-5023, R1C093-R1-5024,</i></p>	<p>R1C093-R1-5015, R1C093-R1-5016, R1C093-R1-5017, R1C093-R1-5018, R1C093-R1-5019, R1C093-R1-5020, R1C093-R1-5021, R1C093-R1-5022, R1C093-R1-5023, R1C093-R1-</p>

R1C093-R1-5025, R1C093-R1-5026	5024A, R1C093-R1-5025A, R1C093-R1-5026
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Table 3.7 Schedule 3 Streets Subject to Permanent Alternation of Layout (page 74 of application draft DCO):

Application text		Proposed change	
C258 Broad Lane	(i) <i>An increase in width, together with associated carriageway tie-in works, on its south west side, from a point some 90 metres north west of its junction with the C874 Plumstead Road, north westwards for 26 metres, so as to provide a turning head situated some 12 metres to the north west of the north western and rear curtilage boundary of the property 'Braemar';</i>	C258 Broad Lane	(ii) <i>An increase in width, together with associated carriageway tie-in works, on its south west side, from a point some 86 metres north west of its junction with the C874 Plumstead Road, north westwards for 30 metres, so as to provide a turning head to the north west of the north western and rear curtilage boundary of the property 'Braemar';</i>

Table 3.8 Schedule 6 Streets to be Stopped Up: Part 2 Private access for which a substitute is to be provided (page 107 of application draft DCO):

Application text			Proposed change		
<i>None – New Text to be Inserted (below the line included for X50 and above the line included for PMA 60)</i>			PMA 58	Field access to farmland of Dairy Farm, from the C874 Plumstead Road, at a point 15 metres north east of the existing railway crossing on the C874 Plumstead Road, north westwards for 2 meters.	X51
<i>PMA 59</i>	<i>Field access to Fuel Allotment land, from the C874 Plumstead Road, at a point 280 metres south west of its junction with the C258 Broad Lane, north westwards for a distance of 2 metres.</i>	<i>X51</i>	Text deleted entirely		

Table 3.9 Schedule 6 Streets to be Stopped Up: Part 3 Private access for which no substitute is to be provided (page 114 of application draft DCO):

Application text			Proposed change		
<i>PMA 58</i>	<i>Field access to farmland of Dairy Farm, from the C874 Plumstead Road, at a point 15 metres north east of the existing railway crossing on the C874 Plumstead Road, north westwards for 2 metres.</i>		Text deleted entirely		
<i>None – New Text to be Inserted (below the line included for X57)</i>			PMA 59	Field access to Fuel Allotment land, from the C874 Plumstead Road, at a point 280 metres south west of its junction with the C258 Broad Lane, north westwards for a distance of 2 metres.	

Table 3.10 Schedule 12 Land of Which Temporary Possession May be Taken (pages 140 and 141 of application draft DCO):

Application text	Proposed change			
<i>None – New Text to be Inserted (below the line included for Plot 10/39 and above the line included for Plot 10/42)</i>	To the north west of the C874 Plumstead Road and to the south east of the Norwich to Cromer & Sheringham Railway line.	Plot 10/41	Bridge compound.	Part of Work No. 18

3.3. Plans/drawings/sections

3.3.1. The proposed change would involve minor amendments to the plans/drawings/sections submitted as part of the DCO application as indicated in Table 3.7 below.

Table 3.11 Plans/drawing/sections

Title	Sheet	Drawing number	Status
Reference: 2.2 Land Plans			
<p>'Plan Number DCO-LP-04 Plan Revision: 0' is replaced with 'Plan Number DCO-LP-04A Plan Revision: A' and which –</p> <ul style="list-style-type: none"> - Amends the plot symbol for Plot 10/41 to orange (from green stippled black). - Amends the plot symbol for Plot 10/42 to orange (from green hatched orange stippled black). - Shows the reduced area for Plot 10/45, as included in the amended description above. - Has <i>deleted</i> the green hatched orange symbol and the wording 'Land to be used temporarily and subsequently given in exchange' alongside the symbol, from the Key on the Plan. 			
Reference: 2.3 Work Plans			
'Plan number R1C093-R1-5011 and R1C093-R1-5012' replaced with 'Plan number R1C093-R1-50011A and R1C093-R1-5012A' to reflect the amended DCO Boundary.			

Reference: 2.4 Street Plans
'Plan Number DCO-SP-10 Plan Revision: 0' is replaced with 'Plan Number DCO-SP-10A Plan Revision: A' and which shows the amended Street and Access provisions identified in the above amendments.
Reference: 2.6 General Arrangement Plans
'Plan number R1C093-R1-5024 and R1C093-R1-5025' replaced with 'Plan number R1C093-R1-5034A and R1C093-R1-5025A' which shows the amended provisions identified in the above amendments.

3.4. **Book of Reference**

3.4.1. The proposed change would involve the minor amendments to the Book of Reference (Application Document 4.3) as listed below:

	Proposed change
<i>Part 1</i> <i>Plot 10/41</i> <i>Page 99</i>	In the 'Number on Plan Sheet/Plot' column, in Part 1, the words 'Temporary Use' are inserted under the plot number.
<i>Part 1</i> <i>Plot 10/45</i> <i>Page 101 and 102</i>	The area measurement included in the description included in the 'Extent, description and situation of the land or right' column is reduced from '3,101 square metres' to '298 square metres'
<i>Part 5</i> <i>Plot 10/42</i> <i>Page 223</i>	The plot in its entirety is deleted from Part 5
<i>Part 5</i> <i>Plot 10/42</i> <i>Pages 223</i>	The plot in its entirety is deleted from Part 5
<i>Part 5</i> <i>Plot 10/45</i> <i>Pages 223 and 224</i>	The area measurement included in the description included in the 'Extent, description and situation of the land or right' column is reduced from '3,101 square metres' to '298 square metres'

3.5. Statement of Reasons

3.5.1. The proposed changes would involve amendments to the Statement of Reasons (Application Document 4.1), as shown in the table below:

Table 3.10 Statement of Reason

	Application text	Proposed change
<i>Paragraph 1.9.4 (page 8)</i>	<i>“The draft DCO includes for the compulsory acquisition of part of a fuel allotment (plot 10/45), which is also special category land. Replacement land is proposed to be provided”</i>	“The draft DCO includes for the compulsory acquisition of part of a fuel allotment (plot 10/45), which is also special category land. No replacement land is proposed to be provided”
<i>Paragraph 10.2.2 (page 46)</i>	<i>“Plot 10/45 (which covers some 3117 square metres) forms part of a fuel allotment and would be acquired to create a new Private Means of Access.”</i>	“Plot 10/45 (which covers 298 square metres) forms part of a fuel allotment and would be acquired to create a new turning head.”
<i>Paragraph 10.2.3 (page 46)</i>	<i>“Replacement land is proposed to be provided for plot 10/45. This replacement land consists of two areas of land, plot 10/41, which covers some 3117 square metres, and plot 10/42, which covers some 9209 square metres. Plot 10/41 will be provided at the same time as plot 10/45 and is acquired for the scheme. Plot 10/42 will be provided once its temporary use as a Bridge Compound has finished. This replacement land would vest in the Trustees of the Great Plumstead Fuel Allotment Charity and be subject to the same rights, trusts and incidents as attached to the use of the land which it replaces. In view of this NCC is content that its proposals accord with section 131(4) of the</i>	“No replacement land is proposed to be provided for plot 10/45. The land to be acquired is required for the widening of an existing highway. The agent for the Trustees of the Great Plumstead Fuel Allotment Charity (who control the special category fuel allotment land) has confirmed that he is satisfied that replacement land is not necessary given the small area of land to be lost. In view of this NCC is content that its proposals accord with section 131(5) of the PA 2008 (a matter upon which the Secretary of State is required to be satisfied).

	<i>PA 2008 (a matter upon which the Secretary of State is required to be satisfied. “</i>	
<i>Appendix 1: Table 1 Page 61</i>		Delete plots 10/41 and 10/42 from Work No 18
<i>Appendix 1: Table 1A Page 64</i>		Insert plot 10/45 within “Required for new highway (Non-NDR)”
<i>Appendix 1: Table 1A Page 65</i>		Delete plot 10/45 from “Required for provision of new Private Means of Access”
<i>Appendix 1: Table 1A Page 65</i>		Delete plots 10/41 and 10/42 from “Required as replacement land”
<i>Appendix 1 Table 3 Page 67</i>		Insert plots 10/41 and 10/42 within “Work No. 18”
<i>Appendix 1 Table 3A Page 67</i>		Insert plots 10/41 and 10/42 within “Required for bridge compound”
<i>Appendix 2 Paragraph 76.3 Page 96</i>	<i>“The land is required for the Scheme to be developed as part of the new NDR highway alignment, including the NDR Bridge (Over Railway Line), the Plumstead Road Roundabouts link road and for improvements to the C874 Plumstead Road. This will also include provision of land for environmental mitigation measures and temporary land to</i>	<i>“The land is required for the Scheme to be developed as part of the new NDR highway alignment, including the NDR Bridge (Over Railway Line), the Plumstead Road Roundabouts link road and for improvements to the C874 Plumstead Road. This will also include provision of land for environmental mitigation measures and temporary land to</i>

	<i>facilitate construction activities. Land is also being acquired to provide replacement land for Special Category Land.</i>	facilitate construction activities.”
Appendix 2 Paragraph 78.3 Page 96	<i>“The land is required to provide a new Private Means of Access. As the land comprises Special Category Land replacement land is being provided immediately to the west.”</i>	“The land is required to provide a new turning head on the C258 Broad Lane. It is Special Category Land, but no replacement land is to be provided.”

4 NEED FOR PROPOSED CHANGES

4.1. Ongoing affected landowner discussions

- 4.1.1. Initial discussions with local landowners had raised concerns about the impact of the proposed Broad Lane / Plumstead Road junction closure on their agricultural operations. In particular the field immediately north of the railway line was severed by the NDR and access between the two areas would involve a significant journey including travelling along part of the NDR. To mitigate this impact a PMA link was included in the application which would enable the landowner and their tenant farmer only to gain access between Broad Lane and Plumstead Road. This would significantly reduce the journey distance between the two severed land areas.
- 4.1.2. Following submission of the application, and ongoing land acquisition discussions with the parties' representative, concerns were raised with NCC about safety and security issues from the potential misuse of the PMA track by the general public. This ultimately resulted in a request from the landowner and their tenant that the PMA track be removed.
- 4.1.3. The removal of the PMA link would reduce the land acquisition requirements from the fuel allotment charity to just that required to provide the new turning head.
- 4.1.4. One of the parties who would have used the proposed PMA link is also the owner of the proposed replacement land.
- 4.1.5. Discussions with the representatives of both the fuel allotment charity and owner of the replacement land landowner have considered the issue of whether replacement land is still appropriate.
- 4.1.6. The representative for the fuel allotment charity has confirmed that they do not need to receive replacement land. The other landowner is content to retain ownership of the previously identified replacement land, following its temporary use as a bridge compound, provided that a new field access to the land is created.

5 STAKEHOLDER ENGAGEMENT

- 5.1. NCC has undertaken a targeted consultation on the potential change to ensure that relevant stakeholders were given an opportunity to consider and comment.
- 5.2. A letter, dated 25 March 2014, setting out the potential change was sent to those parties with a legal interest in either the directly affected or proposed replacement land, as well as their professional advisers, together with the three residential properties adjacent to the proposed PMA link. A total of 21 letters were sent. The letter requested responses by Friday 25 April 2014. A copy of the letter is included in Appendix B.
- 5.3. 3 responses have been received.
- 5.4. The Secretary to the Fuel Allotment Charity advised that he had no comment to make on the proposals at this stage.
- 5.5. A further response was received on behalf of the Fuel Allotment Charity confirming that they had no objection to the PMA removal and seeking confirmation that there was a field access from their land onto Plumstead Road.
- 5.6. The third response was from an agent on behalf of his two clients, namely the tenant of the land severed by the NDR, who would have used the proposed PMA link, and the owner of the proposed replacement land (who is also the owner of the severed field). He confirmed on behalf of both clients that they wholly support the removal of the PMA on safety grounds. His clients also acknowledge that they will have to take a longer route to access all parts of their property.
- 5.7. The agent also confirmed on behalf of the previously proposed replacement landowner that he is content to retain ownership of the previously identified replacement land, following its temporary use as a bridge compound, provided that a new field access to the land is created.
- 5.8. Given the supportive responses to the consultation exercise NCC has decided to progress the proposed modification to the NDR scheme.

6 ENGINEERING AND BUILDABILITY EFFECTS

6.1. Design and Geometry

6.1.1. The proposed change would require a minor change to the Scheme design at the location of the turning head on Broad Lane and the provision of a new field access on Plumstead Road.

6.2. Structures

6.2.1 The proposed change would have no impact on existing or proposed structures.

6.3. Non Motorised Users

6.3.1. The NMU provision would remain unchanged as a result of the proposed change.

6.4. Drainage

6.4.1. The proposed change would have no impact on the drainage design.

6.5. Public Utilities

6.5.1. There is no impact on the existing public utilities as a result of the proposed change.

6.6. Private Means of Access

6.6.1. The proposed change would remove the PMA track between Broad Lane and Plumstead Road. Access between the two severed land areas would be solely via the public highway.

6.6.2. A new field access would be provided into the land which was previously identified to be acquired as replacement land.

6.7. Construction

6.7.1 The proposed change would have a minimal impact on the construction works.

7 ENVIRONMENTAL EFFECTS

- 7.1. There are no envisaged environmental impacts predicted if the PMA track is removed with no anticipated additional or different effects of significance with regard to water, landscape, ecology or social and economic impacts.
- 7.2. The proposed change will however impact on the area of land to be acquired from Great Plumstead Fuel Allotment Charity. Fuel and Field Garden Allotments consist of land that was allotted for public or semi-public purposes under the Enclosure Acts. It is not technically common land but is held in trust by its owner and generally falls within the jurisdiction of the Charity Commissioners.
- 7.3. Under the NDR scheme as applied for, a 3,101m² area was to be acquired from the Great Plumstead Fuel Allotment Charity land to provide a PMA for agricultural vehicles to bypass the local road that is closed by the NDR. An adjoining, larger, area of agricultural land was to be given in exchange to the Charity.
- 7.4. As a consequence there was no predicted loss of amenity or use associated with this land take.
- 7.5. With the PMA link removed (as now proposed) a significantly smaller area of land will be required for the NDR scheme (298m²). No replacement land from the adjoining field is proposed to be given as exchange land to the Charity. Whilst this will result in a small loss of land area fuel allotment charity, it is not considered to be a significant adverse impact.

8 TRAFFIC, SAFETY AND ECONOMIC EFFECTS

- 8.1. The proposed changes are not considered to have any traffic, safety or economic effects on the proposed scheme and therefore an operational, safety and economic appraisal on the change has not been undertaken.

9 CONCLUSIONS

- 9.1. The PMA was included in the DCO application at the request of the landowner and tenant farmer who were concerned about the distance to be travelled between two severed areas of their landholding.
- 9.2. The landowner and tenant have now indicated that they no longer want this PMA provided.
- 9.3. The consultation on the proposed change has not raised any objection to the proposed change to the scheme.
- 9.4. NCC therefore considers that the PMA link should therefore be removed from the DCO application.
- 9.5. The requirement for replacement land for the fuel allotment charity is also no longer required and should be removed from the DCO application.

The Norfolk County Council (Norwich Northern Distributor Road (A1067 to A47(T))) Order

6.1 Environmental Statement: Volume I

Planning Act 2008

Infrastructure Planning

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009


PINS Reference Number: TR010015

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Regulation Number: 5(2)(a) & 5(2)(i) & 5(2)(m)

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0	8 th January 2014	Revision For Submission

Mott MacDonald Internal Audit			 Mott MacDonald
Revision	Originator	Checked By	Approved By
0	J Nichols	J Fookes	G Hewson G Kelly

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We accept no responsibility for the consequences of this document being relied upon by any other party, or being used for any other purpose, or containing any error or omission which is due to an error or omission in data supplied to us by other parties.

This document is submitted in relation to the application for a proposed development by Norfolk County Council to the Planning Inspectorate, under the Planning Act 2008.

The application is for the Norfolk County Council (Norwich Northern Distributor Road (A1067 to A47(T))) Order, to grant development consent for the construction of a new highway running west-east between the A1067 Fakenham Road and the A47 Trunk Road at Postwick, including improvements to the existing highway network to the north and north east of Norwich.

This document comprises part of the application documents and relates to Regulation 5(2)(a) of the Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009.

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1. Introduction

1.1 The Scheme

- 1.1.1 This Environmental Statement (ES) has been prepared by Mott MacDonald on behalf of Norfolk County Council (NCC), in support of an application, by NCC, for a Development Consent Order (DCO) in accordance with the Planning Act 2008 as amended.
- 1.1.2 The proposed Scheme (the Norwich Northern Distributor Road, known as the NDR) is a dual carriageway all-purpose strategic distributor road, which would link the A1067 Fakenham Road, near Attlebridge to the A47 Trunk Road (T) at Postwick. This would be over a length of approximately 20.4km. See General Arrangement Plans, drawing number R1C093-R1-5015 to 5026 (Appendix 1). A full description of the proposed Scheme can be found in Chapter 2 The Scheme Description.

1.2 The Legislative Context

- 1.2.1 In December 2012 NCC decided to promote the proposed Scheme as a Nationally Significant Infrastructure Project (NSIP) and, at the time of NCC's initial contact with The Planning Inspectorate (PINS) in January 2013, the proposed Scheme fell within the definition of an NSIP set out in Section 22 of the Planning Act 2008 (PA 2008) as it was at that time. As a result, consent for the construction and operation of the proposed Scheme was to be obtained via a Development Consent Order (DCO).
- 1.2.2 In December 2012 the Government commenced a public consultation on proposals to amend the definitions in the PA 2008 of “nationally significant infrastructure” rail and highways projects. As a result of this consultation, The Highway and Railway (Nationally Significant Infrastructure Project) Order 2013 (SI 2013/1883) came into force in July 2013.
- 1.2.3 The Order amended Section 22 of the PA 2008 so that a project such as the proposed Scheme would not fall within the definition of a NSIP
- 1.2.4 In July 2013, a qualifying request was made by NCC, under section 35(10) of the PA 2008, to the Secretary of State for Transport, seeking that he direct that the proposed Scheme be treated as development for which development consent is required.
- 1.2.5 On 9 August 2013, the Secretary of State confirmed he was satisfied that:

- "the development does not currently fall within the definition of a 'nationally significant infrastructure project' and therefore it is appropriate to consider use of the power in section 35; and
- "Norfolk County Council's request constitutes a 'qualifying request' in accordance with section 35(10) of the Act."

1.2.6 The Secretary of State issued a direction under section 35 of the PA 2008 that the proposed Scheme by itself is a project of national significance and is to be treated as development for which development consent is required. His reasons were given as:

- The Scheme "provides a direct connection to/from an international airport to the Trans European Network-Transport (TEN-T) and the Strategic Road Network. The TEN-T link is to the A47, one of only a limited number of Roads in the East of England which is recognised as such; and
- in addition the scheme:
- supports national growth potential including by directly supporting over 135ha of proposed employment growth; and
- improves connection to/from the Great Yarmouth Enterprise Zone and supports the offshore energy industry and supply chain."

1.2.7 As a project for which development consent under the PA 2008 is required, the need for the proposed scheme to be subject to Environmental Impact Assessment (EIA) has to be considered with regard to the Infrastructure Planning (Environmental Impact Assessment) Regulations 2009 (as amended) (the EIA Regulations 2009). The proposed Scheme is EIA development because it falls within the description of development given in paragraph 7(c) of Schedule 1 of those Regulations, in that it is:

1.2.8 "Construction of a new road of four or more lanes, or realignment and/or widening of an existing road of two lanes or less so as to provide four or more lanes, where such new road, or realigned and/or widened section of road would be 10 kilometres or more in a continuous length".

1.2.9 Section 104 of the PA 2008 highlights the importance of national policy statements (NPSs) in the determination of DCO applications. At the time of making this application for development consent for the proposed Scheme, however, there is no national policy statement in place for highway schemes.

1.2.10 Chapter 2 of this ES therefore provides a summary of national policy and guidance that is of relevance to the principle of the proposed Scheme. This is, in turn, followed by a brief summary of the local policy and guidance relevant to the proposed Scheme.

Habitat Regulations Assessment

1.2.11 Due to the proximity of the proposed Scheme to the River Wensum Special Area of Conservation (SAC), there is a requirement for a Habitat Regulations Assessment to be undertaken in order to identify whether the proposed Scheme is likely to have any significant effect on the Natura 2000 site under the The Conservation of Habitats and Species Regulations 2010 (The Habitats Regulations) (SI 201/490 (see ES Chapter 8 Nature Conservation). The Habitat Regulations Assessment for the proposed Scheme is presented within the Volume 2, Chapter 17.

1.3 Scheme Objectives

1.3.1 The objectives of the proposed Scheme are to:

- Reduce traffic levels, and thereby relieve congestion, on the existing road network within the urban area and beyond to the north of the city centre;
- Facilitate journeys that are already difficult and congested and require traffic to use residential and minor roads that are inappropriate for the type and volume of traffic that is currently accommodated;
- Provide access to and thereby help to deliver, planned and potential areas of growth, and enable those areas to be free of the need to incorporate provision for extraneous through traffic;
- Provide improved transport connections between existing and future areas of residential and employment development and with the national strategic road network as well as improving connections with Norwich International Airport and the wider area of North Norfolk;
- Increase the opportunities for improving provision for public transport and other sustainable forms of transport and for improving traffic management within the city centre, thereby encouraging modal shift; and
- Improve traffic related environmental conditions for those communities in the northern suburbs of Norwich and outlying villages whilst minimising the environmental impact of the NDR

- 1.3.2 A number of options have been assessed in order to ascertain whether or not they could achieve the aims of the NDR. These options, and the outcome of the assessment of them, are outlined in ES Chapter 3 Alternatives.
- 1.3.3 Value engineering and environmental considerations have been incorporated throughout the design process. The design development also took into account, where possible, the responses made through the informal and formal pre-application consultation process.

1.4 Environmental Impact Assessment

- 1.4.1 The EIA scoping exercise has been undertaken in accordance with the EIA Regulations which implement Council Directive 85/337/EEC (as amended) on the assessment of the effects of certain public and private projects on the environment.
- 1.4.2 In February 2013, NCC submitted a Scoping Report to the Secretary of State, under Regulation 8 of the EIA Regulations, requesting a scoping opinion for the Scheme. The Scoping Opinion, setting out the information to be included in the Environmental Statement (ES) accompanying the DCO application, was provided by the Planning Inspectorate on behalf of the Secretary of State in April 2013.
- 1.4.3 NCC confirmed with PINS that the proposed Scheme constituted a development requiring Environmental Impact Assessment (EIA) under Schedule 1 Section 7(c) of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2009. In accordance with Regulation 6(1)(b) of the aforementioned regulations it stated that an Environmental Statement (ES) in respect of the proposed Scheme would be submitted with the application for a DCO.
- 1.4.4 As part of the pre-application requirements for projects requiring development consent under the PA 2008, it is necessary to produce and consult upon preliminary environmental information. A Preliminary Environmental Information Report (PEIR) was made public from the start of consultation.

Scope of the Environmental Statement

- 1.4.5 This ES presents the findings of the EIA. It follows the guidance provided in the Department for Transport's Design Manual for Roads and Bridges (DMRB) Volume 11, Section 1, Part 6 and Part II of Schedule 4 of the EIA Regulations and comprises the following documents:

- Non-Technical Summary;
- Volume 1 Environmental Statement; and
- Volume 2 Technical Appendices (including plans) to the Chapters in Volume 1 and supplementary technical information relevant to the assessments in Volume 1 and the DCO application.

1.4.6 Due to the size of the ES and the quantity of information presented, each Appendix in Volume 2 corresponding to the chapters in Volume 1 is a self-contained section, comprised of all relevant documents and plans.

1.4.7 Following the scoping exercise and the receipt of the Scoping Opinion from PINS, the structure of the ES is as follows:

- Chapter 1. Introduction
- Chapter 2. The Scheme
- Chapter 3. Need and Alternatives
- Chapter 4. Air Quality
- Chapter 5. Carbon
- Chapter 6. Cultural Heritage
- Chapter 7. Landscape
- Chapter 8. Nature Conservation
- Chapter 9. Geology and Soils
- Chapter 10. Materials
- Chapter 11. Noise
- Chapter 12. Effects on All Travellers
- Chapter 13. Community and Private Assets
- Chapter 14. Road Drainage and the Water Environment
- Chapter 15. Cumulative Impacts
- Chapter 16. Conclusions

- Chapter 17 References
- Glossary

1.4.8 It was initially proposed to submit a Sustainability Appraisal in which carbon would be assessed. However, Scoping Opinion stated that carbon should be assessed within the ES. Therefore, a carbon chapter has been added, and other sustainability issues assessed within the various chapters, so a separate Sustainability Appraisal it considered not to be required.

Overall Methodology

1.4.9 The EIA for the proposed Scheme has been prepared in accordance with guidance and standards set out in the Department for Transport's Design Manual for Roads and Bridges (DMRB) Volume 11 Sections 2 and 3, WebTAG and The Planning Inspectorate's Advice Note 7 (April 2012): Environmental Impact Assessment: screening and scoping.

1.4.10 For some topics, the assessment has gone beyond the requirements of DMRB to follow current best practice as detailed within the individual topic chapters. WebTAG is a web based resource setting out transport assessment guidance (<http://www.Webtag.org.uk>). It originally brought together the Department for Transport's existing guidance, including the Government's Guidance on the Methodology for Multi-Modal Studies (GOMMMS). WebTAG is particularly useful for the guidance it gives on determining environmental capital and environmental significance criteria. The following table (Table 1.1) sets out how this ES complies with the EIA Regulations 2009, and describes how this regulatory compliance is achieved under the DMRB Guidance.

Table 1.1 ES Regulatory Compliance

Regulatory Requirement	Location within the ES	DMRB Reference
Regulation 6 EIA requirement	NCC informed PINS that an ES would be submitted with the DCO application – Regulation 6(1)(b)	Volume 11, Section 2, Part 3 (HA 202/08)
Regulation 8 – request for a Scoping Opinion	NCC submitted a request for a Scoping Opinion in the form of a Scoping Report including a	Volume 11, Section 2, Part 4 (HD 204/08) addresses

Regulatory Requirement	Location within the ES	DMRB Reference
	plan sufficient to identify the land, a description of the proposal and the possible effects on the environment in February 2013 (see Appendix 4 of this document). The Scoping Opinion received from PINS is contained in (Appendix 5 of this document).	Scoping
Regulation 10 – Consultation Statement requirements	The Statement of Community Consultation (SoCC) (prepared under section 47 of the Planning Act 2008) set out how the applicant will publicise and consult on the Preliminary Environmental Information Report (PEIR). The Consultation Report (Document 5.1 of the DCO Application) sets out the results of that consultation.	Volume 11, Section 2, Part 6 (HD 48/08) states that the requirements of the EIA Regulations in relation to public participation must be met (para.1.1).
Regulation 11 – Pre-application publicity under S48 of the Planning Act 2008 (duty to publicise)	The Consultation Report lists those bodies that were contacted by the applicant when it was publicising its intention to prepare and submit the DCO application, including those that were also consulted regarding the Scoping Opinion (Appendix 5)	Volume 11, Section 2, Part 6 (HD 48/08) states that the requirements of the EIA Regulations in relation to public participation must be met (para.1.1).
Regulation 20 – Availability of copies of the ES	Sets out the information regarding where a copy of the ES can be viewed or obtained.	Volume 11, Section 2, Part 6 (HD 48/08) states that obligations of public access must be fulfilled

Regulatory Requirement	Location within the ES	DMRB Reference
		(para.1.1(vi)).
Schedule 1 – Definition of development where EIA is required.	Schedule 1 section 7(c) described in Chapter 1 of the ES	Not applicable
Schedule 4, Part 1, para 17 (a) – description of the physical characteristics of the whole development and land use requirements during construction and operation	This is described in Chapter 2 of the ES.	Volume 11, Section 2, Part 6 (HD 48/08) Describes what the required content of the ES (para 3.12).
Schedule 4, Part 1, para 17 (b) – description of the main characteristics of the production process, for instance, nature and quantity of materials used.	This is described in Chapter 2 and Chapter 10 of the ES	Volume 11 Section 2 Part 6 (HD 48/08) Describes what the required content of the ES (para 3.12).
Schedule 4, Part 1, para 17 (c) – an estimate, by type and quantity, of expected residues and emissions (water, air and soil pollution, noise, vibration, light, heat, radiation, etc) resulting from the operation of the proposed development	This is described in Chapters 4,5,7,9,11,13,14 of the ES	Volume 11 Section 2 Part 6 (para 3.20) and Section 3, Parts 1-12)
Schedule 4, Part 1, para 18 – outline of the main alternatives studied by the applicant and an indication of the main reasons for the applicant’s choice, taking into account the environmental effects	This is described in Chapter 3	Volume 11, Section 2, Part 6 (HD 48/08) (para 2.5(iv); para 3.3(iv); paras 3.13 and 3.14)

Regulatory Requirement	Location within the ES	DMRB Reference
<p>Schedule 4, Part 1, para 19 - description of the aspects of the environment likely to be significantly affected by the development, including, in particular, population, fauna, flora, soil, water, air, climatic factors, material assets, including the architectural and archaeological heritage, landscape and the interrelationship between the above factors.</p>	<p>This is described in Chapters 4 -15 and on Drawings MMD-233906-DT-0881, 0883, 0884, 0885, 0909 and 0937 Environmental Constraints Plans, Appendix 2</p>	<p>DMRB Volume 11, Section 3, Parts 1-12), describes the required content of the ES.</p>
<p>Schedule 4, Part 1, para 20 – Description of likely significant effects on the environment resulting from: (a) the existence of the development; (b) the use of natural resources; and (c) the emission of pollutants, the creation of nuisances and the elimination of waste. Description of the forecasting methods used to assess the effects on the environment.</p>	<p>See Chapters 4 - 15</p>	<p>DMRB Volume 11, Section 3, Parts 1-12 describes the required content of the ES</p>
<p>Schedule 4, Part 1, para 21 - description of the measures envisaged to prevent, reduce and where possible offset any significant adverse effects on the environment.</p>	<p>See Chapters 4 – 16 and Drawing MMD-233906-DT-0552-0563 Environmental Mitigation Plan</p>	<p>DMRB Volume 11, Section 3 Parts 1-12 describes the required content of the ES</p>
<p>Schedule 4, Part 1, para 22 – Non Technical Summary of the information provided above.</p>	<p>Separate Non – Technical Summary – this is provided as a separate document (DCO Reference 6.3a)</p>	<p>Volume 11, Section 2, Part 6 (HD 48/08) (Para 3.3(v))</p>

Regulatory Requirement	Location within the ES	DMRB Reference
Schedule 4, Part 1, para 23 – indication of any difficulties encountered by the applicant.	See Chapters 4 – 15 of ES	Volume 11, Section 2, Part 6 (HD 48/087), Paras 3.14, 3.15 and 3.20 includes a requirement to identify any difficulties encountered.

Overall Approach to the EIA

1.4.11 This section sets out the generic approach taken to EIA. There are methods and requirements specific to each assessment topic and these are detailed on the basis of topic relevancy in Chapters 4 - 15. However, the approach set out below is common to all topics, in accordance with regulatory requirements and best practice.

1.4.12 The EIA has to be considered having regard to the EIA Regulations 2009. The proposed Scheme is EIA development as it falls within the description of development given in paragraph 7(c) of Schedule 1 of those Regulations, as explained in above.

Scoping Report

1.4.13 The submission of the Scoping Report and the Scoping Opinion produced in response are described in paragraph xx above. As required by Regulation 8(6) of the EIA Regulations 2009, the Secretary of State was under a duty to consult widely before adopting his scoping opinion. The consultation responses were provided with the Scoping Opinion (Volume 1 Appendix 5). An explanation of the manner in which these consultation responses have been addressed within the ES can be found in Volume 1 Appendix 6.

1.4.14 The Scoping Report proposed that Carbon be assessed as part of the Sustainability Appraisal. However, the Secretary of State requested in his Scoping Opinion that carbon be considered within the ES. As a result, Carbon has been assessed in Chapter 5 of the ES.

1.4.15 There are no un-navigable, disused or abandoned waterways affected by or connected with the proposed Scheme footprint and the Secretary of State therefore agreed that they could be scoped out of the ES.

1.4.16 Appendix 6 of Volume 1 lists all the items noted in the Scoping Opinion as requiring environmental impact assessment, together with a commentary to explain how they have been assessed.

Temporal Scope of the EIA

1.4.17 The EIA assessed effects arising from the construction of, temporary and permanent land take for, and operation of the proposed Scheme as follows:

- construction effects that may arise directly from construction activities (e.g. piling) and from the temporary use of land (e.g. construction sites), and/or from associated changes in traffic movements (e.g. diversions); and
- operational effects that may arise from the new infrastructure and traffic flows associated with the NDR.

1.4.18 The 'baseline' year for the purposes of the assessment is identified for each topic in the baseline section of each topic chapter, depending on when the baseline information was gathered (generally between 2011 and 2013). For traffic modelling this is referred to as the 'base year' and is 2012. With construction anticipated to take approximately 2 years to complete, 2017 is expected to be the 'opening' year for the purposes of the assessment. The 'design' year (usually 15 years after scheme opening) will therefore be 2032. The opening and design years are based on the assessment years set out in the Transport Assessment (Mott MacDonald, 2013), which has been submitted with the DCO Application.

1.4.19 Subject to obtaining development consent under the PA 2008, construction of the proposed Scheme is due to commence in May 2015 and to continue until May 2017. The design life of the proposed Scheme is 60 years and maintenance will be undertaken throughout the lifetime of the road.

Spatial Scope of the EIA

1.4.20 The overall spatial scope of the EIA has taken into account:

- the footprint of the proposed works including areas required for construction, enabling work and mitigation;

- the footprint of the traffic model where traffic flows are used for the air quality and noise assessments;
- the nature of the existing baseline environment;
- the manner in which effects are likely to be propagated (for example noise and air quality effects will extend significantly beyond the footprint of the works) ;
- the area affected (positively and negatively) by transport movements;
- the geographical boundaries of the political and administrative authorities which provide the planning and policy context for the proposed Scheme; and
- the alignment, both vertically and horizontally, of the proposed Scheme has been assessed with regard to certain tolerances or design parameters.(These are detailed in Chapter 2 The Scheme)

1.4.21 The spatial scope will vary for each topic discipline, and the factors which are relevant in determining the spatial scope of each topic assessment are described in the individual topic Chapters 4 to 15, as appropriate.

Assessment Methodology

1.4.22 DMRB Volume 11 provides environmental assessment guidance in relation to EIA carried out for trunk roads. This guidance has been used for assigning value or importance to environmental features and determining the magnitude of impacts and significance of effects. If DMRB assessment guidance was not considered the most appropriate form of guidance for a particular topic, or if other best practice guidance was considered useful to supplement the DMRB guidance, then this has been employed, as described in the relevant topic chapters of the ES. Topic assessments have used the latest versions of the relevant guidance unless otherwise stated.

1.4.23 The significance of an effect is a factor of the value or sensitivity of the resource affected, and the magnitude of the impact upon it. The relevant criteria used to define the value of a resource are explained in each topic assessment. Unless otherwise stated, guidance in DMRB Volume 11, Section 2, Part 5, has been used to determine the value of an affected resource. This methodology is set out in Table 1.2 below.

Table 1.2: Description of the Value or Sensitivity of an Environmental Resource

Value or Sensitivity	Example Description
Very high	Very high importance and rarity, international scale and very limited potential for substitution.
High	High importance and rarity, national scale, and limited potential for substitution.
Medium	High or medium importance and rarity, regional scale, limited potential for substitution.
Low	Low or medium importance and rarity, local scale.
Negligible	Very low importance and rarity, local scale.

Source: DMRB Volume 11 s2 p5, Table 2.1

1.4.24 Assessment of the magnitude of impact has been based on the degree of direct and indirect impact and whether the impact was permanent or temporary. Criteria for establishing the magnitude of impact have been taken from DMRB Volume 11, Section 2 Part 5, Table 2.2, and are shown in Table 1.3 below. Any use of other criteria has been explained and justified within the relevant assessment topic.

Table 1.3: Magnitude of Impact

Magnitude of Impact	Impact	Example Description
Major	Adverse or Beneficial	Loss of resource and/or quality and integrity of resource; severe damage to key characteristics ,features or elements or Large scale or major improvement of resource

Magnitude of Impact	Impact	Example Description
		quality; extensive restoration or enhancement; major improvement of attribute quality
Moderate	Adverse or Beneficial	Loss of resource, but not adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements or Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality
Minor	Adverse or Beneficial	Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics features or element or Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on attribute or a reduced risk of negative impact occurring
Negligible	Adverse or Beneficial	Very minor loss or detrimental alteration to one or more characteristics, features or elements or Very minor benefit to or positive addition of one or more characteristics, features or elements
No change	Not Applicable	No loss or alteration of characteristics, features or elements; no observable change in either direction.

Source: DMRB Volume11, Section 2, Part 5, Table 2.2

1.4.25 Once the value of resources and magnitude of impacts were considered, the overall significance of effects was assessed using the matrix in DMRB

Volume 11, Section 2 Part 5, Table 2.4 (see Table 1.4 below). Where a different methodology has been adopted for specific environmental topics, this has been explained in the relevant sections of this ES.

Table 1.4: Significance of Effects

Sensitivity	Magnitude of Impact or Degree of Change				
	No change	Negligible	Minor	Moderate	Major
Very High	Neutral	Slight	Moderate/ Large	Large/ Very Large	Very Large
High	Neutral	Slight	Slight/ Moderate	Moderate/ Large	Large/ Very Large
Medium	Neutral	Neutral/ Slight	Slight	Moderate	Moderate/ Large
Low	Neutral	Neutral/ Slight	Neutral/ Slight	Slight	Slight/ Moderate
Negligible	Neutral	Neutral	Neutral/ Slight	Neutral/Slig ht	Slight

Source: DMRB Volume 11, Section 2 Part 5, Table 2.4

1.4.26 Only those effects that are considered moderate or above adverse/beneficial are considered significant for the purposes of the EIA.

Mitigation and Monitoring

1.4.27 Mitigation is defined as “measures intended to avoid, reduce and, where possible, remedy significant adverse environmental effects” (DMRB Volume 11, Section 2, Part 7 (HA 218/08)).

1.4.28 The EIA has been made on the assumption that the proposed Scheme incorporates measures to prevent, reduce and where possible offset environmental impacts from the earliest stage of the project. Specific details of the proposed mitigation measures are included in the individual topic sections of this ES. The proposed measures were designed according to statutory and

non-statutory guidance and the DMRB to provide proposals that are proportionate to the significance of the relevant effect. Such mitigation measures are set out in the requirements in the DCO and NCC is committed to delivering them as an integral part of the proposed Scheme.

1.4.29 Monitoring is defined as ‘a continuing assessment of the performance of the project, including mitigation measures. This determines if effects occur as predicted or if operations remain within acceptable limits, and if mitigation measures are as effective as predicted’ (DMRB Volume 11, Section 2, Part 7 (HA 218/08)). Where monitoring is proposed over and above statutory requirements it is set out in the individual topic chapters.

Combined and Cumulative Effects

1.4.30 A cumulative impact may arise as the result of: a) the combined impact of a number of different environmental topic-specific impacts from a single environmental impact assessment project on a single receptor/ resource; and b) the combined impact of a number of different projects within the vicinity (in combination with the environmental impact assessment project) on a single receptor/resource. Combined effects are additional impacts arising from interrelationships within the same scheme.

1.4.31 Those impacts arising from the scheme in combination with other proposed developments are termed cumulative. This includes development under construction; permitted applications which have not yet been implemented; submitted applications which have not yet been determined; projects on the Planning Inspectorate’s programme of projects; projects identified in development plans and emerging development plans and projects identified in other plans and programmes which set the framework for future development consents/approvals and which are reasonably likely to come forward. Combined and Cumulative effects are assessed within Chapter 15 of the ES.

Consultation

1.4.32 1.1.48 The results of the informal and formal public consultation on the Scheme in accordance with Sections 42, 47 and 48 of the PA 2008 are summarised in the Consultation Report, document 5.1 of the DCO submission.

1.4.33 As described in Chapter 2, the proposed Scheme has been the subject of assessment since 2003. During that time extensive informal and formal

consultation with Statutory Stakeholders/consultees has been conducted on a regular basis. This consultation, particularly with the Statutory Environmental Bodies, has been the basis for the focus of the EIA work to date. Volume 2 of the ES details the relevant consultation undertaken for each of the chapter topics.

Other Environmental Documents

1.4.34 The following environmental information has been prepared and will be submitted as part of the DCO application:

- Transport Assessment;
- Habitat Regulations Assessment;
- Arboricultural Impact Assessment;
- Construction Environmental Management Plan (CEMP) containing the Site Waste Management Plan (SWMP);
- Health Impact Assessment;
- Draft EPS Licence; and
- Non-Technical Summary

2. The Scheme

2.1 Introduction

2.1.1 The Scheme (the Norwich Northern Distributor Road, known as “the NDR”) is a dual carriageway all-purpose strategic distributor road, to be classified as the A1270 Principal Road, which would link the A1067 Fakenham Road, near Attlebridge, to the A47 Trunk Road (T) at Postwick. This will be over a length of approximately 20.4 km. Refer to the General Arrangement Plans in document number 2.6.

2.2 General Description: Scheme Route

2.2.1 From west to east, the scheme will start with a realignment of 750m of the A1067 Fakenham Road to the north of the existing carriageway, where the NDR (A1270) starts at a new at-grade roundabout junction, located to the west of Taverham. The NDR would then continue eastwards as a dual carriageway to its new at-grade roundabout junction with the C262 Fir Covert Road. From this roundabout, the NDR would then cross the Marriott’s Way (a permissive path providing a pedestrian, cycling and horse riding facility along the route of a disused railway) which will be taken across the NDR via a new bridge), to a new at-grade roundabout junction with the C261 Reepham Road. The NDR would then continue south eastwards, crossing Bell Farm Track/Horsford Restricted Byway No. 5 (which will be taken up over the NDR via a new Restricted Byway and private access accommodation bridge) before connecting with a new at-grade roundabout junction, just west of the existing C282 Drayton Lane, and which new roundabout will have two new link road connections, one with the C261 Reepham Road and one with the B1149 Holt Road, to replace the existing Drayton Lane.

2.2.2 From here, the NDR would then continue south eastwards to a new grade-separated junction (provision of a bridge over the NDR with slip roads to/from the NDR) with the A140 Cromer Road, located close to and just north west of Norwich International Airport. The provision of this grade-separated junction will require the stopping up of lengths of the B1149 Holt Road and Holly Lane (U57142), as well as a length of the A140 Cromer Road, which will be replaced by a new highway west of its existing position, which will be taken over the NDR and provide the connection for its four connecting slip roads. East of the A140, the NDR would continue as a dual carriageway, turning north eastwards around the northern boundary of the airport to a further new at-grade roundabout junction at the northern tip of the airport. The primary

purpose of this roundabout is to allow the NDR to undertake a roughly 90 degree change of direction around the Airport site. From this roundabout, the NDR would continue south eastwards, skirting the north east boundary of the airport, before turning eastwards and passing under a new highway, which will be carried by bridge over the NDR, immediately to the east of the existing C246 Buxton Road, and which would provide the new connection for its realignment sections north and south of the NDR.

- 2.2.3 The route of the dual carriageway NDR would then continue eastwards through the north of Beeston Park. It would then connect with both the B1150 North Walsham Road and the A1151 Wroxham Road via a new at-grade roundabout at each location, before turning south eastwards and entering the north eastern section of Rackheath Park approximately 250 metres from the western end of Sir Edward Stracey Road (U57538). It would then continue south eastwards, passing under a new bridleway and access bridge across the NDR, some 200 metres south west of the junction of Newman Road (U57490) with Long's Crescent (U57852).
- 2.2.4 The NDR would then connect with the C283 Salhouse Road via a new at-grade roundabout, before rising up on an embankment (maximum height approximately 8.5 metres), to cross both the Norwich to Cromer & Sheringham rail line and the C874 Plumstead Road on individual bridges in close proximity, prior to a new at-grade roundabout on the NDR, which would connect it via a new link road to a further small at-grade roundabout on the C874 Plumstead Road.
- 2.2.5 The NDR route would then continue southwards, crossing under the C442 Middle Road (which would be raised to pass over the NDR, on its existing alignment, via a new bridge) before connecting with a new at-grade roundabout known as the Business Park Roundabout.
- 2.2.6 At this point a single carriageway link is provided westwards to the existing C829/C830 Broadland Way/C831 Peachman Way roundabout and includes an at-grade roundabout on the link road to the proposed Broadland Gate Business Park.
- 2.2.7 From the Business Park roundabout the NDR proceeds southwards as a dual carriageway to a new Postwick north east at-grade roundabout immediately north of the A47(T) Norwich Southern Bypass. This roundabout has links from a new A47(T) eastbound diverge slip road and a new A47(T) eastbound merge slip road. The NDR continues over the A47(T) as a four lane carriageway, one lane north and three south, on a new bridge and terminates

at its southernmost point at a signalised junction, which replaces the existing Park and Ride roundabout with the A1042 Yarmouth Road.

2.2.8 This signalised junction provides further links:

- Directly to and from the park and ride site for buses;
- West to the existing Postwick North West roundabout, via the existing Postwick bridge over the A47(T);
- East to the proposed park and ride site entrance at the proposed Oak's Lane roundabout and further east to the Brundall Low Road junction with the A1042 Yarmouth Road to Postwick village; and
- West to the A47(T) via an existing westbound merge slip road.

2.2.9 The works at Postwick Junction, will include modifications to the existing Postwick north west roundabout (as a result of closing the existing eastbound diverge slip road) and to the existing A1042 Yarmouth Road overbridge of the A47(T), to provide revised traffic lanes and the provision of a shared use cycle/footway.

2.2.10 The route of the NDR that has been described above is, for the majority of its length, within Broadland District. It does, however, for a short stretch close to Norwich International Airport, fall within the administrative area of Norwich City Council. A very small part of the works at Postwick falls within the administrative area of The Broads Authority. The new road from west to east runs through the following parishes:

- Attlebridge;
- Taverham;
- Drayton;
- Horsford;
- Horsham St. Faith and Newton St. Faith;
- Spixworth;
- Beeston St. Andrew;
- Sprowston;
- Rackheath;

- Great and Little Plumstead; and
- Postwick with Witton.

2.3 Overview of scheme features

2.3.1 As described above, the scheme consists of a number of different features which are detailed further below. The location of the proposed Scheme features is measured by reference to the “chainage”, which is the distance from the start of the scheme, at its junction with the A1067 Fakenham Road, in metres.

2.3.2 There will be ten new highway structures, which consist of six overbridges and four underbridges carrying the following existing routes, or new routes as necessary, either under or over the NDR.

Table 2.1: Overbridges

Overbridge	Chainage
Marriott’s Way – permissive path providing a pedestrian, cycling and horse riding facility along the route of a disused railway	2390
Bell Farm Track – Horsford Restricted Byway No. 5 and private means of access	3980
New A140 Cromer Road	6800
New road - C246 Buxton Road replacement	10940
Private means of access and new bridleway leading from Newman Road (U57490)	15500
C442 Middle Road	18060

Table 2.2: Underbridges

Underbridge	Chainage
Norwich to Cromer & Sheringham railway line	16920
C874 Plumstead Road	17010
New flood culvert/bat underpass which will be located to the west of Rackheath	14810
A47 Trunk Road at Postwick	20220

Table 2.3: Grade separated junctions

Junction	Chainage
A140 Cromer Road (to include eastbound and westbound merge and diverge slip roads)	6800
A47 Trunk Road at Postwick (to include new roundabout east of the existing roundabout with provision of new eastbound diverge and eastbound merge slip roads to/from the A47(T))	19450 - 20400

Table 2.4: At-grade roundabout junctions

Junction	Chainage
A1067 Fakenham Road	510
C262 Fir Covert Road	1750
C261 Reepham Road	2910
New Highway links just west of C282 Drayton Lane	5330
B1150 North Walsham Road	12100
A1151 Wroxham Road	14240
C283 Salhouse Road	16100
C874 Plumstead Road (South)	17300

Table 2.5: On-line access roundabouts

Access roundabouts	Chainage
Northernmost point of Norwich Airport to include a new highway access to the Petans offshore training facilities and secure access to Norwich International Airport	9120
At the proposed Broadland Gate Business Park location to link the NDR to the proposed Broadland Gate Link Road	19450 – 20400

Table 2.6: Off-line roundabouts

Off-line roundabouts	Chainage
C282 Drayton Lane/B1149 Holt Road junction	Off-line
C874 Plumstead Road (North)	Off-line
Proposed site of the Broadland Gate Business Park, off the Broadland Gate Link Road	Off-line

Table 2.7: Major/minor priority junction

Junction	Chainage
C282 Drayton Lane/C261 Reepham Road	Off-line

Table 2.8: Bat gantries

Bat gantry	Chainage
Along the line of Attlebridge Restricted Byway No.3	760
Along the line of track to Glebe Farm	5780
Approximately 150 metres south west of Quaker Farm	10020
Approximately 150 metres north east of North Park Cottage	12650
Along the line of track approximately 400 metres east of Park Farm	13140
Along the line of track approximately 250 metres north west of Oak's Farm	17730
Parallel with Smee Lane (U59400)	19000

2.3.3 To convey natural runoff under the NDR, a number of culverts will be provided.

Table 2.9: Road closures

Road closures	Chainage
Breck Farm Lane (U57168) to the south of the NDR	2525
Furze Lane (U57168) to the north of the NDR	2525
C282 Drayton Lane – a 892 metres length from its junction with the C261 Reepham Road	5350
B1149 Holt Road to north of the NDR	6600
Holly Lane (U57142) to the South of the NDR	6600
C251 Bullock Hill to the North of the NDR	8900
Road closures	Chainage
Quaker Lane (U57188) to the North of the NDR	9820
C251 St. Faiths Road to the South of the NDR	9990
C258 Broad Lane at its junction with C874 Plumstead Road/Norwich Road (by Traffic Regulation)	17010
Low Road (U59392) to the east and west of the NDR	18380
Smee Lane (U59400) to the east and west of the NDR	19000
A length of the existing A47(T) eastbound diverge slip road, from the A47(T) connection point with the new eastbound diverge slip road, eastwards to the existing Postwick North West roundabout	19500
A length of the existing A47(T) eastbound merge slip road, from its junction with Postwick North West roundabout, eastwards to the connection point with the new A47(T) eastbound merge slip road	19500

Table 2.10: Public and Private Rights of Way to be stopped up/diverted

Tracks and Rights of Way	Chainage
Private: Access Track running north-south between the A1067 Fakenham Road and Attlebridge Restricted Byway No.3, to the north of the NDR)	700
Public: A 386 metre length of Attlebridge Restricted Byway No. 3, north westwards from its junction with the A1067 Fakenham Road (a diverted route from the northern side of the A1067 Fakenham Road Roundabout to be provided)	760
Private: A length of Access Track running along a co-existent route with Attlebridge Restricted Byway No.3, to the north of the NDR	760
Private: A length of Access Track running along a co-existent route with Drayton Restricted Byway No.6, north eastwards off the C261 Reepham Road, to Felthorpe Woods	3000
Private: A length of Access Track running north eastwards, to agricultural land, off the C261 Reepham Road	3000
Private: Access Track, leading to Bell Farm, from the C261 Reepham Road, opposite Long Dale (U51249), to Dog Lane (U57176), to the north and south of the NDR	3750
Private: Bell Farm Track to be placed on a diverted route on overbridge of the NDR	4000
Private: Access Track running from the C261 Reepham Road to Glebe Farm on B1149 Holt Road, to the north and south of the NDR	5150
Public: Horsford Restricted Byway No.7 – a 60 metre length from its junction with the C282 Drayton Lane (remaining length will connect with new Drayton Lane (north) Link Road))	5300
Private: Access Track at the southern termination point of C250 Old Norwich Road, to Norwich International Airport Control Tower and Airport curtilage, to the north of the NDR	7900
Public: Horsham St. Faith and the Newton St. Faith Bridleway No.6, to the west of the NDR	8900

Public: Spixworth Bridleway No.1, to the east of the NDR	9800
Private: Access Track leading north of Red Hall Farm, Beeston Lane (U57186), to the north and south of the NDR	11730
Private: AccessTrack leading north off Beeston Lane (U57186), approximately 400 metres east of Park Farm, to the north and south of the NDR	13150
Private: Access Track leading south west from the C258 Green Lane West, to the pumping station, to the north and south of the NDR	14800
Private: AccessTrack leading from the existing Newman Track west of Gazebo Farm in a northerly direction for approximately 250 metres.	15200
Private: Access Track leading from the realigned Newman Track on the east of overbridge leading northwards for approximately 80 metres.	15500
Private: Access Track leading southwards from Newman Road (U57490)/Long's Crescent (U57852) junction, over its length to the circulatory track around March Farm, Park Gardens etc.	15500
Private: Access Track leading from C258 Green Lane West to Hall Farm, west of the NDR	15800
Public: Great and Little Plumstead Footpath No.5, to the east and west of the NDR	18750
Private: Access Track running along a co-existent route with Great and Little Plumstead Footpath No.5 to the Nurseries, to the east and west of the NDR	18750
Public: Postwick Footpath No.2 – a 700 metre length from its junction with the A1042 Yarmouth Road.	19000

2.3.4 A number of other highways are to be stopped up under the NDR proposals, but which are to be replaced by the NDR itself, or parts of it, or by other new highways.

2.3.5 A number of other private means of access to premises are to be stopped up under the NDR proposals, but which are to be replaced by other new means

of access to premises, other than where another reasonably convenient means of access to those premises already exists.

Table 2.11: Diversions of Public Rights of Way

Track and Rights of Way diversions	Chainage
Public: Attlebridge Restricted Byway No. 3 (to the North of the NDR) diverted alongside the NDR to join the A1067 Fakenham Road roundabout.	750
Public: Drayton Restricted Byway No. 6 diverted around the north of the NDR Reepham Road roundabout to join the roundabout.	3000
Public: Horsford Restricted Byway No. 5 diverted over the new Bell Farm Overbridge.	3950

2.4 New links

- 2.4.1 Approximately 25 kilometres of new links suitable for use by pedestrians, cyclists and equestrians where permitted would be provided alongside, over, and connecting with, in places, the NDR route, together with improved surfacing provided on some existing rights of way.
- 2.4.2 The new links provided for use by pedestrians, cyclists and equestrians would be provided alongside the NDR route within the landscape strip. These would link to existing facilities and be screened from the NDR carriageway by a combination of low mounds and/or hedge and tree planting.
- 2.4.3 Where individual or joint access to premises will be severed by the NDR, new accesses will be provided to link these to the NDR or to other existing roads, other than where the premises are already served by another reasonably convenient means of access.

2.5 Statutory undertakers

Table 2.12: Utility works

Utility company	Number of diversions
EDF	22
Government pipelines	1
National Grid Gas	9
National Grid Gas (High P)	1
Utility company	Number of diversions
British Telecom	16
Anglian Water (potable)	16
Anglian Water (Sewers)	7
Biffa	1
Virgin Media	1

2.6 Complimentary works

2.6.1 It is proposed to carry out the following off-line complimentary works:

2.6.2 Relocation of the C258 Green Lane West junction with the A1151 Wroxham Road, by provision of a new highway connection from the C258 Green Lane West to the A1151 Wroxham Road, 75 metres to the south west of its existing junction, together with closure of the existing junction (by Traffic Regulation) and turning the remaining C258 Green Lane West into a residential cul-de-sac;

2.6.3 Closure of the C249 Rackheath Lane at its junction with the B1150 North Walsham Road (by Traffic Regulation), together with widening of the C249 Crostwick Lane arm of the junction;

2.6.4 Highway improvements measures on the C874 Plumstead Road through Thorpe End; and

2.6.5 The provision of a shared use footway/cycleway, within the northern highway verge of the C261 Reepham Road, between its junction with Horsford Restricted Byway No.5 and Long Dale (U51249).

2.7 Lighting

The majority of the proposed scheme will not be lit. The exception to this is the Postwick Junction area of the scheme which will provide lighting as follows:

Table 2.13: Lighting

Illumination	Chainage
From the Business Park roundabout westwards to the C829 Broadland Way/C831 Peachman Way roundabout.	19450 - 20400
From the Business Park roundabout southwards to and including the Postwick North East roundabout.	19450 - 20400
South from the Postwick North East roundabout across the new NDR overbridge of the A47(T) to the signalised junction on the A1042 Yarmouth Road.	19450 - 20400
The A1042 Yarmouth Road signalised junction.	19450 - 20400
On the existing A1042 Yarmouth Road bridge over the A47(T).	19450 - 20400
From the existing A1042 Yarmouth Road bridge over the A47(T) to and including Postwick North West roundabout.	19450 - 20400

2.8 Proposed Traffic Regulation

2.8.1 In addition to the above scheme features, it is proposed that the following Permanent Traffic Regulation measures will be brought into effect:

- 2.8.2 Clearway for the entire length of the NDR between and including the A1067 Fakenham Road roundabout and A47(T) at Postwick and roads forming the Postwick Hub junction and Broadland Gate link;
- 2.8.3 Amendment to speed limits on existing routes where these are bisected by the NDR;
- 2.8.4 Extension of the existing 30 mph speed limit on the C442 Middle Road westwards to a point immediately west of the proposed bridge over the NDR, to include the built-up extents of Toad Lane closest to Middle Road;
- 2.8.5 40 mph speed limit to roads forming the Postwick Junction, south of and including the proposed Broadland Gate link.
- 2.8.6 Prohibition of entry on the NDR Diverge Slip Roads at the A140 Cromer Road junction (at their connection points with the NDR Cromer Road Roundabout North and the A140 Cromer Road Roundabout South) and on the new A47(T) eastbound Diverge Slip Road at its connection point with Postwick North East Roundabout;
- 2.8.7 30 mph, 40 mph and 50 mph speed limits on components of the Drayton Lane Link Road.
- 2.8.8 Extension of 30 mph speed limit on the B1149 Holt Road to include the new roundabout.
- 2.8.9 Extension of 30 mph speed limit on the C283 Salhouse Road.
- 2.8.10 Extension of 40 mph speed limit on the C874 Plumstead Road/Norwich Road.
- 2.8.11 40 mph speed limit on new Plumstead Road Link Road.
- 2.8.12 Amendments to existing 7.5T weight restrictions on the U59400 Smee Lane, the U59393 Low Road, the U57188 Quaker Lane and the C251 St. Faiths Road.
- 2.8.13 Prohibition of Motor Vehicles on the C249 Rackheath Lane at its junction with the B1150 North Walsham Road.
- 2.8.14 Prohibition of Motor Vehicles on the C258 Green Lane West at its junction with the A1151 Wroxham Road.
- 2.8.15 Prohibition of Motor Vehicles on the C258 Broad Lane (north western leg) at its junction with the C874 Norwich Road.

2.8.16 Prohibition of Motor Vehicles (except for buses) at the western entrance to the Postwick Park and Ride site.

2.9 Overview of Policy and Legislation

Introduction

- 2.9.1 This section covers two matters. The first is an outline of the legislative context against which the proposed NDR scheme is being considered. The second is an overview of policy and guidance relevant to both the principle of, and the need for the proposed NDR scheme.
- 2.9.2 The detailed analysis of wider relevant legislation, policies and guidance, and of the policy implications of the proposed NDR scheme, are provided on a chapter by chapter basis within this Environmental Statement (ES). In particular, each topic assessment chapter of the ES sets out the national (and where relevant international) legislation and policy and local policies and guidance relevant to the specific environmental topic that it is considering.
- 2.9.3 Regard has been had to policy and legislative material both in drawing up the NDR proposals and in the assessment of the environmental effects of the proposed NDR scheme. Further analysis of the policy and guidance outlined in the second part of the overview below, the focus of which relates to planning and transport matters, is given in Chapter 3 of the ES: Need and Alternatives, together with an assessment of how the proposed NDR scheme relates to the policy objectives identified in that material.

Legislative Context

- 2.9.4 In December 2012, Norfolk County Council (NCC) decided to promote the proposed NDR scheme as a Nationally Significant Infrastructure Project (NSIP). At that time the proposed NDR scheme fell within the definition of an NSIP set out in section 22(2) of the Planning Act 2008 (PA 2008) (as it was at that time) because it included works to the Postwick junction of the A47(T) and was to be constructed for a purpose connected with the A47(T).
- 2.9.5 In July 2013 the Highway and Railway (Nationally Significant Infrastructure Project) Order 2013 (SI 2013/1883) (the Order) came into force. The Order amended section 22 of the PA 2008 so that a project such as the NDR would not fall within the definition of a NSIP. However, in August 2013 the Secretary of State for Transport made a direction under section 35 of the PA 2008 that the NDR was a project of national significance and was to be treated as development for which development consent (under the PA 2008) was

required. Consent for the construction and operation of the proposed NDR scheme therefore needs to be obtained via a Development Consent Order (DCO).

- 2.9.6 As proposed development for which development consent under the PA 2008 is required, the need for the proposed NDR scheme to be subject to Environmental Impact Assessment (EIA) has to be considered having regard to the Infrastructure Planning (Environmental Impact Assessment) Regulations 2009 (as amended) (the EIA Regulations). The proposed NDR scheme is EIA development because it falls within the description of development given in paragraph 7(c) of Schedule 1 of those Regulations.
- 2.9.7 A formal Scoping Opinion as to the information to be included in the ES accompanying the DCO application has been provided by the Planning Inspectorate (the body who will, on behalf of the Secretary of State, examine the DCO application when it is submitted). In addition, NCC has (in accordance with Regulation 6 of the EIA Regulations) notified the Planning Inspectorate of its intention to provide an ES in respect of the proposed NDR scheme.
- 2.9.8 Section 104 of the PA 2008 highlights the importance of National Policy Statements (NPS) in the determination of applications for development consent. The draft NPS for National Networks was published by the Department for Transport in December 2013, the underlying substance of which has been addressed in the NDR application.
- 2.9.9 At the time of making the application for development consent for the proposed NDR scheme, there is no designated NPS in place for highway schemes. In the absence of a designated NPS, the application for development consent for the proposed NDR will need to be determined under section 105 of the PA 2008, which requires the Secretary of State for Transport, in determining the application, to have regard to:
- Any local impact report submitted to the Secretary of State;
 - Any matters prescribed in relation to the development of the description to which the application relates; and
 - Any other matters which the Secretary of State thinks are both important and relevant to the Secretary of State's decision.
- 2.9.10 The following section therefore provides a summary of national planning and transport policy and guidance that is of relevance both to the principle of, and

the need for, the proposed NDR scheme. This is then, in turn followed by a summary of relevant local policy and guidance. As the Secretary of State is required under section 105 of the PA 2008 to have regard to any other matters which he thinks are both important and relevant to his decision, such matters may also include the draft NPS if it has not yet been formally designated.

2.10 National Policy and Guidance

The Plan for Growth (March 2011) (HM Treasury)

2.10.1 Produced soon after the Government came to power, the Plan for Growth set out the objective of the Government's economic policy as being the achievement of strong, sustainable and balanced growth across the country and between industries (Executive Summary, page 5). The Plan for Growth contains four overarching ambitions to ensure progress is made towards achieving this economic objective; those ambitions are:

- to create the most competitive tax system in the G20;
- to make the UK one of the best places in Europe to start, finance and grow a business;
- to encourage investment and exports as a route to a more balanced economy; and
- to create a more educated workforce that is the most flexible in Europe.

2.10.2 It was further made clear (Plan for Growth, paragraph 1.34) that to achieve the second of these ambitions, one of the steps the Government intended to take was to produce a shorter, more focused and inherently pro-growth National Planning Policy Framework to deliver more development in suitable and viable locations. In order to achieve the third ambition the Government indicated (Plan for Growth, paragraph 1.54) that it would seek to increase investment in infrastructure by, amongst other things, publishing the UK's long-term forward view of infrastructure projects and programmes as part of a National Infrastructure Plan. Support for the creation of Local Enterprise Partnerships (LEP) and the introduction of Enterprise Zones are highlighted as steps taken to achieve this ambition.

National Planning Policy Framework (NPPF) (March 2012) (Department for Communities and Local Government)

- 2.10.3 The National Planning Policy Framework (NPPF) sets out the Government's planning policies for England and explains how these are expected to be applied (NPPF, paragraph 1). It is made clear that whilst the NPPF does not contain specific policies for NSIPs (which are determined in accordance with the decision-making framework set out in the PA 2008) it may be considered relevant in the determination of NSIP applications (NPPF, paragraph 3).
- 2.10.4 The NPPF highlights that the purpose of the planning system is to contribute to the achievement of sustainable development, which is recognised as having three dimensions: economic, social and environmental (NPPF, paragraphs 6 and 7). It is further recognised that these roles should not be undertaken in isolation, as they are mutually dependent (paragraph 8). A presumption in favour of sustainable development is at the heart of the NPPF and is seen as a golden thread through both plan making and decision taking (NPPF, paragraph 14) (although it is noted that this presumption does not apply in relation to development requiring appropriate assessment under the Birds or Habitats Directives (NPPF, paragraph 119)).
- 2.10.5 A series of twelve core planning principles are identified (NPPF, paragraph 17). These emphasise, amongst other things, that planning should: be genuinely plan led; proactively drive and support sustainable economic development to deliver the homes, business and industrial units, infrastructure and thriving local places that the country needs; and, actively manage patterns of growth to make the fullest use of public transport, walking and cycling, and focus development in locations which are or can be made sustainable.
- 2.10.6 In respect of its policies aimed at building a strong, competitive economy, the NPPF highlights the fact that the Government is committed to ensuring that the planning system does everything that it can to support sustainable economic growth. It adds that planning should operate to encourage and not act as an impediment to sustainable growth (NPPF, paragraph 19).
- 2.10.7 The NPPF also makes clear that transport policies have an important role to play in facilitating sustainable development and in contributing to wider sustainability and health objectives. It states that local authorities should develop strategies for the provision of viable infrastructure to support sustainable development, including transport investment to support the growth of airports or other major generators of travel demand in their areas (NPPF,

paragraph 31). Notwithstanding this emphasis, the Government acknowledges (NPPF, paragraph 29) that opportunities to maximise sustainable transport solutions will vary from urban to rural areas. The NPPF states (at paragraph 33) that when planning for ports, airports and airfields that are not subject to a separate national policy statement, plans should take account of their growth and role in serving business, leisure, training and emergency service needs. In the absence of a NPS for highways development it would seem reasonable to extend this approach to road proposals also.

2.10.8 Where new development has to be accommodated (in line with the NPPF's central objective to meet each area's objectively assessed needs) and that doing so will have transport implications, the NPPF expects that opportunities for sustainable travel should be taken up wherever practicable, so as to reduce the need for major transport infrastructure (paragraph 32). However, the NPPF goes on to advise that improvements to the transport network should be undertaken, where this can cost effectively limit the significant impacts of development, and that development should only be prevented on transport grounds if the residual impacts (after the provision of such infrastructure improvements) would be severe (paragraph 32). The message of the NPPF is therefore that transport infrastructure should be provided where necessary to support new development (having regard to the opportunities to minimise the need for such infrastructure through sustainable travel initiatives) and that it is only where development cannot be accommodated without severe impacts that it should be prevented on transport grounds.

The National Infrastructure Plan 2011 (November 2011), Infrastructure Delivery Update March 2012, National Infrastructure Plan update (December 2012), Infrastructure Delivery Update March 2013, and National Infrastructure Plan 2013 (December 2013) (HM Treasury and Infrastructure UK)

2.10.9 The National Infrastructure Plan 2011 (NIP) sets out a strategy for meeting the infrastructure needs of the UK economy. It recognises that infrastructure networks form the backbone of a modern economy and are a major determinant of growth and productivity. The Government considers that historically, UK infrastructure has suffered from under-investment and lack of coherent strategic forward planning. The Government makes it clear in the NIP that, "To remain globally competitive, the UK needs to address these failures and develop an infrastructure capable of supporting a dynamic, modern economy" (NIP, Executive Summary, page 5).

- 2.10.10 The NIP states that local transport systems “must enable suburban areas to grow” and that “the transport system must be efficient but also resilient and responsive to infrequent and unexpected pressures” (NIP, paragraph 3.2). It also highlights that the nation's airports and ports are gateways to international trade and that the Government will work to improve the road and rail connectivity to major ports and airports (NIP, paragraph 3.3). Congestion – particularly in and around the major cities – is identified as still being a significant issue in the UK, and one which is likely to significantly worsen as the economy recovers (following the recession) and the pressure on the road system increases as a result of growth (NIP, paragraph 3.8).
- 2.10.11 The NIP cites the Eddington Study (jointly commissioned by the Chancellor of the Exchequer and the Secretary of State for Transport and published in December 2006) which examined the long-term links between transport and the UK's economic productivity, growth and stability, within the context of the Government's broader commitment to sustainable development, and found that congestion had a significant detrimental economic effect upon all road users including businesses (NIP, paragraph 3.9).
- 2.10.12 As part of the Government's strategy for meeting the infrastructure needs of the UK economy, the NIP identifies 40 key areas of infrastructure investment. Referred to as 'Priority infrastructure investments' these priority areas include “Local authority major transport schemes – development pool projects” (see NIP Table 2.B page 23 and NIP Appendix C, Table C1: Transport). The NDR had been placed in the development pool as a result of the 2010 Comprehensive Spending Review whilst the Government assessed which of the schemes in the development pool it would prioritise for investment. Local Authority 'development pool' schemes considered by the Government to fall within this priority infrastructure investment area were initially announced in stages in late 2011. The Norwich Northern Distributor Road (NDR) was given funding approval as a Local Authority Major transport scheme in December 2011 (see item 14 on the DfT's list entitled: Local Authority Majors - Development Pool Schemes - Scheme Decisions - December 2011).
- 2.10.13 An update on the delivery of priority infrastructure was published alongside the Budget in March 2012 (Infrastructure Delivery Update 2012). In this update the Government reiterated its intention to take an active role in ensuring the efficient and on time delivery of infrastructure. An update to the NIP – the National Infrastructure Plan Update 2012 (the NIP Update 2012) –

was published in December 2012 alongside the Government's Autumn Statement 2012.

- 2.10.14 Building on its statement in the NIP that infrastructure is a major determinant of growth and productivity, in the NIP Update 2012 the Government reported on its progress in delivering priority infrastructure projects and in sustaining its commitments to infrastructure set out in the NIP. In the NIP Update 2012, the Government restates its commitment to: progress the development pool schemes (Appendix B); to "ensuring that infrastructure investment is not subject to any unnecessary delays" (page 8), and "to ensuring that the road network is fit for the UK's future transport needs" (page 15).
- 2.10.15 A further update on the delivery of priority infrastructure investments was published alongside the Budget in March 2013 (Infrastructure Delivery Update 2013). In this update the Government restated its belief that "Infrastructure is vital to the success of any modern economy; it drives growth, creates jobs and generates the networks that allow businesses and organisations to thrive. Investing in and improving this country's infrastructure in order to make the UK globally competitive is a key part of the Government's economic strategy" (paragraph 1.1). The delivery summary (at pages 7 to 16) includes reference to Local Authority Major Transport Schemes – development pool projects (which include the proposed NDR scheme).
- 2.10.16 The NIP 2013 confirms the Government's commitment to developing and maintaining a road network that will facilitate people's day-to-day activities, drive economic growth and meet the needs of road-users now and in the future. Strategic objectives for roads include addressing road quality, increasing capacity and tackling congestion, and ensuring the network provides critical connections and securing the network, by fixing the instability and institutional problems that have led to 20 years of underinvestment (paragraph 3.6).
- 2.10.17 In the 2013 NIP the NDR is specifically identified as a top 40 priority infrastructure investment (see Table 5.H Top 40 priority infrastructure investments; local infrastructure) as a regional priority, i.e. a project of either high strategic importance or capital value in a particular region (paragraph 5.17).

*Creating Growth, Cutting Carbon – Making Sustainable Local Transport Happen
(January 2011) (Department for Transport)*

- 2.10.18 In this local transport White Paper the Government sets out its vision for local transport as being, “a transport system that is an engine for economic growth, but one that is also greener and safer and improves quality of life in our communities” (White Paper, paragraph 1.3).
- 2.10.19 This vision is recognised as requiring immediate attention. The improvement of links that help to move people and goods around is recognised by the Government as an important factor in helping to build the balanced dynamic low carbon economy that is essential for the UK's future prosperity (White Paper, Executive Summary, paragraph 1). Also key to this vision is the need to reduce carbon emissions from transport (paragraph 1.4), a proposed strategy for which is set out at Figure 1.1 of the White Paper.
- 2.10.20 The White Paper makes it clear that alongside technological change to address carbon output, measures will need to be taken to tackle the problem of congestion (paragraph 1.8) and that the tackling of such issues encourages sustainable local travel and economic growth (paragraph 1.9). The White Paper goes on to emphasise that the Government believes that “it is at the local level that most can be done to enable people to make more sustainable transport choices and to enable the mainstream use of more genuinely sustainable transport modes – environmentally as well as fiscally, economically and socially sustainable” (paragraph 1.11).
- 2.10.21 The Government makes it clear that it recognises that “it is simply not possible for public transport, walking or cycling to represent a viable alternative to the private car for all journeys...”. As such, the Government is committed to making car travel greener (Executive Summary, paragraph 5). Eliminating the use of passenger cars altogether is seen as the wrong approach given that “for many people, particularly in rural areas and for medium-distance or multi-leg trips, the car is the only practical choice and will remain so” (paragraph 1.5).

Government's Response to the Heseltine Review (March 2013) (HM Treasury and Department for Business Innovation and Skills)

- 2.10.22 The Heseltine review, “No Stone Unturned” (commissioned by the Government and issued in October 2012), reviews all parts of Government policy affecting economic growth, and makes recommendations relating to wealth creation. In its response to the Heseltine review the Government

recognises that historically London and the south-east have been relied on as the primary source of UK economic growth, but that greater success can be achieved by having multiple thriving centres each with their own strengths throughout the country. It is made clear by Government that every locality must be able to fulfil its full potential by taking responsibility for decisions and resources that affect its local economy.

- 2.10.23 Transport provision is key to this approach, and the Government sets out its belief (in paragraph 2.21) that there is a very strong case for the funding of major local transport schemes (which, as is noted above, include the proposed NDR scheme) within the transport budget. This is because such spending is integral to economic development and momentum needs to be maintained in delivering the new infrastructure that is vital to the economy (Box 2.C: Local Authority Transport Majors).

Investing in Britain's Future (June 2013) (HM Treasury)

- 2.10.24 Investing in Britain's Future builds on the process, begun by the publication of the National Infrastructure Plan 2011, of providing clarity and visibility on the investment needed to deliver the infrastructure required to grow, rebalance and enhance the economy (paragraphs 1.1 to 1.5).
- 2.10.25 Chapter 2, which deals with roads, begins by describing the road network as fundamental to the UK economy. It sets out the Government's commitment to major investment in the road network, but also makes clear that improvements to the road network must be brought forward in a way that supports the nation's overall quality of life and environment. It states that "there is no longer a choice between a well-functioning road network and a well-protected environment" (paragraph 2.14). The Government's commitment to supporting technology which will enable transport to play its part in meeting carbon budgets and other environmental targets is stated as a key component of sustainable economic growth (paragraph 2.15). Annex A of the document details the Government's road programme, and includes as a local transport scheme in Table A.2 the Norwich Northern Distributor Road (NDR).

Action for Roads: A network for the 21st century (July 2013) (Department for Transport)

- 2.10.26 Within the foreword to this Command Paper, the Secretary of State for Transport makes clear that "We need to maximise every one of our economic

advantages, and deal with every factor that holds us back if we are to succeed in the global race”. Transport is identified as one of the most important factors in making the country prosper (Foreword) and the road network in particular is described as being “vital to our economy and to our way of life” (Box at start of Chapter 1) and “the life-blood of the economy, performing a crucial function in supporting jobs and growth” (paragraph 1.5).

2.10.27 1.37 The Command Paper outlines how parts of the road network have been left in an inadequate state, with historic underinvestment leaving the UK in an unfavourable position in comparison to its European competitors, despite its clear advantage in terms of its compactness and the comparatively short distances between its major cities (paragraphs 1.7 and 1.8). Indeed, more than 60% of overseas investors said that good road transport is critical or important to their investment decisions and nearly all small, medium and large firms in the UK said that road transport plays an important role in their business (paragraph 1.12).

2.10.28 The Command Paper sets out an expectation that, as a result of the return to economic growth in combination with other factors, traffic and congestion will grow (paragraph 1.21). Even assuming the worst economic circumstances and low population growth, traffic levels on strategic roads are predicted to be 24% higher in 2040 in comparison to today's levels (paragraph 1.22). It is predicted that without action, “growing demand will place unsustainable pressure on our roads, constraining the economy, limiting our personal mobility and forcing us to spend more time stuck in traffic” (paragraph 1.23). The paper goes on to highlight that without investment, congestion will, amongst other things, work against current efforts to help the economy grow (paragraph 1.25).

2.10.29 In respect of local roads (i.e. those that do not form part of the national strategic road network) the Command Paper highlights that the local highway network is the country's most valuable public asset (paragraph 1.40). It also makes it clear that local authorities know their own network better than any national body or outside observer and that they remain best placed to manage their assets (paragraph 1.44). There is also a recognition that until recently, little could be done to free up funding for an authority to tackle congestion or build better links to the outside world, if Whitehall had decided funding should be spent in a particular way (paragraph 1.46).

2.10.30 In the chapter of the Command Paper which specifically covers the support given to local roads (chapter 5) the paper discusses the links provided by local roads to the strategic road network. It is made clear that motorists

almost always start and end their journeys on local roads and that not only, therefore, do decisions about strategic roads have to take account of the impacts on local transport infrastructure, but well maintained and improved local roads are needed for a successful strategic road network (paragraph 5.32). The paper indicates that focusing on problems from both a national and a local perspective with central and local authorities working together will result in a better chance of the respective national and local networks functioning better. The Government's emphasis on the need to pursue decarbonisation strategies and to provide suitable environmental mitigation to counter the effects of road development is maintained in the Command Paper (paragraph 3.4).

Transport – an engine for growth (August 2013) (Department for Transport)

2.10.31 This publication repeats a number of the themes and points highlighted in the Command Paper referenced above. It explains that an efficient transport system depends on effective maintenance, management and capacity improvements, as well as expansion. It also confirms the Government's intention to provide a broad and balanced investment package: striking a balance between maintenance of the UK's existing transport assets and developing new schemes, and achieving balance in geographical terms by supporting a wide range of benefits in all parts of the country.

Planning Policy Statement: Eco-Towns A supplement to Planning Policy Statement 1

2.10.32 This PPS1 Supplement on eco-towns (which remains as extant policy guidance after the publication of the NPPF) sets out the principles and locational criteria for eco-towns (section ET 1 and ET 2). At Annex A the supplement identifies four locations with the potential to be eco-towns, which Government considers should be exemplar projects that encourage and enable residents to live within managed environmental limits and in communities that are resilient to climate change (paragraphs 5 and 6). Rackheath to the north-east of Norwich is identified in Annex 1 as one of the four eco town locations.

2.11 Local Policy and Guidance

2.11.1 This section considers the principle of, and the need for, the proposed NDR scheme in respect of policy and guidance at the local level. It begins by outlining key elements of the statutory development plan relevant to the proposed scheme before then providing an overview of other policy and

guidance. Further analysis of this material, together with an assessment of how the proposed NDR scheme relates to the objectives identified in the material, is set out in Chapter 3 of the ES: Need and Alternatives.

Adopted Joint Core Strategy for Broadland, Norwich and South Norfolk (Adopted March 2011) (Broadland District Council, Norwich City Council, South Norfolk District Council and Norfolk County Council – together the Greater Norwich Development Partnership (GNDP))

2.11.2 The alignment of the proposed NDR scheme is predominantly located within Broadland District. The strategic development plan for this area has been produced in partnership with the neighbouring authorities (Norwich City and South Norfolk District) supported by the County Council – it is known as the Joint Core Strategy (JCS).

2.11.3 The JCS sets out the long term vision and objectives for the area and provides strategic policies for steering and shaping development. It identifies Greater Norwich as having the region's largest economy and being one of the most important city regions in the east of England. The JCS sets out a far reaching spatial vision to be achieved by 2026. In order to monitor the success of achieving the defined spatial vision, a series of twelve spatial planning objectives are set out. In respect of transport, Objective 7 seeks, *"To enhance transport provision to meet the needs of existing and future populations while reducing travel need and impact."*

2.11.4 JCS Policy 6 deals with access and transportation matters. It states that,

"The transportation system will be enhanced to develop the role of Norwich as a regional Transport Node, particularly through the implementation of the Norwich Area Transportation Strategy, and will improve access to rural areas. This will be achieved by: implementation of the Norwich Area Transportation Strategy (NATS) including construction of the Northern Distributor Road (NDR)"

2.11.5 The supporting text to policy 6 explains that:

"The transport strategy will promote sustainable economic development, improve local quality of life, reduce the contribution to climate change, promote healthy travel choices and minimise the need to use the private car."

Social exclusion, deprivation and isolation will be reduced and accessibility to all jobs, services and facilities enhanced” (paragraph 5.44).

- 2.11.6 Implementation of NATS, including the proposed scheme, is identified as being fundamental to the delivery of this transport strategy. The JCS refers to the corridor protected for the proposed scheme being shown on the adopted Proposals Map of Broadland District Council (paragraph 5.45). The supporting text to the policy also highlights that the NDR scheme is a strategic improvement required to deliver growth and facilitate modal shift (paragraph 5.47).
- 2.11.7 Policy 9 of the JCS deals with the strategy for growth in the Norwich Policy Area (NPA) and explains that this area is the focus for major growth and development. The construction of the NDR (to provide strategic access, significantly improve quality of life and environmental conditions in the northern suburbs and nearby villages, and provide capacity for comprehensive improvements for buses, cycling and walking as well as facilitating economic development) is highlighted as a piece of transport infrastructure required to deliver growth and support the local economy. Supporting text at paragraph 6.8 further highlights that the NDR is the fundamental part of NATS and the growth strategy identified in the policy.
- 2.11.8 The Implementation Framework at Appendix 7 of the JCS lists infrastructure required to facilitate development promoted in the JCS. The Implementation Framework identifies the NDR as Priority 1 Infrastructure, which is defined as infrastructure which "is fundamental to the [JCS] strategy or must happen to enable physical growth". The Implementation Framework goes on to state that "Failure to deliver infrastructure that is fundamental to the strategy would have such an impact that it would require the strategy [in the JCS] to be reviewed. This particularly applies to the NDR and the associated package of public transport enhancement. The sustainable transport requirements of the strategy and much of the development to the north of the built up area is dependent on these key elements of NATS."
- 2.11.9 Following its adoption in March 2011, the JCS was subject to a legal challenge which resulted in certain parts of the JCS (including elements of Policy 9) being remitted and treated as not having been adopted. The Councils then undertook further work on the remitted parts of the plan to address the judgement, and submitted those parts of the plan for independent examination in February 2013. The examination took place between May and July 2013. Further modifications were produced as a result of the examination and these were consulted upon in September and October 2013. The

Inspector reported in November 2013 that the remitted JCS (with some further modifications) was sound. The GNDP has indicated that the remitted JCS is likely to be adopted in January 2014.

Norfolk's Local Transport Plan 3: Connecting Norfolk (April 2011) (Norfolk County Council)

2.11.10 The Local Transport Plan (LTP3) sets out the strategy and policy framework for transport within Norfolk up to 2026. The transport vision set out in LTP3 is for *"A transport system that allows residents and visitors a range of low carbon options to meet their transport needs and attracts and retains business investment in the county"* (Executive Summary and Chapter 2).

2.11.11 One of the six aims that support this vision is identified as being to 'Deliver sustainable growth' (paragraph 2.2). LTP3 recognises that there will be significant growth in Norfolk and sets out a strategy which provides a framework for this growth to be delivered. An element of this framework is *"Ensuring necessary infrastructure to support growth is secured, including a Norwich Northern Distributor Road to facilitate economic growth in the greater Norwich area"* (Executive Summary). The supporting text for Policy 6 'Transport Infrastructure to Support Growth' states that *"a Northern Distributor Road, running from the A47 in the east at Postwick to the A1067 in the north-west, is vital to help unlock development to the north-east of the city and improve connectivity between North Norfolk and the trunk road network"* (paragraph 4.11).

2.11.12 A further aim (Policy 7) is identified as improving 'Strategic connections'. The key strategic connections which are identified and where opportunities will be taken to enhance them through partnership working include *"A Norwich Northern Distributor Road to facilitate strategic access to north-east Norfolk and Norwich Airport"*.

Norwich Area Transportation Strategy (NATS) 2006 (as amended 2010) (Norfolk County Council)

2.11.13 This strategy replaces and builds upon earlier transportation strategies for the Norwich Area. It highlights that transport plays an important part in allowing the Norwich Area to fulfil its potential, but that it can also cause problems. The transportation strategy is seen as an important tool, setting out not only how any problems can be minimised, but also to ensure that transport can bring the maximum benefits to the area (paragraph 1.7). The

provision of a Northern Distributor Road is identified as an important element of the transportation strategy for the Norwich area to enable growth in and around the city (Executive Summary).

2.11.14 The Northern Distributor Road is the subject of policy 2 of NATS, which states that:

“A Norwich Northern Distributor Road will be developed for implementation, in conjunction with other measures including:

- Traffic mitigation measures on minor rural and suburban residential streets around the north of Norwich
- Provision of facilities for cycling and walking.”

Delivering Economic Growth in Norfolk ‘The Strategic Role for Norfolk County Council’ 2012 – 2017 (March 2012) (Norfolk County Council)

2.11.15 This document outlines how Norfolk County Council will support the economic growth of Norfolk. It sets out the following five priority themes, below which sit more detailed action plans:

- to provide support for growth and removing infrastructure constraints
- to help businesses to start up and grow
- to improve perceptions of Norfolk’s business offer and secure inward investment and growth in key sectors
- to address Norfolk’s skills and employability challenges
- to provide fair access to the public sector

2.11.16 In respect of the first theme, the aim that is set out is “To ensure Norfolk can meet its economic growth potential through properly funded strategic infrastructure (roads, rail, broadband, utilities etc)” (paragraph 5.2.1). In terms of priorities to meet this aim, the document highlights the NDR as being “vital to the continued economic success of the Greater Norwich area, also benefiting North Norfolk and Gt Yarmouth” (paragraph 5.2.1).

Norfolk Infrastructure Plan (October 2012) (Norfolk County Council)

- 2.11.17 A key aim of Norfolk County Council's Economic Growth Strategy (which is discussed in the preceding paragraphs) is to address the infrastructure constraints that are preventing further economic growth in Norfolk. An infrastructure plan has therefore been produced, which *"pulls together information on the key infrastructure needed to deliver economic growth in Norfolk"* (Chapter 1).
- 2.11.18 The NDR is identified as a key infrastructure project which "will bring much needed traffic relief for communities to the north and east of Norwich and the city centre, and deliver rapid and sustained economic benefits for Norwich and a large part of north Norfolk. For existing business, the benefits of easy and reliable access to the national trunk road network and the Airport are considerable. The road also unlocks the potential for new businesses and jobs." (page 18).
- 2.11.19 The plan highlights the NDR as "key to the Norwich Area Transportation Strategy, allowing the development of a modern, sustainable transport system for Norwich, including Bus Rapid Transit and facilities for cyclists and pedestrians. Government support for the road is conditional upon progress being made on these elements of the Strategy" (page 18). It is further recognised in the Plan that "while the NDR's primary purpose is to reduce traffic on unsuitable roads and allow progress on the Norwich Area Transportation Strategy, the new road will help the area to the north and east of Norwich cope with unavoidable growth pressures" (page 18).

Towards a Growth Plan Consultation Draft (July 2013) (New Anglia Local Enterprise Partnership (LEP))

- 2.11.20 Within the emerging version of the New Anglia LEP growth plan ('Towards a Growth Plan – Consultation Draft, July 2013) the LEP sets out its commitment to supporting the proposed NDR scheme, acknowledging that the NDR is *"essential to unlock the potential of sustainable new settlements to the north of Norwich."* (Chapter 6, Enabling Infrastructure for Business, para 6.16).

3. Needs and Alternatives

3.1 Introduction

3.1.1 This chapter of the Environmental Statement sets out the need which the Norwich Northern Distributor Road (NDR) proposals have been designed to meet. It also explains the consideration Norfolk County Council (NCC) has given to potential alternatives to meeting the need. Supporting Figures for this chapter are provided in Volume 2, Chapter 3 Needs and Alternatives.

3.2 Summary

3.2.1 The NDR is needed to improve connectivity and accessibility across both the northern part of the Norwich urban area and areas of the county in an arc from the north west to the east of this main urban area. Such improvement will ease the relative disadvantage of the peripheral location of these areas and provide the basis of the transport infrastructure required to both address existing and future problems and achieve the growth objectives which have been identified for Norwich and its surrounding area.

3.2.2 The requirement to improve connectivity and accessibility arises out of the analysis that led to the production of the Norwich Area Transportation Strategy (NATS) and the conclusions reached. This strategy sets out Norfolk County Council's (i.e., the highway authority's) approach to the delivery of sustainable transport in and around Norwich.

3.2.3 The overall strategy set out in NATS is that a package of transport improvements, interventions and measures, which includes the NDR scheme, needs to be implemented. Together these improvements, interventions and measures will (amongst other things) deliver a reliable, efficient and long-term sustainable transport network which will improve accessibility and connectivity and which will support the continued economic and physical growth of the Norwich area. In setting out the authority's approach to current and future needs, NATS seeks to improve the overall economic competitiveness of Norwich as a focus for inward investment, create conditions in which sustainable forms of transport can be promoted and improve the quality of life.

3.2.4 The possibility that the need could be met in some other way, for example by a different standard NDR, by an NDR following a different route, or without road construction has been addressed in principle and detail over a lengthy period. The necessary environmental, traffic and economic studies and analyses have been progressed as a central component of the development

of a sustainable transport strategy (NATS) in the context of the evolution of planning and economic policies for Norwich and the surrounding area

- 3.2.5 The studies confirm that the NDR is an essential component of the NATS package of measures to address existing and likely future issues of congestion, connectivity and economic and urban growth. Analysis of other approaches have confirmed that it is not possible to meet the need without the NDR and that the role of the NDR cannot be replicated by improving the existing road network or public transport. Examination of alternative standards and alignments has confirmed that the application proposals are the most appropriate response to the need, taking account of the results of the EIA.

3.3 Context for the Need

- 3.3.1 To assist in understanding the need that has been identified, the following paragraphs provide some historical and background context.

Local connectivity and access

- 3.3.2 Norwich is a key freestanding, medium sized historic city located within the East of England and the largely rural county of Norfolk. It exerts a strong economic, social and cultural influence over a wide area. These facts have had, and continue to have, considerable implications for the growth and development of the transport network that serves the urban area of the City and its surroundings. As a dominant regional City within a largely rural county, Norwich has historically been a focal point on which the road network converges. The most significant transport legacy of the past is, therefore, a road network which is structured around a series of routes which radiate out from the centre of the City like spokes on a wheel. These roads are shown on Figure 3.1 (titled 'Radial and Orbital Route Road Network') and are subsequently referred to as the 'radial routes' or the 'radial network'.
- 3.3.3 As can be seen from both Figures 3.1 and 3.2 (titled 'Norfolk Route Hierarchy') these routes provide links between the city and an extensive area that includes most of the county of Norfolk and substantial areas of north Suffolk. A number of these routes converge on the City Centre, which, as the Local Plan for the City makes clear, is especially rich in terms of historic assets and associations. The need for these assets and associations to be managed and, where possible, preserved within the context of a growing and developing City is also made clear in the Local Plan (paragraph 3.1). This has

been (and remains today) a fundamental issue in respect of the consideration of the City's transport problems and possible solutions to those problems.

- 3.3.4 It was during the early part of the 20th century, as a result of increasing car ownership and use, that the need to deal with the issue of traffic congestion within the historic centre, amongst other areas, was identified. By the mid 20th century Norwich's radial road framework was under growing pressure from motor vehicles seeking both access into and through the City Centre.
- 3.3.5 One aspect of the response to this issue was to link the radials by the construction or formalisation of Inner and Outer Ring Roads (shown on Figure 3.1). The Inner Ring Road was implemented in stages between the post war years (when the City of Norwich Plan 1945 provided a blue print for the future of the City) through to the 1960's. Today, the western side of the Inner Ring Road consists of a route of two traffic lanes in either direction. The eastern side is mainly single carriageway. The Outer Ring Road was formalised along its current alignment in the 1960's, and today consists of a mainly single carriageway route. A further description of the key routes in and around the city is provided in the Transport Assessment submitted as part of the NDR DCO application (document reference 5.5).
- 3.3.6 An alternative route for east – west through traffic, avoiding the City Centre, was provided in 1992 with the construction of the A47(T) Norwich Southern bypass (shown in black on Figure 3.1). This bypass was constructed as part of the national trunk road network to carry east – west traffic, but also acts as an orbital distributor road, distributing traffic between the southern radials beyond the limits of the principal urban area. No equivalent provision has been made to the north of the City.
- 3.3.7 Various measures have also been put in place to restrict the use of the private car within the City Centre. This has included the pedestrianisation of certain City Centre streets (including the first such street in the UK – London Street – in the 1960's) and the implementation of various car parking policies.
- 3.3.8 Alongside these measures, considerable progress has been made in providing the infrastructure required to support alternatives to the use of the private car within the City. Most notably this has involved the provision of six bus-based park and ride facilities comprising car parks on certain radial routes at the fringes of the City linking the City Centre with the central area via some of the radial routes where, in certain instances, bus priority measures are provided.

Strategic connectivity and access

3.3.9 For obvious reasons of geography, the county of Norfolk is on the periphery of the national road and rail networks. Despite being the fifth largest English county by land area there are no motorways in the county and only three trunk roads. A short stretch of the A12(T) runs to the south of Great Yarmouth towards Lowestoft, the A11(T) links Norwich with London and Cambridge and the east-west A47(T) crosses the county from Great Yarmouth to King's Lynn (including as part of its route the dual carriageway southern bypass to Norwich) and thence to the Midlands. Completion of the Fiveways to Thetford improvement, on the border with Suffolk, in 2014 will mark the completion of a dual carriageway A11(T) between Norwich and its connection with the east-west A14(T) and south with the M11 to London. The A47(T), however, remains of variable standard with sections of single and dual carriageway road.

3.3.10 In addition to providing access to other towns and cities and the wider strategic road network of the country, the trunk roads and other principal roads (such as the A140) link Norwich and the rest of Norfolk to various international gateways into and out of the UK including Stansted Airport, the Haven Ports (Felixstowe, Harwich and Ipswich) and the Port of Great Yarmouth (East Port). Norwich International Airport (NIA), which is not on the strategic road network, has scheduled services to international and domestic destinations. The airport plays a nationally significant role in the offshore energy industry, as a base for four of the leading offshore helicopter transport services - Bristow, Bond, NHV and Dancopter – and the location for offshore survival training. It is understood that in NIA's last full year these companies transported over 85,000 passengers to and from offshore installations. Scheduled flights to and from the airport are also important to this industry. It provides frequent passenger services to a range of locations including Aberdeen (5 flights a day) and Amsterdam (4 flights a day) from where passengers connect to international destinations.

3.3.11 The A47(T) forms part of the Trans European Network – Transport (TEN-T). This network was established by the European Commission as a key element in the overall strategy for competitiveness and employment within Europe. Figure 3.2 shows the route hierarchy for the whole of Norfolk, from the strategic trunk routes described above to the local access roads.

3.3.12 The rail network that serves Norwich and the surrounding county is similarly at the periphery of the national system. It plays a much smaller role in providing local transport opportunities than the road network. Norwich station is

located to the south east of the City Centre. The principal strategic route is to London Liverpool Street via Ipswich with a further route available to Kings Cross via Thetford and Cambridge. Local connections are provided by stations on this route including Wymondham, Attleborough and Thetford, and local lines to Sheringham in the north of the county and to Great Yarmouth and Lowestoft in the east. Longer distance services to the Midlands and northern England and Scotland are via Ely, on the London/Cambridge/King's Lynn line.

Urban Form

3.3.13 Norwich is one of the largest urban areas in the East of England, and a significant centre for employment, tourism and culture. The City exerts a powerful economic, social and cultural influence well beyond its administrative boundaries. The City, for example, is consistently within the top 15 national destinations for shopping; it is currently ranked 13th.

3.3.14 Over recent years Norwich has seen the demise or relocation of some of the traditional industries that previously occupied sites in the City Centre. Significant areas of the City Centre and its environs have been regenerated, including large areas of higher density residential development, leisure attractions and cultural and retail facilities.

3.3.15 Norwich is one of the most important employment centres in the East of England. The economy of the City and surrounding area is diverse and has seen fundamental change over recent years. Although still of great significance, in common with the national picture, employment in the manufacturing and agriculture sectors has declined relative to other sectors. There has been major development of the service sector, with particular strengths being the growing knowledge economy (particularly life sciences and health), financial services, retail, media, arts, and cultural and information technology based industries. The Norwich Research Park, located on the south western outskirts of the City, is identified as an international centre of excellence in life sciences and is a world class asset of the Greater Norwich area. The City and its surrounds also benefit from a strong and growing tertiary education sector led by the University of East Anglia and Norwich University of the Arts.

3.3.16 The urban area has expanded beyond the historic and administrative boundaries of the city (into Broadland district to the north and South Norfolk district to the south). To the south, the spread has been contained by natural

and man-made features, such as the River Yare and its valley (which is crossed in only a few locations), the A47(T) Norwich Southern Bypass and the Norwich – Cambridge rail line, which collectively create a distinct break point between the urban and the rural areas. These features have, amongst other things, restricted the number of access points into the City from the south.

3.3.17 The area beyond the northern edge of the urban area of the City is significantly more permeable in respect of routes in and out of the City. This edge is characterised by a mixture of urban fringe, open countryside and Norwich International Airport. To the north-west, the urban fringe extends some way along the slopes of the River Wensum valley, which does constrain development and forms a wedge of relatively undeveloped land extending into the heart of the urban area.

3.3.18 The rich concentration of historic assets in the area is dominated by the medieval city centre, which helps to make the City a major visitor destination in its own right and provides a high quality residential and commercial environment. River valleys and green areas extend into or adjoin the built up areas, creating a close relationship between the urban and rural environments. For many visitors, Norwich is also a gateway to the Broads, and much of Norfolk's attractive coast and countryside.

Future Objectives

3.3.19 The following aspect of the contextual picture explains certain future objectives and aspirations which have been identified for Norwich and its surrounding area. These have been identified at the local level by those authorities and organisations charged with undertaking functions relating to the management and future development of the area. They are explained firstly by reference to the strategic element of the development plan for the area and then by reference to other local strategies and plans. This section then explains that, although set at the local or sub-regional level, these objectives and aspirations for Norwich and its surrounding area are supported by and consistent with objectives set at the national level.

The Development Plan

3.3.20 Strategic land use planning for the Norwich area is undertaken jointly by the City Council and the District Councils of Broadland and South Norfolk, working with Norfolk County Council, through the Greater Norwich Development Partnership (GNDP). The adopted Joint Core Strategy (JCS),

prepared by the Councils sets out an overall spatial vision for the future of the area. This vision outlines how the area will develop, and highlights that Norwich is a main focus for growth in the East of England, for new homes and jobs, leisure, cultural and educational development. The spatial vision is wide ranging but, in summary, seeks to ensure that by 2026 the extended communities of Broadland, Norwich and South Norfolk will be strong, cohesive, creative and forward looking (Spatial Vision).

- 3.3.21 JCS policy 5 (titled 'The Economy') promotes the sustainable development of the local economy in both rural and urban locations. It makes clear that the local economy needs to grow to provide for a growing population and to develop its role as an engine of the wider economy (i.e. the wider regional and national economy). A target of at least 27,000 additional jobs within the period 2008 to 2026 is set. It is further made clear that sufficient employment land will be allocated in accessible locations, consistent with the detailed policies for specific places set out in JCS policies 9 to 19, to meet identified need and provide for choice. It is also made clear that, amongst other things, investment strategies will focus on overcoming constraints to the release and development of key sites.
- 3.3.22 The level of housing growth planned for is detailed in Policy 4 (titled 'Housing Delivery'). It indicates that allocations will be made to ensure at least 36,820 new homes are delivered within the period 2008 to 2026 (JCS Policy 4). This level of growth is planned for to both address identified housing need, and to support the growth potential of the local economy (JCS Paragraph 5.22).
- 3.3.23 Policy 4 highlights that a large proportion of the planned overall level of housing growth is to be focused within the 'Norwich Policy Area' (NPA). The NPA is defined in Appendix 4 of the JCS and consists of 50 parishes within and around Norwich. JCS Policy 4 indicates that within the NPA approximately 33,000 dwellings will be delivered within the period 2008 to 2026.
- 3.3.24 Policy 9 of the JCS (titled 'Strategy for Growth in the Norwich Policy Area') provides specific policy guidance for the NPA. The text supporting the policy identifies that the Norwich area has historically been recognised as a regional engine of growth (JCS Paragraph 6.4) and that development is focused within the established urban area and in sustainable locations elsewhere in the NPA (JCS Paragraph 6.5).
- 3.3.25 Following its adoption in March 2011, the JCS was subject to a legal challenge which resulted in certain parts of the JCS (including elements of

Policy 9) being remitted and treated as not having been adopted. The Councils then undertook further work on the remitted parts of the plan to address the judgement, and submitted those parts of the plan for independent examination in February 2013. The examination took place between May and July 2013. Further modifications, which did not impact on the locational policies, were produced as a result of the examination and these were consulted upon in September and October 2013. The Inspector reported in November 2013 that the remitted JCS (with some further modifications) was sound. The GNDP has indicated that the remitted JCS is likely to be adopted in January 2014.

- 3.3.26 JCS Policy 9, as published in the remitted JCS and now found to be sound, identifies a location for growth, known as the Old Catton, Sprowston, Rackheath and Thorpe St Andrew growth triangle, to the north east of the Norwich urban area. This is considered by the Councils to be a sustainable location for growth and will deliver a minimum of 7,000 dwellings by 2026 growing to around 10,000 dwellings eventually.
- 3.3.27 The text in the JCS to support this proposal makes clear that this growth triangle incorporates land at Rackheath that is promoted as an eco-community under the Government's eco-towns programme. It is further made clear that development of the rest of the area will be expected to reflect similar high standards (JCS paragraph 6.7).
- 3.3.28 Within those parts of JCS Policy 9 that were unaffected by the legal challenge, strategic locations for employment development within the NPA are identified, including at locations around the east and north of the city. These locations include a new business park of around 30ha associated with Norwich International Airport and focussed on uses benefiting from an Airport location and an extension to the Broadland Business Park of around 25ha. Within the remitted JCS Policy 9 is a further 25ha of new employment land at Rackheath, identified as part of the proposed growth triangle.
- 3.3.29 The JCS, amongst other things, indicates that to aid delivery and economic success specific support is given to improvements at Norwich International Airport that will expand business opportunities and provide for a wide range of international and domestic destinations (Paragraph 5.48).

Other local plans and strategies

- 3.3.30 Economic and population growth are matters which are also considered by the 'New Anglia' Local Enterprise Partnership (LEP), whose area includes

Norwich and its surrounds. The New Anglia LEP, which along with other LEPs was formed to create an economy which is driven by private sector growth and which is evenly balanced across the country and between sectors, has been asked by Government to develop a growth plan for its area. The LEP has produced a consultation document ('Towards a Growth Plan') setting out its vision and strategy and the way in which they currently propose the growth plan to be developed.

3.3.31 The LEP's vision includes making Greater Norwich one of the most competitive City Regions in Europe for domestic and foreign investment by 2025. The following four 'Priority Sectors' (described as having high growth potential) and five 'Other growth sectors' (described as having great potential to grow and develop) are identified.

Priority Sectors	Other growth sectors
Energy	Advanced manufacturing
Tourism	Digital and Cultural Creative Industries
Information and Communications Technology (ICT)	Food, Drink and Agriculture
Life Sciences and Biotechnology	Financial Services
	Ports and Logistics

3.3.32 Collectively, these nine sectors are identified as being at the heart of the wealth creation capacity of Norfolk and Suffolk (paragraph 2.4). The next stage of the strategy is expected to be published in draft and it is understood that these priority sectors are being revisited.

3.3.33 In addition to the emerging LEP growth plan, Norfolk County Council's own economic strategy – covering the period 2012 to 2017 – outlines how the County Council will support the economic growth of Norfolk. An aim of ensuring Norfolk meets its economic growth potential is identified under the priority theme relating to supporting growth (Paragraph 5.2.1).

3.3.34 The sub-regional Greater Norwich area economic strategy also has a vision that Greater Norwich will be recognised as one of England's major city

regions with a rapidly growing diverse and sustainable economy providing all of its residents with opportunities and a great quality of life (Paragraph 3.1). The foreword to this strategy makes plain that the challenges set for Greater Norwich in terms of the delivery of new homes and jobs is immense, but that meeting this challenge will showcase the dynamism, creativity and economic potential of the area.

National support for the future objectives

3.3.35 Soon after it came to power, the Government produced a plan for growth which it described as an urgent call for action. This 2011 Growth Plan highlights that the Government's economic policy objective is to achieve strong, sustainable and balanced growth that is more evenly spread across the country and between sectors (Executive Summary). The plan also set out four overarching ambitions to ensure progress is made towards achieving the stated economic objective.

3.3.36 One of the four ambitions of the Growth Plan is defined as making the UK 'one of the best places in Europe to start, finance and grow a business' (Ambition 2). One of the steps the Government indicated it would take to achieve this ambition was to reform the planning system radically and fundamentally (Paragraph 1.34) through, amongst other things, the production of a "shorter, more focused and inherently pro-growth National Planning Policy Framework (NPPF) to deliver more development in suitable and viable locations."

3.3.37 The National Planning Policy Framework (NPPF) that was subsequently published in March 2012 highlights the importance of building a strong and competitive economy. In this respect, the Government in NPPF makes clear it is committed to ensuring that the planning system does everything that it can to support sustainable economic growth, and as a result, significant weight should be given to supporting economic growth through the planning system (paragraph 19).

3.3.38 Within the core planning principles set out within the NPPF is the expectation that every effort should be made objectively to identify and then meet the housing, business and other development needs of an area, and respond positively to wider opportunities for growth (paragraph 17).

3.3.39 Furthermore in respect of economic growth, the Government supports the strong recommendation made in the Heseltine Review that more should be done to allow the potential of local economies to be unlocked. It makes clear

that it recognises that the economic wellbeing and performance of cities located outside of London and the South East (such as Norwich) is significant to the nation as a whole. Amongst other things, it agrees that “Every locality must be able to fulfil its potential”..., and seeks a rebalanced economy “where every part of the UK – not just London and the south-east – drives strong and lasting growth” (paragraph 1.11). The importance of City Deals and the role of empowered LEPs in reinvigorating local economies are also highlighted in this aspect of the Government’s response.

- 3.3.40 City Deals are a Government initiative aimed at giving powers to a city in exchange for it taking on the responsibility of creating economic growth. The City Deal for Greater Norwich was agreed by Government in December 2013. The City Deal approach is focussed on delivering significantly enhanced job growth for Greater Norwich. A key knowledge based cluster is already growing at Norwich International Airport with the emerging 40ha Aeropark and associated Norwich International Aviation Academy. The City Deal is expected to create more than 19,000 jobs, including 3,000 high value jobs at Norwich Research Park, 2,000 jobs around Norwich International Airport, 1,000 jobs based around Norwich University of the Arts and 6,000 construction jobs.
- 3.3.41 A further ambition of the Government’s 2011 Growth Plan is to ‘encourage investment and exports as a route to a more balanced economy’ (Ambition 3). Support for the creation of LEPs and the introduction of Enterprise Zones are highlighted as steps taken to achieving this ambition. The Government also explains that to help achieve this ambition they would seek to increase investment in infrastructure by, amongst other things, publishing the UK’s long-term forward view of infrastructure projects and programmes as part of a National Infrastructure Plan (paragraph 1.54).
- 3.3.42 The National Infrastructure Plan 2011 made clear that infrastructure networks form the backbone of a modern economy and are a major determinant of growth and productivity (Executive Summary). The updates to the National Infrastructure Plan produced in 2012 and 2013 continue to support this approach. The National Infrastructure Plan (NIP) 2013 explicitly identifies the NDR as a top 40 priority infrastructure investment project.
- 3.3.43 In respect of transport infrastructure in particular, the Government through recent publications has highlighted its importance to economic growth. The 2011 White Paper ‘Creating Growth, Cutting Carbon’ sets out the Government’s vision for a transport system that is an engine for economic

growth, but one that is also greener and safer and improves the quality of life in communities.

- 3.3.44 The July 2013 Command Paper 'Action for Roads: A network for the 21st Century' produced by the Department for Transport identifies that the road network is vital to the economy and our way of life, and performs a crucial function in supporting jobs and growth.
- 3.3.45 Enterprise Zones (EZ) have been set up as a result of Ambition 3 within the 2011 Growth Plan. This includes an EZ, covering some 121 hectares, in and around Great Yarmouth and Lowestoft. This has been defined to capitalise on the area's leading position in the energy sector, the national importance of which is reflected in its designation by the Government as a Centre for Offshore Renewable Engineering (CORE) – a partnership between Central and Local Government and the LEP to ensure businesses looking to invest in manufacturing for the offshore renewable industry receive the most comprehensive support possible
- 3.3.46 In December 2013 the Department for Transport published the draft National Policy Statement for National Networks (NPS) for consultation. The draft NPS sets out the Government's vision and strategic objectives for the national road and rail networks. The objectives of the NDR Scheme are in accordance with the Government's strategic objectives for the delivery of national networks. Those strategic objectives are set out in the draft NPS, and include delivering networks with the capacity and connectivity to support national and local economic growth; facilitate growth and create jobs and support and improve journey quality, reliability and safety.

Summary

3.3.47 Norwich is a dominant regional city located within a largely rural county. In terms of access it is located at the periphery of the national transport network. Its road network is structured around a series of radial routes which provide links between the city and an extensive area beyond. Various measures have been taken historically in response to the issues associated with an increasing amount of traffic within the City. These measures have included the provision of an Inner and Outer Ring road within the urban area, the provision of a strategic A47(T) Norwich Southern Bypass cross radial connection to the south of the City, the implementation of works and strategies to restrict the use of the private car within the City and the implementation of works and strategies to support alternatives to the use of the private car.

3.3.48 The preceding contextual analysis also highlights that a number of objectives and aspirations which centre on substantial population growth and economic development have been identified and determined for the City of Norwich and its surrounding area. These determined objectives and aspirations recognise and reflect:

the overarching national growth agenda;

- the need, identified at national level, for every part of the UK (and not just London and the south-east) to fulfil its potential and thereby drive strong and lasting growth and create a balanced economy;
- the fact that Norwich is one of the largest and most important urban centres in the East of England and has the potential to contribute significantly to the country's growth and economic development needs, and
- the fact that Norwich and surrounding area is a suitable location to provide for development that will contribute to growth and economic development needs.

3.4 The Identified Problems

3.4.1 One of the key issues affecting the City and its surroundings today and which will also affect the ability to achieve the determined objectives and aspirations for Norwich and its surrounding area relates to the transport network.

3.4.2 The problems are fundamentally caused by the limitations of the road network in and around the urban area of Norwich and its resulting incapacity to deal with the demands placed on it. This issue will get worse as Norwich grows, which is what the growth objectives and aspirations outlined for the area seek to achieve.

3.4.3 As has been explained earlier, the road network within and around the urban area of Norwich is dominated by radial routes that provide access from all directions to the City Centre. The principal radial routes within the urban area have, however, restricted capacity with the vast majority being two way single carriageway routes with numerous junctions, frontage development and associated access requirements, on road parking and at-grade pedestrian crossing points.

3.4.4 The more recent Inner and Outer Ring Roads are similarly urban in character and limited in terms of capacity. These characteristics, combined with the amount of traffic that needs to be accommodated, results in routes which suffers from congestion and are inefficient. These routes are also located

within an already built up urban environment which restricts the ability to deliver improvements.

- 3.4.5 Furthermore, whilst to the south of Norwich, movements around the City can take place on the A47(T) Southern Bypass outside of the urban area, no such strategic provision outside the built up area is available to the north of the City. The main cross radial connection remains the Outer Ring Road.
- 3.4.6 The transport and related problems which are caused by the limitations of the road network in and around the urban area of Norwich, and its incapacity to deal with the demands placed on it, are explained in the following sub-sections.

Traffic Levels and Congestion

- 3.4.7 The traffic model information (which is detailed in the NDR Transport Assessment (TA) and Traffic Forecasting Report (TFR)) demonstrates that a significant number of vehicle movements cross the City on a daily basis (Appendix I of the TFR).
- 3.4.8 As illustrated in Figures I.1 and I.2 in Appendix I of the TFR, the northern section of the Outer Ring road (between its junction with the A1067 Fakenham Road/ Drayton High Road in the west to the junction where it becomes the A1242 in the east) currently accommodates flows of between 13,500 and 30,000 Annual Average Daily Traffic (AADT) . Only two sections of this northern part of the Outer Ring Road do not accommodate AADT flows over 20,000. The other sections of this northern part of the Outer Ring Road all currently accommodate flows ranging between 21,500 and 30,000 AADT. The flows that are predicted in the future are between 14,200 and 32,500 AADT in 2032.
- 3.4.9 The radial routes to the north of the City Centre also accommodate significant traffic flows. Current two way AADT flows within the urban area to the north of their respective junctions with the Outer Ring Road range from 18,300 for the A1067 Fakenham Road / Drayton High Road (location A32 on Figure I.1) and 18,100 for the A1151 Wroxham Road (location A43 on Figure I.2), through 17,600 for the A140 Cromer Road (location A35 on Figure I.1) to 13,100 for the C874 Plumstead Road (location A47 on Figure I.2), 12,600 for the C283 Salhouse Road (location A45 on Figure I.2) and 12,400 for the C251 St Faiths Road (location A37 on Figure I.2). These AADT flows are forecast to increase in the future, for instance, on the A1151 Wroxham Road and the C283 Salhouse Road by 26% and 29% respectively by 2032.

3.4.10 The traffic model also shows a considerable number of vehicles currently using the City Centre, the Inner Ring Road and the Outer Ring Road for through trips (see Table 3.1 which is a reproduction of certain information provided in section 7.4 of the TFR).

Table 3.1: City Centre Through Traffic – AADT

	2012	2017	2032
Inner Ring Road Inner Cordon (just inside the Inner Ring Road)	9,477	8,159	9,236
Inner Ring Road Outer Cordon (just outside the Inner Ring Road)	77,825	82,152	88,368
Outer Ring Road Outer Cordon (just outside the Outer Ring Road)	68,117	73,691	79,151

3.4.11 The top row of Table 3.1 (Inner Ring Road Inner Cordon) shows the amount of traffic (in AADT flows) that passes through the City Centre area within the Inner Ring road.

3.4.12 The second row in Table 3.1 (Inner Ring Road Outer Cordon) shows the amount of traffic (in AADT flows) that passes through the City Centre via the network in the centre area or using the Inner Ring Road.

3.4.13 The third row in Table 3.1 (Outer Ring Road Outer Cordon) shows all trips (in AADT flows) that cross the City from areas outside of the Outer Ring Road to another location outside of the Outer Ring Road.

3.4.14 In addition to showing the 2012 base position, Table 3.1 also shows the traffic forecast in 2017 and 2032. The decrease shown in future in respect of trips passing through the City Centre (the first row) is a result of the implementation of works programmed to take place in the City Centre which will restrict traffic – although by 2032 it can be observed that flows are nearly back to current

levels even with such works. For the other trips considered, the figures demonstrate that the number of such trips is forecast to increase by both 2017 and again by 2032.

Use of inappropriate routes

3.4.15 As already made clear, whilst to the south of the City cross radial movements can take place on the A47(T) Norwich Southern Bypass outside of the urban area, no such strategic provision is available to the north of the City. The principal means of moving between the radials to the north of the City is thus provided by the Inner and Outer Ring Roads.

3.4.16 Due to the issues highlighted in the preceding section with the use of the radials and the Ring Roads, traffic seeking to move east / west between one radial route and another also makes inappropriate use of certain residential roads within the urban area, a practice known colloquially as “rat running”. These roads are not designed to accommodate high volumes of strategic through traffic. They are narrow in places, have numerous minor junctions and are fronted by a considerable number of residential properties with many having direct vehicular access. Schools are also located on a number of these roads with 20mph zones and traffic calming to reduce vehicle speeds. Additionally, increased traffic flows adversely affect residential amenity, walking and cycling on and adjacent to these roads. Such inappropriate ‘rats runs’ (which are correspondingly numbered on Figure 3.3) include:

Route 1: Middletons Lane (which provides a connection between the A1067 and the A140) (location A83 and A10, Appendix I, Figure I.1 TFR);

Route 2: Fifers Lane / St Faiths Road / Church Street (which collectively provide a connection between the A140 and the C246 Spixworth Road) (location A11, Appendix I, Figure I.2 TFR);

Route 3: White Woman Lane (which provides a connection between the C246 Spixworth Road and the B1150 North Walsham Road) (location A13, Appendix I, Figure I.2 TFR);

Route 4: Barkers Lane / Church Lane (which collectively provides a connection between the B1150 North Walsham Road and the A1151 Wroxham Road) (location A14, Appendix I, Figure I.2 TFR);

Route 5: Blue Boar Lane (which provides a connection between the A1151 Wroxham Road and C283 Salhouse Road) (location A75, Appendix I, Figure I.2 TFR); and

Route 6: Woodside Road (which provides a connection between the C283 Salhouse Road and the C874 Plumstead Road) (location A20, Appendix I, Figure I.2 TFR).

- 3.4.17 Fifers Lane and White Woman Lane are designated as Local Access Routes within Norfolk County Council's Route Hierarchy. The other routes are not classified. As shown in Table 3.2 below, schools are located along three of the routes and they are subject to 20pmh zones and traffic calming and they all have accesses to properties to varying degrees. These routes are not designed to carry high volumes of strategic through traffic.
- 3.4.18 The traffic model provides details of some of the traffic flows that use these routes (see Table 3.2 which is based on data extracted from Appendix I of the TFR). In certain instances, they are considerable. For example the residential Fifers Lane (location A11 on Figure I.2) and Woodside Road (location A20 on Figure I.2) have two way AADT flows of 10,600 and 11,800 respectively in the 2012 base year. These flows are not very much lower than flows along parts of the Outer Ring Road which provides a needed traffic distribution function. For example, the St Williams Way section of the Outer Ring Road (location A48 on Figure I.2) which has a base year flow of 13,500 AADT.
- 3.4.19 Table 3.2 below shows that the flows will increase in 2017 and 2032 on a number of these routes in the Do Minimum (DM) scenario i.e. in the absence of the NDR. As part of the implementation of the NEGТ required by the JCS a number of developer link roads are required. These are designed to act as urban high streets that would meet the needs of pedestrians and cyclists as well as providing vehicular access to the new development as local distributor roads. At 2017, flows on White Woman Lane and Barkers Lane / Church Lane decrease as a result of the implementation of the developer link roads. A proportion of this traffic will, however, use the new link between Wroxham Road and Buxton Road (locations A94, A95 and A96 on Figure I.2 of the TFR), which itself is not designed to cater for the level of traffic movements predicted. By way of illustration, the proposed developer link road approaching the Wroxham Road junction has flows of 13,500 AADT at 2032.

Table 3.2: AADT Traffic Flows along inappropriate urban routes

Route	2012 AADT Traffic Flows	2017 AADT Traffic Flows (DM Scenario)	2032 AADT Traffic Flows (DM Scenario)	Route Hierarchy Type	Features	Area Type
1. <i>Middletons Lane (locations A10 and A83)</i>	8,900 – 9,600	10,200 - 10,400	11,400 - 11,300	<i>Not categorised</i>	<i>Two schools with 20mph zones and traffic calming, shared cycleway / footway, pedestrian refuge islands</i>	<i>Suburban with individual accesses to properties along the whole length</i>
2. <i>Fifers Land / St Faith's Road / Church Street (location A11)</i>	10,600	11,700	12,600	<i>Local access</i>	<i>School on Church St with 20mph zones and traffic calming</i>	<i>Suburban with individual accesses to properties along 25% of route</i>
3. <i>White Woman Lane (location A13)</i>	3,900	3,000	3,500	<i>Local access</i>	<i>School with 20mph zones and traffic calming, shared cycleway / footway</i>	<i>Suburban with individual accesses to properties along 25% of route</i>

Route	2012 AADT Traffic Flows	2017 AADT Traffic Flows (DM Scenario)	2032 AADT Traffic Flows (DM Scenario)	Route Hierarchy Type	Features	Area Type
4. Barkers Lane / Church Lane (location A14)	6,400	3,100	3,400	Not categorised	Pedestrian refuge islands	Suburban with individual accesses to properties along 50% of route
5. Blue Boar Lane (location A75)	13,000	13,400	12,200	Not categorised	Shared cycleway/footway along part of route, signal controlled pedestrian crossing, no footway on route through woodland area	Suburban/rural with individual accesses to properties along 15% of route
6. Woodside Road (location A20)	11,800	13,000	11,600	Not categorised	Pedestrian refuges, some on street parking and parking in dedicated laybys	Suburban with individual accesses to properties along 30% of route

3.4.20 The movement between radial routes is not just something which occurs within the urban area. Certain rural routes beyond the urban area are utilised by traffic seeking to get around the north of Norwich, or obtain a different radial route for getting into Norwich. Such rural routes are inappropriate for carrying significant volumes of traffic making such movements. To the north of Norwich such routes (which are correspondingly numbered on Figure 3.3) include:

- Route 7: the B1145 between the A1067 at Bawdeswell to the A140 at Aylsham via Reepham and Cawston (location 10, Appendix I, Figure I.4 TFR);
- Route 8: the route between the A140 and Hoveton via Coltishall which utilises the B1354 (location 7, Appendix I, Figure I.4 TFR); and
- Route 9: the Spixworth Road / Church Lane / Buxton Road / Crostwick Lane route between the A140 and the B1150 North Walsham Road (location 12, Appendix I, Figure I.4 TFR).

3.4.21 To the east of Norwich such routes (which are correspondingly numbered on Figure 3.3) include:

- Route 10: Church Road / Broad Lane / Green Lane West through Great Plumstead (location 11, Appendix I, Figure I.4 TFR);
- Route 11: Woodbastwick Road / B1140 Low Road and Bell Lane through Salhouse (location 6, Appendix I, Figure I.4 TFR), and
- Route 12: Green Lane/Green Lane North between the A1042 Yarmouth Road (via Peachman Way and Broadland Way) and the C874 Plumstead Road (location A23, Appendix I, Figure I.2 TFR).

3.4.22 Although the B1145, B1354 and the B1140 are designated as Main Distributor Roads within Norfolk County Council's Route Hierarchy they are narrow in places and pass through rural villages. Woodbastwick Road/Primrose Corner is a Local Access Route from the A47 to the village of Blofield Heath but is no more than a narrow country lane between Blofield Heath and the B1140. Church Road is also a Local Access Route from the A47 to the village of Great Plumstead but is also a narrow country lane.

3.4.23 Crostwick Lane passes through the village of Spixworth. There are numerous minor junctions and a considerable number of residential properties fronting the road with many having direct vehicular access. The road has a 30mph speed limit and traffic calming to reduce vehicle speeds.

3.4.24 The other rural routes are primarily narrow country lanes providing local access to villages and do not form part of Norfolk County Council’s Route Hierarchy. Unacceptable levels of traffic on these routes result in increasing environmental impacts and an increasing future maintenance liability on Norfolk County Council’s rural road network.

3.4.25 In addition high volumes of traffic using these routes and crossing the radial roads give rise to a high number of accidents due to this conflict.

3.4.26 All these rural routes are not designed to carry high volumes of strategic through traffic which should be more appropriately located on Principal Routes within Norfolk County Council’s Route Hierarchy.

3.4.27 Without the NDR, developer link roads would carry significant amounts of strategic through traffic movements. With the flows predicted, these roads would not be able to perform their desired role in enabling walkable neighbourhoods, as envisaged by the emerging North East Growth Triangle Area Action Plan, which seeks to reduce the amount of local short trips being made by car.

Table 3.3: AADT traffic flows along inappropriate rural routes

Route	2012 AADT Traffic Flows	2017 AADT Traffic Flows (DM Scenario)	2032 AADT Traffic Flows (DM Scenario)	Route Hierarchy Type	Width on Traffic Count Section	Area Type
7. B1145 and A1067 to the A140 via Reepham and Cawston (location 10)	3,700	4,100	5,500	Main distributor	5 to 6m	Rural
8. B1354 between A140 and Hoveton via Coltishall / (location 7)	4,300	4,800	6,800	Main distributor	5 to 5.5m	Rural
9. Spixworth Road / Church Lane/	5,700	6,800	9,400	Not	6 to	Rural

Route	2012 AADT Traffic Flows	2017 AADT Traffic Flows (DM Scenario)	2032 AADT Traffic Flows (DM Scenario)	Route Hierarchy Type	Width on Traffic Count Section	Area Type
Buxton Road / Crostwick Lane between the A140 and B1150 North Walsham Road (location 12)				categorised	6.5m	
10. Church Road / Broad Lane / Green Lane West through Great Plumstead (location 11)	3,500	6,200	9,800	Local access / Not categorised	4.5 to 5m	Rural
11. Woodbastwick Road / B1140 Low Road and Bell Lane through Salhouse (location 6)	2,500	4,300	5,800	Local access / Not categorised	5m	Rural
12. Green Lane/Green Lane North between the A1042 Yarmouth Road and the C874 Plumstead Road (location A23)	7,700	0 ¹	0 ¹	Not categorised	4.5 to 5m	Rural

Note: Green Lane/Green Lane North would be closed once the Brook Farm/Laurel Farm developer link road is operational

3.4.28 Orbital traffic movements on these routes are significant for the standard of road being used (see Table 3.3 which is based on data extracted from

Appendix I of the TFR). The transport model analysis has shown that the current two way AADT flows on the three routes north of Norwich added together amount to 13,700, and the flows on the routes to the east added together also amount to 13,700. The traffic model information forecasts that this would increase to 15,700 and 10,500 respectively in 2017 and 21,700 and 15,600 respectively in 2032. This assumes no traffic on Green Lane / Green Lane North at 2017 on the assumption that it would be accommodated on the Brook Farm/Laurel Farm link road assumed to be operational in 2017 at which point Green Lane/ Green Lane North would be closed to traffic. To put this in context, the level of traffic that passes through the City Centre area within the Inner Ring Road is of the order of 10,000 AADT (see Table 3.1 above) and the total traffic using the northern section of the Outer Ring road ranges between 13,500 and 30,000 AADT. This shows that the rural routes are carrying substantial volumes of strategic bypass traffic.

3.4.29 It should be noted that a number of the model links that carry strategic traffic flows are outside the fully modelled area, so base flows may not be fully represented but changes in traffic would be.

Poor strategic accessibility and journey times

3.4.30 The preceding issues highlight the poor accessibility and connectivity which the northern part of the urban area and rural areas beyond the urban area have to the national strategic road network. This is a significant issue.

3.4.31 Reference has earlier been made to the importance of Norwich International Airport which is located to the north-west of Norwich City Centre. The issue of poor strategic accessibility is clearly illustrated by the existing access to the Airport from the A140 Aylsham Road / Cromer Road / Holt Road; it does not have a direct connection to the strategic road network. Although it is served by a regular bus service linking the Park and Ride facility at the Airport with the city centre, as well as coach services operated by First Eastern, traffic accessing the Airport from the south, west and east is obliged to navigate the road network within the urban area of Norwich, or to use inappropriate rural routes to the north.

3.4.32 It is not simply an 'Airport' issue as NCC's MarketMeasures database, for example, suggests that in the order of 12,000 jobs are located within postcode area NR6 6, which contains the Airport and industrial estates to the south.

3.4.33 The traffic model has been used to investigate the time taken for certain journeys in and around Norwich, including journeys between the Airport and

certain locations (section 7.5 and Figure 7.8 of the TFR). These routes are detailed below (and given the number they are referred to in the TFR).

- Between the Airport and the A47(T) to the west of Norwich (TFR Route 1);
- Between the Airport and the A47(T) / A11 (T) roundabout junction at Thickthorn to the south of Norwich (TFR Route 2);
- Between the Airport and the A47(T) Brundall junction to the east of Norwich (TRF Route 3);
- Between the Airport and Attlebridge on the A1067 to the west of Norwich (TFR Route 4), and
- Between the Airport and Rackheath to the north east of Norwich (TRF Route 9).

3.4.34 Figures 7.9 and 7.10 of the TFR demonstrates that the average journey times for these example routes to and from the Airport in the AM and PM peak are predicted to increase in the future. The one exception being the route between the Airport and Attlebridge on the A1067 (Route 4) where the PM peak average journey time in 2032 is predicted to be slightly lower than the base average journey time.

3.4.35 The journey time information (see section 7.5 of the TFR) also identifies the delay (i.e. the time spent stationary at junctions) which occurs on the journeys on these routes. In respect of the example routes to and from the Airport, the delay, in certain instances, makes up a significant proportion of the overall journey time. For example, Table K.3 in Appendix K of the TFR indicates that in the morning peak the delay on the journey from the A47 east of Norwich to the Airport (Route 3) is in the order of six minutes within an overall journey of just under 26 minutes (or approximately 23% of the overall journey time).

3.4.36 Not only are the journey times forecast to increase in the future, the traffic model demonstrates that the length of delay will also increase in the future. Using the same journey between the A47 east of Norwich and the Airport in the AM peak as an example, the journey time is forecast (Table K.4 in Appendix K of the TFR) to increase in 2017 to 27 minutes and 20 seconds with delay accounting for 7 minutes and 27 seconds (or approximately 27% of the overall journey time). In the 2032 AM peak the same journey is forecast (Table K.6 in Appendix K of the TFR) to take 31 minutes and 11 seconds with delay accounting for 11 minutes and 24 seconds (or approximately 36% of the overall journey time).

3.4.37 The journey time and delay information provided in the TFR and referred to in the preceding paragraphs relate to modelled average journey times and delay. Journeys times on the network in and around Norwich are, however, not always predictable or reliable. A problem on one of the radial routes or one of the ring roads has the potential to significantly affect the time taken to undertake a journey and the delay experienced. The amount of traffic needing to be accommodated and the characteristics of the network combine to make delays and journey time unpredictability a high probability. The variability of journey times is a matter further discussed in the context of public transport in subsequent sections.

3.4.38 It is not, however, just strategic access to and from the Airport which is poor. Areas of north and north-east Norfolk do not benefit from direct access to the strategic road network. Instead, connections between these areas and the strategic road network are currently provided via various routes. For example, access from Cromer on the north Norfolk coast to the strategic road network is currently, amongst other potential routes, via the A140 to the urban area of Norwich and then via this route in its role as part of the Outer Ring road of the City to the A47(T) or the A11(T).

Existing business and services, and future growth

3.4.39 The structural inadequacies of the transport network within and around the City, including limited connectivity, generate practical constraints for businesses. Transport has implications for existing businesses as it affects access to workplaces by staff, the importing and exporting of goods and the ability of customers to access the business.

3.4.40 NCC regularly consults and engages with local residents, businesses and other organisations as a means of informing people about its activities, and also as a means of ensuring that the decisions it takes and the services it provides are responsive to local needs and views. A number of these consultation and engagement exercises have made specific reference to travel and transportation matters.

3.4.41 Studies and associated consultations undertaken since 2002 in connection with the review of the Norwich Area Transportation Strategy (NATS) have highlighted that in some instances businesses are either not expanding as a consequence of transport problems or are considering leaving Norwich altogether. In addition, feedback from various consultations undertaken has indicated that the transport network and the problems associated with it are

acting as a disincentive for companies and organisations who might be considering setting up enterprises in Norfolk.

3.4.42 Section 7.8 of the TA summarises the problems with the existing road network and comments on how the network will perform in the future in the absence of the NDR. It notes that such a network would be inadequate to accommodate traffic generation produced by the high levels of employment and residential growth planned for greater Norwich and would lead to a substantial deterioration in operational performance, transport journey times and reliability, thus reducing the economic competitiveness of the City. This would occur with a further deterioration in traffic conditions on inappropriate routes, reductions in operational performance for bus services and worsening conditions for walking and cycling.

3.4.43 The forecast traffic data and information for 2017 and 2032 takes account of, as is further explained in section 5 of the TFR, the development that is envisaged in the JCS. The traffic forecasts which are made are therefore a further demonstration of the negative implications of the existing transport network for the achievement of future growth aspirations.

3.4.44 It is, however, not just growth and development in and around the City of Norwich which is potentially impacted upon by problems with the transport network in and around Norwich. Reference has earlier been made to the establishment of an energy sector based Enterprise Zone in and around Great Yarmouth and Lowestoft. In introducing this zone on its Enterprise Zone website, the Government refers to Norwich International Airport and the ability of the Airport to provide UK and international air connections and helicopter transfers for the oil and gas sector. As previously indicated, there are issues with the accessibility and connectivity of the Airport, in particular with the strategic road network.

Public transport, pedestrian and cycle movements

3.4.45 As part of the evidence and analysis produced to support the JCS (Baseline Conditions Report - BCR) consideration was given to the problems and issues facing pedestrians and cyclists.

3.4.46 The Norwich Policy Area (NPA) was identified as being suitable for cycling trips because it is relatively compact and flat. It was highlighted that the cycle network in and around the NPA consists of a mix of on-street and off-road facilities (BCR section 6.1). There was, however, a recognition that in places

cycle facilities are not joined up and there are many areas with no cycling provision at all, often through difficult junctions.

- 3.4.47 Key issues and problems identified in respect of cycling include a lack of continuity of the cycle network, a lack of cycle paths and a lack of cycle parking facilities. Whilst priority crossing facilities for cyclists are being installed, the priority that is given to cyclists can be affected by the weight of traffic with less priority being provided where traffic flows are heaviest (BCR Section 6.5). The 'stop-start' nature of the existing provision was considered to be an issue because it forces cyclists back into the main flow of traffic suddenly and unexpectedly.
- 3.4.48 It was noted that facilities giving pedestrians priority have been introduced at most traffic signals within the City Centre and dedicated pedestrian crossing facilities have been introduced at specific locations. However, as is the case for cyclists, the time taken to provide a 'green' signal to cross a road can be dependent on the flow of traffic. During times of heavy traffic flow, the length of time between green crossing phases is likely to be extended. Increases in traffic flows would likely see priority for pedestrians at crossings reduce (BCR Section 6.2).
- 3.4.49 The limitations of the existing road network affect the highway authority's ability to work with bus operators to deliver public transport facilities within the City. Whilst initiatives have been put in place in recent years to improve public transport provision and service within the City, the scope for further improvements is limited because of the increasingly congested road network. This is evidenced by work carried out in 2010 to develop public transport improvements as part of a whole corridor strategy for Bus Rapid Transit (BRT) on Dereham Road. Preliminary design development and traffic modelling work undertaken at the time identified that where widening was not possible due to the urban constraints of the corridor, the reallocation to buses of some existing road space, in particular at the Dereham Road junction with the Inner Ring Road, resulted in anticipated increased delays and queue lengths for non bus users. Limited improvement was possible but at the time the delay was not considered acceptable and the scheme was modified with the benefit for public transport reduced.
- 3.4.50 The BCR also considered public transport conditions, including bus journey time data for different links in the northern suburbs of Norwich (BCR sections 5.1.1.5 to 5.1.1.12). The specific links considered were chosen as they had been shown to suffer from worse bus service punctuality than other areas of the City.

- 3.4.51 The evidence demonstrated that the roads experiencing high bus journey time variability include radial routes to / from the north (Figure 5.24). Routes with inbound high bus journey time variability during the weekday AM peak period included the A1067 Fakenham Road / Drayton High Road, the A140 Cromer Road / A1402 Aylsham Road and the A1151 Wroxham Road. The BCR noted that a high level of journey time variability is an indicator of transient congestion and the type of unpredictable delays that are very difficult for bus operators to schedule for (section 5.1.1.15).
- 3.4.52 The BCR highlighted that despite the introduction of measures to improve bus journey times in the Norwich urban area, traffic delays to buses had increased such that the quality of bus journeys was being eroded (section 5.1.1.16). In terms of bus service reliability, the BCR provided evidence to demonstrate that no operator was able to achieve an on-time punctuality of more than 80% across all stops (section 5.1.1.17).
- 3.4.53 The Traffic Commissioners (a tribunal non-departmental public body of the Department for Transport) who, amongst other things, are responsible for the regulation of bus services have set targets regarding the operation of registered bus services. The current punctuality target is one where 95% of services should depart from timing points within the bracket of 1 minute early and up to 5 minutes late.
- 3.4.54 Recent data for the period 2012 to 2013 obtained from the automatic vehicle location bus tracking system demonstrates that on a number of the bus routes into the City, this target is not being achieved. For the three corridors considered (Catton Grove, Cromer Road and Wroxham Road), average on-time performance at bus stops in the AM peak was between 55% and 86% and between 65% and 80% in the interpeak periods (see paragraph 7.8.3 of the TA).
- 3.4.55 The BCR also highlighted the issue of ongoing detrimental impacts on the operation of bus services as a result of increases in traffic flows in the future (section 5.1.3). From the analysis undertaken, the BCR reached a number of conclusions in respect of public transport issues (section 5.9), including:
- Whilst certain initiatives have brought improvements to the quality and reliability of bus services, scope for further benefits are likely to reduce as the transport network becomes increasingly congested in the future;
 - Bus performance varies with traffic levels, suggesting that improvements in bus service could be delivered through reduced traffic flows, and

- Roads affected by low average bus speeds coincide with those with high journey time unreliability, and in general, these are radial routes from the north and bus services along these corridors perform worse than those along corridors from other directions. Bus services along corridors from the south were shown to perform the best at 82 – 86% on time during the period 2006 – 2009 with corridors from the north, in comparison, performing at 69 – 73% over the same period.

Quality of life / environmental conditions

- 3.4.56 High levels of traffic on a road network that is incapable of dealing with it results in various quality of life / environmental issues, including such issues associated with noise, air pollution and road traffic accidents.
- 3.4.57 Within the TFR (section 7.3) an analysis has been undertaken of the effects of traffic on people by calculating the number of dwellings that are located within 50 metres of roads with a Volume to Capacity ratio of over 90%. This provides an indication as to how many residents are affected by daily peak hour congestion. The calculation demonstrates that within the area that is considered by the transport model, the number of such properties in the AM peak amounts to 3,922, whilst in the PM peak the number of properties is lower at 2,973.
- 3.4.58 The analysis undertaken further demonstrates that over time the situation is forecast to get worse. In 2017 the equivalent numbers for the AM and PM peaks are forecast to be considerably worse at 5,676 and 4,432 whilst for 2032 the figures are forecast to increase again to 6,824 and 5,587 respectively.
- 3.4.59 The NDR Transport Assessment (TA), in section 10, provides a high level analysis of Personal Injury Collision (PIC) data for the period July 2008 to June 2013 for principal routes within the defined study area. A total of 89 accident cluster sites were identified from the data analysed. Whilst accident clusters are common at the junctions of key radial routes with the Inner or Outer Ring Road, there is also evidence of accidents occurring at the junction of radial routes with some of the rat run routes, and on the rural routes earlier referred to, including the junction of the A1067 and Middletons Lane and the junction of the C283 Salhouse Road and Blue Boar Lane (TA, Appendix H).
- 3.4.60 Earlier reference has been made to the significant number of trips which occur through the City Centre within the Inner Ring Road. The City Centre is, as also already noted, especially rich in terms of historic assets and associations.

Reducing the dominance of traffic in certain areas of the City Centre is not only important in respect of the cultural importance of the centre, but will also improve the experience of shoppers and other visitors to the City Centre.

Summary

3.4.61 One of the key issues that does and will continue to affect the City of Norwich and its surroundings both today and in the future relates to problems associated with the transport network. Fundamentally the problems are caused by the limitations of the road network in and around the urban area, and its incapacity to deal with the demands placed upon it. The transport and related problems caused can be summarised as including:

- High volumes of traffic on routes such as the Outer Ring Road and the radial routes, which in combination with the physical characteristics of these routes leads to congestion and associated issues.
- High volumes of traffic using inappropriate routes. This includes traffic travelling through the historic City Centre, traffic 'rat running' along urban residential streets and routes to move between the main radial routes and traffic using rural routes in an attempt to get around the north of Norwich.
- Poor access to the strategic road network to and from areas located to the north of Norwich such as Norwich International Airport and areas of north and north-east Norfolk.
- Adverse implications for existing businesses and services in terms of access to workplaces for staff, the importing and exporting of goods and the ability of customers to access businesses and services.
- Adverse implications for the growth and development of both Norwich and its surrounding area, and other locations further afield, which result from an effective restriction on the extent to which planned and proposed development can be brought forward and growth aspirations achieved.
- Adverse implications on the effective operation and attractiveness of public transport within the City and its surroundings, and a limitation on the ability to provide further public transport, walking and cycling improvements.
- Adverse environmental and quality of life implications.

3.5 Resolving the Identified Problems

- 3.5.1 Transport and related problems within and around the City of Norwich have been the subject of analysis, discussion and consultation over the course of many years. The inter-relationships between and interdependence of the City and the surrounding area have been recognised since the 1970s and 80s, since when a cross local authority boundary approach to planning for the future development of the transport system serving Norwich and surrounding area has been taken. This has taken the form of the Norwich Area Transportation Strategy (NATS), which has been developed by Norfolk County Council, working with Norwich City, Broadland District and South Norfolk District Councils. Since 1992, NATS has played a key role, alongside other strategies and plans (including the statutory development plan), in identifying the problems facing the transport system and setting out how the transport system is to be developed to overcome those problems.
- 3.5.2 NATS has been subject to various iterations and updates since it was initially published. The fourth iteration of NATS was adopted in October 2004 and subject to further updates in April 2010. The strategy covers the same area that is defined as the Norwich Policy Area (NPA) within the JCS.
- 3.5.3 The overarching vision of the most recent iteration of NATS is to provide the highest possible level of access to and within the area covered by the strategy to benefit people's individual needs and enhance the economic health of the strategy area, and to do this at the same time as ensuring that journeys minimise any adverse impact on people and the built and natural environment.
- 3.5.4 The overall strategy of NATS is defined through a series of eight policies, aspects of which are then further detailed in subsequent sections and policies of the strategy. The overall strategy set out in NATS is that a package of transport improvements, interventions and measures is needed which will:
- Support and enhance the local economy and the role of the Norwich Area as a regional centre, whilst taking due regard of environmental objectives (Policy 1);
 - Improve the pedestrian environment and the movement of public transport within the city centre (Policy 3);
 - Discourage vehicular traffic from driving through the city centre where appropriate in order to deliver a more pedestrian friendly environment (Policy 4);

- Reduce the impact of traffic on residential roads in the built up area by increasing pedestrian and cycle priority, undertaking traffic management measures to reduce vehicle speeds to 20mph or less and put in place, where appropriate, vehicle access restrictions (Policy 5);
- Restrict access on certain minor rural and residential roads around the north of Norwich (Policy 6);
- Improve public transport, including the improvement of interchange facilities, to enhance Norwich's role as a Strategic Interchange Centre (Policy 7);
- Improve accessibility and travel choice in the Norwich area through the improvement of facilities for all modes of transport, the improvement of access to support economic health and the accommodation of the growth in the number of trips by means other than the car (Policy 8).

3.5.5 The list is complemented by Policy 2, which makes clear that a Norwich Northern Distributor Road will be developed for implementation. The policy and accompanying explanatory text highlight that the proposed NDR should be developed in conjunction with other measures such as traffic mitigation measures on minor rural and suburban residential streets around the north of Norwich and the provision of facilities for cycling and walking.

3.5.6 NATS gives an explanation of the likely achievements of an NDR. Having regard to these and the various considerations and the analysis that has been undertaken, the specific objectives for the NDR are to:

- reduce traffic levels and congestion on the existing road network both within the urban area and beyond to the north;
- facilitate journeys that are currently difficult and require traffic to use roads that are unsuitable for the type and volume of traffic that is currently accommodated;
- provide access to and help to deliver, planned and potential areas of growth, and enable those areas to be free of the need to incorporate provision for extraneous traffic;
- provide improved transport connectivity, including with the national strategic road network, for existing and future areas of residential and employment development, Norwich International Airport and the wider area of North and North East Norfolk;

- increase the opportunities for improving provision for public transport and other sustainable forms of transport and for improving traffic management within the City Centre, thereby encouraging modal shift, and
 - improve traffic related environmental conditions for residents in the northern suburbs of Norwich and outlying villages, whilst minimising the adverse environmental impacts of the NDR.
- 3.5.7 Through the achievement of these objectives, the NDR will facilitate the step change in transport infrastructure that is required to address existing deficiencies and serve the full scale of population and economic expansion identified in the objectives and aspirations for the area.
- 3.5.8 In March 2010, NCC agreed a NATS Implementation Plan (NATSIP) for the future vision of NATS and what that would consist of, in particular in respect of delivering improvements for public transport, walking and cycling. The NATSIP was agreed following significant consultation in 2009, whereby 160,000 booklets were distributed showing the most significant proposals for improving transport within the Norwich area and a series of exhibitions were held.
- 3.5.9 In addition to the NDR, the proposals considered in the NATSIP included public transport Bus Rapid Transit Corridors, Core Bus Route improvements, bus ticketing and bus facility improvements, measures to reduce the dominance of traffic in certain areas of the City Centre and improvements to the walking and cycling network and facilities.
- 3.5.10 Details of the progress made on delivery was reported in November 2013 as part of a process of updating the NATSIP. This update explained that significant improvements had already been delivered through the NATS process. Such improvements include: the publication of a new city wide cycle network and significant investment in delivering improvements along some of the routes on that network; significant improvement work on some bus routes, including elements of some BRT corridors to the south and west of Norwich that benefit from the A47(T) Norwich Southern Bypass; the provision of some City Centre bus priority measures; and improvements to bus ticketing and bus facilities.
- 3.5.11 Whilst some elements of the NATS / NATSIP measures have been progressed, the NDR is needed to realise the full benefits and potential of the measures. Furthermore, failure to implement the NDR proposals would pose a serious risk to the long term future of the City and its surrounding area since a significant element of planned growth is allocated to the north of the City

and requires the delivery of the NDR. The JCS notes that achieving the full economic potential of the area is dependent on improved connectivity (JCS paragraph 5.38). As has already been explained in Chapter 2 of this ES, Policy 6, which covers access and transportation matters specifically highlights the need to implement NATS, including construction of the NDR. Appendix 7 of the JCS identifies the NDR as a 'Priority 1 Infrastructure' requirement which is needed for the overall scale of growth identified in the plan.

- 3.5.12 Although produced and developed in advance of the publication of the NPPF, the approach taken in the production of NATS and the JCS is consistent with policy contained in NPPF which makes clear that local authorities should work with neighbouring authorities, and transport providers, to develop strategies for the provision of viable infrastructure necessary to support sustainable development.
- 3.5.13 It is not just the JCS which highlights that the achievement of the objectives and aspirations for Norwich and surrounding area is dependent on the implementation of NATS, including the NDR proposal.
- 3.5.14 One of the aims supporting the vision for the transport system within the County that is set out in Norfolk County Council's Local Transport Plan is identified as 'Delivering sustainable growth' (Paragraph 2.2). A framework aimed at helping to deliver such growth is provided. The NDR is identified as an element of the framework that will facilitate growth in the Greater Norwich area. A further aim is identified as the enhancement of strategic connections, and in this respect the provision of the NDR is identified as important to facilitate strategic access to north-east Norfolk and Norwich Airport.
- 3.5.15 As has already been explained, NCC's economic growth strategy for Norfolk outlines a series of priority themes, which include providing support for growth and removing infrastructure constraints. The aim set out in respect of this theme is to ensure Norfolk can meet its economic growth potential through properly funded strategic infrastructure. In terms of priorities to meet this aim, the strategy highlights the NDR as being vital to the continued economic success of the Greater Norwich area, and also of benefit to North Norfolk and Great Yarmouth (section 5.2).
- 3.5.16 The infrastructure plan produced to provide further information on the key infrastructure needed to deliver economic growth in Norfolk identifies the NDR as a key infrastructure project. It is indicated that the NDR will address existing traffic issues to the north and east of Norwich and the city centre and

deliver economic benefits for Norwich and North Norfolk. The benefits of the NDR providing easy and reliable access to the national trunk road network and to Norwich Airport are identified as considerable.

- 3.5.17 Within the emerging version of the New Anglia LEP growth plan ('Towards a Growth Plan – consultation draft') the LEP set out its commitment to supporting the NDR scheme within the section that discusses enabling infrastructure for business. The NDR will assist in the achievement of the LEP's vision of making Greater Norwich one of the most competitive City Regions in Europe.
- 3.5.18 Recognition at the local level of the importance of infrastructure to facilitate economic growth is reflected at the national level. As has already been highlighted the Government through their National Infrastructure Plan make it clear that to remain globally competitive the UK needs to address issues and develop infrastructure capable of supporting a dynamic, modern economy. The inclusion of the NDR within one of the key areas of infrastructure investment identified in this national plan has been explained within Chapter 2.
- 3.5.19 The traffic impact of the NDR is detailed within the TA and associated documentation that supports the NDR DCO application. The information provided in those documents demonstrates that the NDR will achieve its objectives. For completeness, however, a short summary of the performance of the NDR is provided below.

Reduced traffic levels and congestion

- 3.5.20 Appendix I of the TFR shows the effect the NDR will have on traffic flows on routes in and around the northern urban area of Norwich.
- 3.5.21 On the northern section of the Outer Ring Road referred to earlier in paragraph 3.4.8 the forecast effect of the NDR is to reduce two way AADT flows between 9% and 19% in 2017 in comparison with what they would otherwise be. In 2032 the reduction is forecast to be between 6% and 18%. In all but one instance the flows shown on the Outer Ring Road in 2032 with the NDR are lower than the existing base flows. The exception to this is the section of the Outer Ring Road between the A1067 and the A140 (location A5 on figure I.1 of Appendix I of the TFR) where the flows in 2032 with the NDR are forecast to be 24,100 in comparison with current flows of 22,400.

3.5.22 A similar situation occurs in respect of flows on the northern radial routes adjacent to the Outer Ring Road referred to earlier in paragraph 3.4.9. In 2017, the forecast effect of the NDR is to reduce two way AADT flows between 2% and 21% on those radials in comparison with what they would otherwise be. In 2032 the reduction is forecast to be between 10% and 19%. In 2032 with the NDR, the flows on the radials are forecast to be either below or similar to the existing base flows.

3.5.23 Section 7.4 of TFR demonstrates that in respect of City Centre through traffic, these flows are forecast to reduce with the NDR in place. It is forecast that with the NDR in combination with City Centre traffic management measures traffic travelling through the City Centre is effectively halved in 2032 in comparison with what it would otherwise be. Cross City traffic that passes through the City Centre via the network in the centre area or uses the Inner Ring Road is forecast to reduce with the NDR in place in comparison with what it would otherwise be by 3,783 AADT (5%) in 2017 and by 8,016 AADT (9%) in 2032. These forecast levels are just higher than existing base levels. These figures demonstrate that the NDR will decrease the amount of traffic that travels through and across the City.

Reduced levels of traffic on unsuitable routes

3.5.24 Reference has been made in the preceding paragraphs to the positive impacts of the NDR of City Centre through traffic. In addition, as a result of the NDR, traffic flows on unsuitable urban residential routes and on rural routes to the north of the urban area are forecast to be reduced.

3.5.25 As shown in Table 3.4 below, in the 'Do Something' (DS) scenario, i.e. with the NDR in place, the residential Fifers Lane (location A11 on Figure I.2 in Appendix I of the TFR) and Woodside Road (location A20 on Figure I.2 in Appendix I of the TFR) routes are, for example, forecast to have reductions in two way AADT flows of 1,400 (12%) and 4,300 (33%) respectively in 2017 in comparison with flows that would otherwise occur. In 2032 the reduction is 1,600 (13%) and 3,300 (28%) respectively.

Table 3.4: AADT traffic flows along inappropriate urban routes

Route	2017 AADT Traffic Flows (DM)	2017 AADT Traffic Flows (DS)	2032 AADT Traffic Flows (DM)	2032 AADT Traffic Flows (DS)
1. Middletons Lane (locations A10 and A83)	10,200 - 10,400	9,100 - 10,200	11,400 - 11,300	10,100 – 11,100
2. Fifers Land / St Faith's Road / Church Street (location A11)	11,700	10,300	12,600	11,000
3. White Woman Lane (location A13)	3,000	2,700	3,500	3,100
4. Barkers Lane / Church Lane (location A14)	3,100	2,500	3,400	2,800
5. Blue Boar Lane (location A75)	13,400	7,200	12,200	7,900
6. Woodside Road (location A20)	13,000	8,700	11,600	8,300

3.5.26 In respect of the rural routes to the north of Norwich highlighted in paragraph 3.4.20, and referred to in Table 3.5 below, the transport model analysis forecasts that the flows on these routes when added together would reduce by 5,700 AADT in 2017 and 10,600 in 2032. For the routes to the east highlighted in paragraph 3.4.20, the forecast reduction added together would be 7,100 AADT in 2017 and 11,000 AADT in 2032.

Table 3.5: AADT traffic flows along inappropriate rural routes

Route	2017 AADT Traffic Flows (DM)	2017 AADT Traffic Flows (DS)	2032 AADT Traffic Flows (DM)	2032 AADT Traffic Flows (DS)
7. B1145 and A1067 to the A140 via Reepham and Cawston (location 10)	4,100	3,700	5,500	4,300
8. A140 and Hoveton via Coltishall (location 7)	4,800	1,900	6,800	2,300
9. Spixworth Road / Church Lane/ Buxton Road / Crostwick Lane between the A140 and B1150 North Walsham Road (location 12)	6,800	4,400	9,400	4,500
10. Church Road / Broad Lane / Green Lane West through Great Plumstead (location 11)	6,200	2,100	9,800	2,700
11. Woodbastwick Road / B1140 Low Road and Bell Lane through Salhouse (location 6)	4,300	1,300	5,800	1,900

3.5.27 In the absence of the NDR, as shown on Figure I.2 of the TFR, the developer link roads would carry very high traffic flows incompatible with their intended purpose. For example, at locations A101 and A102, AADT traffic flows of 17,300 and 16,700 respectively are forecast in 2032.

Improved strategic accessibility and journey times

3.5.28 The NDR provides significantly improved access for north Norwich and north and north east Norfolk to the strategic road network via its junction with the A47(T) at Postwick. Direct dual carriageway access is provided from all of the

key northern radials to the national strategic road network. Access to the Airport is similarly significantly improved through the provision of a direct dual carriageway link to the national strategic road network.

- 3.5.29 The transport model analysis provided in the TFR identifies that with the NDR in place, the average time taken for the journeys on the routes to and from the Airport referred to in paragraph 3.4.33 above are all forecast to reduce in the morning and afternoon peak in 2017 and 2032 in comparison with the situation that would otherwise occur (see Figures 7.9 and 7.10 in section 7.5 of the TFR). In the vast majority of cases the average journey times on these routes in both the morning and afternoon peak in 2017 and 2032 is forecast to be less than the existing base average journey time. The exception to this is the route between the Airport and the A11(T).
- 3.5.30 The transport model analysis also demonstrates that with the NDR in place, the extent of delay on such journeys is forecast, in the vast majority of cases, to be less in 2017 and 2032 than would otherwise be the case (see Tables K.3 – K.7 in Appendix K of the TFR).
- 3.5.31 Overall, as reported in section 9 of the TA, the analysis demonstrates that journey times on key routes linking the strategic road network with the main development areas and the Airport are forecast to significantly decrease in 2017 and 2032 with the NDR in place. In most cases journey times in these future years are predicted to be lower than existing base journey times.
- 3.5.32 An economic appraisal has been carried out for the NDR scheme. This assesses the transport benefits of the scheme, amongst other aspects, and compares these with the costs of the scheme. The appraisal was undertaken in accordance with standard Department for Transport methods and the values obtained show that the benefits are above four times the scheme costs. This means that the NDR scheme represents high value for money.
- 3.5.33 As identified in section 6.3 of the Economic Appraisal Report, the majority of the transport benefits arise from journey time savings. These are broken down in the economic appraisal into three categories: shorter (less than 2 minutes), medium (2-5 minutes) and longer (more than 5 minutes). For the appraisal of the NDR scheme the time benefits in these three categories are, respectively, 26%, 29% and 44%. This shows that the scheme has a large effect on transport times and efficiency, with the vast majority of the time savings comprising medium and longer time savings.

3.5.34 Section 7.1 of the TFR and section 9 of the TA both provide a description of key changes in strategic traffic movements as a result of the NDR. In general terms, this analysis explains that, amongst other things:

- journeys from the east to Norwich become more attractive via the A47(T), with reductions on other routes currently used for such movements;
- certain routes north of Norwich experience substantial reductions in traffic; and
- to the west of Norwich there is an increase in traffic using the A1067 Fakenham Road, with some trips reassigning to this routes from the direction of King's Lynn.

Providing access to enable growth

3.5.35 As earlier explained, the forecast traffic data and information that has been produced is based on national traffic growth forecasts and proposed development spatially allocated in accordance with the JCS, but with growth constrained to national forecasts (NTEM). The inadequacies of the existing road network to accommodate traffic generation produced by the high levels of employment and residential growth planned for greater Norwich are set out in section 7.8 of the TA. The forecasts made for 2017 and 2032 and which are reported throughout the TFR and the TA therefore demonstrate that in order for the growth envisaged for Norwich and surrounding area to be accommodated, the NDR is required.

3.5.36 Earlier reference has also been made to the position that a number of key sites where planned and proposed development is, at least partly, contingent on provision of improvements to the transport network. The NDR provides the necessary step change in transport infrastructure needed to allow planned and proposed growth to come forward.

Improvements for public transport, walking and cycling

3.5.37 The reduction in traffic flows on the road network that are forecast to result with the NDR in place increases the opportunities for improving the provision for pedestrians and cyclists within the urban area. Walking and cycling benefits are made possible with the ability to improve junction arrangements at key locations as a result of reduced traffic flows. Beneficial measures are also made possible in the City Centre by reducing the amount of traffic and

giving more focus to routes used by pedestrians (shoppers, visitors and workers) and cyclists. The envisaged City Centre measures will also seek to provide easier movement for buses by providing space to circulate and drop off / pick up passengers efficiently and conveniently. Such benefits can more easily be realised with a reduction in traffic flows.

3.5.38 Whilst some bus related improvements have been progressed through the NATS / NATSIP process, improvements to the public transport corridors to the north and east of the City have been constrained by the amount of traffic and related congestion on key radial routes and the ring road routes. With the reduction in traffic flows and congestion on these routes forecast to result from the NDR, further improvements in these areas can be made and benefits realised.

3.5.39 Journey time savings on five key bus routes in the north and east of Norwich resulting from the NDR being in place have been assessed. The five routes considered run along: the A1067 Fakenham Road / Drayton High Road to Attlebridge, the Cromer Road to the Holt Road / Cromer Road junction, the Wroxham Road to the Wroxham Road / Green Lane West junction, the Plumstead Road to the Plumstead Road / Broad Lane junction, and Yarmouth Road to the Postwick north west roundabout.

3.5.40 The full analysis is contained in section 7.6 of the TFR. It shows that in 2017, AM peak journey times into the City Centre reduce with the NDR by between 5% and 14%, with a journey time reliability improvement of around 30 seconds. In the 2017 PM peak the journey times out of the City Centre reduce with the NDR by between 1% and 13%, with a journey time reliability improvement of around 15 seconds. Journey time changes in 2032 are more affected by the complementary City Centre measures. In 2032 AM peak journey times into the City Centre change with the NDR by between a 1% increase and an 11% reduction, with the average journey time reliability improvement of 18 seconds. In the 2032 PM peak the journey time for routes out of the City reduce by between 3% and 24%, with a journey time reliability improvement of around 30 seconds.

Quality of life / environmental conditions

3.5.41 The transport model analysis that is provided in the TFR shows that as a result of the NDR, the number of properties within 50 metres of roads with a volume to capacity ratio of over 90% are forecast to reduce in 2017 and 2032 in comparison with the situation that would otherwise occur (TFR section 7.3).

In the AM peak the reductions in the number of affected properties is 21% and 27% in 2017 and 2032 respectively.

3.5.42 The analysis of accident data contained within section 10 of the TA concludes that the NDR is likely to have a beneficial impact at nearly 70% of all existing accident cluster sites considered (62 out of the 89 sites). Further detail of the impact of the NDR on specific accident cluster sites is provided in section 10 and Appendix I of the TA.

3.6 Conclusions on Need

3.6.1 One of the key issues affecting the City of Norwich and its surroundings is the problems associated with the transport network. Fundamentally, the problems are caused by the limitations of the road network in and around the urban area, and its incapacity to deal with the demands placed on it.

3.6.2 The transport and related problems within and around the City have been the subject of analysis, discussion and consultation over the course of many years. A cross local authority boundary approach to planning for the future development of the transport system serving Norwich and surrounding area has been adopted, and takes the form of the Norwich Area Transportation Strategy (NATS).

3.6.3 The overall strategy of NATS is that a package of transport improvements, interventions and measures is needed. Together these improvements, interventions and measures will deliver a reliable, efficient and long-term sustainable transport network which will improve accessibility and connectivity and which will support the continued economic and physical growth of the Norwich area.

3.6.4 NATS identifies the NDR as part of this package. The NDR is needed to improve connectivity and accessibility across both the northern part of the Norwich urban area and areas of the county in an arc from the north west to the east of this main urban area. Such improvement will ease the relative disadvantage of the peripheral location of these areas and provide the basis of the transport infrastructure required to address existing and future problems, and achieve the growth objectives which have been identified for Norwich and its surrounding area.

3.7 Introductions to Alternatives

3.7.1 This part of the Need and Alternatives chapter records how the application proposals for the proposed NDR scheme were prepared and selected in

preference to other possible approaches that might meet be considered to see whether they could address the need identified earlier in the chapter. It explains the account taken of a range of material considerations, including environmental effects, leading to the conclusion that the application proposals are the most appropriate response to the need.

- 3.7.2 A summary of the process follows this introduction. In brief, the requirement for an NDR was first formally identified in 1992 following a review of transportation strategies for the greater Norwich area (NATS). A subsequent review of NATS carried out between 2002 and 2005 centred around a further comparative analysis of possible interventions to resolve the area's transport problems, conserve the historic core of the City, reduce the effect of traffic on the urban area and rural settlements used as rat-runs and facilitate the continued growth of the City in accordance with the policies of the statutory development plan.
- 3.7.3 The 2002 - 2005 NATS review identified as a preferred approach a package of interventions comprising the NDR and measures to improve public transport and encourage modal shift. The route and design of the NDR scheme were then improved by further rounds of iteration to take account of the results of environmental studies, views expressed by residents and stakeholders and up-dated traffic modelling based on surveys undertaken in 2006 and 2012.
- 3.7.4 The 2012-based modelling confirms that implementation of the application proposals is likely to have the required wide-ranging benefits for the City's transport network (section 9 of the TA). It will relieve rural roads currently used to make cross-city journeys and the congested radial and ring roads, making it possible to progress the NATS / NATSIP proposals for further improvements to public transport and take the necessary traffic management measures to effectively remove unnecessary through traffic from the historic core of the City. It will also provide the necessary transport infrastructure to facilitate employment and residential growth.
- 3.7.5 The incorporation of the NDR into the road network will significantly improve connectivity within and across the City and the surrounding area. The provision of a direct connection with the A47(T) will make it much easier for travellers to and from the north and north-east of the City to access the strategic road network and also key regional facilities, such as Norwich International Airport, without negotiating the City's congested road network. The traffic forecasts supporting this analysis can be found in the TFR.

3.7.6 As already noted, the 2002 - 2005 NATS review concluded that whilst the NDR would not, by itself, resolve the area's transport problems, it would be an essential component of any strategy. Improvements to public transport and cycling and walking infrastructure were also required, but those initiatives alone also would not provide the transport infrastructure required to encourage and sustain economic growth, and achieve the other objectives. As well as facilitating employment and housing development, the provision of the NDR will free the radials, the inner and outer ring roads, outlying rural roads, the City Centre and residential streets of the role of catering for cross-city movements for which there is currently no more appropriate alternative route. As explained below, the analysis of other options concludes that these strategically important benefits cannot be as effectively achieved by other means.

3.8 Consideration of Other Approaches Leading to the Development of the Proposals

3.8.1 The need for a distributor road around the north of the City was identified in 1992 through a review of the transport strategy for the Norwich area (NATS). The initial proposal was for a 'full length' NDR, i.e., one which would terminate in junctions with the A47(T) on both the western and the eastern flanks of the City.

3.8.2 The 1992 NATS review acknowledged that the construction of an NDR would inevitably have an impact on the environment of the area through which it passed. Environmental studies showed that adverse effects were particularly likely on the most westerly section of the full NDR route, between the A1067 Fakenham Road and the A47(T)(west), where all possible alignments would have to cross the valley of the River Wensum (designated as a Special Area of Conservation (SAC)).

3.8.3 Over the course of subsequent years, NCC therefore examined and consulted on possible route corridor options and detailed designs, in order to ensure that when the time came to submit an application for the necessary consents, the scheme applied for would as far as possible avoid or minimise significant adverse effects and that the alignment would reflect the comments of stakeholders.

NATS Options Assessment Report 2005

3.8.4 Transport strategy for the Norwich area was next comprehensively reviewed, in the context of strategic land use planning policies, over the period 2002 -

2005. The NDR proposal was revisited. The concept was again compared against other possible approaches and detailed alignments were investigated to identify a scheme that would best meet the need with least adverse environmental effects. A steering group drawn from the membership of NCC, Norwich City Council and Broadland and South Norfolk District Councils oversaw the process.

- 3.8.5 Commencing in 2002, a body of work was carried out to identify and assess transportation strategies that could be considered for adoption as part of a review of the Norwich Area Transportation Strategy (NATS). The detailed results of the studies and analyses were reported in the NATS Options Assessment Report 2005.
- 3.8.6 A wide-ranging 'long list' of over 30 transportation interventions for inclusion in the review of possible strategies was identified. Possibilities included road-based and public transport interventions and the application of land use policies and other measures to reduce the demand for travel and encourage modal shift. Following a qualitative assessment of the performance of each intervention in addressing the problems and issues facing the area, possibilities that performed inadequately against social, environmental, and economic objectives, or were less effective than other options, were not taken forward.
- 3.8.7 For example, the possibility of a short NDR to the north-west of the city, between the A140 or the A1067 and the A47(T)(west), was examined but rejected. It would be much less effective than other versions of the NDR in meeting the economic and conservation objectives, the traffic benefits would be limited and it would not facilitate growth, which is largely planned to the north east of the city. The section between the A1067 and the A47(T) (west) would also be likely to give rise to significant adverse environmental effects, which studies showed and consultation at the time confirmed could not easily be mitigated.
- 3.8.8 Another possibility examined and discarded was improvements to the Outer Ring Road. It was concluded that even if they could be implemented without unacceptable harm to the urban environment, such improvements would be much less effective than the NDR options in improving accessibility and meeting the economic objectives. They would also fail to address the growth issues on the north-east edge of the city. Whilst the possibility of improvements to the existing road network was not taken forward in the Options Assessment Report as an alternative, it was nonetheless retained for later re-examination (see below).

Approach to public transport interventions

3.8.9 A range of public transport interventions was considered for inclusion in the 2002-2005 NATS review, although not necessarily as alternatives to the NDR:

- a light rapid transit (LRT) system;
- a guided bus route along the Marriott's Way corridor;
- orbital bus routes;
- cross-city bus routes linking existing Park and Ride sites;
- a new Park and Ride site at Taverham/Drayton;
- interchange facilities at key nodes within Norwich;
- additional rail stations to the east of Norwich, and
- revenue support for additional bus services.

3.8.10 A qualitative assessment of the performance of these options in resolving the transport problems and issues and the NATS aims and objectives concluded that individual public transport interventions or a combination of them would not meet the need. This did not mean that public transport would not be a key element of a sustainable transport strategy for the City and the surrounding area. It recognised that unless the issue of traffic congestion was addressed, proposals to significantly improve public transport could not be fully implemented. As outlined below, public transport options were therefore retained alongside NDR options.

3.8.11 Orbital bus routes and LRT/bus rapid transit (BRT) emerged as potentially the most effective of the public transport interventions. A guided bus route on Marriott's Way had potential, if combined with a new Park and Ride site at Taverham / Drayton, to offer a solution to the difficulty of providing comprehensive bus priority measures along the A1067 corridor. Marriott's Way, however, was important for wildlife and informal recreation and as significant lengths also run along an undeveloped river valley it serves little existing or potential development. Moreover, as the route of a former railway line, it was a location-specific.

Options Assessment 2005

3.8.12 Following the initial assessment, six possible strategies were identified and assessed using an approach based on the Department for Transport's WebTAG methodology. Each option was assessed against its likely environmental effects; its benefits for road safety, the economy and accessibility; and the degree to which it reflected planning and other policies.

3.8.13 The following strategies were compared:

- Option 1 – A 'full length' NDR linking the northern radial routes with the A47(T) on both the east and west sides of the City; complementary measures to reduce the impact of traffic on minor roads and residential streets around the north of Norwich; improvements to junctions on the Inner and Outer Ring Roads; improvements to radial bus services, and measures to reduce through traffic in the City Centre.
- Option 2 – As Option 1 but a 'half length' NDR between the A47(T) at Postwick and the A140 Cromer Road, adjacent to Norwich International Airport.
- Option 3 – As Option 1, but a 'three quarter length' NDR from the A47(T) at Postwick, past Norwich International Airport to the A1067 Fakenham Road.
- Option 4 – A new orbital bus service around Norwich; major improvements to existing radial bus services; improvements to junctions on the Inner and Outer Ring Roads, and a 'Ring and Loop' system to prevent car drivers making through trips within the Inner Ring Road.
- Option 5 – A Light Rapid Transit service on a route linking Thickthorn Park and Ride, Norfolk & Norwich Hospital, University of East Anglia (UEA), the City Centre and railway station, Postwick Park and Ride, Broadland Business Park and residential development in the north east fringe of Norwich; improvements to junctions on the Inner and Outer Ring Roads; road user charging or workplace parking charging within the Inner Ring Road; a Ring and Loop system to prevent car drivers making through trips within the Inner Ring Road, plus additional physical restrictions on car access to the City Centre as a consequence of the LRT alignment through the City Centre.
- Option 6 – Planning new development so as to reduce the distance between home, work and services; financial incentives to implement workplace travel plans (including targets for reduced car use, by existing businesses as well as those expanding or relocating), improvements to walking and cycling

networks, including measures to support safer and healthier journeys to school; the promotion of alternative modes of transport and alternative fuels, and delivery of individualised marketing campaigns in support of travel plans.

- 3.8.14 The object of the assessment was to identify the comparative performance of contrasting strategies, including ascertaining whether reliance could be placed on approaches that did not involve road construction. Discarding a strategy because it failed as a standalone option did not, however, necessarily mean that elements of that approach could not be included, perhaps in combination with others, in the overall NATS strategy. This is especially the case in respect of Option 6, the policy option, the content of much of which encapsulates the approach taken in statutory land-use plans. As with option 5 (public transport strategy) the question being asked in the assessment was whether a particular approach on its own would suffice to meet the need.
- 3.8.15 The evidence, analysis and conclusions of the assessment were documented in a “NATS Options Assessment Report” published in August 2005, and a full report on the further work, including appendices summarising the evidence, was made to NCC's Cabinet the following month.
- 3.8.16 As the officer report to Cabinet noted, the assessment concluded that an NDR was required in order to address the area’s transport problems. It drew attention to the significantly superior performance of the NDR options over other interventions. At the same time it acknowledged that the NDR options, especially a ‘full length NDR’ were also likely to have significant adverse effects on the environment:

“An NDR as part of an area wide transportation strategy, and implemented with a suite of complementary measures made possible by the freeing up of capacity on the existing road network, would help alleviate many of the problems and issues currently highlighted within the NATS area, in particular: congestion on the outer ring road; access to the airport; and accommodation of future housing requirements. It also gives rise to the most economic benefits and is the only strategy to provide a strategic transport link to North Norfolk. However, whilst an NDR option affords the most benefits within the NATS area, it also gives rise to the most adverse environmental impacts of all options considered, some of which could not be mitigated.” (Paragraph 4.1 of Appendix 3 to the Cabinet report “Statement on Justification of Need”).

- 3.8.17 The reference in the last phrase to the impacts ‘which could not be mitigated’ is to the likely effects of constructing a ‘full NDR’, which between the A1067

and the A47(T) to the west of the city would have to cross the Wensum Special Area of Conservation (SAC) and pass through a landscape containing historic parkland. The evidential position to support the officers' judgement is documented in Appendix 4 to the Cabinet report.

3.8.18 The review concluded that even if the link between the A1067 and the A47(T) were not built, a 'three-quarter length' NDR would still achieve the objectives set by the NATS review. Option 3 (an NDR linking the A47(T) at Postwick with the A1067 Fakenham Road) was therefore preferred. The Cabinet deferred a decision on a preferred route pending further assessment of options, including mitigation measures.

3.8.19 The officer report summarised the superiority of an option based on the construction on an NDR over other possibilities that did not include an NDR, in the following terms:

"Other outcomes to the aims and objectives of NATS do not offer solutions to the full range of problems and issues. It is only the NDR option that answers the majority of these concerns. In addition, it is only the NDR option that frees up capacity on the existing road network to allow the maximum use of the complementary measures to make improvements to public transport and provisions for non-motorised users." (Paragraph 4.2 of Appendix 3 to the Cabinet report.)

3.8.20 In respect of the public transport options, the assessment concluded that cross-city bus routes linking existing Park and Ride sites, the development of interchange facilities at key nodes within Norwich and additional rail stations on the Cromer line to the east of Norwich would not have sufficient impact across the NATS area to be considered as strategic alternatives in their own right or in combination, but they could play an important role to complement the NDR options.

3.8.21 An experimental orbital bus service was subsequently operated within the built up area of Norwich between November 2005 and March 2007. The service ceased because it covered less than one-third of its operating costs. Its lack of success may have reflected the unavoidably long journey times on a route linking major residential areas with key employment sites around the busy Outer Ring Road.

3.8.22 The NATS review thus concluded that though improvements in public transport were desirable, they were not an alternative to an NDR. They would not by themselves address the fundamental economic and accessibility

problems of the area, including the needs of settlements in the wider area, nor would they provide the essential road infrastructure required to support the growth of the city.

Consultation input to the 2002 – 2005 Review

3.8.23 The Options Assessment Report was prepared with the benefit of responses to a wide-ranging consultation on the draft proposals. In autumn 2003, NCC distributed information brochures and questionnaires to residents and stakeholders around Norwich, describing the Council's preferred NATS strategy and requesting views on route options for a northern distributor road. (The work carried out on route options, which was recorded in a Stage 2 Environmental Assessment Report of October 2004, is described later in this chapter.) The questionnaire and related information was also available for viewing and completion on the Internet. Twenty-five exhibitions and ten public meetings were held.

3.8.24 A further public consultation on alternative routes for the NDR was carried out in autumn 2004. Preliminary engineering designs were published alongside the results of environmental studies and an assessment of the traffic and economic implications of each of the route options. Some 132,000 information brochures and questionnaires were distributed to residents and stakeholders around Norwich, and exhibitions were held in the consultation area.

Further assessment work

3.8.25 In accordance with the 7th March 2005 Cabinet decision, NCC undertook further studies in consultation with key stakeholders, using more detailed environmental assessments to refine the preferred route of the NDR.

3.8.26 After careful consideration of the more detailed environmental studies, and of the need to plan effectively for transport infrastructure to serve the expansion of the city, in September 2005 NCC's Cabinet resolved to proceed with a preferred scheme for a dual carriageway NDR between the A1067 Fakenham Road and the A47(T) at Postwick to the east of the City. Substantial economic and traffic benefit was seen in providing an NDR of consistent, high standard throughout its length. A road of this nature would improve connectivity across the whole of the northern part of the city and its catchment and provide maximum relief of residential and rural roads that were currently carrying significant flows of extraneous traffic.

NDR Major Scheme Business Case, 2008 - 2009

3.8.27 In 2009, following the submission by NCC of a Major Scheme Business Case, the Department for Transport (DfT) granted funding for the NDR from the A140 to the A47(T) at Postwick, subject to progression by NCC of the NATS public transport measures which were complementary to the NDR. At its April 2010 meeting, NCC's Cabinet re-affirmed its commitment to the NDR as a dual carriageway from Postwick to the A1067.

Further studies of public transport

3.8.28 A public transport model was developed to test public transport options in preparing the Major Scheme Business Case (MSBC) for the NDR.

3.8.29 The work carried out is recorded in the Position Statement on Development of Public Transport Option of December 2007. It began with the two public transport strategy options appraised in the NATS Options Assessment Report. Variations were developed to cover the range of public transport interventions that could realistically be considered as potential options. The appraisal resulted in a total of four options for initial consideration. Two involved improvements to conventional bus services and two involved alternative forms of light rapid transit - Bus Rapid Transit (BRT) and Light Rail Transit (LRT).

3.8.30 A heavy rail option was not developed because the geography of the National Rail network within the NATS area is such that, even allowing for the possibility of new stations, a very small percentage of the population of the NATS area would have access to a heavy rail service for local travel. A heavy rail option thus could not meet the objectives set for the NDR scheme. Improvements to local rail services were therefore appropriately taken forward as one of the complementary measures within NATS.

3.8.31 It was considered that BRT was more likely than LRT to be economically viable to serve a city of the scale of Norwich. A combination of BRT and the best performing bus improvements was therefore adopted as the preferred public transport option for modelling and a WebTAG appraisal for the MSBC. The option comprised improvements to the frequency of radial services on existing routes; a new bus service on a part of the Outer Ring Road, which would provide service to areas similar to that of the NDR; and a BRT corridor linking Sprowston, the City Centre, the University (UEA), Norfolk and Norwich Hospital and the Norwich Research Park.

- 3.8.32 Following submission of the MSBC, DfT asked the County Council to investigate the sensitivity of the Benefit/Cost Ratio (BCR) for the Public Transport (PT) Option presented in the MSBC to higher levels of patronage on the new and enhanced services, thus generating additional revenue and reducing the level of subsidy required.
- 3.8.33 The results of these tests suggested that additional bus services included in the PT Option would have to operate without subsidy to achieve a BCR of 1.5 or above. In addition, patronage on the existing core bus routes enhanced under the PT Option (either through the introduction of a more frequent bus service or a new BRT service) would need to increase by 25% to achieve a BCR of circa 1.5 and by 32% to achieve a BCR of circa 2.0. These scenarios were considered to be implausible as they meant that the orbital bus service would have to generate sufficient patronage and revenue to operate without subsidy. As noted earlier, the experimental orbital bus service that operated between November 2005 and March 2007 covered less than one-third of its operating costs.
- 3.8.34 Following submission of the test results, DfT granted funding for the NDR. It was recognised that NATS included public transport measures that were complementary to the NDR, and NCC gave an assurance that those measures would be progressed.

Development Pool Bid 2011

- 3.8.35 Following a Government spending review, the NDR was included in a 'Development Pool' of schemes requiring a new funding bid. The required Development Pool submission document sent to DfT in September 2011 included an updated MSBC and supporting documents. In December 2011, DfT re-confirmed its funding for the NDR and added it to its list of approved "Local authority major transport schemes – development pool projects" included in the National Infrastructure Plan in November 2011. In December 2013, the NDR was explicitly identified as a 'Top 40' priority infrastructure investment project in the National Infrastructure Plan 2013.

3.9 Overall Review of Options and Alternatives 2013

- 3.9.1 Before deciding on the application proposals, the conclusions of previous analyses of options and alternatives were reviewed in the light of traffic surveys undertaken in 2012, the final results of the environmental studies (recorded elsewhere in this ES) feedback from stakeholder and public consultation, and the progress of the Joint Core Strategy to adoption.

3.9.2 The two options that had previously been discarded as alternatives to the NDR, i.e., improvement of the existing highway network and of public transport (referred to in the Options Assessment Report, see paragraphs 3.8.8 above) were re-examined and the remaining feasible alternatives to the application proposals were compared. This analysis is summarised in the following paragraphs. A standard approach has been adopted: a short written analysis is followed by an assessment table.

3.9.3 A common key has been used to indicate how the degree to which the option or alternative meets (positive) or does not meet (negative) the objectives. As a comparator, the application proposals are assessed to have a large positive rating in respect of each of the objectives:

Key to tables

+++	Large positive
++	Moderate positive
+	Slight positive
=	Neutral
-	Slight negative
--	Moderate negative
---	Large negative

Measures to enhance the existing highway network as an alternative to the NDR (Option 1)

3.9.4 The 2002-2005 NATS review had considered whether forecast traffic growth in and around the north of Norwich could be accommodated on the existing network without an NDR. It concluded that this would require widespread major works to widen and reconfigure many carriageways and junctions, including several with frontage properties necessitating extensive property purchase and/or demolition. The scale of the works required would be likely to be greater if, as would be desirable, measures were also introduced to give priority to public transport.

3.9.5 The interconnected nature of the radial and orbital road system serving the City means that small-scale piecemeal improvements to sections where schemes might be feasible in isolation would not resolve the current traffic

issues since other links and junctions, where improvement was impractical, would remain congested, leaving overall route capacity and journey time reliability little changed and the propensity and opportunity for continued rat-running undiminished.

- 3.9.6 To provide significantly increased highway capacity for movements between the A47(T) at Postwick and the Airport, it would be necessary to significantly improve the capacity of the A1042 and the A140 radials. Selective widening and junction improvement would be required. Between the A47(T) and the Airport, the A140 and the A1042 are single carriageways lined with residential and commercial properties. A short stretch of the A1042 abuts Mousehold Heath, a local nature reserve. There are four junctions with other 'A' or 'B' classified roads and many others with significant urban distributors and local connections, and a railway under-bridge.
- 3.9.7 The final link from the A140 to the A1067 would require improvement of one or other of the minor roads that run between the A140 and the Fakenham Road and pass through the centre of Hellesdon or Drayton.
- 3.9.8 An improvement scheme of this nature through the urban area would only partly replicate the functions of an NDR and would not resolve many cross-city connectivity issues or serve new development. It would unavoidably have a very significant direct and/or indirect physical and environmental impact on many residential and commercial properties, and would require property acquisition and demolition in order to provide the necessary additional highway capacity. It would be likely to face considerable objection, especially from affected occupiers.
- 3.9.9 Such a scheme would thus partially meet the traffic need at the expense of widespread impacts on urban and residential environments. Traffic would continue to be drawn into the urban area and many cross-city journeys that would be facilitated by the NDR would not be facilitated or would be less well served by such a scheme, resulting in continued urban and rural rat-running.
- 3.9.10 It would be less effective than an NDR in supporting urban expansion to the north east of the City and in stimulating and serving economic growth generally. To improve its performance in those respects, it would be necessary either to rely on the link roads likely to be associated with development proposals (considered below) or improve local rural roads, which would result in a further range of adverse impacts.
- 3.9.11 It was therefore concluded that it is not possible to replicate the benefits that would arise from the construction of the NDR by improving the existing road

network. A very significant adverse impact on the urban environment would be likely to result, which was likely to be judged unacceptable. The effect on residential properties in particular would be such as to make it unlikely that such a scheme would be promoted and if it was, that the necessary powers of compulsory purchase of residential properties would be forthcoming. It was therefore not considered to be a feasible alternative.

3.9.12 The table below summarises the performance of this option.

Table 3.6: Summary of performance of Option 1 against the objectives

Objective	Scoring	Comment
Reduce traffic levels and congestion on the existing road network both within the urban area and beyond to the north	=	There would be some reduction in congestion but no reduction in traffic levels in the urban area
Facilitate journeys that are currently difficult and require traffic to use roads that are unsuitable for the type and volume of traffic that is currently accommodated	+	Some journeys might be facilitated and congestion eased
Provide access to and help to deliver, planned and potential areas of growth, and enable those areas to be free of the need to incorporate provision for extraneous traffic	- -	This option would not provide access to development areas, which are planned on the basis of the construction of the NDR
Provide improved transport connectivity, including with the national strategic road network, for existing and future areas of residential and employment development, Norwich International Airport and the wider area of North and North East Norfolk	=/+	Connectivity would be improved but limited to the route(s) improved. Other existing constraints to cross-city accessibility would remain

Objective	Scoring	Comment
Increase the opportunities for improving provision for public transport and other sustainable forms of transport and for improving traffic management within the City Centre, thereby encouraging modal shift	++	The improvements to public transport would be limited unless priority measures were built into the scheme, which would increase its scale and increase the likelihood that it could not be delivered
Improve traffic related environmental conditions for residents in the northern suburbs of Norwich and outlying villages, whilst minimising the environmental effects of the proposed intervention	-/--	The propensity for rat running using convenient cross-radial routes might increase as planned growth areas are developed. There would be limited opportunity to mitigate the effects of improving rural and urban roads on the environment

Improvement to public transport provision as an alternative to the NDR (Option 2)

3.9.13 As explained earlier, extensive and detailed analyses of the potential for public transport improvements formed part of the reviews of NATS and supported the MSBC submission to the DfT. Each previous iteration of the analysis has reached the conclusion that public transport initiatives are an essential complement to the NDR and key to the implementation of a sustainable transport policy but, even in combination, they do not constitute an alternative to it. By relieving the radials of traffic, the NDR would in practice help to facilitate the introduction of bus priority measures and an orbital bus service. By freeing the internal road networks of new development areas of the need to cater for extraneous through traffic, better residential environments could be created, which would be more easily penetrated by local bus services and walking and cycling routes.

3.9.14 A review of the studies undertaken shows that these conclusions remain valid. Proposals coming forward for major development to the north east of the city in accordance with the Joint Core Strategy support the view that reliance on the NDR to accommodate through traffic that would otherwise pass through the development or along adjoining radials, (thereby adding to congestion on

routes used by bus services) will facilitate the development of high quality residential environments.

3.9.15 The table below summarises the performance of the public transport option considered as an alternative to the NDR.

Table 3.7: Summary of performance of Option 2 against the objectives

Objective	Scoring	Comment
Reduce traffic levels and congestion on the existing road network both within the urban area and beyond to the north	=	Whilst there would be an uncertain effect on traffic levels, the introduction of bus priority measures would be likely to increase local congestion. The viability of cross-city bus routes would continue to be constrained by congestion
Facilitate journeys that are currently difficult and require traffic to use roads that are unsuitable for the type and volume of traffic that is currently accommodated	--	As above, a significant proportion of trips using rat-runs would not be served by public transport. Additional traffic congestion may encourage more rat-running
Provide access to and help to deliver, planned and potential areas of growth, and enable those areas to be free of the need to incorporate provision for extraneous traffic	---	Public transport measures would need to be supplemented by road construction
Provide improved transport connectivity, including with the national strategic road		Public transport measures would not

Objective	Scoring	Comment
network, for existing and future areas of residential and employment development, Norwich International Airport and the wider area of North and North East Norfolk	---	significantly benefit the wider area
Increase the opportunities for improving provision for public transport and other sustainable forms of transport and for improving traffic management within the City Centre, thereby encouraging modal shift	=	The provision of more effective public transport would be constrained and offset by congestion. It could serve only a limited variety of cross-city journeys and would not enable the closure of the City Centre to most through trips
Improve traffic related environmental conditions for resident in the northern suburbs of Norwich and outlying villages, whilst minimising the environmental effects of the proposed intervention	-	As above, rat-running is related to cross-radial journeys and unlikely to be served by public transport

3.10 Alternatives to the Application Proposals

3.10.1 The analyses described above reaches the conclusion that the need can only be met by the construction of a NDR alongside the implementation of measures to improve public transport. The possibility of a 'full length' NDR was discarded because of the likelihood of a significant impact on the environment of the Wensum Valley SAC, which would have to be crossed between the A1067 and the A47(T) to the west of the City.

3.10.2 The feasible alternatives to the application proposals are thus variations of the standard and alignment of the NDR between the A1067 and the A47(T) at Postwick, including the possibility that its role could be performed by a developer-funded link road constructed as part of the physical expansion of the City.

- 3.10.3 The consideration given to each of these alternatives is explained below, but it is first necessary to record how the preferred alignment of the NDR was determined. Environmental considerations figured largely in the judgements that have been made about the most appropriate route. A prime concern was to avoid or reduce the impact on the natural environment and features of landscape or cultural value. Once identified, these were matched against highway engineering considerations and likely effects on the human environment (advised by the results of public consultation) and a judgement reached as to the most appropriate alignment and design.
- 3.10.4 In summary, therefore, the alignment and form of the proposals are the result of iteration of options, informed by the output of land-use/transportation modelling, and the preliminary conclusions of the studies carried out for the environmental impact assessment. Studies of the nature and quality of the existing natural and human environment have confirmed the most appropriate design and alignment and the requirement for mitigation measures.
- 3.10.5 As recorded earlier in the chapter, the process of identifying a corridor and refining the standard, alignment and design to reach an application proposal was addressed and reported as part of the work undertaken during the 2002-2005 review of NATS. Figure 3.4 is a composite plan showing the majority of the routes considered at that time and in subsequent consultations. Possible corridors were initially split into western and eastern options, the dividing line being the crossing of the A140 Cromer Road in the vicinity of Norwich International Airport. The extended period of study and consultation means that the figure shows several overlapping possibilities.
- 3.10.6 As noted earlier, examination of possible routes between the A1067 and the A47(T) (west) concluded that none were free of the possibility of a significant impact on the Wensum Valley SAC. NCC took the decision not to proceed with a 'full NDR'. The routes examined between the A1067 and the A47(T)(west) are therefore not shown on the plan.
- 3.10.7 Five possible routes were identified between the A140 and the A1067, four of them being variations on a direct route to the north of Taverham, Thorpe Marriott and Drayton (options 1-4 on Figure 3.4). The fifth option would retain the A1067 through those settlements with a shorter link to the A140 between Drayton and Hellesdon. It would do nothing to relieve the settlements or the built-up section of the A1067 through them and was not considered further.
- 3.10.8 The outer options (1 and 2) would have a greater impact on the landscape and nature conservation and were also discarded. Of the remaining routes,

option 3 was preferred to option 4 because it would have less impact on property. From this point, the open landscape supported the direct route common to options 1-4 and became the basis of the application proposals.

3.10.9 East of the A140, three broad route options were identified: an inner route immediately north of the then existing urban edge; an outer route to the south of Rackheath, Spixworth and Horsham St Faith, and a central route between the two. An NDR following the inner route would have greater impact on the existing urban area and would also be less well related to the proposed areas of new development. A road following the central route would have greater impact on the natural environment and would leave less room for growth than the outer route. The outer route was mainly through farmland and was best located to serve new development. It was therefore used as the basis for working up the application proposals.

3.10.10 Subsequent effort has been concentrated on identifying the alignment and design that would minimise environmental impacts. Inclusion of the preferred route in the JCS (the statutory development plan) has meant that residential and employment sites in the area could be planned and designed in the knowledge that the role of providing for extraneous or through traffic would be taken by the NDR.

3.10.11 Several detailed variations within a corridor between the Airport and Horsham St Faith were investigated. The selected route passes as far as possible from dwellings in Horsham St Faith and Spixworth without interfering with the operation of the Airport.

3.10.12 Between Thorpe End and the junction with the A47(T) at Postwick, the selected route is part of the arrangement of the junction with the A47(T) and the development of the Broadland Gate Business Park.

Alternatives to the Scheme

3.10.13 To confirm that the preferred option is the one that best meets the need, the application proposals (the Scheme) have been compared with the following five variations, which constitute the potential alternatives to the application proposals. Their relative merits and disadvantages have been assessed in relation to the objectives set in the need section of this chapter:

- Alternative 1 – a single carriageway road following the same route as the proposed scheme

- Alternative 2 – a dual carriageway from the A47(T) at Postwick on a route the same as that of the preferred scheme but terminating at the A140
- Alternative 3 – as alternative 2 but with the addition of a single carriageway from the A140 to the A1067
- Alternative 4 – the preferred scheme except as a single carriageway between Fir Covert Road and the A1067
- Alternative 5 – Developer-funded link roads between the north east radials (in the segment between the A47(T) at Postwick and the A140) in conjunction with the development of planned growth areas

3.10.14 Following a detailed description of each option the same assessment methodology was followed as previously described, i.e., a scoring system based on the following seven point scale:

- +++ Large positive
- ++ Moderate positive
- + Slight positive
- = Neutral
- Slight negative
- Moderate negative
- Large negative

3.10.15 As a comparator in order to calibrate the relative effectiveness of the alternatives, the application proposals have been assessed as providing large positive benefits (+++) under each objective.

Table 3.8: Performance against the objectives: The NDR Scheme (NDR)

Objective	Scoring	Comment
Reduce traffic levels and congestion on the existing road network both within the urban area and beyond to the north	+++	Dual carriageway copes best with traffic flows and provides the most attractive alternative for existing

Objective	Scoring	Comment
		journeys. Sufficient capacity to accommodate future planned growth
Facilitate journeys that are currently difficult and require traffic to use roads that are unsuitable for the type and volume of traffic that is currently accommodated	+++	As above, a dual carriageway performs best and will provide the most attractive alternative route because it has the greatest capacity
Provide access to and help to deliver, planned and potential areas of growth, and enable those areas to be free of the need to incorporate provision for extraneous traffic	+++	Dual carriageway provides high quality and capacity transport connections, attractive to potential investment in employment and housing. Removes any requirement for new residential areas to accommodate through traffic
Provide improved transport connectivity, including with the national strategic road network, for existing and future areas of residential and employment development, Norwich International Airport and the wider area of North and North East Norfolk	+++	Dual carriageway provides high quality transport connections with the national road network through the Postwick Hub
Increase the opportunities for improving provision for public transport and other sustainable forms of transport and for improving traffic management within the City Centre, thereby encouraging modal shift	+++	Dual carriageway provides an attractive alternative and thus relieves existing corridors to ease conditions for

Objective	Scoring	Comment
		sustainable modes
Improve traffic related environmental conditions for those communities in the northern suburbs of Norwich and outlying villages, whilst minimising the environmental effects of the proposed intervention	+++	Dual carriageway reduces traffic on inappropriate roads and best alleviates environmental conditions associated with traffic

3.11 Alternative 1 – Single Carriageway Road on the Same Route as the Proposed NDR Scheme

Description

3.11.1 Alternative 1 comprises a single 7.3m wide carriageway (Design Manual for Roads and Bridges (DMRB) TA 46/97 standard S2) highway on the same alignment as the proposed NDR Scheme (the Scheme), and with the same end points.

3.11.2 Alternative 1 would be connected to the same side roads as the Scheme. The junction with the A140 would be an at-grade roundabout (the Scheme has a grade-separated roundabout junction at that location). Other junctions, including the junction with the A47(T) at Postwick, would be in the same form as those in the Scheme.

3.11.3 The single 7.3 metre wide carriageway (standard S2) has been used in preference to the 10 metre wide single carriageway standard (standard WS2) because WS2 roads have a higher than expected percentage of accidents involving overtaking than S2. This collision type has a high risk of death or serious injury as the outcome.

3.11.4 Alternative 1 would have a design speed of 100kph with a proposed speed limit of 60mph.

3.11.5 A plan of Alternative 1 is shown in Figure 3.5.

Engineering and Buildability

Design and Geometry

- 3.11.6 Alternative 1 would be a single carriageway road designed to broadly match the alignment of the Scheme as closely as possible taking geometric design criteria into account.
- 3.11.7 The principles of horizontal and vertical alignment design for single and dual carriageway roads are fundamentally different. Dual carriageway design is based on sinuous curves to maintain optimum design speed for light vehicles, with visibility designed to achieve desirable minimum Stopping Sight Distance (SSD). Single carriageway design is based on long straight or nearly straight sections to provide Full Overtaking Sight Distance with short curves to maximise overtaking opportunities. It is likely that optimisation of the alignment would be necessary to maximise overtaking opportunities. No detailed assessment of overtaking provision has been undertaken.
- 3.11.8 The predicted flows for the Scheme are in excess of the economic flow range for a single carriageway (S2) recommended in the Design Manual for Roads and Bridges (DMRB) TA 46/97 Traffic Flow Ranges for Use in the Assessment of New Rural Roads, with the exception of the section between the A1067 and Fir Covert Road.
- 3.11.9 The proposed junction at Postwick would be a modification of the existing grade separated junctions similar to proposals in the preferred Scheme. All of the remaining junctions would be at-grade roundabouts including the junction with the A140 close to the Airport.

Structures

- 3.11.10 A new three span overbridge to cross the A47 would be required at Postwick similar to the preferred Scheme. Alternative 1 would also cross Plumstead Road and the Sheringham to Norwich railway line on new bridges similar to those proposed in the preferred Scheme. All-purpose road bridges would be provided at Middle Road and Buxton Road which would include facilities for non-motorised users.
- 3.11.11 Bridge crossings for private means of access and non-motorised users would be provided at Newman Road and Bell Farm Track. A bridge crossing for non-motorised users would be provided at Marriotts Way

Non-motorised Users

3.11.12 For non-motorised users, Alternative 1 would include similar provision to the Scheme.

Drainage

3.11.13 Sustainable Drainage Systems (SuDS) would be provided, similar to the Scheme.

Statutory Undertakers Apparatus

3.11.14 Alternative 1 crosses an existing high-pressure gas main (HPGM) close to the A1067. The HPGM would need to be diverted as it would in the Scheme.

3.11.15 The route is mainly through greenfield land. There are service diversions detailed for the Scheme, which would also be required for this alternative. These would consist of the relocation of overhead and underground electric cables, gas mains, overhead and underground telephone cables and water mains.

Private Means of Access

3.11.16 Alternative 1 would include similar provision to that proposed by the Scheme.

Construction

3.11.17 Construction methodology would be similar to the preferred Scheme with the majority of the scheme being constructed on greenfield land. It is anticipated that these works could be undertaken in 125 weeks.

Economy

3.11.18 A single carriageway alternative was assessed as a Low Cost Option for the MSBC in 2009. It was similar to but not identical to Alternative 1. The results of its economic assessment indicated that it had transport disbenefits – “The Low Cost Option performs poorly, failing to deliver journey time savings, due to the impacts of additional traffic using existing road links.” (MSBC Vol 3 Section 3.5.6).

3.11.19 The traffic forecasts for the proposed NDR Scheme vary between 12300 AADT at the western end (at the A1067) and 35200 AADT towards the eastern end (at Postwick / the A47) in the 2017 opening year. The range overall is substantially higher than the upper limit in TA46/97 of 13000 AADT for a single carriageway road. Whilst Alternative 1 will meet the transport connections objective, the lower standard means that there would be a poorer operational performance of Alternative 1 compared with the Scheme due to overcapacity of the single carriageway and thus reduced attractiveness, so that a proportion of traffic will remain on the existing network. Consequently the economic performance of Alternative 1 would be significantly reduced compared with the Scheme, as would the reliability benefits for business users and the wider economic impacts.

Environmental

3.11.20 A single carriageway would result in much the same environmental benefits and disbenefits as the preferred dual carriageway Scheme. Disbenefits associated with ecology and land use would be marginally reduced, and any benefits associated with noise and air quality would also be reduced as a result of a less efficiently functioning network.

Social

3.11.21 The performance of Alternative 1 compared with the Scheme for commuters and other users would be similar to that described for business users in the section on economy above. However, the travel benefits would be reduced with this alternative, as would reliability benefits.

3.11.22 Dual carriageways have a better safety record than single carriageways. In addition, due to the limited capacity of the single carriageway, there will be higher traffic levels on the existing unimproved network. For these reasons the safety benefits of the single carriageway Alternative 1 would be significantly reduced compared with the Scheme.

Public Accounts

3.11.23 The construction cost of the Scheme and of Alternative 1 has been estimated on the same basis to give an overall cost comparison for each of the designs. The results are summarised below:

Value in £m	Scheme	Alternative 1
Construction	110.2	90.4
Preparation	10.9	9.0
Supervision	1.3	1.1
Land Cost	15.3	14.3
Total	137.7	114.8

3.11.24 The construction cost estimate has been produced in consultation with the Contractor and reflects Quarter 1 of 2013 prices. The construction cost shown for the Alternative is a very early design estimate that includes a notional allowance for further design development and risk. The preparation and supervision costs have been estimated pro rata from those for the proposed Scheme.

3.11.25 It is estimated that there would be an approximate 6% reduction in the land taken compared to the proposed Scheme.

3.11.26 Through the reduced land take requirements some landowners affected by the proposed Scheme may not be affected by this Alternative, or may be affected by it to a lesser degree than they would be affected by the proposed Scheme.

3.11.27 It is assumed that all of the land acquisition would require the exercise of compulsory purchase powers.

Overall Assessment

3.11.28 The table below provides an objective assessment of the performance of Alternative 1 against the Scheme objectives.

Table 3.9: Performance of Alternative 1 against Scheme Objectives

Objective	Scoring	Comment
Reduce traffic levels and congestion on the existing road network both within the urban area and beyond to the north	+ +	Limited by capacity and attractiveness of single carriageway
Facilitate journeys that are currently difficult and require traffic to use roads that are unsuitable for the type and volume of traffic that is currently accommodated	+ +	Limited by capacity and attractiveness of single carriageway
Provide access to and help to deliver, planned and potential areas of growth, and enable those areas to be free of the need to incorporate provision for extraneous traffic	+ +	Limited by capacity and attractiveness of single carriageway
Provide improved transport connectivity, including with the national strategic road network, for existing and future areas of residential and employment development, Norwich International Airport and the wider area of North and North East Norfolk	+ +	Limited by capacity and attractiveness of single carriageway
Increase the opportunities for improving provision for public transport and other sustainable forms of transport and for improving traffic management within the City Centre, thereby encouraging modal shift	+	Limited by capacity and attractiveness of single carriageway
Improve traffic related environmental conditions for those communities in the northern suburbs of Norwich and outlying villages, whilst minimising the environmental effects of the proposed intervention	+	Noise and air quality may be improved

Conclusion

3.11.29 Alternative 1's fulfilment of the Scheme objectives is limited by the traffic capacity and attractiveness of its single carriageway to traffic. Its lower cost has resulted in a better assessment for effects on Public Accounts. However, this is outweighed by its assessments for other aspects. It has therefore been assessed as not performing as well as the Scheme, and has not been pursued.

3.12 Alternative 2 – Dual Carriageway from Postwick Terminating at the A140

Description

3.12.1 Alternative 2 comprises a curtailed version of the Scheme, extending from the A140 to the A47(T) at Postwick. It would follow the same route as the Scheme, and comprise dual 7.3 metre wide carriageways (standard D2AP).

3.12.2 A plan of Alternative 2 is shown in Figure 3.6.

Engineering and Buildability

Design and Geometry

3.12.3 Alternative 2 would be a dual carriageway road designed to match the alignment of the preferred scheme from the A140 Cromer Road to A47(T) at Postwick.

3.12.4 As Alternative 2 would be designed along the alignment of the Scheme, it would be designed to the same horizontal and vertical alignment as that proposed for the Scheme.

3.12.5 Alternative 2 would be connected to the same side roads as the Scheme over its length. The terminal junction with the A140 would be an at-grade roundabout (the Scheme proposes a grade-separated roundabout junction). Other junctions, including the junction with the A47(T) at Postwick, would be in the same form as those in the Scheme.

Structures

3.12.6 A new three span overbridge to cross the A47 would be required at Postwick as proposed in the preferred Scheme. Alternative 2 would also cross Plumstead Road and the Sheringham to Norwich railway line on new bridges.

All-purpose road bridges would be provided at Middle Road and Buxton Road which would include facilities for non motorised users.

3.12.7 A bridge crossing for private means of access and non-motorised users would be provided at Newman Road.

Non – Motorised Users

3.12.8 Similar provision to the Scheme between the A140 and A47 at Postwick.

Drainage

3.12.9 Sustainable Drainage Systems (SuDS) would be adopted similar to the Scheme.

Statutory Undertakers Apparatus

3.12.10 The new dual carriageway link is mainly on greenfield land. There are service diversions detailed for the Scheme, which would also be required for this Alternative. These would consist of overhead and underground electric cables, gas mains, overhead and underground telephone cables and water mains.

Private Means of Access

3.12.11 Similar provision to the preferred Scheme between the A140 and A47 at Postwick.

Construction

3.12.12 Construction methodology would be similar to that proposed for the Scheme with the majority of the scheme constructed on greenfield land. It is anticipated that these works could be undertaken in 104 weeks.

Economy

3.12.13 Alternative 2 would provide similar traffic relief and safety benefits in the northeast sector but not in the northwest sector, compared with the Scheme. The overall scale of these benefits would be smaller than those for the Scheme due to its shorter length.

- 3.12.14 A consequence of Alternative 2 is that it does not provide an improved transport connection to the west of the A140 and Airport, and thus traffic conditions are not relieved on Fakenham Road through Taverham and Drayton. In addition the minor route via Hall Lane between Drayton and the termination of Alternative 2 at the A140 would carry much higher traffic flows. These are forecast to increase by up to 9800 AADT.
- 3.12.15 The business user travel time benefits would be reduced with Alternative 2 compared with the Scheme, as would reliability benefits and wider economic impacts.

Environmental

- 3.12.16 There would be environmental disbenefits associated with ecology and landscape arising from this Alternative. However, there is development proposed for the northeastern area of Norwich. As this already has permission it is likely to result in significant habitat loss in the area of this proposed Alternative. There would be benefits to noise and air quality as this Alternative would take traffic away from residential roads.

Social

- 3.12.17 The performance of Alternative 2 compared with the Scheme for commuters and other users will be similar to that described for business users in the section on economy above. Consequently the travel benefits will be reduced with the alternative, as will reliability benefits.
- 3.12.18 The absence of a western section for the distributor route means that traffic will be increased on unsuitable routes such as Hall Lane and that Fakenham Road will not experience any relief. Consequently there would be a poorer safety record compared with providing the western section of the Scheme as the new road would be designed to modern highway standards and would have a superior safety performance compared with the existing roads.

Public Accounts

3.12.19 The construction cost of the Scheme and the cost of implementing Alternative 2 have been estimated on the same basis to give an overall cost comparison for each of the designs. The results are summarised below:

Value in £m	Scheme	Alternative 2
Construction	110.2	82.3
Preparation	10.9	8.2
Supervision	1.3	1.0
Land Cost	15.3	9.7
Total	137.7	101.2

3.12.20 The construction cost estimate has been produced in consultation with the Contractor and reflects Quarter 1 of 2013 prices. The construction cost shown for the Alternative is a very early design estimate, which includes a notional allowance for further design development and risk. The preparation and supervision costs have been estimated pro rata from those for the proposed Scheme.

3.12.21 It is envisaged that there would be an approximate 26% reduction in the land taken compared to the proposed scheme.

3.12.22 As a result of the significantly reduced land take requirement a number of landowners affected by the proposed Scheme would not be affected by this Alternative.

3.12.23 It is assumed that all of the land acquisition would require the exercise of compulsory purchase powers.

Overall Assessment

3.12.24 The table below is an objective assessment of the performance of Alternative 2 against the Scheme objectives.

Table 3.10: Performance of Alternative 2 against Scheme Objectives

Objective	Scoring	Comment
Reduce traffic levels and congestion on the existing road network both within the urban area and beyond to the north	+ +	No relief west of A140
Facilitate journeys that are currently difficult and require traffic to use roads that are unsuitable for the type and volume of traffic that is currently accommodated	+ +	No relief west of A140
Provide access to and help to deliver, planned and potential areas of growth, and enable those areas to be free of the need to incorporate provision for extraneous traffic	+ +	No improved transport connection west of A140
Provide improved transport connectivity, including with the national strategic road network, for existing and future areas of residential and employment development, Norwich International Airport and the wider area of North and North East Norfolk	+ +	No improved transport connection west of A140 and thus reduced level of transport connections to new developments, the Airport and North Norfolk
Increase the opportunities for improving provision for public transport and other sustainable forms of transport and for improving traffic management within the City Centre, thereby encouraging modal shift	+	No improvement west of A140
Improve traffic related environmental conditions for those communities in the northern suburbs of Norwich and outlying villages, whilst minimising the environmental effects of the proposed intervention	+	Will improve noise and air quality in the northwestern suburbs of Norwich

Conclusion

3.12.25 Alternative 2 fails to address problems west of the A140, and this limits its fulfilment of scheme objectives. Its lower cost results in a better assessment for effects on Public Accounts. However, this is outweighed by its assessments for other aspects. It has therefore been assessed as not performing as well as the Scheme, and has not been pursued.

3.13 Alternative 3 - Dual Carriageway from Postwick to the A140 and a Single Carriageway from the A140 to the A1067

Description

3.13.1 Alternative 3 comprises dual carriageways (standard D2AP) as the Scheme from the A47(T) at Postwick to the A140, and then a single carriageway (standard S2) to the A1067 on a similar alignment as the Scheme.

3.13.2 A plan of Alternative 3 is shown in Figure 3.7

Engineering and Buildability

Design and Geometry

3.13.3 Alternative 3 would be a combination of a dual carriageway scheme between the A47 (T) at Postwick and the A140 Cromer Road and a single carriageway road between A140 and the A1067.

3.13.4 The Alternative would be as per the horizontal and vertical alignment proposed for the Scheme along the dual carriage section. Over the single carriageway section, the Alternative would be designed to broadly match the alignment of the preferred Scheme as closely as possible along the single carriageway section taking geometric design criteria into account.

3.13.5 As discussed in section 3.11.7, the principles of horizontal and vertical alignment design for single and dual carriageway roads are fundamentally different. It is likely that optimisation of the single carriageway alignment west of the A140 would be necessary to maximise overtaking opportunities. No detailed assessment of overtaking provision has been undertaken.

3.13.6 The predicted flows for the Scheme are in excess of the economic flow range for the section of single carriageway (S2) road with the exception of the section between the A1067 and Fir Covert Road. Standard S2 is proposed rather than 'Wide Single' WS2 because WS2 roads have a higher than

expected percentage of accidents involving overtaking than S2 roads. This collision type carries a high risk of death or serious injury as the outcome.

- 3.13.7 Alternative 3 would be connected to the same side roads as the Scheme. The junction with the A140 would be an at-grade roundabout (the Scheme has a grade-separated roundabout junction). The other junctions would as per those proposed for the Scheme.

Structures

- 3.13.8 A new three span overbridge to cross the A47 would be required at Postwick similar to the Scheme. Alternative 3 would also cross Plumstead Road and the Sheringham to Norwich railway line on new bridges. All-purpose road bridges would be provided at Middle Road and Buxton Road, which would include facilities for non-motorised users.

- 3.13.9 Bridge crossings for private means of access and non-motorised users would be provided at Newman Road and Bell Farm Track.

- 3.13.10 A bridge for non-motorised users would be provided at Marriotts Way.

Non-motorised Users

- 3.13.11 Alternative 3 would include similar provision to the Scheme.

Drainage

- 3.13.12 Sustainable Drainage Systems (SuDS) would be adopted similar to the Scheme.

Statutory Undertakers' Apparatus

- 3.13.13 Alternative 3 crosses an existing high-pressure gas main close to the A0167, which would need to be diverted. This is similar to the Scheme. There are service diversions detailed for the Scheme, which would also be required for this alternative. These would consist of overhead and underground electric cables, gas mains, overhead and underground telephone cables and water mains.

Private Means of Access

3.13.14 Alternative 3 would include similar provision to the Scheme.

Construction

3.13.15 Construction methodology would be similar to the preferred Scheme with the majority of the scheme constructed on greenfield land.

3.13.16 It is anticipated that these works could be undertaken in 135 weeks.

Economy

3.13.17 The traffic forecasts for the Scheme on the NDR vary between 12,300 AADT between Fakenham Road and Fir Covert Road at the western end of the NDR and 22,300 AADT west of the A140 in the 2017 opening year. The range overall is substantially higher than the upper limit in TA46/97 of 13,000 AADT for a single carriageway. In addition the Alternative requires an at grade roundabout junction on the A140 at the transition between the dual and single carriageway standard which would cause additional delays compared with the proposed Scheme. Whilst Alternative 3 will meet the transport connections objective, the lower standard of the western section and the A140 junction means that there would be a poorer operational performance of Alternative 3 compared with the Scheme due to overcapacity of the single carriageway and thus reduced attractiveness, such that a proportion of traffic will remain on the existing network. Consequently the economic performance of Alternative 3 would be reduced compared with the Scheme, as would the reliability benefits for business users and wider economic impacts.

Environmental

3.13.18 This Alternative would have disbenefits as regards ecology and landscape, although the single carriageway section would have fewer effects on biodiversity than would the dual carriageway section. However the dual carriageway section is situated in an area allocated for development and as a result there would be considerable future habitat loss not associated with the road.

3.13.19 There would be benefits with regard to noise and air quality as this Alternative would reduce the traffic on inappropriate roads in suburban areas.

Social

3.13.20 The performance of Alternative 3 compared with the Scheme for commuters and other users will be similar to that described for business users in the section on economy above. Consequently the travel benefits will be reduced with the Alternative, as will reliability benefits.

3.13.21 Dual carriageways have better safety records than single carriageways. In addition, due to the limited capacity of the single carriageway, there would be higher traffic levels remaining on the existing unimproved network. For these reasons the safety benefits of the single carriageway element of Alternative 3 will be reduced compared with the Scheme.

Public Accounts

3.13.22 The construction costs of the Scheme and of Alternative 3 have been estimated on the same basis to give an overall cost comparison for each of the designs. The results are summarised below:

Value in £m	Scheme	Alternative 3
Construction	110.2	102.8
Preparation	10.9	10.3
Supervision	1.3	1.2
Land Cost	15.3	15.0
Total	137.7	129.3

3.13.23 The construction cost estimate has been produced in consultation with the Contractor and reflect Quarter 1 of 2013 prices. The construction cost shown for the Alternative is a very early design estimate, which includes a notional allowance for further design development and risk. The preparation and supervision costs have been estimated pro rata from those for the proposed Scheme.

3.13.24 It is envisaged that there would be an approximate 2% reduction in the land taken compared to the proposed Scheme.

3.13.25 The small reduction in land take means that it is possible that some landowners affected by the proposed Scheme may not be affected by this Alternative.

3.13.26 It is assumed that all of the land acquisition would require the exercise of compulsory purchase powers.

Overall Assessment

3.13.27 The table below is an objective assessment of the performance of Alternative 3 against the Scheme objectives.

Table 3.11: Performance of Alternative 3 against Scheme Objectives

Objective	Scoring	Comment
Reduce traffic levels and congestion on the existing road network both within the urban area and beyond to the north	+ +	Limited by capacity and attractiveness of single carriageway west of A140
Facilitate journeys that are currently difficult and require traffic to use roads that are unsuitable for the type and volume of traffic that is currently accommodated	+ +	Limited by capacity and attractiveness of single carriageway west of A140
Provide access to and help to deliver, planned and potential areas of growth, and enable those areas to be free of the need to incorporate provision for extraneous traffic	+ +	Limited by capacity and attractiveness of single carriageway west of A140
Provide improved transport connectivity, including with the national strategic road network, for existing and future areas of residential and employment development, Norwich International Airport and the wider area of North and North East Norfolk	+ +	Limited by capacity and attractiveness of single carriageway west of A140
Increase the opportunities for improving provision for public transport and other sustainable forms of transport and for improving traffic management		Limited by capacity and attractiveness of single carriageway

Objective	Scoring	Comment
within the City Centre, thereby encouraging modal shift	+	west of A140
Improve traffic related environmental conditions for those communities in the northern suburbs of Norwich and outlying villages, whilst minimising the environmental effects of the proposed intervention	+	Will improve noise and air quality for suburban areas

Conclusion

3.13.28 Alternative 3’s fulfilment of Scheme objectives is limited by the capacity and attractiveness of its single carriageway west of the A140. This is not outweighed by other aspects. It has therefore been assessed as not performing as well as the Scheme, and has not been pursued.

3.14 Alternative 4 - NDR as Proposed Scheme Except Single Carriageway between Fir Covert Road and A1067

Description

3.14.1 Alternative 4 comprises dual carriageway (standard D2AP) as per the Scheme from the A47(T) at Postwick to Fir Covert Road, and then a single carriageway (standard S2) to the A1067 on a similar alignment as the Scheme.

3.14.2 A plan of Alternative 4 is shown in Figure 3.8.

Engineering and Buildability

Design and Geometry

3.14.3 Alternative 4 would be a combination of a dual carriageway scheme between the A47 (T) at Postwick and Fir Covert Road and a single carriageway road from a roundabout junction at Fir Covert Road to the A1067.

3.14.4 The Alternative would be as per the horizontal and vertical alignment proposed for the Scheme.

3.14.5 Alternative 4 would be connected to the same side roads using the same junction arrangements as those proposed for the Scheme.

Structures

3.14.6 A new three span overbridge to cross the A47 would be required at Postwick similar to the Scheme. Alternative 4 would also cross Plumstead Road and the Sheringham to Norwich railway line on new bridges. All-purpose road bridges would be provided at Middle Road and Buxton Road, which would include facilities for non-motorised users.

3.14.7 Bridge crossings for private means of access and non-motorised users would be provided at Newman Road and Bell Farm Track.

3.14.8 A bridge for non-motorised users would be provided at Marriotts Way.

Non-motorised Users

3.14.9 Alternative 4 would include similar provision to the Scheme.

Drainage

3.14.10 Sustainable Drainage Systems (SuDS) would be adopted similar to the Scheme.

Statutory Undertakers Apparatus

3.14.11 Alternative 4 would require similar diversions to the Scheme.

Private Means of Access

3.14.12 Alternative 4 would include similar provision to the Scheme.

Construction

3.14.13 Construction methodology would be similar to the Scheme with the majority of the scheme constructed on greenfield land.

3.14.14 It is anticipated that these works could be undertaken in 135 weeks.

Economy

- 3.14.15 The traffic forecasts for the Scheme between Fakenham Road and Fir Covert Road is 12300 AADT in the 2017 opening year. This is below the upper limit in TA46/97 of 13000 AADT for a single carriageway. The lower standard on this short section of NDR would not have a significant effect on traffic forecasts and consequently the economic performance of Alternative 4 would be similar to that for the proposed Scheme.

Environmental

- 3.14.16 There are environmental disbenefits associated with ecology and landscape. The western end of the route is particularly sensitive with regards to bat populations, while the eastern section is subject to development unrelated to the Scheme and will experience habitat loss. This is similar to the preferred Scheme.

Social

- 3.14.17 The performance of Alternative 4 compared with the Scheme for commuters and other users will be similar to that described for business users in the section on economy above. Consequently the travel benefits will be similar to the published Scheme, as will reliability benefits.
- 3.14.18 Dual carriageways have a better safety record than single carriageways. For this reason the safety benefits of the single carriageway element of Alternative 4 will be reduced compared with the Scheme.
- 3.14.19 Alternative 4 was included as an alternative to the Scheme within both the Section 47 and Section 42 statutory consultation under the Planning Act 2008. Feedback from the consultation indicated that of those that responded there was a majority support for a dual carriageway between Fir Covert Road and the A1067.

Public Accounts

3.14.20 The construction costs of the Scheme and of Alternative 4 have been estimated on the same basis to give an overall cost comparison for each of the designs. The results are summarised below:

Value in £m	Scheme	Alternative 4
Construction	110.2	109.4
Preparation	10.9	10.9
Supervision	1.3	1.3
Land Cost	15.3	15.3
Total	137.7	136.9

3.14.21 The construction cost estimate has been produced in consultation with the Contractor and reflects Quarter 1 of 2013 prices. The construction cost shown for the alternative is a very early design estimate, which includes a notional allowance for further design development and risk. The preparation and supervision costs have been estimated pro rata from those for the proposed Scheme.

3.14.22 It is envisaged that there would be a negligible reduction in the land taken compared to that required for the proposed Scheme.

3.14.23 It is considered that all landowners affected by the proposed Scheme will still be affected by this Alternative.

3.14.24 It is assumed that all of the land acquisition would require the exercise of compulsory purchase powers.

Overall Assessment

3.14.25 The table below is an objective assessment of the performance of Alternative 4 against the Scheme objectives.

Table 3.12: Performance of Alternative 4 against Scheme Objectives

Objective	Scoring	Comment
Reduce traffic levels and congestion on the existing road network both within the urban area and beyond to the north	+ ++	Similar to Scheme
Facilitate journeys that are currently difficult and require traffic to use roads that are unsuitable for the type and volume of traffic that is currently accommodated	+ ++	Similar to Scheme
Provide access to and help to deliver, planned and potential areas of growth, and enable those areas to be free of the need to incorporate provision for extraneous traffic	+ ++	Similar to Scheme
Provide improved transport connectivity, including with the national strategic road network, for existing and future areas of residential and employment development, Norwich International Airport and the wider area of North and North East Norfolk	+ ++	Similar to Scheme
Increase the opportunities for improving provision for public transport and other sustainable forms of transport and for improving traffic management within the City Centre, thereby encouraging modal shift	+ ++	Similar to Scheme
Improve traffic related environmental conditions for those communities in the northern suburbs of Norwich and outlying villages, whilst minimising the environmental effects of the proposed intervention	+ ++	Will improve noise and air quality for suburban areas

Conclusion

3.14.26 Alternative 4 would not provide a consistent standard for the NDR, it would not provide continuity of road type with the A47 (T) Norwich Southern Bypass for the entire length of the NDR and would provide an inferior performance in terms of link accidents and user costs. Alternative 4 was included as an alternative to the Scheme within both the Section 47 and Section 42 statutory consultation under the Planning Act 2008. Feedback from the consultation indicated that of those that responded there was a majority support for the dual carriageway between Fir Covert Road and the A1067. It has therefore been assessed as not performing as well as the Scheme, and has not been pursued.

3.15 Alternative 5 - Developer Links between Radials (within the Growth Areas)

Description

3.15.1 Alternative 5 comprises a single carriageway link road between St Faith's Road and Broadland Business Park. A plan of Alternative 5 is shown in Figure 3.9.

3.15.2 It has been assumed that:

- the route between St Faiths Road and Wroxham Road would follow the alignment of the Beyond Green development spine road (Planning Application Number 20121516), which has the benefit of a resolution to grant planning permission subject to a planning obligation and various planning conditions;
- between Wroxham Road and Salhouse Road the route would follow the alignment of the Blue Boar Lane development spine road (Planning Application Number 20080367) granted outline planning permission in 2011, and
- between Broadland Business Park and Plumstead Road the route would follow the alignment of the Brook Farm Laurel Farm development spine road (Planning Application Number 20090886 granted outline planning permission in 2013).

3.15.3 It has been assumed there would be some improvement works to widen Wroxham Road between the connections from the Beyond Green and Blue Boar Lane developments.

3.15.4 To facilitate a connection from St Faiths Lane to Meteor Close and Hurricane Way it has been assumed that either St Faith's Road and Repton Avenue

would be improved or that a possible new road could be constructed across the field immediately north of Repton Avenue.

- 3.15.5 There is no published alignment for the missing section of this Alternative between Salhouse Road and Plumstead Road. It is therefore assumed this would take a straight alignment which would pass close to or through an area of ancient replanted woodland just to the north of Plumstead Road.
- 3.15.6 Junction improvements to the A47 interchange (Planning Application Number 20081773) do not form part of this alternative. It should be noted that the Broadland Gate and Brook Farm Laurel Farm development is conditional on the improvement of Postwick Interchange.

Engineering and Buildability

Design and Geometry

- 3.15.7 Between St Faith's Road and Wroxham Road the alignment would mirror that included in the planning application for the Beyond Green development. It has been assumed that this section of the road would comprise a single 6.5m wide carriageway.
- 3.15.8 The section between Salhouse Road and Wroxham Road would mirror that included in the planning permission for the Blue Boar development. As per the planning application, the alignment would include a new roundabout junction with Salhouse Road and would be designed with a 7.3m wide carriageway and subject to a 30mph speed limit.
- 3.15.9 The Alternative would adopt an indicative alignment for a link between Plumstead Road and Salhouse Road. This link is technically feasible and a geometric design solution could be found that follows the suggested alignment (which is shown in green on the plan at Figure 3.9). It has been assumed that it would be a modern single carriageway road comprising a single 7.3m wide carriageway. Without a detailed assessment it is not possible to say if the ancient replanted woodland or County Wildlife Site could be avoided. There are residential curtilages to the east at the southern end between Salhouse and Plumstead Road.
- 3.15.10 Between the Broadland Business Park and Plumstead Road, the proposed alignment follows that proposed as part of the Brook Farm / Laurel Farm development spine road. The route over this section would include a new roundabout junction with Plumstead Road as well as four internal roundabouts within the development. This section of the route would

comprise either a 7.3m or 6.5m wide carriageway and would be subject to a 30mph speed limit.

3.15.11 Between the White House Farm development access point and the Beyond Green development access point, the Alternative includes an allowance for widening works to Wroxham Road.

3.15.12 The Alternative would adopt an indicative alignment either along St Faith's Road and Repton Avenue or constructed across the field immediately north of Repton Avenue to connect with Meteor Close. This link is technically feasible and a geometric design solution could be found that follows the suggested alignment. It has been assumed that it would be a modern single carriageway road comprising a single 7.3m wide carriageway.

Structures

3.15.13 No detailed assessment has been undertaken.

Non-motorised Users

3.15.14 No detailed assessment has been undertaken.

Drainage

3.15.15 No detailed assessment has been undertaken.

Statutory Undertakers Apparatus

3.15.16 No detailed assessment has been undertaken.

Private Means of Access

3.15.17 No detailed assessment has been undertaken.

Construction

3.15.18 No detailed assessment has been undertaken.

Economy

3.15.19 The link roads have been represented in the Do Minimum scenario in the model testing. This shows the following forecasts on the link road sections:

Link	2032 AADT
Buxton Road to North Walsham Road	3700
North Walsham Road to Wroxham Road	13500
Wroxham Road to Salhouse Road	11100
Salhouse Road to Plumstead Road	16700
Plumstead Road to Broadland Business Park	17300

3.15.20 The traffic flows have been taken for 2032 when the developments are assumed to be fully built out.

3.15.21 The Do Minimum scenario does not include a link from Buxton Road via St Faiths Road then to Meteor Close to allow a connection through to the Airport and A140 Holt Road, and this explains the low forecast traffic level between Buxton Road and North Walsham Road. However it serves to show that the traffic flows forecast on the other link roads would be very high and well in excess of their intended function as mixed use urban high street through the Beyond Green development (between North Walsham Road and Wroxham Road). Adding a connection to the Airport and A140 would increase the through traffic movements further, and thus this Alternative would fail in relation to the objective of removing extraneous through traffic from residential development. The operational performance of the link roads would be significantly poorer than with the proposed NDR Scheme and Alternative 5 would therefore have a more limited benefit in removing traffic from existing routes.

3.15.22 The economic benefits for business users would be reduced significantly for the northeast quadrant between the A47(T) and the A140, and there would be no benefits for the northwest segment as the Alternative terminates at the A140. Reliability benefits and wider economic benefits would be considerably reduced with Alternative 5 compared with the Scheme.

Environmental

3.15.23 In terms of landscape and ecology the environmental disbenefits would be associated with the developments and involve habitat loss. Putting roads through areas of housing creates new receptors for noise and air quality disbenefits.

Social

3.15.24 The performance of Alternative 5 compared with the Scheme for commuters and other users would be similar to that described for business users in the section on economy above. Consequently the travel benefits would be substantially reduced with the Alternative, as would reliability benefits.

3.15.25 Due to the limited capacity of the (assumed) single carriageway link roads, there will be higher traffic levels on the existing unimproved network. For these reasons the safety benefits of the single carriageway Alternative 5 will be substantially reduced compared with the Scheme.

Public Accounts

3.15.26 The construction cost of the Scheme and Alternative 5 have been estimated on the same basis to give an overall cost comparison for each of the designs. The results are summarised below:

Value in £m	Scheme	Alternative 5
Construction	110.2	37.7
Preparation	10.9	3.8
Supervision	1.3	0.4
Land Cost	15.3	0.9
Total	137.7	42.8

3.15.27 The construction cost estimate has been produced in consultation with the Contractor and reflects Quarter 1 of 2013 prices. The construction cost shown for the Alternative is a very early design estimate, which includes a notional allowance for further design development and risk. The preparation and supervision costs have been estimated pro rata from those for the proposed Scheme.

3.15.28 The above land cost estimate excludes the existing consented development sites as for the purposes of this assessment it has been assumed that developers would make this land available to NCC at no cost.

3.15.29 It is assumed that land acquisition for the remaining land would require the exercise of powers of compulsory acquisition.

Overall Assessment

3.15.30 The table below is an objective assessment of the performance of Alternative 5 against the scheme objectives.

Table 3.13: Performance of Alternative 5 against Scheme Objectives

Objective	Scoring	Comment
Reduce traffic levels and congestion on the existing road network both within the urban area and beyond to the north	=	Limited due to serving as direct access to developments and catering for large traffic flows; no provision west of A140
Facilitate journeys that are currently difficult and require traffic to use roads that are unsuitable for the type and volume of traffic that is currently accommodated	=	Limited due to serving as direct access to developments and catering for large traffic flows; no provision west of A140
Provide access to and help to deliver, planned and potential areas of growth, and		Limited due to serving as direct access to

Objective	Scoring	Comment
enable those areas to be free of the need to incorporate provision for extraneous traffic	+	developments and catering for large traffic flows; no provision west of A140
Provide improved transport connectivity, including with the national strategic road network, for existing and future areas of residential and employment development, Norwich International Airport and the wider area of North and North East Norfolk	+	Limited due to serving as direct access to developments and catering for large traffic flows; no provision west of A140
Increase the opportunities for improving provision for public transport and other sustainable forms of transport and for improving traffic management within the City Centre, thereby encouraging modal shift	=	Limited due to serving as direct access to developments and catering for large traffic flows; no provision west of A140
Improve traffic related environmental conditions for those communities in the northern suburbs of Norwich and outlying villages, whilst minimising the environmental effects of the proposed intervention	-	The proximity of sensitive receptors associated with the new developments may have noise and air quality disbenefits

Conclusion

3.15.31 Alternative 5's fulfilment of Scheme objectives is very limited as it would serve as a direct access to development, would cater for large traffic flows and due to the lack of provision west of the A140. This is not outweighed by its significantly better assessment for its effects on Public Accounts due to its much lower cost. It has therefore been assessed as not performing as well as the Scheme, and has not been pursued.

3.16 Conclusion on Alternatives

3.16.1 In order to meet the need identified at the beginning of this chapter, a detailed assessment of alternative options has been carried out, covering both the principle of an NDR and its route, standard and design.

3.16.2 In summary, the conclusions of the assessment are:

- improvements to public transport and increased provision for cycling and walking would not by themselves address the fundamental economic and accessibility problems of the area. This is due in part to the difficulty of improving public transport without addressing the problem of traffic congestion. It also reflects the reality that public transport cannot fully address the connectivity problems in the increasingly polycentric City or support its growth as envisaged in planning policy;
- an NDR is essential if the current and future transport and land use problems of the greater Norwich area are to be addressed, the economic and physical expansion of the City facilitated, sensitive urban and rural environments protected from extraneous traffic, connectivity within and around the northern part of the City restored and improved, and improvements to public transport fully implemented;
- a non-road building solution will not meet the need, but an NDR has to be accompanied by parallel improvements in public transport, which the NDR will itself enable and to which NCC is committed;
- improvements to the existing highway network will also not meet the need. The scale of the works that would be required would have unavoidable, significant impacts on the urban environment and it is not feasible to conclude that they could be implemented;
- reliance on the internal link roads to be provided by developers of land to the north east of the City would neither meet the need nor be in the interests of the quality of life and function of these future residential areas, and
- variations to the standard and length of the application proposals would to varying degrees reduce the benefits of the Scheme and its contribution to the need, and would erode its value as a key element of the transport infrastructure of the growing City.

3.16.3 These conclusions derive from studies carried out over a lengthy period as part of the review and implementation of NATS, in parallel with EIA and with public and stakeholder consultation. Other approaches to meeting the need and alternative schemes have been assessed within the process of the review of transport strategy for the greater Norwich area and in the context of the evolution of land use policies in a Joint Core Strategy prepared by all the constituent local planning authorities. The overall conclusion is that the application Scheme proposals for a dual carriageway NDR between the A47(T) at Postwick and the A1067 Fakenham Road represent the most appropriate response to the need identified in the first section of this chapter.

4. Air Quality

4.1 Introduction

4.1.1 The proposed Scheme has the potential to cause air quality effects during the construction and operational phases. The key pollutants for consideration within the assessment of air quality effects are:

- nitrogen oxides (NO_x), particularly nitrogen dioxide (NO₂);
- fine particles (particulate matter defined as those less than 10 and 2.5 microns in diameter; PM₁₀ and PM_{2.5} respectively); and
- dust (defined as particulate matter in the size range 1-75 microns in diameter).

4.1.2 During the construction phase, the proposed Scheme would introduce new emission sources in the form of traffic and plant at some locations, and involve potentially dust generating activities.

4.1.3 During operation the proposed Scheme would add in a new major road and alter parts of the existing road network. It would therefore introduce traffic along a new route and change the characteristics of traffic flows on the wider road network. Changes in traffic flows can impact the location and amount of emissions to air and, subsequently, affect ambient air quality.

4.1.4 Potential changes in air quality at sensitive receptors affected by the proposed Scheme are considered by comparison with air quality standards, as well as with relevant policy and legislation.

4.2 Methodology

Introduction

4.2.1 This Chapter describes the approach that has been taken for the assessment of effects on air quality as a result of the proposed Scheme.

Construction Phase

Dust Generating Activities

4.2.2 Construction activities can result in temporary effects from dust. 'Dust' is a generic term which usually refers to particulate matter in the size range 1-75

microns in diameter; the most common impacts from dust emissions are soiling and increased ambient PM₁₀ concentrations (Building Research Establishment, 2003). Assessment methodologies based on a qualitative approach are advocated in a range of guidance, including that produced by the Mayor of London (Greater London Authority and London Councils Best Practice Guidance, 2006), the Buildings Research Establishment (BRE) (Building Research Establishment, 2003)] and more recently guidance published by the Institute of Air Quality Management (IAQM) (Institute of Air Quality Management, 2011). Therefore, a qualitative approach has been adopted for this assessment based on key issues identified in the guidance described above.

- 4.2.3 The distances from the emission source at which significant construction dust effects are likely to occur are dependent on the extent and nature of mitigation measures, the prevailing wind conditions, rainfall and the presence of natural screening by, for example, vegetation or existing physical screening. However, research indicates that effects from construction activities that generate dust are generally limited to within 150-200m of the construction site boundary (Highways Agency, 2007) although guidance issued by IAQM requires consideration of effects up to 350m from the construction area boundary (Institute of Air Quality Management, 2011) . The construction phase of the assessment is therefore limited to within 350m of the area where construction activities would take place.

Site Plant Emissions

- 4.2.4 Construction work requires the use of a range of site plant, such as excavators, piling equipment, cranes and on site generators. All of these plant have an energy demand and some may result in direct emissions to air from exhausts.
- 4.2.5 Guidance from the IAQM notes that impacts from exhaust emissions from on-site plant are unlikely to be significant. The Scheme Construction Methodology [Volume 2, Chapter 19: CEMP] provides a list of the number of plant likely to be on site at any time. Given the small, local and temporary nature of site plant, effects of emissions on local air quality are considered to be of negligible significance. Construction plant emissions have therefore not been assessed further. Nevertheless, mitigation measures to reduce the effect of site plant on local air quality are discussed in Section 4.6.

Construction Traffic

4.2.6 During the construction phase the proposed Scheme will generate up to 75 Heavy Goods Vehicle (HGV) deliveries (150 movements) per day predominantly in 20 tonne eight wheeled wagons [Volume 2, Chapter 19: CEMP]. EPUK guidance indicates that assessments of construction traffic emissions is only likely to be required for large, long-term construction sites that would generate HGV flows of over 200 movements per day over a period of a year or more. In addition, the Design Manual for Roads and Bridges advises that roads where long term changes in HDV movements are lower than 200 AADT can be screened out from further assessment. On this basis no further consideration has been given to the impacts of construction traffic on ambient air quality.

4.3 Operational Phase

Study Area

4.3.1 Traffic modelling has been undertaken for the Norwich area, and this forms the basis of the overall geographical extent considered in the air quality assessment. However, only areas where changes in traffic flow, and therefore emissions, have the potential to cause significant effects on local air quality have been considered in detail.

4.3.2 Consistent with the (DMRB) (Highways Agency, 2007), the following criteria have been applied to determine which areas require detailed assessment using dispersion modelling:

- new roads (NDR and adjoining junctions); or
- roads where alignment will change by 5m or more; or
- roads with changes in flows of 1,000 annual average daily traffic (AADT) or more; or
- roads with changes in Heavy Duty Vehicle (HDV) flows of 200 AADT or more; or
- roads with changes in daily average traffic speeds of 10 km/h or more; or
- roads with changes in peak hour speed of 20 km/h or more; or
- roads located in areas where existing concentrations are highest within the City Centre, including the Central Norwich Air Quality Management Area (AQMA).

- 4.3.3 Increases in ambient pollutant concentrations as a result of emissions from road vehicles are greatest very near to the road, and reduce rapidly with increasing distance. The DMRB identifies that contributions from a road to ambient pollutant concentrations are generally negligible at a 200m distance from the road and therefore only receptors within 200m of roads meeting the criteria above, have been considered. Based on the criteria outlined above the study area defined for dispersion modelling is presented in Volume 2.
- 4.3.4 Traffic data used within the dispersion model has been provided by Mott MacDonald's traffic consultants and is based on the outputs of a SATURN model developed for the proposed Scheme. Details of the SATURN modelling are provided in DCO Document 5.9: Highway LMVR.
- 4.3.5 The SATURN model has incorporated predicted growth from the Joint Core Strategy (JCS) in both the 'without Scheme' and 'with Scheme' scenarios and therefore any predicted changes in ambient air quality are as a result of the NDR and additional measures associated with the proposed Scheme. Further details of the traffic model and assumptions related to the JCS and measures are presented within the Transport Assessment (DCO Document 5.5: Transport Assessment).

Model Selection

- 4.3.6 The assessment uses a dispersion model called 'ADMS-Roads' (version 3.1); a PC-based model of dispersion in the atmosphere of pollutants released from road traffic sources, produced and validated by Cambridge Environmental Research Consultants (CERC). This model is widely used in the UK, including by Local Authorities for Review and Assessment purposes and to support planning application assessments. The approach used for the modelling is consistent with Technical Guidance produced by the Norfolk Environmental Protection Group (Technical Guidance, Air Quality and Land use Planning, Norfolk Environmental Protection Group (undated)).

Emission Factors

- 4.3.7 Defra's current guidance to Local Authorities recommends the use of the 'Emission Factor Toolkit' (EFT) to calculate road traffic emissions for dispersion modelling. The newest version of the toolkit (Version 5.2c) is available from Defra (<http://laqm.defra.gov.uk/review-and-assessment/tools/emissions.html>). Although the EFT provides predictions of future emissions, there remains some uncertainty over these predictions.

This has been addressed through sensitivity analyses, as detailed below in Sensitivity Analysis for Long Term NO_x and NO₂ Projections

Meteorological Data

4.3.8 The most important meteorological parameters governing the atmospheric dispersion of emissions are wind direction, wind speed and atmospheric stability, as described below:

- wind direction determines the sector of the compass into which the emissions is dispersed;
- wind speed affects the distance, which the emission travels over time and can affect dispersion by increasing the initial dilution of pollutants;
- atmospheric stability determines the dispersion of the emissions as they move away from the source.

4.3.9 For meteorological data to be suitable for dispersion modelling purposes, a number of meteorological parameters need to be measured on an hourly basis. These parameters include wind speed, wind direction, cloud cover and temperature. There are only a limited number of sites where the required meteorological measurements are made.

4.3.10 Data from Norwich weather centre from 2010 to 2012 were used within the assessment. Although the land use within the study area does vary between urban and rural, the meteorological station is considered sufficiently representative for the purposes of the assessment and this is shown through the model verification process (see Model Verification).

4.3.11 Windroses have been produced for each of the three years of meteorological data used in this assessment and are presented in Volume 2, Chapter 4: Air Quality, Section A, Figure 1.1.

Background Pollutant Concentrations

4.3.12 Only road traffic emission sources have been explicitly included within the dispersion model. Non-road traffic related emission sources have been accounted for within the assessment by assigning appropriate 'background' concentrations to modelled receptor locations.

4.3.13 A number of information sources are available on background concentrations and these are presented, along with the choice of background data, within the baseline section (Section 4.5, below).

4.3.14 Assessment of uncertainty with future year background concentrations has been addressed through sensitivity analyses, as detailed in Sensitivity Analysis for Long Term NO_x and NO₂ Projections.

NO_x to NO₂ Relationship

4.3.15 Research undertaken on behalf of Defra has provided a method to determine NO₂ concentrations (<http://uk-air.defra.gov.uk/>). This method has been used within this assessment and its suitability assessed within the model verification process (see below).

Predicted 1 hour and 24 hour pollutant concentrations

4.3.16 The assessment of NO₂ concentrations against the 1 hour air quality objective has only been considered within the assessment if annual mean NO₂ concentrations exceed 60µg/m³. Government guidance (Department for Environment Food and Rural Affairs, 2009) [advises that exceedences of the 1 hour mean objective for NO₂ are only likely to occur where annual mean concentrations are 60µg/m³ or above.

4.3.17 The prediction of daily mean concentrations of PM₁₀ is available as an output option within the ADMS roads dispersion model for comparison against the short term air quality objective. However, as the model output for annual mean concentrations is considered more accurate than the modelling of the daily mean, an empirical relationship has been used to determine daily mean PM₁₀ concentrations. In accordance with Government guidance (Department for Environment, Food and Rural Affairs, 2009). The following formula has been used:

$$\text{No. of 24-hour mean exceedences} = -18.5 + 0.00145 \times \text{annual mean}^3 + (206 / \text{annual mean})$$

Modelled Scenarios

4.3.18 This assessment has modelled the following scenarios

- 'Without Scheme' (WO) scenario 2017 (opening year); and
- 'With Scheme' (W) scenario 2017 (opening year).

4.3.19 An analysis of the predicted future (2032) traffic flows shows that, although an increase is expected, this is outweighed by the improvement in vehicle emissions and background concentrations expected. No additional future years have therefore been considered; the opening year of the proposed Scheme is expected to present the worst case within the first 15 years of opening and therefore, in accordance with DMRB, no other future year has been assessed.

Model Verification

4.3.20 Dispersion modelling has associated with it an inherent level of uncertainty, primarily as a result of:

- uncertainties with traffic flow and emissions data;
- uncertainties with recorded meteorological data; and
- simplifications made in the model algorithms or post processing of the data that describe atmospheric dispersion or chemical reactions.

4.3.21 This uncertainty has been addressed within the assessment by carrying out model verification and sensitivity analyses. Details of the model verification are presented in Volume 2, Chapter 4: Air Quality, Section A.

Ecological Assessment

4.3.22 Elevated NO_x concentrations can adversely affect ecosystems. Assessment of exposure to NO_x has included the following key stages (following the DMRB methodology):

- identification of all Designated Sites within 200m of roads 'affected' by the proposed Scheme which have designated features sensitive to air pollutants directly or indirectly; and
- calculation of annual average NO_x concentrations at the Designated Sites with and without the Scheme.

4.3.23 Elevated nitrogen deposition can also adversely affect ecosystems.

Assessment of nitrogen deposition has included the following key stages (following the DMRB methodology):

- identification of all Designated Sites which 200m of roads 'affected' (see Study Area) by the proposed Scheme which have designated features sensitive to nitrogen deposition;
- obtaining total average nitrogen deposition for all 5km by 5km grid squares for the study area of interest from the Air Pollution Information System (APIS) (www.apis.ac.uk);
- obtaining background NO_x and NO₂ concentrations for the study area;
- calculation of annual average NO₂ concentrations at the Designated Sites with and without the proposals;
- estimation of the dry deposition of NO₂ at the Designated Sites with and without the proposals and the dry deposition of NO₂ in the 5km by 5km APIS square;
- determination of the road contribution to NO₂ dry deposition, and total nitrogen deposition; and
- comparison with the relevant critical load (a description of critical loads is presented in the Summary).

Sensitivity Analysis for Long Term NO_x and NO₂ Projections

4.3.24 Following model verification there is still the potential for uncertainty to remain with respect to NO_x and NO₂ projections. The Highways Agency Interim Advice Note (IAN) 170/12 Rev1 (Highways Agency, 2012) provides guidance on how to address this issue for roads schemes. It includes predicting concentrations at receptors based on different assumptions on long term NO_x and NO₂ projections so that a judgement can be made as to which results should be relied upon to form a concluding view of significance. The approach set out in the IAN has been followed for this assessment.

Receptors

Human Health Receptors

4.3.25 The air quality objectives only apply in locations of relevant exposure. Table 1.1 provides details of where the respective objectives should and should not apply and therefore the types of receptors that are relevant to the assessment.

Table 4.1: Locations where the air quality objectives should and should not apply (Reference Defra 2009)

Averaging period	Objectives should apply at:	Objectives should not apply at:
Annual	<p>All locations where members of the public might be regularly exposed.</p> <p>Building façades of residential properties, schools, hospitals, care homes etc.</p>	<p>Building façades of offices or other places of work where members of the public do not have regular access. Hotels, unless people live there as their permanent residence.</p> <p>Gardens of residential properties.</p> <p>Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short-term.</p>
24 Hour	<p>All locations where the annual mean objective would apply, together with hotels. Gardens of residential properties.</p>	<p>Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short-term.</p>
1 Hour	<p>All locations where the annual mean and 24 and 8-hour mean objectives apply.</p> <p>Kerbside sites (for example, pavements of busy shopping streets).</p> <p>Those parts of car parks, bus stations and railway stations etc. which are not</p>	<p>Kerbside sites where the public would not be expected to have regular access.</p>

Averaging period	Objectives should apply at:	Objectives should not apply at:
	fully enclosed, where members of the public might reasonably be expected to spend one hour or more. Any outdoor locations where members of the public might reasonably be expected to spend one hour or longer.	

4.3.26 On the basis of Table 4.1, and the road selection criteria described in the Study Area, discrete human health receptors have been selected and are presented in Volume 2, Chapter 4: Air Quality, Section A.

4.3.27 These receptors have been chosen as they represent locations where changes in ambient concentrations as a result of the Scheme are likely to be greatest or where the existing concentrations are highest.

Ecological Receptors

4.3.28 The DMRB (Highways Agency, 2007) provides a methodology for assessing air quality effects on SACs, SPAs, SSSIs and Ramsar sites (hereafter referred to as 'Designated Sites'). This is discussed further within the Ecological Assessment Section.

4.3.29 Discrete receptors have been included within the dispersion modelling to predict potential effects at ecological sites. Receptors have been placed in a transect across the Designated Sites at increasing distances from the affected roads at a height of zero metres.

4.3.30 Volume 2, Chapter 4: Air Quality, Section A presents the ecological Designated Sites potentially affected by the proposed Scheme (i.e. those within 200m of roads meeting the criteria described in the Study Area Section). Table 4.2 presents the modelled ecological discrete receptors (which are located as 'transects' across the designated sites) included within the dispersion modelling.

Table 4.2: Modelled Discrete Ecological Receptors

Designated Site	Distance from 'Affected' Road	Coordinates	
		X	Y
River Wensum 1 (SAC)	0 ^(a)	625935	316535
	70	626003	316517
	115	626046	316504
	175	626105	316488
Broadland (SPA, RAMSAR), The Broads (SAC)	0 ^(a)	612818	316746
	70	612800	316820
	115	612777	316875
	175	612752	316941

Notes: (a) Represents closest point of the designated site adjacent to the road

Site survey

4.3.31 As part of the Assessment an air quality monitoring survey was undertaken along the route of the NDR.

4.3.32 A summary of the method and results is presented in Volume 2, Chapter 4: Air Quality, Section A.

Assessment Criteria

Construction Phase

4.3.33 Guidance from the IAQM recommends splitting the construction phase into four separate source categories and determining the dust risk associated with each of those sources individually. This assessment has determined the risk of each of the following source categories;

- Demolition;
- Earthworks;

- Construction; and
- Track out.

4.3.34 The risk of each source for dust effects is described as 'negligible', 'low risk', 'medium risk' or 'high risk' depending up the nature and scale of the construction activities and the proximity of sensitive receptors to the construction site boundary.

4.3.35 The assessment considers three separate effects from dust:

- annoyance due to dust soiling;
- harm to ecological receptors (including internationally and nationally designated sites and County Wildlife Sites (CWS); and
- the risk of health effects due to significant increase in exposure to PM₁₀.

4.3.36 The first stage of the assessment is to determine the overall dust raising magnitude from each of the dust sources identified (demolition, earthworks, construction and trackout) in accordance with the criteria outlined in Volume 2, Chapter 4: Air Quality, Section A, Table 1.3.

4.3.37 The second stage of the assessment is to determine the overall risk of each of the dust sources in relation to dust soiling, ecological receptors and PM₁₀ concentrations during the construction phase. This is based on the distance of the construction boundary to the closest receptors and the magnitude of dust raising activities for each source. Volume 2, Chapter 4: Air Quality, Section A, Table 1.4 to 1.7 present the criteria used for determining overall dust risk from each dust raising source.

4.3.38 In the third stage of the assessment the sensitivity of the receptors located within 350 m of the construction boundary is determined based on the criteria outlined within Volume 2, Chapter 4: Air Quality, Section A, Table 1. Receptors include residential areas and relevant features of cultural heritage interest. The sensitivity of receptors has been based on the highest of any of the criteria being met and therefore the assessment is considered conservative.

4.3.39 The final stage of the assessment takes the risk category identified for each of the dust sources identified and the sensitivity of receptors, to determine the overall significance of effects on annoyance due to dust soiling, harm to ecological receptors and the risk of health effects due to an increase in exposure to PM₁₀. The significance criteria are outlined within Volume 2,

Chapter 4: Air Quality, Section A, Table 1 and assume that mitigation measures appropriate for construction sites with the dust raising potential identified within the assessment will be applied.

Operational phase – Human Health Receptors

4.3.40 A number of approaches can be used to determine whether the potential air quality effects of a Scheme are significant. However, there remains no universally recognised definition of what constitutes ‘significance’ for air quality effects.

4.3.41 Guidance is available from a range of regulatory authorities and advisory bodies on how best to determine and present the significance of effects within an air quality assessment. It is generally considered good practice that, where possible, an assessment should communicate effects both numerically and descriptively.

4.3.42 Any description of an effect of a Scheme is informed by numerical results. However, an element of professional judgement must also be involved. To ensure that the descriptions of effects used within the assessment are clear, consistent and in accordance with recent guidance, definitions for the assessment of changes in ambient air quality at discrete human health receptors have been adapted from the Environmental Protection UK (EPUK) Development Control: Planning for Air Quality 2010 guidance (Environmental Protection UK, 2010). Table 4.3 to Table 4.4 provide descriptors for changes in NO₂, PM₁₀ and PM_{2.5} concentrations as a result of the proposed Scheme.

Table 4.3: Magnitude descriptors for predicted change in annual mean concentrations (Source: Ref 22)

Magnitude	NO ₂ /PM ₁₀ Concentrations	PM _{2.5} Concentrations
Large	Increase / decrease >4µg/m ³	Increase / decrease >2.5 µg/m ³
Medium	Increase / decrease 2 - 4µg/m ³	Increase / decrease 1.25 – 2.5 µg/m ³
Small	Increase / decrease 0.4 -2 µg/m ³	Increase / decrease 0.25 -1.25 µg/m ³
Imperceptible	Increase / decrease <0.4 µg/m ³	Increase / decrease <0.25 µg/m ³

Table 4.4: Magnitude descriptors for predicted change in number of days with PM₁₀ Greater than 50 µg/m³ (Source: Ref 22)

Magnitude	Number of Days with PM ₁₀ Greater than 50 µg/m ³
Large	Increase / decrease >4 days
Medium	Increase / decrease 2 – 4 days
Small	Increase / decrease 1 – 2 days
Imperceptible	Increase / decrease < 1 day

4.3.43 The magnitude of any change identified must be considered in the context of existing air quality conditions within the study area to determine the significance of that magnitude.

4.3.44 Table 4.5 provides descriptors for the significance of air quality effects based on the magnitude of change in the context of existing conditions. EPUK recognise that professional judgement is required in the interpretation of air quality assessment significance. Table 4.5 is intended as a tool to help interpret the results to the air quality assessment and will therefore be employed in conjunction with professional judgement. It should be noted only 'moderate' effects or above are considered to be significant for the purposes of this assessment.

Table 4.5: Descriptors of significance of effect (Source: Environmental Protection UK, 201).

Absolute Concentrations in Relation to Objective	Change in Concentration ^(a)		
	Small	Medium	Large
<u>Increase with proposed Scheme</u>			
Above objective value with Scheme (> Objective)	Minor adverse	Moderate adverse	Major adverse
Just below objective value with Scheme (>90% of the Objective)	Minor adverse	Moderate adverse	Moderate adverse
Below objective value with Scheme (>75% of the Objective)	Negligible	Minor adverse	Minor adverse
Well below objective value with Scheme (<75% of the Objective)	Negligible	Negligible	Minor adverse
<u>Decrease with proposed Scheme</u>			
Above objective value with Scheme (>Objective)	Minor beneficial	Moderate beneficial	Major beneficial
Just below objective value with Scheme (>90% of the Objective)	Minor beneficial	Moderate beneficial	Moderate beneficial
Below objective value with Scheme (>75% of the Objective)	Negligible	Minor beneficial	Minor beneficial
Well below objective value with Scheme (<75% of the Objective)	Negligible	Negligible	Minor beneficial

Note: (a) 'Moderate' effects or above are considered to be significant within this assessment.

'Objective' refers to national air quality objective. See below for assessment of compliance with EU limit values

4.3.45 EPUK recognises that, as well as assessing effects at discrete receptors, consideration of a scheme's overall effect on air quality must be made using professional judgement of a suitably qualified person, whilst taking account of the following key factors:

- number of properties affected by air quality effects and a judgement on the overall balance;
- the magnitude of the changes and the descriptions of the effects at the receptors (as per the tables above);
- whether or not an exceedence of an objective is predicted to arise in the study area where none existed before or an exceedence area is substantially increased;
- whether or not the study area exceeds an objectives and whether this exceedence is removed or the exceedence area is reduced;
- uncertainty, including the extent to which worst-case assumptions have been made; and
- the extent to which an objective or limit value is exceeded, e.g. an annual mean NO₂ of 41µg/m³ should attract less significance than an annual mean of 51µg/m³.

4.3.46 The factors set out above have been taken into account when assessing the overall significance of the changes in air quality.

Operational Phase - Compliance with EU Limit Values

4.3.47 The EU Directive on ambient air quality (2008/50/EC) sets a range of 'limit values' for pollutants including NO₂ and PM₁₀ (further details are presented in Section 4.4). Defra assesses and reports on the status of the UK's compliance with the limit values to the European Commission annually.

4.3.48 The evidence base for the annual assessment of compliance is based on a combination of information from the UK national monitoring networks and the results of modelling assessments. Modelling is undertaken using a national model known as the Pollution Climate Mapping (PCM) model. The PCM model has been designed to assess compliance with the limit values at locations defined within the Directive.

4.3.49 In June 2013 the Highways Agency (HA) published an Interim Advice Note (IAN 175/13) which described a method for using outputs from the dispersion modelling for a road scheme assessment with those from Defra's PCM model in order to identify the risk of a scheme causing non-compliance with an EU limit value. IAN 175/13 has recently been withdrawn, pending an update. However, in the absence of an updated version, IAN 175/13 has been followed for this assessment to assess the Scheme's potential effect on compliance with the EU limit values. Key elements of the IAN 175/13 approach are summarised below:

- Obtain outputs from Defra's PCM model for road links being assessed that are included within the Compliance Risk Road Network (CRRN);
- Calculate the Scheme contribution to annual mean NO₂ concentrations at a worst case receptor location near to the CRRN links;
- Identify those road links where the PCM modelled total NO₂ concentrations, or Scheme modelled total NO₂ concentrations are greater than 40 µg/m³;
- Identify those road links where the Scheme is at risk of causing a new exceedence of the annual mean NO₂ EU limit value.

Operational Phase – Ecological Receptors

4.3.50 In accordance with the DMRB, assessment has been made of potential impacts on Special Areas of Conservation (SAC), Special Protection Areas (SPA) and Sites of Special Scientific Interest (SSSI). Increases in NO_x concentrations at Designated Sites as a result of the scheme would be potentially significant if:

- the Scheme is predicted to cause an increase in annual mean NO_x concentrations of at least 2 µg/m³; and
- predicted concentrations (including background) are very close to or exceed the criterion.

4.3.51 Results from the dispersion modelling have been used to compare concentrations at the Designated Sites with and without the proposals and to identify potentially significant effects in accordance with the above. In the absence of a more specific definition within DRMB, 'very close to the criterion' is assumed to be above 29µg/m³ for the purposes of this assessment (the criterion being 30µg/m³).

4.3.52 Increases in nitrogen deposition at Designated Sites as a result of the Scheme would be potentially significant if the critical load for the site is exceeded as a result of the proposed Scheme.

Assumptions and Limitations

4.3.53 As mentioned in Sensitivity Analysis for Long Term NO_x and NO₂ Projections the primary assumptions and limitations to the study are associated with the uncertainty related to emission factors and the background concentrations assumed within the assessment. These have been addressed through model verification and a sensitivity analysis, the results of which are presented in Volume 2, Chapter 4: Air Quality, Section 1.3 and 1.6 respectively. The assessment is based on the current scheme design. DCO permitted deviations have to be reviewed and are considered to be too small to require explicit consideration within the assessment.

4.4 Context

Legislation

European Union Legislation

4.4.1 EU Framework Directive 96/62/EEC on ambient air quality assessment and management came into force in November 1996 and had to be implemented by Member States by May 1998. This Directive aimed to protect human health and the environment by avoiding, reducing or preventing harmful concentrations of air pollutants. As a Framework Directive, it required the European Commission to propose 'Daughter' Directives which set air quality limit and target values, alert thresholds and guidance on monitoring and measurement for individual pollutants. The four Daughter Directives are as follows:

- Council Directive 1999/30/EC (the first Daughter Directive) relating to limit values for sulphur dioxide (SO₂), nitrogen dioxide (NO₂) and oxides of nitrogen (NO_x), particulate matter (PM₁₀) and lead in ambient air;
- Directive 2000/69/EC (the second Daughter Directive) relating to limit values for benzene and carbon monoxide (CO) in ambient air;
- Directive 2002/3/EC (the third Daughter Directive) relating to ozone (O₃) in ambient air; and
- Directive 2004/107/EC (the fourth Daughter Directive) relating to arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons in ambient air.

4.4.2 Directive 2008/50/EC on ambient air quality and cleaner air for Europe was adopted in May 2008. This Directive merges the first three existing Daughter Directives and one Council Decision into a single Directive on air quality (it is anticipated that the fourth Daughter Directive will be brought within the new Directive at a later date). It also sets new standards and target dates for reducing concentrations of fine particles.

English legislation

Air quality – Human Health

4.4.3 The Air Quality Standards Regulations 2010 came into force in June 2010; they implement the EU's Directive 2008/50/EC on ambient air quality.

4.4.4 Part IV of the Environment Act 1995 requires that every Local Authority shall periodically carry out a review of air quality within its area, including likely future air quality. As part of this review, the Authority must assess whether air quality objectives are being achieved, or likely to be achieved within the relevant periods. Any parts of an Authority's area where the objectives are not being achieved, or are not likely to be achieved within the relevant period must be identified and declared as an Air Quality Management Area (AQMA). Once such a declaration has been made, Authorities are under a duty to prepare an Action Plan which sets out measures to pursue the achievement of the air quality objectives within the AQMA.

4.4.5 The air quality objectives specifically for use by Local Authorities in carrying out their air quality management duties are set out in the Air Quality (England) Regulations 2000 and the Air Quality (England) (Amendment) Regulations 2002.

4.4.6 The Environment Act also requires that the UK Government produces a national 'Air Quality Strategy' (AQS) containing standards, objectives and measures for improving ambient air quality and to keep these policies under review. Further details of the AQS are presented below.

Air Quality – Ecological Receptors

4.4.7 The Air Quality Standards Regulations relevant to the protection of vegetation specifically transpose the limit value contained within EU's Directive 2008/50/EC on ambient air quality. The Directive contains guidance on the locations where the limit values apply.

4.4.8 The areas where the Air Quality Standards Regulations annual limit for the protection of vegetation applies are:

- more than 20km from an agglomeration (i.e. an area with a population of more than 250,000);
- more than 5km away from industrial sources regulated under Part A of the Environment Act 1990 (and/or Part A1 sites under the Pollution Prevention and Control (PPC) regulations);
- more than 5km away from motorways; or
- more than 5km away from built up areas of more than 5,000 people .

4.4.9 Designated ecological sites within these areas do not have the benefit of protection from statutory air quality limit values. However, there are a number of international and national agreements which identify and seek to protect ecosystems of high conservation value.

4.4.10 These include Special Protection Areas (SPAs) and Special Areas of Conservation (SACs) established under the EC Habitats and Birds Directive (jointly included in a European Union wide network of protected areas called Natura 2000 sites).

4.4.11 The UK conservation agencies' (Natural England, the Countryside Agency for Wales and Scottish Natural Heritage) policy to apply the Air Quality Regulations limit value to all sensitive ecological sites when considering the potential effects of oxides of nitrogen (NO_x) (Environment Agency, 2010).

Statutory Nuisance

4.4.12 Section 79(1)(d) of the Environmental Protection Act 1990 defines one type of 'statutory nuisance' as "any dust, steam, smell or other effluvia arising on industrial, trade or business premises and being prejudicial to health or a nuisance". Where a Local Authority is satisfied that a statutory nuisance exists, or is likely to occur or recur, it must serve an abatement notice. Failure to comply with an abatement notice is an offence. However, it is a defence if an operator employs the best practicable means to prevent or to counteract the effects of the nuisance.

Policy

UK Air Quality Strategy

4.4.13 The Environment Act 1995 requires the UK Government to produce a national AQS. The AQS establishes the UK framework for air quality improvements. Measures agreed at the national and international level are the foundations on which the strategy is based. The first Air Quality Strategy was adopted in 1997 [Ref 10] and replaced by the Air Quality Strategy for England, Scotland, Wales and Northern Ireland published in January 2000. The 2000 Strategy has subsequently been replaced by the Air Quality Strategy for England, Scotland, Wales and Northern Ireland 2007.

4.4.14 The air quality objectives in the AQS are a statement of policy intentions and policy targets. As such, there is no legal requirement to meet these objectives except in as far as they mirror any equivalent legally binding limit values in EU Directives and English Regulations.

National Planning Policy Framework

4.4.15 The National Planning Policy Framework sets out the government's planning policies for England.

4.4.16 With regard to air quality the policy states at paragraph 109 that:

"The planning system should contribute to and enhance the natural and local environment by:... preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability..."

4.4.17 And at paragraph 124 that:

"Planning decisions should ensure that any new development in Air Quality Management Areas is consistent with the local air quality action plan."

National Planning Policy Guidance

4.4.18 The Department for Communities and Local Government (DCLG) launched national planning practice guidance as a web-based resource for testing and comment on 28 August 2013. The planning practice guidance is in draft form

and has not been formally issued by the Secretary of State (at the time the assessment was carried out).

4.4.19 Regarding the status of the guidance in decision taking, it notes that:

“The Government considers that where the planning practice guidance published in draft during Beta is a material consideration, it is likely to have limited weight. However, it is for the decision taker to determine the weight of this guidance in any individual decisions.” The National Planning Guidance includes a dedicated section on ‘Air Quality,’ It notes that, for new planning applications, the Local Planning Authority may want to know about:

- “the ‘baseline’ local air quality;
- whether the proposed development could significantly change air quality during the construction and operational phases; and/or
- whether there is likely to be a significant increase in the number of people exposed to a problem with air quality, such as when new residential properties are proposed in an area known to experience poor air quality.”

4.4.20 It also states the following in relation to determining whether air quality is relevant to a planning decision:

“Concerns could arise if the development is likely to generate air quality impact in an area where air quality is known to be poor. They could also arise where the development is likely to adversely impact upon the implementation of air quality strategies and action plans and/or, in particular, lead to a breach of EU legislation (including that applicable to wildlife).”

Local Planning Policy

4.4.21 In 2006, Broadland District Council, Norwich City Council and South Norfolk District Council established the Greater Norwich Development Partnership (GNDP). The GNDP’s role is to develop and deliver the area’s growth strategy through the implementation of the strategic planning policy. As part of each council’s Local Development Framework (LDF), the NPPF requires that Local Authorities prepare a ‘Core Strategy’, which should outline policies for local development up to the year 2026. In 2011, the GNDP produced its first Joint Core Strategy (JCS) which was adopted in March 2011. Following a legal challenge, the JCS was amended and the latest JCS was submitted by GNDP to the Secretary of State in February 2013. The inspector issued his final report on 13th November 2013, stating that, subject to a number of Main

Modifications, the Joint Core Strategy is appropriate. It is expected that each Local Authority will formally adopt the Core Strategy in early 2014.

4.4.22 Spatial planning objective 9 of the JCS is “to protect, manage and enhance the natural, built and historic environment including key landscapes, natural resources and areas of natural habitat or nature conservation value.” This encompasses thirteen separate policies. None of these policies makes specific reference to air quality, although a number of them are expected to lead to improvements in traffic and subsequently may improve air quality. Objective 9 also sets a target of having no AQMAs, although a timescale to achieve this is not provided. The JCS refers to the Norwich Area Transport Strategy (NATS) and describes the need for, and benefits associated with, the proposed NDR. It suggests that the NDR may reduce cross-city vehicle trips and thus may lead to improvements in air quality within Norwich.

4.4.23 On 30 March 2010 Norwich City Council adopted *the Northern city centre area action plan*. This document now forms part of the planning policy framework for the council and will be used when determining planning applications in this part of the city. The plan contains policies and proposals for the regeneration of the area and redevelopment of specific sites over the period 2008-16. The plan area is that bounded by the River Wensum, Bakers Road, Magpie Road, Bull Close Road, and Whitefriars. One of the Area Action Plan Objectives is:

“to improve traffic circulation in the area with reductions in congestion and air pollution, particularly (but not only) within the air quality management area on St Augustines Street, while allowing for traffic generated by redevelopment to be accommodated.” (paragraph 3.3.2)

4.4.24 In addition, paragraph 4.4.2 notes: “A key issue for the plan is to address pollution and air quality problems by providing for improvements to traffic circulation, if possible with reduced movement by vehicles through the area.” (paragraph 3.3.2)]

Summary

4.4.25 This Chapter has identified the legislation and policy framework relevant to the assessment. On the basis of the above, relevant numerical environmental quality standards are summarised in Table 4.6.

4.4.26 Within this assessment, the word ‘objective’ has been used to refer to environmental quality standards provided within the Air Quality (England)

Regulations 2000 (as amended) or the UK Air Quality Strategy 2007. The phrase 'limit value' has been used to refer to the environmental quality standards provided within EU Directive 2008/50/EEC.

4.4.27 Non-statutory environmental quality standards are available for nitrogen deposition; referred to as 'critical; loads'. They are usually defined as 'a quantitative estimate of an exposure to one or more pollutants below which significant effects on specific sensitive elements of the environment do not occur according to present knowledge' (Environment Agency, 2010) [. Relevant critical loads are presented in Volume 2, Chapter 4: Air Quality, Section 1.9.

Table 4.6: Relevant Air Quality Objectives and Limit Values

Pollutant	Averaging Period	Standard	
		Concentration	Allowance
Nitrogen Dioxide (NO ₂)	1-hour	200 µg/m ³	18 per calendar year
	Annual	40 µg/m ³	-
Nitrogen Oxides (NO _x)	Annual	30 µg/m ³	-
Particulates (PM ₁₀)	24-hour	50 µg/m ³	35 per calendar year
	Annual	40 µg/m ³	-
Particulates (PM _{2.5})	Annual	25 µg/m ³	-

4.5 Baseline

Introduction

4.5.1 The study area for the air quality assessment covers three Local Authorities' administrative areas: Norwich City Council (NCC), Broadland District Council (BDC) and South Norfolk District Council (SNDC). Data from all of these Local Authorities and Defra's Air Information Resource 'AIR' website have been reviewed.

4.5.2 The first part of the baseline analysis characterises the existing conditions based on current monitoring data and background pollutant concentration

data. The second part determines the background concentrations to be used within the assessment.

Local Authority Data

Overview

- 4.5.3 On 1 June 2003, NCC declared three AQMAs (Grapes Hill St, Augustines Street and the Castle area) due to exceedences of the annual mean NO₂ objective. The results of a diffusion tube survey in 2007 confirmed that the annual mean objective for NO₂ was not met at several additional locations within Norwich, and so a Detailed Assessment (DA) was undertaken in 2008. The DA concluded that a further AQMA (Riverside) was required, and this was declared in 2009.
- 4.5.4 The 2010 Annual Progress Report revealed exceedences of annual mean NO₂ at a further two locations. Following this, the exceedence at King Street resulted in the recommendation of a further AQMA, whereas the exceedence on Bull Close Road was very marginal, so a DA was carried out and additional monitoring recommended. The most recent review and assessment report (the 2012 Updating and Screening Assessment) recommended that the four existing AQMAs should be revoked and replaced with one larger area encompassing all four. The Central Norwich AQMA was subsequently declared on 1 November 2012 (shown in Volume 2, Chapter 4: Air Quality Section 1.6.1). The AQMA is approximately 3.8 kilometres from the proposed Scheme at its closest point.
- 4.5.5 NCC produced an Air Quality Action Plan in 2004 after the initial designations were made. It includes 16 measures to improve air quality, including park and ride schemes, car sharing, travel plans, a cycle network and use of alternative fuels.
- 4.5.6 BDC declared an AQMA in Upper Hellsdon in 2008 due to exceedences of the annual mean NO₂ objective. The 2009 Updating and Screening Assessment (USA) concluded that the concentrations at all diffusion tube locations within the District met the NO₂ annual mean objective both inside and outside the AQMA and in 2010 the AQMA was revoked. The 2012 Updating and Screening Assessment (the latest Review and Assessment document) concluded no exceedences of the objectives have been identified in Broadland District. The USA notes that a Detailed Assessment for PM₁₀ is still required at Haveringland Farm although this has been put on hold while further guidance is sought (this is for PM₁₀ from a poultry farm).

- 4.5.7 SNDC completed its most recent Review and Assessment report in 2012. This Updating and Screening Assessment indicated that there were no exceedences of objectives at any of the monitoring locations. SNDC has therefore not declared any AQMAs.
- 4.5.8 BDC, SNDC and NCC carry out air quality monitoring at a variety of locations and using a variety of methods. The following sections provide an overview of the monitoring locations and present a summary of key monitoring data.

Roadside and Kerbside Monitoring

- 4.5.9 The majority of monitoring in the three Local Authorities concerned is focussed at 'roadside' or 'kerbside' locations in order to provide the Authorities with data on sites affected by road traffic emissions, which is generally their primary concern. The following sub-sections provide a brief summary of this monitoring data; a full description of the roadside and kerbside monitoring results for each of the three Local Authorities is provided in Volume 2, Chapter 4: Air Quality, Section 1.6.

Automatic Analysers

- 4.5.10 NCC carries out roadside monitoring at one roadside site located at Castle Meadow; this site is located within a bus station and monitors NO₂, PM₁₀ and PM_{2.5}. NO₂ concentrations from 2010 to 2012 at Castle Meadow exceeded the annual mean objective, although it should be noted that monitored concentrations at this location are significantly influenced by bus emissions and this site does not represent relevant exposure for the annual mean. The hourly objective was exceeded for the first time in 2011, although only four of the allowed 18 hours exceeded the hourly objective of 200µg/m³ in 2012. No exceedences of PM₁₀ or PM_{2.5} objectives have been recorded.
- 4.5.11 SNDC previously undertook continuous monitoring of NO₂ and PM₁₀ at one roadside site positioned at Long Stratton Library, however monitoring at this site ceased in early 2012. The results of this monitoring indicated that annual mean NO₂ and PM₁₀ concentrations were below the objective in both 2010 and 2011 and no exceedences of the short-term objective have been recorded.
- 4.5.12 BDC do not undertake any automatic monitoring at roadside or kerbside locations.

NO₂ Passive Diffusion Tubes

- 4.5.13 NCC carried out diffusion tube monitoring at 28 sites in 2012; eighteen of these were roadside sites, nine were kerbside sites and one was a background site. The results of this monitoring show a number of exceedences of the annual mean NO₂ objective over the last three years at roadside and kerbside sites. This is reflected in the declaration of the city-wide AQMA for NO₂ in November 2012, which covers all of the kerbside and roadside diffusion tube monitoring locations. Volume 2, Chapter 4: Air Quality, Section 1.6.1 presents the extent of the city-wide AQMA.
- 4.5.14 BDC undertook diffusion tube monitoring at sixteen sites in 2012; all of which were either roadside or kerbside locations. The results of this monitoring indicated that there were no exceedences of the annual mean NO₂ objective at any monitored sites.
- 4.5.15 SNDC carried out diffusion tube monitoring at twenty-nine sites in 2012; the number and locations of diffusion tubes has been reduced district wide over recent years. Following application of a bias adjustment factor, no tubes recorded exceedences of the annual mean objective. However tubes at Long Stratton and Ditchingham recorded NO₂ levels close to the objective. SNDC has confirmed that these trends are being monitored, although there are currently no plans to declare an AQMA.

Background Monitoring

Automatic Analysers

- 4.5.16 NCC undertakes continuous monitoring of background concentrations of nitrogen oxides (NO_x), NO₂ and particulate matter (as PM₁₀ and PM_{2.5}) at one location. The Norwich Lakenfields site is classified as an urban background site and is part of Defra's Automatic Urban and Rural Network (AURN). It is located approximately 500m south of the city-wide AQMA. Monitoring data for the three most recent years is presented in Table 4.7 and Table 4.8 and shows that monitored concentrations of each pollutant are generally low and, where applicable, are well below the relevant air quality objectives.

Table 4.7: Annual mean pollutant concentrations at the Norwich Lakenfields urban background AURN site (Source: Defra AURN website)

Pollutant	Data capture for 2012 monitoring period (%)	Annual Mean Concentration ($\mu\text{g}/\text{m}^3$)		
		2010	2011	2012
NO _x	98	23	20	19
NO ₂	98	13	13	14
PM ₁₀	87	18	20	14
PM _{2.5}	95	13	14	14

(a) Hourly mean (of which 18 exceedences allowed per year)

(b) Daily (24 hour) mean (of which 35 exceedences allowed per year)

4.5.17 BDC and SNDC do not currently undertake any automatic monitoring and there are no AURN sites located within either District.

NO₂ Passive Diffusion Tubes

4.5.18 NCC carried out diffusion tube monitoring of NO₂ at 28 locations in 2012; one of these is the Lakenfields urban background site, where three diffusion tubes are collocated with the continuous analyser. SNDC carried out diffusion tube monitoring at one Rural Background site (Cringleford Park and Ride) in 2010, although this was moved to a nearby 'Roadside' location in 2011; no new background monitoring sites were introduced to replace it. BDC does not undertake diffusion tube monitoring at any background locations. Passive background monitoring data for the NCC site is presented in Table 4.9 below.

Table 4.9: Annual mean NO₂ concentrations at background locations

Site Name	Local Authority	Within AQMA?	Distance to kerb (m)	Annual Mean Concentration ($\mu\text{g}/\text{m}^3$)		
				2010	2011	2012
Lakenfields	Norwich City Council	N	N/A	15 ^(b)	13 ^(b)	14 ^(a)

All results bias adjusted

Source: (a) NCC Diffusion Tube data (obtained through consultation with EHO)

(b) NCC 2012 Updating and Screening Assessment

4.5.19 Volume 2, Chapter 4: Air Quality, Section 1.6.1 presents the location of this background monitoring site and the Norwich city-wide AQMA.

Defra Estimated and Projected Background Pollutant Concentrations

4.5.20 Defra (Department for Environment Food and Rural Affairs, 2012) provides estimates of background pollution concentrations for NO_x, NO₂, PM₁₀ and PM_{2.5} across the UK for each one kilometre grid square for every year from 2010 to 2030. Future year projections have been developed on the base year for the background maps which is currently 2010. The maps include a breakdown of background concentrations by emission source, including road and industrial sources which have been calibrated against 2010 UK monitoring data. Volume 2, Chapter 4: Air Quality, Section 1.8 presents background concentrations for each receptor within the assessment.

Scheme Monitoring Survey

4.5.21 As part of the Assessment an NO₂ diffusion tube monitoring survey was undertaken from April 2012 until July 2013 at twelve locations along the proposed Scheme route. Results from the nine months of monitoring carried out in the year 2012 have been adjusted to represent an annual mean concentration following Government guidance (Department for Environment, Food and Rural Affairs, 2009). The results of the monitoring indicate that annual mean NO₂ concentrations are well below the air quality objective at locations of representative exposure along the route of the proposed Scheme.

4.5.22 Further details on this survey are provided in Volume 2, Chapter 4: Air Quality, Section 1.7.

Background Pollutant Concentrations Assumed within the Assessment

4.5.23 The background concentrations from the Defra AIR website have been used within this assessment. In accordance with Defra guidance (Department for Environment, Food and Rural Affairs, 2009), background concentrations presented within the results section have had contributions from road sources

included within the dispersion modelling removed, to avoid double counting of emissions. Background concentrations for the base year (2012) and opening year (2017) have been presented Volume 2, Chapter 4: Air Quality, Section 1.8. Sensitivity Analysis for Long Term NO_x and NO₂ Projections provides a description of long-term projections of NO_x and NO₂ concentrations.

4.6 Mitigation

Construction Phase

- 4.6.1 The key effects during the construction phase are associated with dust-raising activities associated with earthworks, construction and trackout. This includes the handling of spoil, loading and unloading of trucks and the movement of the trucks around the construction sites and onto the local road network.
- 4.6.2 The proposed Scheme has a number of incorporated mitigations for the construction phase which are principally aimed at reducing dust effects from the construction activities and will be included within the Construction Environmental Management Plan (CEMP) (Volume 2, Chapter 19: CEMP). The construction phase will include the mitigation measures presented in
- 4.6.3 Table 4.10 and will reduce the dust risk from each of the sources assessed. The overall significance for effects from construction dust has been determined taking this mitigation into account.

Table 4.10: Mitigation Measures

Mitigation	Actioned by Whom	Compliance Route
Site Planning	Contractor	CEMP
Plan site layout – machinery and dust causing activities should be located away from sensitive receptors	Contractor	CEMP
All site personnel to be fully trained	Contractor	CEMP
Trained and responsible manager on site during working times to maintain and carry out site inspections	Contractor	CEMP
Construction Traffic	Contractor	CEMP

Mitigation	Actioned by Whom	Compliance Route
	Contractor	CEMP
All loads entering and leaving site to be covered	Contractor	CEMP
All vehicles switch off engines when stationary – no idling vehicles	Contractor	CEMP
Effective vehicle cleaning and specific fixed wheel washing on leaving site and damping down of haul routes	Contractor	CEMP
No site runoff of water or mud	Contractor	CEMP
On-road vehicles to comply to set emission standards	Contractor	CEMP
All non road mobile machinery (NRMM) to use ultra low sulphur taxexempt diesel (ULSD) where available and be fitted with appropriate exhaust after-treatment from the approved list	Contractor	CEMP
Minimise movement of construction traffic around site	Contractor	CEMP
Hard surfacing and effective cleaning of haul routes and appropriate speed limit around site	Contractor	CEMP
Site Activities	Contractor	CEMP
Minimise dust generating activities	Contractor	CEMP
Use water as dust suppressant where applicable	Contractor	CEMP
Cover, seed or fence stockpiles to prevent	Contractor	CEMP

Mitigation	Actioned by Whom	Compliance Route
wind whipping		
Re-vegetate earthworks and exposed areas	Contractor	CEMP
ensure concrete crusher or concrete batcher has permit to operate	Contractor	CEMP

Operational Phase

4.6.4 No specific incorporated mitigation measures are included for the operational phase of the proposed Scheme. However, the route of the Scheme means that increases in traffic flows (and therefore emissions) generally occur in areas where existing pollutant concentrations are lower and therefore the significance of effects is lower. This is included within the assessment of effects presented below.

4.7 Assessment of Effects

Construction Phase Effects

Construction Activities

4.7.1 The main construction phase of the proposed Scheme is anticipated to begin in January 2015 and be completed by January 2018. Construction will be divided into sections along the route. Each of these sections will contain similar activities including earthworks and construction. The duration of these activities will vary depending on the individual task being carried out [Volume 2, Chapter 19: CEMP]. In order to assess the worst case scenario it has been assumed that earthworks, construction and trackout will occur along the length of the NDR route for the duration of the construction period.

4.7.2 The main construction compound will be located at the airport to the north of the NDR and will be accessed via the Cromer Road. Here the main site office, welfare facilities, materials and plant storage and maintenance facilities will be located. In addition to the main site there will satellite construction compounds to provide offices, parking and plant storage. These will be located at Drayton Lane, Buxton Road, Plumstead Road and Postwick. Batching plants will also be located at three of the compounds located at Drayton Lane, Buxton Road and Plumstead Road. Smaller compounds will be located at each of the bridge sites and these will be reinstated after the

bridge construction is complete. Each of the compounds are located within the DCO boundary of the Scheme and therefore have not been included separately within the construction phase assessment.

4.7.3 The number of receptors located within 350 m of the DCO boundary are presented within Table 4.11.

Table 4.11: Receptors Located within 350 metres of DCO Boundary

Distance from DCO Boundary	Number of Receptors
< 20 m	63
20 – 50 m	112
50- 100 m	149
100 – 350 m	1,763
Total	2,087

4.7.4 In accordance with the assessment criteria outlined in Assessment Criteria, Construction Phase. Table 4.12 presents the risk of dust nuisance effects for each of the sources of construction dust after mitigation.

Table 4.12: Summary of the Risk of Dust Soiling Effects

Source	Dust Soiling Effects	Ecological Effects	PM ₁₀ Effects
Demolition	None - No Demolition Required		
Earthworks	High Risk Site	Medium Risk Site	High Risk Site
Construction	High Risk Site	Medium Risk Site	High Risk Site
Track Out	High Risk Site	Medium Risk Site	High Risk Site
Overall Significance	High	Medium	High

4.7.5 The sensitivity of receptors to dust soiling effects, ecological effects and PM₁₀ effects is presented in

4.7.6 Table 4.13. As the Table shows, the significance of dust soiling effects is slight adverse because receptor sensitivity is high and risk category is high. The significance of ecological effects is slight adverse because receptors sensitivity is very high and risk category is medium. The significance of PM₁₀ effects is negligible because receptor sensitivity is low and risk category is high.

Table 4.13: Receptor Sensitivity

Effect	Sensitivity of Receptor	Comment
Dust Soiling effects	High	Between 10-100 sensitive receptors within 20 m of the DCO boundary
Ecological Effects	Very High	The River Wensum SAC lies approximately 220 m from the DCO boundary
	Medium	Locally designated sites <20m
PM ₁₀ Effects	Low	PM ₁₀ background concentrations are below 75% of the objective

4.7.7 Based on the above, the overall significance of effects of dust nuisance from the construction phase is described as Slight Adverse at worst. Table 4.14 presents a summary of the significance of effects for each dust source and each type of effect.

Table 4.14: Summary of Significance where Mitigation has been Applied

Source	Dust Soiling Effects	Ecological Effects	PM ₁₀ Effects
Demolition	-	-	-
Earthworks	Slight Adverse	Slight Adverse	Negligible
Construction	Slight Adverse	Slight Adverse	Negligible
Trackout	Slight Adverse	Slight Adverse	Negligible
Overall Significance			Slight Adverse

Potential Effects from Climate Change

4.7.8 Windy and warm, dry conditions can combine to generate dust temporarily affecting local air quality. These conditions can exacerbate dust generated during construction, causing issues for the wider environment. However, as the construction phase is anticipated to be completed by around 2018 (and therefore well within any time period within which notable changes in the UK's climate could occur), the potential for effects from climate change to exacerbate dust effects is concluded to be Negligible.

Operational

Human Health Receptors

Nitrogen Dioxide (NO₂)

4.7.9 The modelled annual mean NO₂ concentrations at discrete receptors for the opening year with and without the proposed Scheme are presented in Volume 2, Chapter 4: Air Quality, Table 1.23 and Table 1.26.

4.7.10 As noted in Sensitivity Analysis for Long Term NO_x and NO₂ Projections, sensitivity analysis has been undertaken with respect to long term NO_x and NO₂ projections. Therefore, the significance of effects at discrete receptors is presented in Volume 2, Chapter 4: Air Quality, Section A, Table 1.23 and Table 1.26 on the basis of two different long term projections; one that assumes a reduction in road traffic and background emissions (hereafter referred to as the 'LAQM' method) and one that does not (hereafter referred to

as the 'HA IAN' method). The results of both methods indicate that, at the majority of discrete receptors modelled, effects are concluded to be 'negligible' in accordance with the significance criteria presented in the Operational phase – Human Health Receptors Section.

- 4.7.11 Volume 2, Chapter 4: Air Quality, Table 1.23 shows that beneficial effects generally occur within the Central Norwich AQMA or Norwich urban area, where total concentrations are higher. Adverse effects generally occur in the rural areas near to the NDR route where total concentrations are lower. All discrete receptors where an exceedence of the annual mean objective is predicted in the without Scheme scenario, the proposed Scheme is predicted to cause a beneficial effect. The majority of these are within the Central Norwich AQMA. This is due to the Scheme's general impact of reducing traffic flows through urban areas where concentrations are higher, and introducing new flows through more rural areas where concentrations are lower.
- 4.7.12 As the results in Volume 2, Chapter 4: Air Quality, Section A, Table 1.23 and Table 1.26 show, the proposed Scheme is not predicted to cause any exceedences of the NO₂ air quality objectives.
- 4.7.13 Using the 'LAQM' method, a small number of receptors are concluded to experience 'slight adverse' and 'slight beneficial' effects; no 'moderate adverse' or 'moderate beneficial' effects are predicted. Using the 'HA IAN' method, more 'slight adverse' and 'slight beneficial' effects are predicted. In addition, 'moderate beneficial' effects are predicted to the north of the City centre. Because the LAQM method is considered to provide a more realistic representation of likely future conditions, and is more conservative, it has been used as the basis upon which to judge the significance of impacts.
- 4.7.14 In order to provide an analysis of the number of properties affected by air quality effects overall, Table 4.15 presents the number of properties within 25 m of modelled roads that experience any improvement or deterioration in annual mean NO₂ concentrations as a result of the proposed Scheme. Table 4.16 presents the same information, but for changes of greater than 1 µg/m³ only.

Table 4.15: Number of residential receptors experiencing an improvement or deterioration in annual mean NO₂ concentrations

	Number of Properties
Properties with an improvement in air quality	1194
Properties with a deterioration in air quality	726

Table 4.16: Number of residential receptors experiencing an improvement or deterioration in annual mean NO₂ concentrations greater than 1 µg/m³

	Number of Properties
Properties with an improvement in air quality >1 µg/m ³	79
Properties with a deterioration in air quality >1 µg/m ³	21

4.7.15 As described within the Operational phase – Human Health Receptors Section, judging a Scheme’s overall effect on NO₂ concentrations should consider a range of factors. Taking account of the predicted effects at discrete receptors (including consideration of long-term trends in NO_x and NO₂ concentrations), effects on receptors experiencing concentrations above the air quality objective, and the general change in concentrations at residential properties, the proposed Scheme is concluded to have a Slight Beneficial effect on NO₂ concentrations overall.

4.7.16 The proposed Scheme does not conflict with NCC’s AQAP; the overall improvement in NO₂ is consistent with the aims of the Plan.

Fine Particulates (PM₁₀ and PM_{2.5})

4.7.17 The modelled annual mean concentrations at discrete receptors for the opening year with and without the proposed Scheme are presented in Volume 2, Chapter 4: Air Quality, Section A, Table 1.24. At all receptors, concentrations are predicted to be below the air quality objective and the changes in concentrations caused by the proposed Scheme are concluded to be negligible. Daily mean PM₁₀ concentrations are predicted to be below the objective in all scenarios and the number days when concentrations are above 50 µg/m³ are unchanged by the Scheme.

4.7.18 The modelled annual mean PM_{2.5} concentrations at discrete receptors for the opening year with and without the proposed Scheme are presented in Volume 2, Chapter 4: Air Quality, Section A, Table 1.25. At all receptors, concentrations are predicted to be below the air quality objective and the changes in concentrations caused by the proposed Scheme are concluded to be negligible.

Overall fine particulate effects are concluded to be Negligible.

Ecological Receptors

4.7.19 Predictions of atmospheric NO_x concentrations, and nitrogen deposition at Designated Sites are presented in Volume 2.

4.7.20 As noted within the Operational Phase – Ecological Receptors Section, increases in NO_x concentrations at Designated Sites as a result of the proposals would be potentially significant if:

- the proposed link road is predicted to cause an increase in annual mean NO_x concentrations of at least 2 µg/m³; and
- predicted concentrations (including background) are very close to or exceed the criterion

4.7.21 As shown in Volume 2, the above criteria are not met at any designated sites.

4.7.22 Effects on Designated Sites due to nitrogen deposition are concluded to be Negligible as the proposed Scheme does not cause critical loads to be exceeded.

Compliance with EU Limit Values

4.7.23 Volume 2, Chapter 4: Air Quality, Section 1.95 presents the results of the assessment of the Scheme's potential effects on compliance with EU limit values.

4.7.24 There are 26 CRRN links within the study area. The Scheme is predicted to cause increases in AADT flows along 4 of these links and therefore these are the focus of the assessment.

4.7.25 Volume 2, Chapter 4: Air Quality, Table 1.35 shows, increases in annual mean NO₂ concentrations along these links are small. There are no

exceedences of the limit value predicted by the PCM model and the increases in NO₂ predicted to be caused by the Scheme do not result in a risk of a new exceedence of the EU limit value as total concentrations are below 40 µg/m³.

Potential Effects from Climate Change

4.7.26 Although meteorological conditions can affect ambient pollutant concentrations, future climate change is not considered to have the potential to change the conclusions of the assessment presented above. This is because predicted results are not sensitive to the likely degree of change in conditions expected.

4.8 Conclusions

4.8.1 A qualitative assessment of potential construction phase effects has been undertaken. Mitigation measures have been identified for incorporation within the CEMP commensurate with the risk of dust effects identified and in line with best practice. Potential impacts are concluded to be Negligible to Slight Adverse, at worst and therefore not significant.

4.8.2 Operation phase effects have been assessed using an advanced dispersion model. Concentrations of key traffic related pollutants have been predicted at sensitive human health and ecological receptors and the change as a result of the Scheme has been quantified. Existing concentrations of nitrogen dioxide (NO₂) are of concern in Norwich, particularly in the city where an 'Air Quality Management Area' (AQMA) has been declared, The Scheme is predicted to cause a Slight Beneficial effect on NO₂ concentrations, including within the AQMA, and negligible effects on fine particulate concentrations. Overall, operational phase air quality effects are concluded to be not significant.

Potential impacts	Description for the impact	Description of mitigation measures	How the measures will be implemented, measured and monitored
Construction Phase	Negligible to Slight Adverse	Best practice measures for construction activities (see Section 4.6 Mitigation, Construction Phase)	CEMP

Operation Phase – NO ₂	Slight beneficial	N/A	N/A
Operation Phase – Fine particulates	Negligible	N/A	N/A

5. Carbon

5.1 Introduction

- 5.1.1 The Secretary of State for Communities and Local Government has requested that carbon dioxide emissions specifically be addressed within the Environmental Statement (paragraph 3.77 of the Scoping Opinion -see Volume 1, Appendix 5 of the ES). These emissions contribute to climate change, which is a global issue. The emissions of carbon dioxide, the principal climate change gas, are often referred to by the short-hand “carbon”. In this assessment, any reference to ‘carbon’ is to emissions expressed as carbon dioxide (CO₂).
- 5.1.2 The assessment presents emissions of carbon dioxide associated with the construction of the Scheme and the subsequent changes in emissions during the operation of the Scheme. The results are discussed in relation to national and regional emissions and in relation to relevant legislation and policies.
- 5.1.3 This carbon assessment has been carried out using the reference dates of 2012(baseline), 2017 (scheme opening), 2032 (scheme opening + 15 years) and 2077 (sixty years from Scheme opening).
- 5.1.4 A Climate Change Risk Assessment (Volume 2, Chapter 16: Climate Change Risk Assessment) has also been undertaken. This considers the issues associated with resilience of the Scheme to climate change risks.

5.2 Scheme Design in Context of Carbon Dioxide Effects

- 5.2.1 The Scheme has the potential to lead to changes in emissions of carbon dioxide from:
- Activities related to construction of the Scheme.
 - Changes to emissions from use of the road network.
- 5.2.2 Construction activities require resources that have associated carbon dioxide emissions. The use of materials, construction plant and construction vehicles all lead to varying levels of energy and other resource use which lead to carbon emissions. The Scheme will require the installation of new infrastructure including a dual carriageway road, under bridges and over bridges, at-grade and grade-separated junctions, as well as the re-routing of private and public rights-of-way and utilities. The works undertaken on all of these elements will contribute to emissions of carbon from the manufacture of

the materials used (commonly referred to as 'embodied carbon'). Construction processes also require the use of plant which commonly operate on diesel and lead to further emissions.

- 5.2.3 All modes of transport lead to emissions of carbon due to their consumption of energy. Typical road transport modes use internal combustion engines which lead to carbon emissions from their use of fossil fuels. Since the Scheme will also change the configuration of the road network, there will be changes in emissions due to factors including vehicle speed, network capacity, and patterns of travel. These changes can affect the amount of carbon emitted by users of the network.

5.3 Methodology

Introduction

- 5.3.1 This section summarises the overall approach and methodology used for the assessment of carbon dioxide emissions.
- 5.3.2 The methodology used in this assessment follows the main principles prescribed in Design Manual for Roads and Bridges (DMRB) HA/207/07, "Air Quality". An assessment of long-term emissions has also been undertaken following the approach outlined in WebTAG 3.3.5, "The Greenhouse Gases Sub-Objective". Details of the approach are set out below.

Spatial Scope

- 5.3.3 For the construction phase assessment, the spatial scope has been determined by the main construction route, the construction compounds used to store materials and topsoil, and the construction of new structures, such as bridges.
- 5.3.4 The proposed Scheme has the potential to change traffic flows on the wider road network of Norwich and Norfolk. Emissions of greenhouse gases from road vehicles are a function of the engine size, speed and fuel type. At a network level, emissions are dependent on overall traffic flows and the relative mix of different vehicle classes. The Scheme has the potential to affect a combination of these functions, leading to a change in overall emissions.
- 5.3.5 In assessing the operational phase emissions, two spatial scopes have been included. The first study area has been determined from the Fully Modelled Area referenced in the Transport Assessment for the Scheme. The Fully Modelled Area represents the extent of the traffic model which is validated

through traffic counts (see Volume 2, Chapter 5: Carbon). A second, wider, study area has also been assessed. This includes those roads on the 'wider network' which connect to other population centres, including, for example, Great Yarmouth, has been referred to as 'the Wider Network' in this assessment. Flows on the links in the Wider Network have not been validated and therefore may be subject to greater modelling uncertainty. For clarity, the Wider Network also includes all of the links contained in the Fully Modelled Area. In assessing carbon emissions, both study areas have been considered to provide relevant local and regional context to any changes that occur.

Temporal Scope

- 5.3.6 Construction phase carbon emissions will be confined to the construction period only. Construction of the main NDR works is planned for a two year period between 2015 and 2017.
- 5.3.7 In relation to the operational phase, the assessment calculates emissions for the assessment years of 2017 and 2032, which are the years considered in the transport modelling. This follows the guidance presented in DMRB Regional Assessment. The WebTAG methodology sets out that carbon emissions should be calculated over a 60 year period from construction which represents 2017-2077 and this has been done based on the modelled traffic data years. Limitations associated with the traffic data are discussed in Section 5.3.15.

Sensitive Receptors

- 5.3.8 No specific resources or receptors have been focussed upon during the assessment, as the changes in carbon emissions caused by the Scheme cannot be linked to specific climate impacts or specific locations where any impact may occur.

Consultation

- 5.3.9 Formal consultation was undertaken as part of the EIA process through submission of an EIA Scoping Report to the Secretary of State for Communities and Local Government. The Secretary of State requested at paragraph 3.77 of his Scoping Opinion that carbon be considered within the Environmental Statement (see Volume 1, Appendix 5 of the ES).

Desk study

Overview

5.3.10 This assessment calculates carbon emissions based on the available Scheme information. The key sources of information used in this assessment are:

- the development description (see Volume 1, Chapter 2: The Scheme);
- the transport model outputs (see DCO Document 5.6: Forecasting Report);
- the construction bill of quantities (provided by Birse Civils);
- the contractor's construction methodology (see Volume 2, Chapter 24: CEMP);
- Department of Energy and Climate Change (DECC) official statistics: Local Authority carbon dioxide emissions;
- Department for Transport WebTAG guidance 3.3.5 and 3.5.6; and
- The Emission Factor Toolkit published by Defra.

Construction Phase

5.3.11 Carbon emissions due to embodied carbon in construction materials have been estimated using the Mott MacDonald CapIT estimation tool (<http://www.eru.mottmac.com/registrationsubscription/capit/>). This tool estimates the embodied emissions in range of construction products relating to the construction of highways and follows the Highways Agency schedule of items. The methodology includes the embodied emission in the products as well as the construction plant typically required to build the Scheme.

5.3.12 Quantities of construction materials and activities were provided for the Scheme by Birse Civils, the main contractor for the NDR.

5.3.13 No detailed description of construction traffic was available for this assessment. However the Birse Civils Construction Methodology has indicated that peak flows of up to 75 vehicles per day can be expected, with additional movements for the approximately 120 workers that will be on site. Therefore an estimate of the potential emissions has been made based on the following assumptions about the potential construction flows based on worst-case assumptions:

- 75 Heavy Duty Vehicles, travelling an average of 40km per day at 25km/h;
- 30 movements associated with staff which are a mixture of HDVs and Light Duty Vehicles (LDVs) travelling an average of 25km per day at 30km/h;
- 5.5 working days per week; and
- 161 weeks of construction.

5.3.14 Emissions from construction traffic have been calculated using the Emission Factors Toolkit, which is described further in Section 5.3.15.

Operational Phase

5.3.15 The assessment of carbon emissions follows guidance set out in the DMRB regional impacts assessment and the WebTAG guidance (section 3.3.5). For operational phase effects, both guidance documents set out that emissions from the Scheme (the 'With Scheme scenario') should be compared to the baseline (the 'Without Scheme' scenario) for each assessment year. The method adopted is based on calculating the emissions for each link in the traffic model based on its length and its vehicle flow characteristics.

5.3.16 A single development scenario has been considered in the creation of the traffic model. This scenario is based on the Greater Norwich Development Partnership's Joint Core Strategy (JCS). This means the same regional growth assumptions exist in the "With" and "Without" Scheme scenarios and the only difference is in the road network layout.

5.3.17 Traffic model data has been used to estimate emissions in each scenario. For each road link in the study area the following characteristics are determined: link length, number of vehicles, average speed of vehicles, and percentage of vehicles that are heavy duty (HDV). As noted above, two spatial scopes have been included in the assessment, the Fully Modelled Area' and the Wider Network.

5.3.18 The emissions have been calculated separately for each link for each period of the day and then summed. These calculations are based on four traffic characteristics as follows:

for weekday flows

- Weekday Off-Peak flows have been used for 19:00 to 07:00,
- Weekday AM-Peak flows for 08:00 to 09:00

- Weekday Inter-Peak flows for 07:00 to 08:00, 09:00 to 16:00 and 18:00 to 19:00, and
- Weekday PM-Peak flows 16:00 to 18:00;
for Saturday flows
- Weekday Off-Peak flows multiplied by 1.426 have been used for 0:00 to 10:00 and 18:00 to 24:00 and
- Weekday Inter-Peak flows for 10:00 to 18:00;
for Sunday flows
- Weekday Off-Peak flows multiplied by 1.426 have been used for 0:00 to 11:00 and 16:00 to 24:00 and
- Weekday Inter-Peak flows for 11:00 to 16:00.

5.3.19 For each time period, the traffic estimates have been categorised into LDVs, HDVs and buses. Emissions are calculated for each link and for each time period, before being combined into a total. This means that diurnal variations in traffic flows are accounted for, which is particularly relevant to the parameter of speed.

5.3.20 Based on the traffic flow data, emissions have been estimated using the Defra Emissions Factor Toolkit v5.2c (EFT). Emissions have been calculated for each modelled link in the network based on vehicle flow, vehicle-type composition and vehicle average speed for the period. Where speeds were less than 5km/h, these have been set at 5km/h as the EFT does not provide factors for less than this speed. Individual link emissions have then been summed to calculate total network emissions. A vehicle emissions profile was selected within the EFT that represented the year being assessed. For 2012 and 2017, their corresponding years were selected, however, for 2032, the profile for 2030 was selected as this is the latest year available in the current version of the EFT.

5.3.21 Emission factors change from year to year. Government policy suggests that emissions from transport will decrease in the future in order to meet targets set out in the Climate Change Act. This implicitly means that emission factors would be lower than those of present activities. The current version of the EFT does not account for projected changes in the vehicle fleet relating to the introduction of electric vehicles and other alternative ultra-low emission vehicles as set out in the Government's low carbon vehicle strategy, 'Driving the Future Today'. Accordingly, the benefits in terms of reduced emissions

that are expected to be achieved through such technologies are not accounted for in this assessment and the total calculated emissions, particularly for years after 2025. An adjustment to the calculated emissions has been made to include the expected use of electric vehicles. This is based on the DfT expected uptake rate for electric vehicles and the electricity use per kilometre for electric vehicles set out in WebTAG guidance (3.5.6) and the grid electricity rates set out in the WebTAG guidance (3.3.5). These assumptions are set out in Volume 2, Chapter 5: Carbon). The uptake rate for electric vehicles is expressed in WebTAG as a proportion of vehicle kilometres therefore the emissions associated with these vehicles are calculated on the share of vehicle kilometres travelled in each scenario. These rates only apply up to 2035 and in subsequent years the rate is fixed. This means that the emissions in years after 2035 are over-estimates based on the policy expectations that electric vehicle use will increase over time.

Assessment Criteria

- 5.3.22 There are currently no statutory criteria for assessing the relative effects of projects in relation to emissions of carbon. Although the Climate Change Act prescribes a national target for reduction, this has not been transposed into regional, sector or project level targets. In addition, current planning guidance does not give specific guidance in how to appraise the impacts of developments in terms of carbon emissions.
- 5.3.23 The European Commission’s “Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment” (2013) provides a steer on what an assessment of carbon emissions should take into account. There is guidance on what to cover when addressing impacts (although this guidance is provided in general, and not specific to certain types of development), but no guidance is provided on how to determine the significance of changes in carbon emissions. It notes that: “Judging an impact’s magnitude and significance must be context-specific. For an individual project — e.g. a road project — the contribution to GHGs may be insignificant on the global scale, but may well be significant on the local/regional scale, in terms of its contribution to set GHG-reduction targets.” (section 4.4.2).
- 5.3.24 In the absence of accepted EIA criteria, carbon emissions arising from the Scheme have been presented and compared to those from all sources across the region taking account of the trends in baseline emissions.

5.3.25 The significance of the changes in emissions has been assessed qualitatively by presenting them in the context of total emissions from the study area, as well as national, regional and local policies and targets.

Site survey

5.3.26 No baseline site surveys have been required for this assessment.

5.4 Context

Overview

- 5.4.1 Carbon dioxide is a greenhouse gas (GHG) that causes the trapping and absorption of energy in the atmosphere. This leads to warmer atmospheric temperatures and associated climate changes.
- 5.4.2 There are natural variations in carbon emissions; however, atmospheric concentrations of CO₂ have increased by 40% since pre-industrial times due to fossil fuel emissions and land-use change. In the Intergovernmental Panel on Climate Change's 5th Assessment Report, 2013, it is stated with very high confidence, that the recent rates of increase of CO₂ concentrations in the atmosphere are unprecedented in the last 22,000 years. It is considered extremely likely that more than half of the observed increase in global average surface temperature since 1951 has been caused by anthropogenic greenhouse gas emissions.
- 5.4.3 CO₂ is one of several GHGs, but it is responsible for the largest contribution to the net uptake of energy in the climate system. It is also the most significant GHG in relation to emissions from motor vehicles.
- 5.4.4 The European Commission's "Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment" (2013) recognises that climate change is not yet being systematically integrated into EIA, and the "main reason for this is that climate change ... (is) not yet explicitly included in the formal requirements of EIA procedures". (section 1.1). In addition, it is noted that climate change is a multi-faceted issue that does not lend itself to simple or quick analysis. The focus for EIA is on quantifying the emissions and placing them in the context of baseline changes.

Planning and legislative

European Union Policy

- 5.4.5 The European Commission White Paper “Roadmap to a Single European Transport Area – Towards a competitive and resource efficient transport system” (2011) outlines the long-term strategy being pursued to achieve a sustainable transport system across the EU by 2050.
- 5.4.6 The White Paper recognises that “Transport is fundamental to our economy and society.” but also recognises that transport “must be sustainable”. In order to limit climate change “... a reduction of at least 60% of GHGs by 2050 with respect to 1990 is required from the transport sector” and that “By 2030, the goal for transport will be to reduce GHG emissions to around 20% below their 2008 level.” (paragraph 6).
- 5.4.7 To achieve the changes the White Paper recognises that “New technologies for vehicles and traffic management will be key to lower transport emissions ...” (paragraph 8) and “The challenge is to break the transport system’s dependence on oil without sacrificing its efficiency and compromising mobility.” (paragraph 17). It emphasises that “Curbing mobility is not an option.” (paragraph 18).
- 5.4.8 Three strands for future development are set out as follows:
- “Improving the energy efficiency performance of vehicles across all modes. Developing and deploying sustainable fuels and propulsion systems.
 - Optimising the performance of multimodal logistic chains, ...
 - Using transport and infrastructure more efficiently through the use of improved traffic management and information systems ...” (paragraph 19).

National Legislation

- 5.4.9 The UK Climate Change Act (2008) has two key aims:
- to improve carbon management and help the transition towards a low carbon economy in the UK; and
 - to demonstrate strong UK leadership internationally, signalling the UK is committed to reducing global GHG emissions.
- 5.4.10 The Act introduces legally binding net UK GHG emission reduction targets, which are applicable at the national level. The Act specifies a long-term GHG emission reduction target of at least 80% by 2050 and reductions in CO₂ emissions of at least 26% by 2020 (changed to 34% by subsequent legislation

in 2009), both against a 1990 baseline. This will be done through five-year “carbon budgets”. Budgets have currently been set covering the periods 2008-2012, 2013-2017, 2018-2022, and 2023-2027. These targets are reviewed regularly according to the advice of the Committee on Climate Change in line with new evidence and data.

5.4.11 Furthermore, the Act requires all departments of the UK Government, including the Department for Transport (DfT), to develop strategies to reduce GHG emissions.

5.4.12 Carbon budgets cap the total national emissions over the budget period. They do not require emissions from specific locations, or even specific sectors, to reduce; so long as total emissions from the UK as a whole meet the budget limits. The GOV.UK website explains that: *“Where emissions rise in one sector, the UK will have to achieve corresponding falls in another”*.

National Policy

5.4.13 The Planning Act 2008 was introduced to simplify consent for major infrastructure schemes, including those in the transport sector. On 9 August 2013, the Secretary of State decided that the NDR is nationally significant and directed that it be treated as development for which development consent is required. The Planning Act 2008 empowers the Secretary of State to designate a statement as a National Policy Statement, which may set out criteria relating to development that is subject to development control. In designating National Policy Statements, the Secretary of State is required to have regard to the desirability of mitigating, and adapting to, climate change. When National Policy Statements are designated, they are required to include an explanation of how the policy set out in the statement takes account of Government policy relating to the mitigation of, and adaptation to, climate change.

5.4.14 At the time of this assessment, a draft National Policy Statement for Transport Networks had not been published for consultation. In its absence, other policy and guidance has been reviewed to set the policy context. Mention scoping reason

5.4.15 In 2013, the Department for Transport published the policy paper ‘Action for Roads’. Action for Roads sets out the challenges facing the transport network, together with proposals to meet these challenges. One section of the paper deals with delivering ‘a greener, better network’. Proposals to meet these goals include continuing to fund the development and uptake of ultra-

low emission vehicles, further investment in the quality and provision of walking and cycling networks, developing and embracing new technologies to optimise traffic flows across networks. These proposals are designed to help to meet the obligations set out in the Climate Change Act 2008 for reducing carbon emissions.

5.4.16 In December 2013, the Department for Transport published a consultation version of 'National road and rail networks: draft national policy statement'. Although National Policy Statements are specifically for development classed as 'Nationally Significant Infrastructure Projects', it provides a some guidance on the important considerations that can be applied to all road schemes. Chapter 3 of the draft sets out 'Wider Government policy on the national network'. The section recognises that there are a number of national level policies which will reduce carbon emissions in order to meet national targets. Paragraph 3.4 notes that "While, considered in isolation, individual schemes may result in an increase in CO₂ emissions, the Government's overarching plan for reducing carbon emissions will ensure that any such increases do not compromise its overall CO₂ reduction commitments. Increases in carbon emissions from a development should not therefore need to be considered by the Examining Authority and the Secretary of State". This emphasises the importance placed by Government on national level policies in meeting the national carbon targets.

5.4.17 In December 2011, the UK Government published the Carbon Plan which updates and supersedes the 2009 Low Carbon Transition Plan and sets out the Government's strategy for meeting the interim carbon budgets. The Carbon Plan identifies that transport has an important role in meeting the Climate Change Act 2008 obligations and includes the following high-profile policies and proposals for this sector:

- supporting local authorities in enabling people to make lower carbon travel choices, such as walking, cycling or using public transport, by providing a Local Sustainable Transport Fund;
- incentivising more efficient combustion engines and the use of sustainable biofuels;
- moving towards ultra-low carbon vehicles, such as electric vehicles;
- further electrification of the rail network; and
- capping of emissions from domestic aviation as part of the EU Emissions Trading Scheme (ETS).

5.4.18 The DfT White Paper “Creating Growth, Cutting Carbon: Making Sustainable Local Transport Happen” (2011) sets out the government’s vision for a sustainable local transport system that supports the economy and reduces carbon emissions. The White Paper forms part of the Government’s

- “overall strategy to tackle carbon emissions from transport. It sets out what Government believes is the best way in the short term to reduce emissions at the local level, ... principally by encouraging people to make more sustainable travel choices for shorter journeys. This White Paper is about providing the early reduction in carbon emissions that local action is best placed to deliver, while facilitating the access to local jobs that will boost economic growth.” (paragraph 1.4, page 11)
- “The Government is convinced that in the longer term, progressive electrification of the passenger car fleet will play an important role in decarbonising transport, ... Eliminating the use of passenger cars altogether would be the wrong approach given that for many people, particularly in rural areas and for medium-distance or multi-leg trips, the car is the only practical choice and will remain so.” (paragraph 1.5, page 11)
- “... alongside technological change to address carbon output, we will need to take measures to tackle the problem of congestion.”. (paragraph 1.8, page 12)

5.4.19 The National Planning Policy Framework (NPPF) was published on 27th March 2012 and supersedes previous national Planning Policy Statements (PPS) and Planning Policy Guidance, including Planning Policy Statement 1 on delivering sustainable development. Paragraph 94 of the NPPF requires Local Authorities to adopt pro-active strategies to mitigate and adapt to climate change, in line with the objectives and provisions of the Climate Change Act 2008.

5.4.20 At the national level, the following key policy areas of the NPPF are relevant:

- plan for development in locations which reduce greenhouse gas emissions;
- support energy efficiency improvements in existing buildings;
- including low-carbon and renewable energy strategies in new development;
- promoting sustainable transport; and
- meeting the challenge of climate change, flooding and coastal change.

5.4.21 Paragraph 30 of the NPPF notes with regards to sustainable transport that “[e]ncouragement should be given to solutions which support reductions in greenhouse gas emissions and reduce congestion”.

Regional Policy Local and Transport Policy

5.4.22 The Norfolk Climate Change Strategy, ‘Tomorrow’s Norfolk, Today’s Challenge’, identified that 31.4% of Norfolk’s GHG emissions were from road transport in 2006. This is higher than the national average of 22.8% and is attributed to the county’s rural nature. The Strategy acknowledged that transport is the only sector where GHG emissions are expected to increase between 1990 and 2020, due to the projected growth in road travel. It accepted that car travel will always remain necessary for some to access essential services, particularly in rural areas, due to the distances involved or limitations in public transport. Therefore, to achieve reductions in emissions, the Strategy posits a reduction in the overall need to travel. This could include improved accessibility planning, pragmatic siting of developments, energy efficient vehicles, increased availability of sustainable transport options and through reducing the long-term impact of road development through scheme design.

5.4.23 The Norfolk Joint Core Strategy (JCS) is a strategic vision for shaping development across Broadland, Norfolk Norwich and South Norfolk council areas. The Strategy draws attention to the fact that much of Norwich’s current road network is operating at 90% capacity. As a result, traffic delays in the area can be significant. Much of this congestion is caused by significant through-traffic in Norwich. The NDR project is specifically identified in paragraph 3.13 of the JCS as a solution which “would remove some 19,000 cross city trips daily”. The first area-wide objective established by the JCS is “addressing climate change and protecting environmental assets”. To do this, the JCS indicates that future development will need to minimise the need to travel and give priority to low impact modes of travel.

5.4.24 The Norfolk 3rd Local Transport Plan (LTP3), ‘Connecting Norfolk’ (2011), sets out transport strategy and policy for the County to 2026. The Plan has six strategic aims: maintaining the highway network; delivering sustainable growth; enhancing strategic connections; reducing emissions; improving road safety; and improving accessibility. This demonstrates that reducing carbon emissions is one of several competing aims to any transport infrastructure project. Short to medium term priorities highlighted in the LTP3 for reducing emissions are: complementary infrastructure such as electric vehicle charging

points; and promotion of walking and cycling for short journeys. Longer term priorities include: a more efficient vehicle fleet, a significant change in travel behaviour for short journeys, high quality interchange facilities in key urban areas. The NDR project will not affect these priorities for reducing emissions. Instead, the LTP3 specifically mentions the NDR as a facilitator of economic growth in the Greater Norwich area and provider of strategic access to Norwich airport (paragraph 4.11 of LTP3).

5.4.25 Norfolk County Council has an environment policy, approved in 2001, which aims to enable people in Norfolk to benefit from an enhanced environment and consequently an improved quality of life. The Policy asserts that its principles will be integrated into the decisions of all its services. Relevant to this project is the principle of taking measures to reduce greenhouse gas emissions through the adoption of energy and transport initiatives (paragraph 7). It states the Council will also encourage a shift towards more sustainable transport, such as appropriate public transport, cycling and walking (paragraph 8).

Local Policy

5.4.26 The Norwich Area Transportation Strategy (NATS), (2006 and updated in 2010), was created with the intention of ensuring Norwich's transport system meets the needs of the city's planned growth. It addresses transport issues such as congestion, and the NDR is specifically included to address this. Policy 57 of the Strategy addresses the adverse environmental impacts of traffic, including greenhouse gas emissions. NATS also encourages sustainable modes of travel and the use of alternative fuels in vehicles. To preserve growth, NATS does not plan to place major restrictions on car movements in the area. The updates in 2010 modified some of the policies. The first relevant policy is Policy 52: Smarter Choices, which states "In the Norwich area measures that encourage a modal shift to sustainable modes of transport will be investigated before road capacity improvements. ...". *This is a changed policy, included, in part, "... to better reflect the Climate Change Act 2008 and associated carbon reduction targets."* (paragraph 3.113, page 46).

5.4.27 The second relevant policy is Policy 57: Tackling Climate Change and Pollution, which states "We will seek to reduce emissions from road transport, including carbon emissions and to improve air quality in the Norwich area by:

- Encouraging a modal shift to less polluting modes of travel

- Reducing emission from vehicles that emit the most
- Ensuring that new development is planned and located to reduce the need to travel and maximise the opportunities for the most sustainable modes of travel.”

5.4.28 As with Policy 52, this is a changed policy, included, in part, “... to better reflect the Climate Change Act 2008 and associated carbon reduction targets.” (paragraph 3.123, page 49).

5.4.29 The City of Norwich Replacement Local Plan provides guidance for developers and the Council on what development is permitted in the city. It is a collection of policies and has been partially replaced by the JCS and the Northern City Centre Area Action Plan (see below). Carbon dioxide emissions, along with noise and land use, are identified as continuing problems for development in the city. There are no policies specific to road building; however there are a number of sustainability objectives to the Plan. These include promoting a well-connected city which uses resources in a sustainable manner.

5.4.30 The Northern City Centre Area Action Plan (NCCAAP) (2010) establishes the vision and objectives for regenerating the area north of Norwich city centre. It identifies that this area experiences significant congestion, road safety and environmental problems for the local community as main transport routes pass through the area. Consequently, an aim of the NCCAAP is to improve traffic circulation in the area (paragraph 3.2.2, objective 6). It proposes a policy to promote sustainable transport, citing a reduction in vehicular emissions as motivation (Table 6 and Appendix 5). Further to this, a sustainability goal of the NCCAAP is to reduce contributions to climate change (Policy ENV1 and paragraph 4.6.7). The main transport-related activity in the NCCAAP intended to achieve this is the reduction in the need to travel (Appendix 1 paragraphs 12 and 16).

5.5 Baseline

Overview

5.5.1 This chapter presents the existing emission levels, using a 2012 baseline, in order to assist in contextualising the emissions associated with the Scheme.

National and Local Data

5.5.2 For the latest year in which data is available, 2012, UK total GHG emissions were 571.6 MtCO₂e (million tonnes of emissions of all greenhouse gases, expressed as equivalent CO₂ emissions) (Table 4.1). Of this, transport emissions were 116.0MtCO₂e, equivalent to 24% of the national total CO₂ emissions. These are total emissions for all the activities in the UK.

Table 4.1: UK total MtCO₂e emissions 2008-2012 (Source: DECC Statistics - 2012 provisional UK figures: data tables (March 2013))

	2008	2009	2010	2011	2012	Trend 2008-12
Energy supply	212.5	189.5	195.3	182.2	192.1	-10%
from power stations	172.7	151.1	156.6	144.2	156.1	-10%
other Energy supply	39.8	38.4	38.7	37.9	36.0	-10%
Business	90.1	78.5	78.5	75.6	79.2	-12%
Transport	125.5	120.7	119.1	117.4	116.0	-8%
Public	9.3	8.2	8.4	7.1	7.4	-20%
Residential	79.9	74.7	86.5	66.4	74.2	-7%
Agriculture	4.1	4.1	4.1	4.2	4.2	2%
Industrial process	14.0	9.2	9.9	9.5	9.8	-30%
Waste Management	0.3	0.3	0.3	0.3	0.3	0%
LULUCF	-4.5	-4.5	-4.3	-3.9	-3.9	13%
Total CO ₂	531.2	480.7	497.8	458.6	479.1	-10%
Non-CO ₂ emissions	96.7	93.6	93.9	92.1	90.7	-6%
Total GHG	630.5	576.8	594.0	552.6	571.6	-9%

5.5.3 The national figures show a downward trend in total emissions over the last five years for which data is available. The trend for the transport sector as a whole is also downward, although at a slightly slower rate of change than overall emissions (Table 4.1).

5.5.4 Estimates of emissions of greenhouse gases, by Local Authority area, are provided by DECC on an annual basis. This exercise is undertaken to provide consistent information across all local authorities in the UK. Table 4.2 to Table 4.4 present the latest statistics published by DECC, for the period 2007 to 2011. The dataset covers emissions by end-user (rather than source) and compares road transport emissions with the total emissions in the areas where traffic flows are most affected. Population figures have been used to present a per capita carbon emissions figure for comparison over time and between areas (these are the total emissions for the area, divided by the population of that area to give an equivalent per-person value).

Table 4.2: CO2 emissions in Broadland LA (ktCO2)(Source: DECC Statistics: Local and regional CO2 emissions estimates for 2005-2011: full dataset (July 2013))

	2007	2008	2009	2010	2011	% change 2007-2011
Road transport emissions	231.9	228.5	221.2	216.3	211.1	-9%
Grand total emissions	920.1	926.3	909.0	998.7	890.4	-3%
Percentage road transport	25.2	24.7	24.3	21.7	23.7	-6%
Population ('000)	123.2	123.4	123.8	124.5	124.7	1%
Per capita total emissions	7.5	7.5	7.3	8.0	7.1	-5%

Table 4.3: CO2 emissions in Norwich LA (ktCO2) (Source: DECC Statistics: Local and regional CO2 emissions estimates for 2005-2011: full dataset (July 2013))

	2007	2008	2009	2010	2011	% change 2007-2011
Road transport emissions	142.6	137.9	134.2	131.9	128.3	-10%

Grand total emissions	835.5	807.6	730.0	755.4	675.4	-19%
Percentage road transport	17.1	17.1	18.4	17.5	19.0	11%
Population ('000)	126.9	128.0	129.2	130.9	132.2	4%
Per capita total emissions	6.6	6.3	5.7	5.8	5.1	-23%

Table 4.4: CO2 emissions in North South Norfolk LA (ktCO2)(Source: DECC Statistics: Local and regional CO2 emissions estimates for 2005-2011: full dataset (July 2013))

	2007	2008	2009	2010	2011	% change 2007-2011
Road transport emissions	393.1	386.2	373.4	367.2	361.6	-8%
Grand total emissions	1004.8	1009.8	932.7	965.0	907.4	-10%
Percentage road transport	39.1	38.2	40.0	38.0	39.9	2%
Population ('000)	117.1	118.8	120.5	122.6	124.5	6%
Per capita total emissions	8.6	8.5	7.7	7.9	7.3	-15%

5.5.5 In Broadland and North South Norfolk the percentages of emissions from road transport in 2011 were 23.7% and 2939.49% respectively. In Norwich, the percentage from road transport was lower, at 19% in 2011. Road transport emissions have declined consistently across all three relevant Local Authority areas by 98-10% over six five years. This is consistent with national level trends. Grand total emissions were much more variable in their decline, ranging from 3% to 19% decline over five years. These reductions in emissions are despite a small increase in populations in all three areas.

5.5.6 These regional traffic emissions are not directly comparable with those derived for this assessment, due to differences in the methodologies used to

estimate traffic flows in the area, however, they do provide an indication of the relative importance of road transport compared to overall emissions.

Modelled Data

Overview

5.5.7 This section sets out calculated baseline carbon emissions from road transport sources. The calculations are based on the traffic flow data for the Base Year and Without Scheme modelling scenarios outlined in Section 2.6.3. The totals presented in this section are the aggregated carbon emissions for the road links contained in the model in each of the scenarios for the two study areas: the smaller, Fully Modelled Area, and the Wider Network to provide a local and regional context.

Base Year 2012

5.5.8 Carbon emissions have been calculated for the base year of 2012 and are presented in Table 4.5

Table 4.5: Total emissions from Road Network, 2012 (ktCO₂)

	2012
Fully Modelled Area	345.1
Wider Network	1,092

5.5.9 The proportion of emissions from road links that lie within the Norwich Local Authority area has been calculated (as a subset of the Fully Modelled Area). This is 126ktCO₂ in 2012 which is a value similar to the emissions from road transport sources within Norwich in 2011 (128.3ktCO₂ – see Table 4.3), demonstrating that the model is providing a good comparative representation of carbon emissions in the study area.

Without Scheme 2017 and 2032

5.5.10 The baseline (Without Scheme) carbon emissions from the road network in the future years 2017 and 2032 are presented in Table 4.6 for the two study areas considered in the assessment.

Table 4.6: Total emissions from Without Scheme Road Network, 2017 and 2032 (ktCO2)

	2017	2032
Fully Modelled Area	351.4	379.1
Wider Network	1,103	1,246

Without Scheme 2017 and 2077

5.5.11 The total carbon emissions for the Without Scheme scenario over the 60 years between 2017 and 2077 are presented in Table 4.7 for the two modelled study areas.

Table 4.7: Total emissions from Road Network 2017-77 (ktCO2)

	Emissions 2017-77
Fully Modelled Area	22,423
Wider Network	73,409

5.5.12 These values are considered conservative as there is no allowance for the introduction of ultra-low emissions vehicles beyond 2035, which form a cornerstone of current policy.

5.6 Mitigation

Introduction

5.6.1 This chapter describes the mitigation measures that have been considered to address the carbon emissions from the construction and operational phases of the Scheme.

Construction Phase

5.6.2 In the construction phase, a number of design decisions have been taken and incorporated in to design to minimise the impact as far as possible. The overall Scheme design is described in Volume 1, Chapter 2: The Scheme, Section 2. These design decisions include:

- achieving a neutral cut and fill balance, removing the need for transporting bulk fill materials from or to site - all excavated materials will be utilised within the site;
- once the volume of contaminated materials is known there will be remediation and burial under landscape areas;
- cement stabilised granular material will be used to reduce the import of quarried materials; and
- recycled crushed glass filter material as an alternative to sand.

5.6.3 Of these measures, the benefits from the neutral cut and fill balance have been included in the construction assessment. The potential benefits of the other measures have not been quantified at this stage, as the specific amounts of the materials involved have not been established. These other measures will, however, help to reduce further the amount of carbon embodied in the construction of the road by reducing the overall demand for virgin materials, particularly primary materials. Therefore the assessment of construction carbon emissions presented represents a worst-case.

5.6.4 Measures to reduce the impact of construction works will also be implemented through the Construction Environmental Management Plan (CEMP) (see Volume 2, Chapter 24: CEMP). These will include the following typical measures relating to construction plant and construction traffic:

- ensuring that the engines of all vehicles and plant on site are not left running unnecessarily;
- requiring that plant will be well maintained, with routine servicing of plant and vehicles to be completed in accordance with the manufacturers recommendations and records maintained for the work undertaken;
- avoiding the use of diesel or petrol powered generators and using mains electricity or battery powered equipment;
- maximising energy efficiency (this may include maximising vehicle utilisation by ensuring full loading and efficient routing);

- drivers of vehicles, while on the public highway, will be required to switch off their vehicle's engines when stationary to prevent exhaust emissions.
 - development of a Site Waste Management Plan which will identify materials that can be reused and recycled:
- 5.6.5 These measures aim to make the construction process as efficient as possible, reducing the amount of energy and transport movements associated with construction and thereby reducing the carbon emissions.

Operational Phase

- 5.6.6 The NDR is part of a wider package of works to be delivered as part of the Norwich Areas Transport Strategy. The increased capacity that the road will deliver will help to enable development of public transport and park and ride facilities in the area. This will encourage modal shift in the area. Part of the Scheme will include 9km of cycle lanes, and the reduced congestion in the centre of Norwich means that additional bus services can be facilitated. The potential benefits of these measures have not been quantified as part of this assessment.
- 5.6.7 The Scheme will not be lit with the exception of the Postwick Hub which avoids any potential carbon emissions associated with energy use from lighting during the operation of the road.
- 5.6.8 The Scheme will include extensive tree and shrub planting to mitigate for the loss of trees to accommodate the route. The potential benefit to carbon emissions from sequestration has been assessed as part of the Ecosystems Assessment (see Volume 2, Chapter 5). There is a net benefit to overall emissions over the lifetime of the Scheme. The changes in overall carbon stocks within the Development Consent Order area are presented in Table 4.8.

Table 4.8: Carbon stock associated with sequestration from planting (as equivalent ktCO₂) (Source: Ecosystem Goods and Services Assessment for NDR Development – InVest Carbon Storage and Sequestration Model)

Year	Without Scheme	With Scheme
2017	177.3	157.1

2032	181.4	172.8
2077	200.5	215.5

5.6.9 There is a reduction in total carbon stock during the early years, due to the felling of trees during construction. In the longer term, the planting of trees increases the carbon stock, such that over the full 60 year period there will be a net benefit of the Scheme, of 15 ktCO₂, i.e. there will be a greater sequestration of carbon. This is considered further in para' 5.7.7.

5.7 Assessment of changes in carbon emissions

Overview

5.7.1 This section presents the assessment of the potential changes in carbon emission due to the Scheme in both the construction and operational phases.

Construction Phase

5.7.2 Carbon emissions associated with the construction phase of the Scheme derive from embedded carbon in the materials used and the carbon in the fuel used by the construction plant and vehicles. These emissions are summarised in Table 6.1 for the different elements of the construction programme (further details are provided in Volume 2, Chapter 5: Carbon).

Table 4.9: Carbon emissions associated with each part of the Bill of Quantities (Notes: Based on the Bill of Quantities provided by Birse Civils (September 2013). The figures in this table account for quantified mitigation measures.)

Element	Total Carbon (ktCO ₂)
NDR Road	40.4
Buxton Rd Overbridge	1.1
Newman Rd Overbridge	1.0
Middle Rd Overbridge	1.4
Rackheath Bat Underpass	0.1
Marriots Way Overbridge	0.6

Cromer Rd Overbridge	1.0
Bell Farm Overbridge	0.4
Rackheath Rail Bridge	3.3
Rackheath Rd Bridge including Retaining Wall	3.2
All Bat Gantries	0.1
Total	52.4

5.7.3 The emissions for the NDR road allow for the reduction in carbon emissions of 13.8ktCO₂ associated with the mitigation measure of balancing cut and fill in the scheme design (see para' 5.6.2).

5.7.4 Carbon emissions from construction traffic have had to be estimated, as detailed data on construction traffic was not available. The estimate is presented in Table 4.10 and is based on the conservative assumptions outlined in para' 5.3.11.

Table 4.10: Carbon emissions associated with construction traffic

Element	Total Carbon (ktCO ₂)
Construction traffic	5.4

5.7.5 The total quantified carbon emission associated with construction of the Scheme is therefore 57.8 ktCO₂.

5.7.6 The felling of trees in the construction phase leads to a temporary lowering in the carbon stock within the Development Consent Order area (see Section 5.3). This is quantified in the Ecosystem Goods and Services Assessment to be 20.2ktCO₂. However, over the life of the Scheme, this carbon is sequestered by the new trees and vegetation and overall the carbon stock is increased in comparison to the without Scheme scenario.

Operational Phase

5.7.7 This section sets out the carbon emissions associated with the operational phase of the Scheme. Table 4.11 presents the change in total carbon emissions associated with the Scheme for each identified assessment year.

Table 4.11: Total carbon emissions (ktCO₂) from With Scheme road network and change compared to Without Scheme network (Source: Total emissions calculated from traffic model produced for the Scheme)

	2017 (With Scheme)	2017 Change compared to Without Scheme	2032 (With Scheme)	2032 Change compared to Without Scheme
Fully Modelled Area	364.8	+13.4	397.1	+18.0
Wider Network	1,117	+13.2	1,264	+18.0

5.7.8 Compared to the Without Scheme scenario, carbon emissions from the road network within the Fully Modelled Area increase by 13.4ktCO₂ in the opening year (2017). This represents a 3.8% increase in emissions from traffic within the Fully Modelled Area. The increase across the Wider Network is similar, at 13.2ktCO₂, representing a 1.2% increase across this area. In 2032 the projected increase is 18.0 ktCO₂ for both areas, representing a 4.7% increase in emissions from traffic in the Fully Modelled Area and a 1.4% increase across the Wider Network. It is clear that most of the change in emissions occurs within the Fully Modelled Area that represents the road network closer to the scheme. As stated in Section 5.3, the calculations of road transport emissions do not account for other aspects of NATS.

5.7.9 The increase in emissions is due primarily to the increase in vehicle kilometres (a measure of the cumulative distance travelled by all vehicles) across the study area, which is predicted to increase by 3.9% in 2017 and 4.9% in 2032 within the Fully Modelled Area (see DCO Document 5.5: Transport Assessment).

5.7.10 An assessment of the change in emissions over a 60 year period is presented in Table 4.12. The Scheme is predicted to increase emissions from road traffic by 4.6% within the Fully Modelled Area, and by 1.4% across the Wider Network over the period of 2017 to 2077. Emissions for each year are set out in Volume 2, Chapter 5: Carbon. As noted above, there are significant uncertainties associated with the absolute emissions, since the emission

factors are likely to be significantly overestimating emissions in future years, based on the intent stated in current policy in relation to uptake of lower emission vehicles.

Table 4.12: Change in carbon emissions (ktCO₂) compared to the Without Scheme road network, over the period 2017-77 (Source: Total emissions calculated from traffic model produced for the Scheme)

	Change in Emissions 2017-77 (With Scheme)	Percentage change compared to Without Scheme
Fully Modelled Area	+1,104	4.7%
Wider Network	+1,104	1.4%

5.7.11 The changes in emissions can also be compared with the total GHG emissions from the Norfolk area. The total emissions from the Broadland, Norwich, and North South Norfolk Local Authority areas were 2,4732,237.3ktCO₂ in 2011 (summed from Table 4.2, Table 4.3 and Table 4.4). By 2017, this would become 1,8942,094 ktCO₂ if national projections of reductions apply to this area, and by 2032, 1,4971,654 ktCO₂ (see Volume 2, Chapter 5: Carbon). The increases due to the Scheme across the Wider Network in 2017 and 2032 would be 13.2 and 18.0 ktCO₂ respectively, representing 0.763% and 1.21% of the totals in these two years.

5.7.12 The Ecosystem Goods and Services Assessment provides a quantification of the changes in carbon stock in the Development Consent Order area over the 60 year assessment period. The assessment has determined that carbon stocks (as CO₂) would be increased by 15ktCO₂ by 2077 compared to the Without Scheme scenario. This will off-set some of the increase during the construction and operational phases.

5.7.13 As noted in the Assessment Criteria Section, there are no statutory criteria for assessing the impact of carbon emissions. There are also no local or regional targets for reducing emissions. The Scheme is a part of the wider Norwich Area Transport Strategy and will help to enable other sustainable transport measures which are not assessed here, as well as delivering economic benefits. As such the Scheme is currently part of the local and regional planning policy.

5.7.14 The changes in emissions predicted represent a small fraction of the total emissions of the three Local Authorities in which the changes in traffic flows occur. In addition, policies at the national level relating to the expected increased use of hybrid-electric and electric vehicles after 2035 are not accounted for in the calculations presented in this assessment. Such policies are likely to considerably outweigh any changes in emissions presented in this assessment. Since the national reduction targets are based on absolute emissions, the total change in emissions that would result from this Scheme is likely to be less than presented in this assessment in the long term. While national reduction targets do not apply directly to Local Authorities, the predicted changes in emissions on the transport network are unlikely to materially affect the ability of the Local Authorities to contribute to these targets. This is consistent with the draft Government policy statement issued in December 2013.

5.8 Conclusion

Summary of Assessment

5.8.1 This assessment has considered the impact of the Scheme on carbon emissions. This has involved consideration of emissions in the construction phase and operational phase, including the effects on the wider transport network of which the Scheme is part.

Table 5.1: Assessment summary

Potential impacts	Description for the impact	Description of mitigation measures	How the measures will be implemented, measured and monitored
Construction Phase	The construction phase will lead to a one-off emission from the use of construction materials, plant and transport. Mitigation measures have been included in the Scheme design, which reduce emissions by 13.8ktCO ₂	Design decisions. Reuse of site won materials	Scheme design, CEMP
Operation	Increase in carbon emissions with	Scheme is	None – this will

Potential impacts	Description for the impact	Description of mitigation measures	How the measures will be implemented, measured and monitored
Phase	<p>the Scheme due to increase in vehicle kilometres. Changes in absolute emissions represent around 1% of the total emissions from all sources within the relevant Local Authorities in the assessment years. There are no targets in place to reduce emissions at the local or regional level. National policies are likely to reduce the absolute amount of emissions.</p>	<p>part of NATS which will enable other sustainable travel modes to be introduced in the area. Increased sequestration of carbon through changes in vegetation.</p>	<p>be carried out through NATS</p>

6. Cultural Heritage

6.1 Introduction

6.1.1 This chapter provides an assessment of the potential impacts of the NDR on heritage assets. It draws on information gained from desk-based sources, site inspections and specialist field surveys commissioned for the proposed scheme. The assessment seeks to identify heritage assets within a defined study area around along the route and assess the potential for previously unknown assets to be present. The value of the heritage assets and the significance of effect of the development have been addressed, and mitigation proposed where appropriate. All the significant features identified in this chapter are addressed in further detail in the supporting documents. Supporting documents for this chapter are provided in Volume 2: Section 6: Cultural Heritage.

6.1.2 The heritage assets have been ranked in terms of their relative value in accordance with DMRB guidance (Highways Agency 2007). The scale of impact of the scheme on each of these assets has been considered.

6.2 Methodology

Guidance

6.2.1 The assessment of the likely significance impacts of the proposed development on heritage assets has been undertaken using the policy, guidance and methodology set out in:

- National Planning Policy Framework (2012); all relevant chapters;
- All relevant local plan policies;
- The Design Manual for Roads and Bridges, Vol 11, Section 3, Part 2 (Highways Agency 2007);
- English Heritage's Setting of Heritage Assets (2013);
- Institute of Field Archaeologists Standards and Guidance for Desk-Based Assessment (2012);
- The Norwich NDR Scoping Report (Mott MacDonald 2013); and
- The Norwich NDR Scoping Opinion (Planning Inspectorate 2013)

Study Area

- 6.2.2 DMRB specifies that, when preparing an Environmental Statement, the study area for impacts on heritage assets should be assessed for an area extending for at least 200m in all directions from the proposed scheme. Norfolk HER data was gathered for a wider area, extending 300m in all direction from the DCO boundary, and national designation data gathered over a 1km radius from the centreline of the scheme.
- 6.2.3 The 300m study area encompasses all proposed site compounds and lagoon locations included on the most recent scheme design to date (Revision F). An area of historic parkland identified extends outside the study corridor. This has been considered in its entirety, but with greater attention given to those assets directly affected by the scheme. Consideration has also been given to the impact on Catton Hall Grade II* Registered Park and Garden, which although lying over 1km from the scheme, was included in the scoping opinion from the Planning Inspectorate (2013).

Methodology for assessing setting

- 6.2.4 The assessment of historic buildings and historic landscapes has been carried out in accordance with the Department for Transport's Design Manual for Roads and Bridges (DMRB) Volume 11 Section 3 Part 2 and their publication (with English Heritage) Assessing the Effect of Road Schemes on Historic Landscape Character, published in March 2007. It states that any design mitigation approaches would be scheme-specific and a matter of professional judgement. When assessing the effect of a proposed development on the setting of a heritage asset, English Heritage's The Setting of Heritage Assets (English Heritage 2011) recommends using the following criteria for comprehensive assessment:
- Location and siting of development;
 - The form and appearance of the development;
 - Other effects of the development;
 - Permanence of the development; and
 - Longer term or consequential effects of the development

Significance of Impacts

6.2.5 The assessment of the significance of impact (Table 5.3), before mitigation, is determined by cross referencing the value of the asset (Table 5.1) and the magnitude of impact (Table 5.2). Major and moderate impacts are considered to be significant effects.

6.2.6 The setting of a designated heritage asset embraces other forms of experience and associative relationships, but its extent and importance is often expressed by reference to visual considerations, including views. Any development affecting the setting of a heritage asset is a direct impact in terms of EIA definitions.

Methodology for Evaluation of Impact and Assessment of Significance

6.2.7 The methodology used to assess the significance of effects is based on that provided in the Design Manual for Roads and Bridges (DMRB 2007). Each heritage asset has been assigned a value in accordance with the guidance provided in DMRB as shown in Table 6.1.

Table 6.1: Heritage asset value levels and criteria

Value of Asset	Criteria
Very High	The asset is of international significance - . This will include World Heritage Sites and some Scheduled Monuments, Grade I Listed Buildings, Grade I Registered Parks and Gardens and Registered Battlefields.
High	The asset is of national significance - . This will consider: Scheduled Monuments, Grade I and Grade II* Listed Buildings, Grade I and II* Registered Parks and Gardens, Registered Battlefields, undesignated assets of schedulable quality, undesignated buildings, sites, monuments and landscapes that can be shown to have specific nationally important qualities, areas of ancient woodland.
Medium	The heritage asset is of regional importance: Grade II Listed Buildings, Grade II Registered Parks and Gardens, Conservation Areas, Sites of high value identified through consultation, locally listed buildings,

Value of Asset	Criteria
	locally listed parks and gardens, undesignated buildings, monuments, sites or landscapes that can be shown to have important qualities in their fabric or historical association, Historic Townscapes with historic integrity in that the assets that constitute their make-up are clearly legible.
Low	The heritage asset is of local importance, including: undesignated assets – buildings, monuments, landscapes, Archaeological sites with a local value for education or cultural appreciation and which add to local archaeological and historical research, very badly damaged assets that are of such poor quality that they cannot be classed as high or medium, parks and gardens of local interest
Negligible	Assets identified as being of no historic, evidential, aesthetic or communal interest and Assets whose values are compromised by poor preservation or survival or of contextual associations to justify inclusion into a higher grade

6.2.8 For each asset the magnitude of impact of the scheme has then been assessed – as shown in Table 6.2. The magnitude of impact is the level of change that a site would experience as a result of the construction and operation of the scheme. The scheme also has the potential to impact beneficially on heritage assets through increased protection to the cultural heritage resource and its setting, or removal of objects or features currently harming the asset and/or its setting. This has been assigned as being of positive magnitude in the same way as the adverse ratings.

Table 6.2: Magnitude of impact and criteria

Magnitude of Impact	Criteria
Major	The development would completely destroy the heritage asset and its context, or the asset is separated from its setting thereby destroying the value of the asset.
Moderate	The development would damage the heritage asset and its context or the development would impact the setting of the asset to such an extent that its value is decreased.
Minor	The development would cause minimal damage to the heritage asset and/or its context, and/or the setting of the heritage asset is slightly impacted, but the value of the resource is not lost.
Negligible	The development would have little impact on the heritage asset or its setting.
No change	The development would have no impact on the heritage asset or its setting.

6.2.9 The likely significance of the effect of the scheme on each heritage asset has been determined by considering the relevant value of the asset and the magnitude of the impact, using the matrix shown in Table 6.3 below. Moderate effects and above are considered to be significant.

Table 6.3: Significance of effect

Value of Asset	Magnitude of Impact				
	Major	Moderate	Minor	Negligible	No change
Very High	Very Large	Large/Very Large	Moderate/Large	Slight	Neutral
High	Large/Very Large	Moderate/Large	Moderate/Slight	Slight	Neutral

Value of Asset	Magnitude of Impact				
	Major	Moderate	Minor	Negligible	No change
Medium	Moderate/Large	Moderate	Slight	Neutral/Slight	Neutral
Low	Moderate/Slight	Slight	Neutral/Slight	Neutral/Slight	Neutral
Negligible	Slight	Neutral/Slight	Neutral/Slight	Neutral	Neutral

Assumptions and limitations

6.2.10 The current understanding of the extent and survival of archaeological remains within the study area is well informed by the fieldwork investigations along the route. Further archaeological evaluation will be required in advance of construction to inform a detailed archaeological mitigation strategy to be formulated. Further information on assumptions and limitations of this assessment are provided in Volume 2, Chapter 6: Cultural Heritage, Section A.

6.2.11 Wider vantage issues are addressed in Chapter 7 – Landscape

6.3 Context

Technical context

6.3.1 In this assessment, the term cultural heritage is synonymous with ‘historic environment’ and divided into three sub-topics: Archaeological Remains, Historic Buildings and Historic Landscapes.

- Archaeological Remains – are the materials created or modified by past human activities that contribute to the study and understanding of past human societies and behaviour.
- Historic Buildings – are architectural or designed structures with a significant historic value. These may include country houses, churches, vernacular buildings, industrial and military buildings, as well as other structures not usually thought of as buildings, such as bridges and milestones.
- Historic Landscapes – all landscapes of the UK have, to some extent, been shaped by past human activity and, therefore, have some historic character.

However, not all landscapes are historically significant. This sub-topic is mainly concerned with the evidence of the past shaping the present landscape. Historic landscapes can be rural or urban and include designed landscapes, such as parkland.

6.3.2 The baseline was established in order to undertake the assessment of the historic environment potential in the study area. In order to establish the baseline, information was collected on the known cultural heritage within the vicinity of the proposed new road. The existing cultural heritage assets surviving within the study area (a buffer zone 300m from the DCO boundary) are presented in Volume 2, Chapter 6: Cultural Heritage, Section B with further information on the key receptors provided in 1.4.4 below. The location and extent of these sites are illustrated in Volume 2, Chapter 6: Cultural Heritage, Section C (Drawings MMD-233906-DT-0887 to 0889). The baseline conditions and criteria for evaluation are described below. The following designated and undesignated historic environment data has been collated as part of the baseline data gathering process.

6.3.3 Information was gathered from the following sources:

- Norfolk HER data;
- Undesignated historic buildings, structures and built monuments including: Locally listed buildings, buildings of local merit; and buildings, structures and monuments included in the Norfolk HER;
- Archaeological or historic landscape sites including sites listed in the Norfolk HER;
- Archaeological assets of schedulable quality as identified in the NPPF paragraph 139;
- Sites or areas predicted or known from desk based or fieldwork study;
- Known historic settlements including those identified as being of archaeological interest in local planning authority documents;
- Locally listed historic parks, gardens and battlefields;
- Historic maps;
- Published literature about known archaeology;
- Previous cultural heritage reports prepared for this scheme;

- Site Walkover Survey;
- Archaeological surveys carried out along the route corridor using fieldwalking, metal detecting, geophysics and trial trenching techniques;
- Details of designated sites held by English Heritage;
- Local authority conservation area appraisal documents and statements (where available) and their mapping;
- Historic landscape character mapping;
- Aerial photographs held by Norfolk HER; and
- Documentary, cartographic and other resources as deposited within local studies libraries and county and national records libraries and archives.

6.3.4 In order to ensure that all possible impacts on the setting of sensitive heritage assets were assessed, information on protected heritage features was gathered for a wider study area extending 1km from the scheme. These comprised a search of the following;

- Scheduled Monuments;
- Listed Buildings, Grade I, II* and Grade II;
- Conservation Areas;
- Registered Parks and Gardens;
- Registered Battlefields; and
- Ancient Woodlands.

6.3.5 The baseline study has considered all fieldwork reports comprising:

- Geophysical survey undertaken with a magnetometer 2006/2007 (Donaldson and Sabin 2007);
- A field-walking and metal detecting survey 2006/2007 (Hoggett and Morgan 2008);
- Trial trenching undertaken along the route corridor 2008 (Trimble and Watkins 2008);

- An archaeological desk-based assessment of proposed borrow pits 2008 (Penn 2008);
- A geophysical survey undertaken with a magnetometer 2009 (Railton 2009);
- Trial trenching undertaken along the route corridor 2009/2010 (Amis and Silwood 2012, Trimble 2006);
- An archaeological evaluation at the site of the Broadland Gate constructors compound 2010 (Ames and Sillwood 2010);
- An environmental statement including assessment on archaeology, historic buildings and historic landscapes 2008 (Mott MacDonald Ltd 2008 (a and b); and
- Geophysical Survey of the route (ASWYAS 2013).

Environmental Surveys

6.3.6 Site visits have been undertaken on numerous occasions in order to establish the setting of the development as well as to assess the setting of heritage assets (Listed Buildings, historic landscapes or structural remains), and identify any potential areas where sub-surface remains may be likely to be encountered. Archaeological fieldwalking, metal detecting, geophysical survey and trial trenching has also been undertaken in numerous locations across the scheme. The results of these surveys are summarised in the baseline section and detailed in Volume 2 6.D-6.I

Cultural Heritage Scheme Objectives

- 6.3.7 The main objectives of the scheme in relation to cultural heritage have been, as far as practicable, to:
- Design the scheme to avoid adverse impacts on the environment and, where appropriate, take opportunities to create beneficial environmental impacts.
 - Design the scheme to minimise any negative impacts on local landscape and historic landscape character.
 - Mitigate for any potential loss of archaeological remains by preservation in situ through designing appropriate construction methods or preservation by

record, as specified in Design Manual for Roads and Bridges (DMRB) Volume 11 Section 3 Part 2 Cultural Heritage

- Design and implement an archaeological mitigation strategy that will allow remains impacted by the scheme to be preserved by record under controlled and appropriate conditions.

Scoping and Consultation

6.3.8 A scoping report (Mott MacDonald 2013) set out the proposed methodology for the Environmental Impact Assessment. A scoping opinion (Planning Inspectorate 2013) was issued on behalf of the Secretary of State with regard to proposals set out in the scoping report (Mott MacDonald 2013). With regard to Cultural Heritage, the Scoping Opinion reaffirmed that the character or setting of cultural heritage resources are important, especially those which may be directly affected by the scheme, including historic buildings, historic landscapes and archaeological sites. The opinion notes from the scoping report the intention to address impacts on character and setting in the ES and welcomed this approach. The following issues were specifically mentioned and are therefore addressed in this assessment:

- The EIA should assess the proposed development in relation to all existing listed buildings, conservation areas, registered parks and gardens, scheduled monuments within the site and the wider area.
- The heritage assets, their setting and significance must be assessed in accordance with the requirements of NPPF and the scoping report.
- The effect of the development on the asset, its setting and its significance must be assessed.
- Mitigation measures must also be suggested where harm is identified.

6.4 Planning and Legislative context

Overarching Legislation

6.4.1 The overarching legislation in relation to Heritage Management in Britain is provided by:

- The Ancient Monuments and Archaeological Areas Act 1979; and
- The Planning (Listed Buildings and Conservation Areas) Act 1990.

6.4.2 There are three main categories regarding Listed Buildings within England.

- Grade I buildings are of exceptional interest. Just 2.5% of listed buildings within England are Grade I.
- Grade II* buildings are particularly important buildings of more than special interest. 5.5% of listed buildings are Grade II* within England.
- Grade II buildings are of special interest warranting every effort to preserve them. 92% of all listed buildings are in this class within England.

National Policy

6.4.3 The National Planning Policy Framework (NPPF) was published on 27th March 2012 and replaces all previous national planning policy documents, including Planning Policy Statement 5: Planning for the Historic Environment (2010). The NPPF seeks to streamline the national planning policy, simplify the planning process and introduce the concept of presumption of approval for sustainable development. The NPPF sets out guidelines for Local Planning Authorities and developers alike.

6.4.4 Although consent for the NDR scheme is being sought via a DCO from the Secretary of State and not a planning permission from the local planning authority, regard has been had to the elements of the document:

6.4.5 Policy 132 sets out what constitutes harm to heritage assets and the requirements for justifying harm to assets, stating. Significance can be harmed or lost through alteration or destruction of the heritage asset or development within its setting. As heritage assets are irreplaceable, any harm or loss should require clear and convincing justification.

6.4.6 Policy 133 sets out the circumstances when consent should be refused because of harm to a designated heritage asset - Where a proposed development will lead to substantial harm to or total loss of significance of a designated heritage asset, local planning authorities should refuse consent, unless it can be demonstrated that the substantial harm or loss is necessary to achieve substantial public benefits that outweigh that harm or loss, whilst Policy 134 explains that where a development proposal will lead to less than substantial harm to the significance of a designated heritage asset, this harm should be weighed against the public benefits of the proposal.

6.4.7 In policy 135 the assessment of an applications effect on non-designated assets is explained - the effect of an application on the significance of a non-

designated heritage asset should be taken into account in determining the application. In weighing applications that affect directly or indirectly non designated heritage assets, a balanced judgement will be required having regard to the scale of any harm or loss and the significance of the heritage asset. Policy 139 further explains that non-designated archaeological assets of equivalent significance to scheduled monuments, should be considered subject to the policies for designated heritage assets.

- 6.4.8 The requirement for recording heritage assets prior to their loss is explained in Policy 141. Local planning authorities should ... require developers to record and advance understanding of the significance of any heritage assets to be lost (wholly or in part) in a manner proportionate to their importance and the impact, and to make this evidence (and any archive generated) publicly accessible. However, the ability to record evidence of our past should not be a factor in deciding whether such loss should be permitted.

Local Planning Policy

- 6.4.9 The Joint Core Strategy (JCS) covering the authority areas of Broadland District, Norwich City and South Norfolk was adopted in 2011 and forms part of the Local Development Framework. The element of the development plan relevant to the proposed development contains one policy of relevance to cultural heritage matters (Policy 8), however this does not cover the assessment of impact on heritage assets.. There are saved relevant policies regarding cultural heritage in the Broadland District Council Local Plan (Policies ENV10, ENV17, ENV18 & ENV20). There are 12 policies relating to Cultural Heritage presented in the City of Norwich replacement local plan (adopted 2004) the five most pertinent to the NDR are presented in section 5.4.3.3.

The Broadland District Local Plan Policies

- 6.4.10 Policy ENV10 relates to historic parkland and includes the statement Development which would adversely affect their character and setting will not be permitted.
- 6.4.11 Policies ENV17, 18 and 19 address ancient monuments and archaeological sites. These state that the Development which would adversely affect a scheduled ancient monument or other nationally important archaeological sites and monuments, or their settings, will not be permitted...

6.4.12 However for archaeological remains of less importance the following applies - Where there is no overriding case for preservation of a site of archaeological importance, development which affects the site will only be permitted when an agreement has been reached to provide for the evaluation, recording and where desirable, the excavation of the site. To enable a decision to be made by the Local Authority regarding archaeological issues, sites will be subject to an evaluation of their archaeological significance. Any planning permissions granted will be subject to appropriate conditions.

City of Norwich replacement local plan (adopted 2004) (www.norwich.gov.uk)

6.4.13 Policies HBE1-12 relate to cultural heritage. With regard to archaeology the plan sets out that development detrimentally affecting scheduled ancient monuments, or their settings will not be allowed. For other sites of archaeological interest, there will be a presumption in favour of preserving remains in situ. Where this is not appropriate agreements to investigate, excavate and interpret the findings will be secured through planning obligations.

6.4.14 Regarding historic buildings, Policy HBE7 states development affecting significant historical structures or buildings within the development site should take account of the chronology of their development and their physical and historical significance. Proposals in conservation areas will be considered with relation to the following (Policy HBE8):

- demolition of buildings or structures, including ancient walls, will only be permitted if they make little or no contribution to the area's character and appearance, and are accompanied by acceptable and detailed plans of appropriate new development, contributing to the enhancement of the conservation area;
- every effort to conserve and retain the features which contribute to the area's character can be demonstrated. Where historic features cannot be maintained in situ, arrangements should be made, for their salvage and reuse or transfer to a suitable location
- its design respects and is sympathetic to the form and character of the area's development including any extant historic plot boundaries and in particular takes account of the Conservation Area Appraisal for the area in terms of the built form elements and materials which are of significance for its character;

- sufficient detail is provided to demonstrate the townscape implications in relation to neighbouring buildings.

6.5 Baseline

- 6.5.1 Conclusions are provided below about the nature of the historic environment resource across the NDR route from the surveys to date. This section forms the baseline study presented in date order (generally described from east to west). The Norfolk Historic Environment Record (NHER) data and survey results are illustrated in Volume 2, Chapter 6: Cultural Heritage, Section C (Drawings MMD-233906-DT-0887 to 0908).
- 6.5.2 Previously known archaeological sites that lie within or near the route corridor are recorded in the NHER. The available dataset has been augmented by finds recovered during fieldwalking with metal-detector survey, geophysical survey and archaeological evaluation undertaken over specifically targeted areas along the route (where access was possible).
- 6.5.3 The Norfolk National Mapping Programme (NMP) aerial photographic survey has identified and mapped a large number of archaeologically significant cropmarks and earthwork sites along the NDR corridor (Drawings MMD-233906-DT-0896 to 0908). The full NHER dataset (300m buffer zone of the route), updated in August 2013, is tabulated in Volume 2, Chapter 6: Cultural Heritage, Section B.

Geology and Topography

- 6.5.4 The route is located on gently undulating land to the north of Norwich. At the western end of the route, around Taverham, the geological deposit is the Wroxham Crag Formation sand and gravel overlain by mid-Pleistocene glaciofluvial deposits of sand and gravels. Large deposits of brickearth are recorded further to the east, around Spixworth and Horsham St Faith and at Rackheath the route runs over alluvium deposited along the floodplain of the tributary stream of the River Bure. The route then runs through a large area of Happisburgh Glacigenic Formation Diamicton deposited up to 2 million years ago over Crag Group sand and gravel. The eastern end of the route, at the Broadlands Industrial Estate, is situated on bedrock comprising Crag Group sand and gravel.

Known archaeological sites

Scheduled Monuments

- 6.5.5 There are two Scheduled Monuments within a 1km buffer of the route. Horsford Castle (1003998) had a motte which was 77 metres by 85 metres wide, and around 2.3m high, with a single bailey 72 metres by 32 metres wide. The remains of the castle are on the edge of the study area. St Faith Priory (1003933) was founded by Robert Fitz Walter, the son of Walter de Caen who built Horsford Castle and also lies on the edge of the study area.

Prehistoric

- 6.5.6 The entire route is in a landscape that appears to have been utilised from the prehistoric period with background material including prehistoric flint artefacts from the Upper Palaeolithic through to the Iron Age. Trial trenches have in some cases been able to confirm the presence of geophysical anomalies and cropmarks, although evidence to securely date features has been sparse. There are a number of important prehistoric funerary monuments either evaluated as part of the archaeological work for NDR or seen within the vicinity of the route on aerial photographs.
- 6.5.7 Geophysical survey during 2012 and 2013 (ASYWAS 2013) revealed three linear features forming what appears to be an inverted D-shaped enclosure surrounding several possible pits or postholes between chainage 2300 and 2400. The site is located within the construction corridor, on the western side of the railway from Norwich to King's Lynn, adjacent to site 30315, within the parish of Taverham (Volume 2, Chapter 6: Cultural Heritage, Section C, MMD-233906-DT-0889).

Site 30315

- 6.5.8 A programme of evaluation trenching was undertaken to determine the nature of the cropmarks visible on aerial photographs within area 30315 (Volume 2, Chapter 6: Cultural Heritage, Section C – MMD-233906-DT-0889) between chainage 2400 and 2500. A linear earthwork uncovered during the course of evaluation work in Taverham (site 30315) is an important discovery. Although it was visible as a cropmark, its true significance was not understood until identified through trial trenching as a large ditch. Subsequent research shows its line to continue in a north-easterly direction, where it forms the boundary between Drayton and Felthorpe parishes. It also forms part of the boundary between Taverham and South Erpingham hundreds. Along part of its length it is visible as a low upstanding bank and shallow ditch, but not within the

immediate vicinity of the proposed scheme where it survives below ground only. Parish boundaries are some of the oldest surviving features in the modern landscape. Most were in the process of being ‘formalised’ between 900 and 1150 AD and were, in most cases, fixed by 1200 AD. Parish boundaries often perpetuate older boundaries, or ‘marginal zones’ in the historic landscape. In many cases parish boundaries follow ancient physical features in the landscape like rivers, streams, valleys, watersheds, or roads. In Norfolk, five other major linear earthworks of this type are known; the Fossditch, the Bichamditch the Panworth Ditch, the Launditch and the Devil’s Ditch. . Despite the investigations, the date of the feature is uncertain, but Saxon or Iron Age origin is most likely, with the presence of disarticulated human remains found nearby perhaps indicative of more Iron Age origin.

Site 124468

6.5.9 Archaeological trial trenching further to the east revealed postholes containing Bronze Age pottery and worked flint between chainage 2500 and 2900 (Ames and Sillwood 2012; (Volume 2, Chapter 6: Cultural Heritage, Section C – MMD-233906-DT-0889)). A small number of undated features, including a north-east to south-west aligned ditch and small pits/postholes were also recorded.

Site 18131

6.5.10 Two archaeological trenches were excavated across a large rectilinear enclosure cropmark, within the construction corridor, at Bell Farm, Reepham Road between chainage 3900 and 4300 (Site 18131; Volume 2, Chapter 6: Cultural Heritage, Section C – MMD-233906-DT-0890), initially considered to be an early Neolithic mortuary enclosure (Trimble and Watkins 2008). The trenching produced evidence which suggests the enclosure probably dates from the Bronze Age. However, a series of large pits, thought to be from an earlier, perhaps Neolithic, phase of activity were recorded within the enclosure. The excavated ditch sections were of a considerable depth (1.20m) suggesting that the site is relatively well preserved. This is supported by the discovery of undisturbed remnants of a burnt mound (a dump of burnt flints used to heat water). Usually, on arable land, these features only survive as scatters of burnt flint within the ploughsoil. Preservation is no doubt helped by the fact the land here has been set to pasture in recent years. A geophysical survey in 2012 across this area revealed a concentration of small

pit and ditch-like features indicating that the features revealed through cropmarks and the previous trenching exercise extend some distance.

Site 124223

6.5.11 A small number of ditches and pits were identified during trenching in the field to the east of site 18131 (Volume 2, Chapter 6: Cultural Heritage, Section C – MMD-233906-DT-0890), between chainage 4000 and 4400, but none of these could be firmly linked to the features identified to the west (Ames and Sillwood 2012), although they may be associated

Sites 124224

6.5.12 Further positive anomalies were confirmed as ditches and pits although generally undated at sites 124224 & 124225 (Volume 2, Chapter 6: Cultural Heritage, Section C – MMD-233906-DT-0890), they are considered to be prehistoric in date.

Site 35668

6.5.13 A total of 15 trenches were excavated at Site 35668 (Volume 2, Chapter 6: Cultural Heritage, Section C – MMD-233906-DT-0891) between chainage 9100 and 9800 (Ames and Sillwood 2012) which aimed to provide context data for finds recovered during the fieldwalking and metal detecting survey (Morgan and Hoggett 2008). To the south-east of the site, a pit containing four sherds of late Bronze Age pottery was revealed, alongside evidence of fish bone, wheat and oat (Ames and Sillwood 2012) at chainage 9500. A second but undated ditch was also present at chainage 9700. This archaeological evaluation indicated sparse evidence of archaeological activity in this area. The location of Bronze Age activity within this region is not unusual as numerous Bronze Age sites are recorded to the west at Horsford.

Site 35669

6.5.14 Ten trenches were excavated at site 35669 (Ames and Sillwood 2012; Volume 2, Chapter 6: Cultural Heritage, Section C – MMD-233906-DT-0891) targeting possible features identified during a geophysical survey (Railton 2009), within the Parish of Spixworth between chainage 10200 and 10600. Four thin linear cropmarks have also been identified within this area (NMP). A

small number of ditches and pits contained prehistoric pottery and worked flint.

Site 123748

6.5.15 Six trenches were excavated within site 123748 between chainage 10900 and 11000 (Ames and Sillwood 2012; Volume 2, Chapter 6: Cultural Heritage, Section C – MMD-233906-DT-0892), two of which targeted a large earthwork identified through the National Mapping Programme, the postulated Roman road between Brampton and Thorpe St Andrew. No absolute evidence of the road was identified but a compact layer containing Iron Age pottery was present, and might indicate an earlier origin for the track than previously considered. A small number of undated pits and ditches were also identified in these trenches, along with a post-medieval/modern posthole.

Site 49748

6.5.16 Site 49748 (Volume 2, Chapter 6: Cultural Heritage, Section C – MMD-233906-DT-0892) within the Parish of Sprowston, was evaluated with 20 trenches of which 14 contained archaeological features. The majority were undated ditches showing that earlier land divisions had occurred prior to the open field system that presently exist. Ditches were located in Trenches 1, 2, 5, 7, 8, 9, 12, 13, 14 and 18 with the most significant being a ditch located within Trench 2 containing early Neolithic pottery. To the west of site 49748 geophysical results undertaken in 2013 have revealed a series of anomalies which may be archaeological in nature.

6.5.17 In the parish of Beeston St Andrew ring ditches have been recorded on the NHER at various locations (NHER 21124, 50883 & 50804) which lie outside of the construction corridor. Other prehistoric monuments are within the parish of Horsford at Drayton and Felthorpe, where two Neolithic barrows are recorded (NHER 7763 & 52401), which may be the same feature.

Site 123960

6.5.18 Archaeological trial trenching across the area known as Broadland Gate, Site 123960 (Silwood & Ames 2010) revealed features within 17 of the 33 trenches (Volume 2, Chapter 6: Cultural Heritage, Section C– MMD-233906-DT-0894). Ditches mostly aligned north-south and east-west were revealed. Only flint artefacts were recovered from the ditches, with a few fragments of prehistoric

pottery indicating an early date for the site. To the north of this area, adjacent to a balancing pond, geophysics in 2012 uncovered further positive anomalies, close to rectangular shaped cropmarks.

6.5.19 Further to the south, in the Postwick Hub area of the scheme, a series of archaeological investigations including geophysical survey (Sabin and Donaldson 2007) and trial trenching (Trimble and Watkins 2008) revealed prehistoric remains including a ring ditch, possibly a Bronze Age barrow or henge monument.

Site 123955

6.5.20 The evaluation of Site 123955 Postwick Hub confirmed the survival of a large enclosure and other cropmark features (HER 124995) dated from the Neolithic through to the Bronze Age. Of the 14 trenches opened, seven were placed to target known cropmarks and of these, six located features which appear to correspond with the cropmarks. Additional ditches were discovered which had not appeared as cropmarks.

6.5.21 The most significant of the features were in Trenches 10 and 11, where the trenches had been placed to sample the northern and western elements of a rectilinear enclosure identified from cropmarks. In Trench 10 east–west ditch [15] contained finds of prehistoric date in its primary and upper fills. The north–south aligned ditch [19] on the western side of the enclosure contained middle Bronze Age pottery and struck flint. This enclosure is clearly of a prehistoric date and the ditch was still open to a certain depth during the Bronze Age. It may be that the enclosure had its origins as early as the Neolithic period and was being slowly backfilled, but still a feature in the landscape in the Bronze Age. The presence of a pit in the vicinity also containing Bronze Age pottery (Trench 12, pit [28]) is also significant, hinting at the presence of a prehistoric landscape, rather than features in isolation.

Site 49758

6.5.22 A probable Bronze Age barrow or hengiform monument (NHER 52036) was excavated as part of previous evaluation work along the route of the NDR (NHER 49758; Volume 2, Chapter 6: Cultural Heritage, Section C – MMD-233906-DT-0894) in the parish of Postwick with Witton. This feature was recognised during the evaluation trenching although it could not be precisely dated with only medieval pottery recovered from the upper fills. The proposed slip road where the ring ditch was located no longer forms part of the road

design and it will therefore be left undisturbed. A variety of prehistoric hengiform monuments or Bronze Age ring ditches are known in the wider landscape (NHER 52041; 21766; 51972 & 21766), but lie outside of the study area.

Roman

6.5.23 The Roman period appears to be characterised by land management ditches which are rare along the line of the proposed route. Within the parish of Great and Little Plumstead during excavations at Laurel Farm in 2006 a possible Roman roadside cremation cemetery was recorded (NHER 51007). This consisted of an eroded layer containing a quantity of Roman jars, and the lack of any building material suggests that there were no structures, certainly within the excavation area. It may be that this site is related to the Roman pottery kiln to the south, and may, in fact, be a dumping area for pottery.

6.5.24 A Roman road (NHER 7598) runs north-west to south-east crossing several parishes and coincides with part of the route of the NDR. The road is believed to run from Brampton (NHER 1124) to the riverside at Thorpe St Andrew and was investigated during an earlier evaluation of the NDR route (NPS 2008). This site (NHER 41874) did not uncover any evidence for the road, although the excavator noted that there is the possibility that it had been ploughed out.

6.5.25 Excavations by NAU in 1997 ahead of the development of a business park located Roman pottery kilns (NHER 31108), three in total, dated to the 2nd century. This industry is only thought to have been a small scale local enterprise.

6.5.26 The cropmarks of a possible Roman marching camp (NHER 16451) were noted on aerial photographs within Spixworth; metal-detecting and fieldwalking have produced Roman finds which make this camp locally important. This site is not within the construction corridor. Evidence of another square enclosure (NHER 13224) was seen to the north-west of this marching camp, within Horsham and Newton St Faith parish. This enclosure is undated, although a Roman coin found nearby (NHER 19644) may suggest a Roman date for the cropmark.

6.5.27 In the parish of Postwick, a Roman site containing cropmarks of a rectangular enclosure, field boundaries and a trackway (NHER 36341) is located in the most southerly portion of the search area. The enclosure measures 36m by 20m and to its immediate south there is an enclosed area measuring 140m by 130m, with internal subdividing ditches. A trackway and associated ditches

can be seen 250m to the east. Also further, multi-period cropmarks have been found at NHER 49560, and may represent phases of activity from late prehistoric through to post-medieval, the main phase of activity is probably Roman.

Saxon

6.5.28 There have been Saxon features and find spots within the vicinity of the proposed NDR. In the parish of Postwick (NHER 10219) a grubenhaus or sunken-featured building was discovered, previously interpreted as an Iron Age feature. The Laurel Farm excavations in Great and Little Plumstead uncovered Saxon activity (NHER 51008), which included several large fire pits and several more refuse pits. Iron slag was recovered from the fire pits, and the site is interpreted as a small scale industrial site with some evidence for occupation during the period.

6.5.29 In Thorpe St Andrew parish, the cropmarks of a pit-like feature, interpreted as a possible Saxon grubenhaus (NHER 52046), have been recorded. The field that contains this cropmark and cropmarks of other pit-like features (NHER 52045) is recorded as being covered with features of a probable geological nature and hence should be viewed with caution.

Site 124298

6.5.30 Trenching at area ENF124298 (Volume 2, Chapter 6: Cultural Heritage, Section C – MMD-233906-DT-0891) which had previously produced medieval and post-medieval finds during fieldwalking and metal detecting (Morgan and Hoggett 2008) revealed two small early Saxon pits and a ditch (Ames and Sillwood 2012; Trench 2) chainage 6900 and 7200. It lies within the area of St Faith's Fairstead from which numerous metal detected finds have been recovered. One of these finds was an early Saxon copper alloy wrist clasp from site (HER 18126) which is of interest because it places what was found during the evaluation into the context of wider early Saxon activity (Ames & Silwood 2012).

Medieval

Site 41884

6.5.31 Site 41884 lies to the north of Beeston St Andrew Hall and to the west of the B1150 North Walsham Road between chainage 2200 and 2300. Fieldwalking in 2005 recovered medieval and post-medieval pottery fragment with iron slag in the ploughsoil. No features or finds were seen in the one trial trench placed here.

Site 124298

6.5.32 At site 124298 rectilinear system of field boundaries visible as cropmarks were confirmed as being medieval during evaluation (Ames and Sillwood 2012; Volume 2, Chapter 6: Cultural Heritage, Section C – MMD-233906-DT-0891) between chainage 6900 and 7200. There was no clear evidence for associated areas of habitation on the site, although several medieval pits were identified. Two further ditches not visible as cropmarks appeared to represent an earlier, perhaps Roman phase of activity.

Sites 51049 & 50501

6.5.33 Sites 51049 and 50501, located between chainage 14900 and 15300, revealed features that could have been associated with the deserted medieval village at Rackheath; linear ditches are thought to represent former field boundaries, and possible extraction pits date to the 13th to 14th centuries (Ames and Sillwood 2012; Volume 2, Chapter 6: Cultural Heritage, Section C – MMD-233906-DT-0893)

Post-medieval

Site 124299

6.5.34 Site 124299 (Volume 2, Chapter 6: Cultural Heritage, Section C – MMD-233906-DT-0890) was first investigated by field walking which uncovered a selection of post-medieval finds. The area was subsequently subject to geophysical survey which produced a large number of bipolar magnetic anomalies. As a result of the trial trenching two ditches and one pit were recorded within this field. The finds from the ditch indicate a medieval to post-medieval date range.

6.5.35 The only post-medieval archaeological evidence recovered from field 35668 (Volume 2, Chapter 6: Cultural Heritage, Section C – MMD-233906-DT-

0891) were two ditches (Trenches 6 and 15) and two pits (Trenches 9 and 11). The ditch from Trench 6 produced 16th – 17th century pottery.

Undated/ambiguous

Site 50493

6.5.36 In Attlebridge, the field survey identified an aircraft crash site (Site F2- 50493; Volume 2, Chapter 6: Cultural Heritage, Section C – MMD-233906-DT-0889). The site is marked by a spread of aluminium airframe and twisted iron fragments which were situated within a dish-shaped depression. The depression is most likely to have been caused by the impact of the crash. The crash site is not recorded on the NHER and the date of the crash remains uncertain. However, it is likely to be a WW2 crash, possibly of an aircraft from the nearby USAAF airbase at Attlebridge. Ten trial trenches were excavated across the general area of the suspected WW2 crash site in 2010 between chainage 800 & 1100 (Ames & Silwood 2012). None of the trenches revealed any archaeological features or remains of the wreckage within this section of the proposed route. A c. 0.90m thick colluvial layer was revealed across this area.

Site 18126

6.5.37 At site 18126 (Volume 2, Chapter 6: Cultural Heritage, Section C – MMD-233906-DT-0891) two enclosures were noted, and were investigated by NPS Archaeology for the NDR project between chainage 5100 and 5300. The results of the evaluation were negative, with no features found in any of the trenches, although several fragments of possible Bronze Age flint were recovered. Geophysical survey in 2012 has revealed further possible enclosures to the west of this area (Between sites 124255 & 18126)

Site 49745

6.5.38 In Horsham St Faith parish (Site 49745) a medieval fair site (NHER 8126) known as St Faith's Fairstead is recorded between chainage 8400 and 8700. The fair was granted a charter in 1100 and continued to hold annual fairs until the mid-19th century. The fair was predominantly for the trading of cattle, and the site has yielded a great variety of metal-detected finds over many years. Evaluation by NAU in 2006 in preparation for the NDR (NHER 49745; Volume 2, Chapter 6: Cultural Heritage, Section C – MMD-233906-DT-0891)

produced no evidence for the fair even though the trench was placed to sample the densest scatter of artefacts.

Site 41874

6.5.39 Site 41874, (Volume 2, Chapter 6: Cultural Heritage, Section C – MMD-233906-DT-0892) within the parish of Beeston St Andrew, was to the east of the B1150 & area 41884. The proposed route of the NDR crosses the postulated line of a Roman road within this field (NHER 7598) between chainage 2300 and 2700. The road is marked on Fadens map of 1797 and is thought to have run between Brampton and Thorpe St Andrew. At this point the line of the road is marked by the thin north-west south-east 'Broadway'. A trench was placed across the postulated line of the Roman road but no trace of it was revealed. This is consistent with the other trenches designed to prove the existence of the Roman road, which have all been negative. The road may have been ploughed away in recent years. Other trenches to test anomalies in this area proved largely negative.

Site 124225

6.5.40 Four trenches helped to ascertain weak geological anomalies as modern in date between chainage 4600 and 4800.

Site 49757

6.5.41 Site 49757 (Volume 2, Chapter 6: Cultural Heritage, Section C – MMD-233906-DT-0894) lies to the north of Postwick where a proposed link road will connect the NDR to the Broadland Way industrial estate. Two targeted trenches revealed only geological features.

Historic Buildings

6.5.42 Historic buildings include statutory Listed Buildings (Grade I, II* and II), locally listed buildings and other features identified by local authorities as being of historical interest. This definition also encompasses structures of historic merit, for example railway bridges, boundary stones and statues. Designated and undesignated buildings and Conservation Areas are displayed in in Volume 2, Chapter 6: Cultural Heritage, Section C MMD-233906-DT-0886 to 0888.

6.5.43 At the western end of the route there are relatively few historic buildings in the study area. Moving eastwards, the route skirts around the south of the historic settlement areas of Horsham St Faith, which include a number of listed buildings. From Spixworth eastwards there are various historic buildings associated with the historic parklands, including gates, bridges and lodges, as well as the various home farms of the parks/estates. To the south of Rackheath Park, the route skirts around a historic former green in Plumstead, through a number of historic farmsteads towards more modern development in Postwick.

6.5.44 There are 52 Listed Buildings within the defined 1km study area of the proposed development (Table 6.4 and Volume 2 6.B). This includes four Grade I and two Grade II* Listed churches, whilst the remaining listed buildings are all Grade II listed.

Table 6.4: Historic Buildings (Listed)

NHER	Listed Building Ref	Value of Asset	Description
	228423	Medium	Poplars Farm house. 17th Century wing of larger house, with 19th Century additions, of rendered and rough cast brick, with red and black pantiled roofs. L-shaped plan of 2 storeys (Grade II).
48709	228418	Medium	The Lindens, Horsford (Grade II) House early 18th C with early 16th-C core
7795	228419	High	Parish Church, Horsford (Grade II*) Medieval parish church
17520	228420	Medium	Horsford Hall, Horsford (Grade II) Former 18th-C manor house
20966	228421	Medium	Little Orchard, Horsford (Grade II) House 18th C with 17th-C core (Not on plan)
43951	228099	Medium	The Kennels, Horsham & Newton St Faith early 18th century and later, of several builds. Brick, partly rendered and whitewashed, thatched roof. Two storeys and attics, L-shaped (Grade II).

NHER	Listed Building Ref	Value of Asset	Description
48738	228098	Medium	The White House, Horsham & Newton St Faith (Grade II) 17th-C house (BAR)
12250	228092	Medium	The Lilacs Horsham St Faith. House, early 17th century and later; much restored. Red brick, partly colour washed and rendered. Steeply-pitched pantile roof. Two storeys and attics, T-shaped.
11826	228486	Medium	The Smee Farmhouse. Farmhouse, early C18 and later, of brick and thatch
51101	359869	Medium	2 pairs gate piers & att. railings & terminal piers (Grade II) SE entrance to Spixworth Hall
8173	228195	Low	Gateway to Rackheath Park (Grade II) Cast and wrought iron gate piers and screen (gates missing)
8174	228069	Medium	Beeston St Andrew Hall. Walls to south Beeston St Andrew Hall (Grade II) 18th-C curved blind arcaded walls. (The walls to the north of the hall are earlier).
8172	228196	Medium	Rackheath Hall (Grade II) An 18th century Country House remodelled in the mid-19th-C by the Stracey family.
20138	228197	Medium	Bridge 100m NE of Rackheath Hall (Grade II) Early to mid-19th-C bridge linking to kitchen garden
41948	228088	Medium	Methodist Chapel on Church Street (Grade II Listed)
21666	228095	Low	The Clink (Grade II). An 18th century village prison or lock up, attached to a medieval and post medieval boundary wall.
8005	228083	High	Benedictine Priory of St Faith (Grade I Listed)

NHER	Listed Building Ref	Value of Asset	Description
21982	228483	Medium	South Lodge Cottage, Low Road, Little Plumstead. 16th century (Grade II Listed) (Not on plan).
48728	359870	Low	A type K6 telephone kiosk, designed by Sir Giles Gilbert Scott (1935) (Grade II Listed)
48737	228097	Medium	The Old Posthouse, 94 Norwich Rd 18th Century (Grade II Listed)
11528	228424	Medium	The Dog Public House. Early 17th century T-shape in plan (Grade II Listed)
	228082	High	The Parish Church of the Blessed Virgin & St Andrew (Grade I Listed)
	228070	High	The Parish Church of St Peter (Grade I Listed)
	228194	High	The Church of All Saints in Rackheath (Grade I Listed)
	228419	High	Parish Church of All Saints in Postwick & Witton (Grade II* Listed)
	468956	Medium	Church at St Andrew's Hospital (Grade II Listed)
	1050874	Medium	Barn at the site of Spixworth Hall (Grade II Listed)
	1050875	Medium	Garden wall at gatepiers south of barn and Gaffers cottage (Grade II Listed)
	1050876	Medium	Granary to west of barn (Grade II Listed)
	1050876	Medium	2-5, Church Street (Grade II Listed)
	1050901	Medium	The King's Head Public House (Grade II Listed)
	1050902	Medium	Meadow Farm House (Grade II Listed)
	1050904	Medium	The Gildencroft (Grade II Listed)

NHER	Listed Building Ref	Value of Asset	Description
	1051488	Medium	Grove Farm House (Grade II Listed)
	1051489	Medium	Corn Barn and Cart Shed at the Grove(Grade II Listed)
	1051545	Medium	Little Orchard (Grade II Listed)
	1051550	Medium	Barn 50m north west of Low Farm House(Grade II Listed)
	1152491	Medium	Waytes House (Grade II Listed)
	1152508	Medium	Mill Farm House (Grade II Listed)
	1152889	Medium	Church of St Mary the Virgin (Grade II Listed)
	1170605	Medium	Manor Farm Cottages (Grade II Listed)
	1170619	Medium	The Stower Grange (Grade II Listed)
	1170828	Medium	Lower Farm House and attached barn (Grade II Listed)
	1263402	Medium	Boatman's Foremans' Cottage (Grade II Listed)
	1372664	Medium	Manor Farm House (Grade II Listed)
	1372677	Medium	Barn and Byre at the Grove (Grade II Listed)
	1372678	Medium	The Old Lodge (Grade II Listed)
	1372681	Medium	The Church of All Saints (Grade II Listed)
	1372707	Medium	St Andrew's Hospital (Grade II Listed)
	1372960	Medium	Village Hall (Grade II Listed)
	1372961	Medium	The Oaks (Grade II Listed)
	1372985	Medium	Gaffers Cottage (Grade II Listed)

6.5.45 6.5.45 Other Historic Buildings (not statutory listed) that have also been noted within the vicinity of the route corridor are described in Table 6.5 below.

Table 6.5: Selected non-designated historic buildings

NHER	Value of Asset	Description
-	Low	West Farm, Horsham St Faith
12258	Low	Red Hall farm complex.
8176	Low	Late 19th-C Hydraulic Ram (connected to Rackheath Hall by over 1 mile of cast-iron piping)
55989	Low	WWII accommodation sites (Gazebo Farm) associated with Rackheath Airfield
47126	Low	Hall Farm, Rackheath Park, c.1820
50041	Low	Laurel Farm, Gt & Lt Plumstead
12637	Low	Great Plumstead Hall
8142	Low	Possible site of St Andrew's church, Beeston St Andrew, ruins by the mid 16th Century
8022	Low	Spixworth Hall/Spixworth cottages

Conservation Areas

6.5.46 There are two conservation areas within 1km of the DCO boundary. This include the Thorpe End Garden Village Conservation Area, which lies c. 300m to the east of the new road, but off-line improvements will be required within the conservation area. Thorpe End Garden Village was a planned development by Percy Howes and Co in the 1930s, following the model of garden cities such as Letchworth and Welwyn. The development was deliberately separated from Norwich and characterised by wide verges, chestnut trees and the village green (Broadland District Council 2010).

6.5.47 The Horsham St Faith Conservation Area lies c.400m away from the DCO boundary. The conservation areas significance lies in its historical associations with a Benedictine priory (scheduled monument and grade I

listed building) which was the precursor to the village (hence St Faith) and still stands on the west side.

Historic Landscapes

6.5.48 Historic landscapes comprise visible elements of the landscape fashioned by human occupation such as, for example, field patterns, walls and hedgerows, drainage systems, lime kilns, barns, historic woodlands, village greens and historic parks. They also include sites of historical events such as battlefields.

6.5.49 The route travels through a particularly distinctive area of historic landscape to the north-east of Norwich. This area can be characterised by the 8 separate historic landscape character areas recorded in the HER (Table 6.6). Parks of varying size are loosely clustered along with a series of small blocks of ancient woodland. These are predominantly private landscapes although Beeston and Red Hall have minor public roads crossing them. The overall perception is one of a well-wooded landscape with some visible parkland features.

Table 6.6: Historic Landscapes and parklands

NHER	Landscape Ref:	Description
61679	HNF55372	Spixworth Park. Landscape park visible on OS survey 1883 6 inch map
62644	HNF56247	Beeston Old Hall/Red Hall Park. Minor park associated with Beeston Old Hall (HER relates to Hall) (not illustrated)
30495	HNF40903	Beeston St Andrew Hall Park
56245	HNF 62642	Sprowston Lodge Park. Small rectangular park adjacent to Beeston St Andrew Park. Once occupied by a branch of the Stracey family. Described in White's 1845 directory as a 'neat white brick mansion' with 'pleasure grounds' (not illustrated)
30522		Sprowston Hall Park. First Sprowston Hall built c.1560 for Corbett family. Later associated with Gurney family who rebuilt the Hall in neo-Elizabethan style 1872–6. Additions 1905 and more recently in association with its use as a

NHER	Landscape Ref:	Description
		hotel and golf club. Parkland remodelled through use as golf course though a number of mature trees survive. Surveyed by NCC/UEA in 1989–91 (not illustrated)
30518	HNF40826	Rackheath Park and WWII airfield accommodation sites
21637		Gt Plumstead Hall Park, Gt & Little Plumstead (not illustrated)
8137	HNF46673	Horsham St Faith WWII Airfield – A few WWII buildings extant. Site includes aircraft museum with relocated WWII building (not illustrated)

6.5.50 The historic landscape across the route includes eight locally listed historic landscapes. There are two locally listed parklands which will be directly impacted by the NDR route; Beeston St Andrew Park and Rackheath Park (section 5.7.9).

6.5.51 In addition to the above, the Historic Landscape Character data provided by Norfolk HER indicates that the proposed route passes between (not through) two areas of ancient woodland.

6.5.52 The route runs through Beeston St Andrew Park, a locally listed parkland classified as informal parkland of unknown to post-medieval date.

6.5.53 The south-eastern edge of 18th – 20th century woodland, which is a plantation on the western side of the road A1151 will be cut by a proposed roundabout and will also cut into the north-western edge of 18th-20th century woodland plantation on the east side of the road.

6.5.54 The route is planned to cut through a further section of 18th – 20th century woodland plantation to the west of New Rackheath. This section of the route also passes through and to the east of Rackheath Park, a locally listed parkland classified as informal parkland of unknown to post-medieval origin.

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6.5.55 Historic landscapes comprise visible elements of the landscape fashioned by human occupation such as, for example, field patterns, walls and hedgerows,

drainage systems, lime kilns, barns, historic woodlands, village greens and historic parks. They also include sites of historical events such as battlefields.

6.5.56 The route travels through a particularly distinctive area of historic landscape to the north-east of Norwich. This area can be characterised by the 8 separate historic landscape character areas recorded in the HER (Table 6.6). Parks of varying size are loosely clustered along with a series of small blocks of ancient woodland. These are predominantly private landscapes although Beeston and Red Hall have minor public roads crossing them. The overall perception is one of a well-wooded landscape with some visible parkland features.

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6.5.58 In addition to the above, the Historic Landscape Character data provided by Norfolk HER indicates that the proposed route passes between (not through) two areas of ancient woodland.

6.5.59 The route runs through Beeston St Andrew Park, a locally listed parkland classified as informal parkland of unknown to post-medieval date.

6.5.60 The south-eastern edge of 18th – 20th century woodland, which is a plantation on the western side of the road A1151 will be cut by a proposed roundabout and will also cut into the north-western edge of 18th-20th century woodland plantation on the east side of the road.

6.5.61 The route is planned to cut through a further section of 18th – 20th century woodland plantation to the west of New Rackheath. This section of the route also passes through and to the east of Rackheath Park, a locally listed parkland classified as informal parkland of unknown to post-medieval origin.

Historic Parkland

6.5.62 Beeston St Andrew and Rackheath Parks are both directly affected by the proposed route and have therefore been considered more fully. They are shown in Volume 2, Chapter 6: Cultural Heritage, Section C MMD-233906-DT-0886 to 0888.

Beeston St Andrew Park

- 6.5.63 The park at Beeston St Andrew probably dates from the 17th century, when the land was owned by the Corbett family who also owned Sprowston Manor. The curtain walls to the north of the present house are considered to date from this period.
- 6.5.64 An estate map of 1722 depicts an earlier house and park of geometric design. By the early 19th century the park had been radically remodelled and the straight lines replaced by rounded clumps and curving paths. The only element of the earlier scheme that appeared to survive was the line of the former avenue from the present-day North Walsham road. This avenue also forms part of a projected Roman Road (HER 7598).
- 6.5.65 The park is unusually long and rectangular. The current Beeston Hall, a later replacement, was designed by local architect Edward Boardman in 1897. The various estate lodges and cottages all appear to be of late 19th- and early 20th-century date, although the Park Farm complex is earlier.
- 6.5.66 In general, the park has not altered in its basic form since the early 19th century. Significant plantation belts survive to contribute to the well-wooded appearance of this area. The parkland to the south of the Hall is in better condition, with part used for grazing and better survival of mature standard trees. The northern half of the park has lost its standard trees and clumps of trees, along with part of the north-eastern boundary, and is partially under the plough.
- 6.5.67 A minor public road crosses the park to the south of the hall, although the lodges at either end create a private feel. There is no formal public access within the park.
- 6.5.68 This parkland is undesignated but is covered by Broadland District Council Local Plan policy ENV10 'Historic Parklands'. The Hall itself is unlisted but the curtain walls flanking the southern facade of the hall are Grade II listed.

Rackheath Park

- 6.5.69 Rackheath Park is a notably large park, around a square plastered brick Italianate Hall. The parkland is incised by a minor tributary of the River Bure, which creates areas of striking landform. A deer park existed here on a 1588 map of Mousehold Heath. A landscape park was in existence by the later 18th century and was associated with the Stracey family from 1773 onwards. The

parkland was extended over heathland to the south in the early 1800s. The Hall was remodelled in the mid-19th century.

- 6.5.70 Rackheath WWII airfield was established in 1943/4 on a site adjacent to the park. Accommodation blocks for 2400 USAAF personnel were built in the park woodland. The Hall was requisitioned for use by the officers and the main routeways were overlaid with concrete.
- 6.5.71 The park survives in better condition to the west, where the main approach to the hall is located. This area is mainly in (horse) grazing use and a number of mature parkland trees have survived here. The plantation woodland has also survived well.
- 6.5.72 The eastern boundary of the park is not well defined and appears to have moved over time. Changes in use and fragmentation of ownership since the sale of the park in 1949 have impacted on condition. The eastern side towards Green Lane is today in mixed use and multiple ownership. The Hall has been sub-divided into apartments along with adjacent new building. There are a variety of business and amenity uses in the area parallel with Green Lane. These include scaffold storage, plant nursery and car repairs. Several detached bungalows have also been built here.
- 6.5.73 WWII Accommodation clusters, bomb shelters and other unidentified ancillary buildings survive within the park (NHER 50740), albeit in poor condition. The main concreted routes through the park also remain.
- 6.5.74 The parkland is undesignated, but is covered by Broadland District Council Local Plan policy ENV 10 'Historic Parklands'. The Hall, entrance gates and a bridge are all individually grade II listed.

Catton Hall

- 6.5.75 The Catton Hall Grade II* registered park and garden (list number 1000269) is located approximately 2km to the south of the proposed development. The park is located on the north side of Norwich, completely surrounded by urban development including the Norwich inner ring road on its southern side. The significance of the park lies with its design by Humphrey Repton (his first commission); its association with Catton Hall (the principle, u-shaped building) and associated orangery, South Lodge and south entrance piers (all Grade II listed); and historic association with the City of Norwich. The main views out of the site are from the south front of the Hall looking south over the park to

the rooftops of the city in the distance, a gap in the tree line focusing the eye on the spire of Norwich Cathedral.

Ancient Woodland

6.5.76 Ancient woodland is defined as sites that have been woodland continuously from AD 1600 or earlier. The proposed route passes through an area containing a series of blocks of ancient woodland although it does not directly impact upon them. These areas are currently identified and mapped under Broadland District Council policy ENV 7 'Ancient Woodlands'. A number of Ancient Woodlands are located within the surrounding area of the site: Spowston Wood lies adjacent to the site; Ladies Wood, Church Carr, Beeston St Andrew; Church Wood, Rackheath and Tolshill Wood at Spowston.

6.6 Mitigation

6.6.1 The identification of potential impacts to heritage assets is an important part of the iterative design process because it can help avoid or minimise potential negative effects of the proposed development by avoiding physical damage or changes to setting

Approach to Mitigation

6.6.2 Mitigation by design is the preferred option, and for the NDR has included: works to reduce potential impacts on the settings of heritage assets such as planting trees or shrubs, creation of bunds to reduce road noise and block views, and/or grading the back of bunds for return to agriculture and integration with the local topography. These measures can, however, also themselves have an impact on archaeological remains.

6.6.3 Impacts of the proposed scheme on the setting of heritage assets can be mitigated by the use of appropriate landscaping. Mature landscape planting can reduce the visual impact by integrating the new road with its surroundings. Landscape mitigation proposed for the scheme includes native hedgerow and tree planting along the new road, earth bunds and areas of woodland planting to screen views (see Chapter 7: Landscape).

6.6.4 Where effects on identified archaeological assets are unavoidable appropriate mitigation measures are proposed to offset the loss of the resource.

Archaeological mitigation

- 6.6.5 The preferred mitigation option for archaeological sites is to preserve them in situ. Where this is not possible, the alternative is to make a detailed record of the archaeological remains that would be lost in accordance with professional standards and guidance. This is referred to as 'preservation by record'. Due to the general nature of the construction, preservation in situ will be difficult to achieve (through avoiding impacts on archaeological remains) in many areas, although there may be opportunities, for example under landscape bunds or construction compounds, where construction activities can be controlled to prevent damage. Additional strategies (fieldwalking, geophysical survey & targeted trial trenching) employed to inform the baseline study will form part of the overall preservation by record mitigation strategy.
- 6.6.6 As described above, not all areas of the route have been archaeologically surveyed and therefore, an additional programme of survey will be required to finalise the mitigation strategy.

Fieldwalking and Geophysical Survey

- 6.6.7 Fieldwalking and geophysical survey, along with cropmark analysis from the National Mapping Programme has been undertaken along the majority of the proposed route. Due to alterations in the design of the new road some areas such as roundabout and the edges of the road have not been subject to geophysical survey, where access has not been possible. These areas will be surveyed, where possible, to inform the archaeological mitigation strategy.

Targeted Trial Trenching

- 6.6.8 Following completion of the geophysical survey, additional targeted trial trenching will be undertaken in areas of archaeological significance, identified by the surveys and the assessment report. The trial trenching program will be used to identify the type, quality, extent and depth of archaeology within the footprint of the new road and within any associated features such as lagoons and bunds. This data will inform the archaeological mitigation strategy.

Preservation by Record

- 6.6.9 A programme of archaeological mitigation in defined and specific areas of archaeological importance identified in this assessment and through further

surveys will need to be undertaken. This is likely to involve excavation of remains in advance of, and during the construction of the new road. A mitigation strategy will be produced, and agreed with Norfolk Landscape Archaeology following completion of the above surveys.

6.6.10 The time required for this mitigation will have to be factored into the scheme’s construction programme. The requirements for archaeological mitigation will be set out in an overarching archaeological Written Scheme of Investigation, and will also need to be incorporated into the Construction Environmental Management Plan (CEMP) and their implementation facilitated and monitored by an Archaeological Manager and/or an Archaeological Clerk of Works.

6.6.11 The archaeological work is likely to involve excavation of remains in advance of, and during the construction of the proposed scheme. A mitigation strategy will be produced, and agreed with Norfolk Landscape Archaeology. The sites identified to date which will require archaeological mitigation are listed in Table 6.7. Further areas of mitigation are likely to be needed following further surveys and consultation.

Table 6.7: Archaeological Mitigation areas identified to date

NHER/Site	Archaeological Resource	Implementati on	Action	Compliance mechanism
30315	Possible Iron Age Ditch and bank-on line of parish boundary	Archaeologic al Investigation	Contract or	WSI, CEMP
30315	Field systems of possible IA date evaluated by trial trenches and further associated features seen in 2012 geophysics to the west	Archaeologic al Investigation	Contract or	WSI, CEMP
124468	Prehistoric discrete features	Archaeologic al Investigation	Contract or	WSI, CEMP
49748	Ditch or pit with early Neolithic pottery (NPS 2012)	Archaeologic al Investigation	Contract or	WSI, CEMP

NHER/Site	Archaeological Resource	Implementation	Action	Compliance mechanism
49758 (T1 & T3)	Rectilinear enclosure and possible ring ditches	Archaeological Investigation	Contractor	WSI, CEMP
123955	Large prehistoric enclosure and cropmarks (NPS 2012)	Archaeological Investigation	Contractor	WSI, CEMP
124298	Early Saxon pits and ditch (NPS 2012)	Archaeological Investigation	Contractor	WSI, CEMP
51049	Deserted medieval village (edge of)- Rackheath (NPS 2012)	Archaeological Investigation	Contractor	WSI, CEMP
50501	Deserted medieval village- Rackheath (NPS 2012)	Archaeological Investigation	Contractor	WSI, CEMP
18131	Large rectilinear enclosure. Probably dates from the Bronze Age (NPS 2012). Also prehistoric pits and burnt mound recorded in trial trenches.	Archaeological Investigation	Contractor	WSI, CEMP

Historic Building mitigation

6.6.12 There will be no direct physical impacts on any listed buildings identified within the study area. Visual impacts on the setting of historic buildings are minimised as much as possible, with impacts on all buildings incorporated in mitigation outlined in the Landscape Chapter (Chapter 6).

6.6.13 Construction of the road will result in the loss of some unlisted historic farm buildings and WWII buildings within Rackheath Park. These will be recorded to supplement the existing report on the farmhouse (NHER 42007) and all historic fabric recovered from the site for re-use.

6.6.14 In the case of WWII buildings in the vicinity of Gazebo Farm, these will be investigated and recorded as part of a wider investigation into the WWII buildings and occupation of the parkland. The buildings may have only minimal inherent quality in terms of their fabric, which was designed for only a short life, but have other historic value. Without the NDR these buildings would be left to decay.

Historic Landscape mitigation

6.6.15 The proposals to mitigate the visual impacts of road building on the historic landscape are dealt with in the Chapter 7: Landscapelandscape chapter (Chapter 6).

6.6.16 As a general historic landscape mitigation principal, relict field corners that are created through road construction, will be subject to planting schemes. This has several potential benefits. In terms of the general historic landscape, it means the lines of the former field boundaries are fossilised. The planting provides visual screening. It is also likely to provide biodiversity benefits. The landscape plan includes localised moulding (and where necessary dense planting) to screen the route from the most affected historic buildings.

6.6.17 Mitigation in respect of the severance impact on the historic parkland is more problematic. Severance is difficult to mitigate as key relationships are lost, usually irreversibly. A range of measures have therefore been proposed which provide a degree of compensation, but in this case cannot be regarded as reducing the adverse impact. Mitigation measures include new planting and a combination of mounding and planting to tie into existing parkland and blend the new road into the landscape.

Key affected Historic Landscapes

Beeston Park

6.6.18 Beeston Park will be severely affected by severance. The northern third of the park, which is approximately 200 years old, and the line of the former long carriage drive, which is older and is the sole surviving feature of the earlier park, will be severed and no physical link retained between the two halves.

6.6.19 Incorporated landscape mitigation proposals propose a gradual grading of land towards the road, effectively a large-scale ha-ha. This will allow a visual connection to be retained when viewing the park towards the north. .

6.6.20 Where the route crosses the former parkland to the north of Beeston Hall, a gentle graded mound would screen views of the NDR from the Hall without appearing intrusive within this sensitive landscape. Planting would be restricted to clumps of specimen trees to reinforce the parkland feel. Further east towards Beeston Lane however, a combination of mounding and dense planting would be provided to screen the route from the estate cottages and the church. It is also proposed to update the NCC/UEA survey of 1989–91 to include all changes since this report was produced and to produce a comprehensive photographic record.

Rackheath Park

6.6.21 Rackheath Park will also experience a degree of severance, but to a lesser extent than Beeston as the line of the road is broadly parallel with the eastern boundary of the park and is mostly screened by the landform from the intact parkland area. Extensive mitigation planting and screen mounding is proposed along the route which would help to blend the new road into the landscape and screen it from affected properties.

6.6.22 Information held on the park is not currently as detailed as many others in the county as it was not comprehensively surveyed by NCC/UEA 1989–91. A full report will be produced to include a comprehensive photographic record. This will include a report on the WWII occupation and remains should also be identified, plotted and inventoried.

Horsham St Faith Airfield

6.6.23 An area to the north-west of the airfield site, which formed part of the former WWII airfield and is home to the aircraft museum, will be used as a site compound.

6.6.24 A record of any WWII remains will be made ahead of any site works. It is proposed to relocate the museum to a nearby site of similar size.

Table 6.8: Summary table of Historic Landscape mitigation

Historic Landscape	Impact of scheme	Mitigation to be implemented	Action	Compliance mechanism
Beeston Park	High	Graded Mound Planting schemes Survey report	Contractor Contractor Contractor	CEMP
Rackheath Park	High	Planting and Screen mounding Survey report	Contractor Contractor	CEMP
Horsham St Faith Airfield	High	Record of WWII structures. Relocation of museum	Contractor	CEMP

6.7 Assessment of Effects

Construction impacts on archaeology

6.7.1 The construction of the new road, structures, lagoons, bunds and construction compounds is of most relevance to the assessment. In particular, those areas that will experience major ground disturbance through the construction period will be sensitive.

6.7.2 The construction of the scheme will have a permanent and long term impact on the potential archaeology (where present). Groundworks during the excavation of lagoons or balancing ponds (used for drainage) will have a major effect on any archaeological assets. Ground reduction to formation depth will also have a permanent and long term impact, whereas areas requiring only topsoil stripping, for example, access roads or temporary site compounds, although could cause permanent damage to archaeological remains, when the land is restored at the end of the construction period its

impact on the historic landscape should cease. There is also the potential for impacts relating to compaction, for example the areas set aside for bunds may pose a threat to features and deposits, leaving them inaccessible and susceptible to damage from the weight above. The impact on buried remains can also come from changes in the below ground hydrology, i.e. waterlogged deposits which contain organic archaeological remains may get affected by large scale drainage.

- 6.7.3 The necessary ground disturbance will have an adverse impact (of varying magnitude depending on the value of any designated site) on any archaeological remains within the working route. The magnitude of impacts is the degree of change that would be experienced by the asset and its setting if the scheme were to be completed as compared with a 'do nothing' situation. The determination of magnitude of impact has been based on the vulnerability of heritage assets within the study area, the current state of survival/condition and the nature of the impact upon them. The survival and extent of the archaeological deposits is often uncertain and consequently, the magnitude of impact can be difficult to predict with any certainty.
- 6.7.4 Archaeological assets within the NDR working corridor will be of differing values and, as such overall effects of differing significance will be generated. The assessment of the significance of known archaeological sites is detailed in the tables which follow the assessment of value and magnitude of impact.

Prehistoric sites

Site 30315

- 6.7.5 The enclosures discovered at this site, visible as crop marks and geophysical anomalies, have been dated to the Roman and medieval period during archaeological evaluation (NPS 2008). The large ditch which forms the parish boundary may have originated during the Iron Age and is of local importance. As the ditch is a linear earthwork running for a long distance to both the south and north of the proposed NDR any strategy to avoid the heritage asset would not be possible. The new road will only cause partial damage to the monument where it bisects it, resulting in a loss to only a small percentage of the ditch which only survives below ground (at this location) as a whole. The value of Site 30315 has been assessed to be medium, and the magnitude of impact has been assessed to be moderate adverse.

Site 124468

6.7.6 The construction of the road will directly impact this site. The archaeological evaluation (NPS 2012) revealed a number of discrete features with two dated to the Bronze Age along with an undated ditch. It is likely that the pottery represents just one vessel – a Biconical Urn. Such vessels were current in the Middle Bronze Age (MBA) (around 1800–1300BC) and have been found accompanying burials and in domestic contexts. The geophysical survey did not reveal any definite evidence of prehistoric occupation, but often prehistoric drip gullies are shallow and will not necessarily show on geophysical survey results, especially within an area of high cultivation disturbance from potato planting. The value of Site 124468 (Volume 2, Chapter 6: Cultural Heritage, Section C MMD-233906-DT-0889) has been assessed to be medium, and the magnitude of impact has been assessed to be moderate adverse.

Site 18131

6.7.7 The construction of the road will directly impact this site. This site is of Medium value and the extensive cropmarks and geophysical anomalies have been proven as archaeological (NPS 2008), although dating was unclear. The enclosure may represent a Neolithic elongated mortuary enclosure. Neolithic long mortuary enclosures are one of the rarest prehistoric monuments in Britain with only a handful having been excavated to modern standards. Crop marks identified on the NMP to the immediate north of this suspected ‘mortuary enclosure’ are of a similar shape and size, but look more characteristic of a Roman or medieval field system. This site is of archaeological importance, especially as it remains somewhat enigmatic even after archaeological evaluation.

6.7.8 The large number of pits may indicate deliberate backfilling, which may provide evidence of prehistoric ‘ritual’ activity. The high quantity of burnt flint (362 fragments) and flint tools (53 in total) recovered from this site may indicate these discrete features are flint extraction pits rather than ritual in any way. Additional discrete features have been identified during the 2012 geophysical survey to the west of this enclosure, which are probably associated. The anomalies/pits proven in trial trenching (NPS 2008) on the inside of the enclosure have proven to be large and deliberately backfilled. Within trench 2 the pottery recovered was either early Neolithic or early Iron Age. Internal features within mortuary enclosures are generally sparse, with only a few ever having internal features recorded. The value of Site 18131 has been assessed to be medium, and the magnitude of impact has been assessed to be moderate adverse.

Site 124223

6.7.9 The construction of the road will directly impact this site. This site is adjacent to the possible mortuary enclosure (described above). A large ditch 2.4m wide was established close to area 18131. It is possible that the cropmarks and features seen here are associated. The remainder of the area does not hold any further potential as the trenches were mainly blank with only sparse ditches or natural tree hole features present. The value of Site 124223 has therefore been assessed to be low, and the magnitude of impact has been assessed to be moderate adverse.

Site 124224

6.7.10 Two ditches were revealed which formed part of a large enclosure seen as cropmarks (NMP) to the southwest of the NDR. The ditches remained undated after evaluation. The NDR only affects the northern limits of this enclosure, with the majority remaining undisturbed by the proposed road. The value of site 124224 has been assessed as low and the magnitude of impact as moderate adverse.

Site 35668

6.7.11 The construction of the road will directly impact this site. The only archaeological evidence recovered from this field were two ditches (Trenches 6 and 15) and two pits (Trenches 9 and 11). The ditch from Trench 6 produced 16th – 17th century pottery. The two pits in Trenches 9 and 11 had similar fills consisting of grey-brown-black sandy silt. Four sherds of late Bronze Age pottery were recovered from the pit within Trench 11, also the environmental sample produced evidence of fish bone, wheat and oat. The location of Bronze Age activity within this region is not unusual as numerous Bronze Age sites are recorded to the west at Horsford. The value of Site 35668 has therefore been assessed as low with a moderate adverse magnitude of impact.

Site 35669

6.7.12 The earlier fieldwalking and metal detecting surveys had produced Roman metalwork and medieval pottery. Several discrete bipolar magnetic anomalies (linear in shape) towards centre of field are likely to represent further electricity cables, one of which was located in Trench 6.

6.7.13 The trial trenching revealed several undated ditches and pits from which prehistoric pottery and worked flint were recovered. One pit was dated to the Roman period and also included burnt flints. The scarcity of the archaeological features seen within the trenches and the limited cropmarks identified from the National Mapping Programme would lead to the suggestion that this site holds little further potential. The site 35669 has been assessed as low value with a moderate adverse magnitude of impact.

Site 123748

6.7.14 The construction of the road will directly impact this site, west of 49748, situated on an interfluvium between two shallow valley/watersheds. Trenches 2, 4 and 6 were placed on the line of a postulated Roman Road which ran between Brampton and Thorpe St Andrew. Although no direct evidence for the road was encountered, compact natural ground was observed in Trench 2. Iron Age pottery was recovered from the compact ground and from a pit or tree hole within the same trench. There is the possibility that this road may have originated in the Iron Age and although there was only limited evidence for the road, the site is likely to hold further potential given the clear cropmarks and evidence of extraction pits. The value of Site 123748 has been assessed to be low, and the magnitude of impact has been assessed to be moderate adverse.

Site 49748

6.7.15 A total of 20 trenches were placed across this field to a cumulative length of 800m (Volume 2, Chapter 6: Cultural Heritage, Section 6C MMD-233906-DT-0892) between chainage 13400 and 14200. Of the 20 trenches, 14 contained archaeological features and deposits. The majority were undated ditches showing that earlier land divisions had occurred prior to the open field system that presently exists. The construction of the road will directly impact this site.

6.7.16 A series of ditches were uncovered in Trench 2, one of which contained early Neolithic pottery. Enclosures of possibly Neolithic date have been recorded elsewhere along the route in particular at site 18131 (described above). The value of this area within site 49748 has been assessed as medium and the magnitude of impact as moderate adverse.

Site 123960

6.7.17 This site at Broadland Gate, which was evaluated as the area for the contractors compound, proved known cropmarks as archaeological and at least two phases of activity. It has proven difficult to accurately date the ditches as only sparse finds were present, such as a few pieces of prehistoric pottery or worked flints. Even though the site lies over a probable prehistoric field enclosure the archaeology is sealed by a layer of subsoil. Even though the construction of the compound will directly impact this site, the ground reduction is not expected to be greater than the depth of the surviving subsoil. The value of site 123969 has therefore been assessed as low and the magnitude of impact as minor adverse.

Site 123955

6.7.18 The evaluation of area 123955 Postwick Hub confirmed the survival of a large enclosure and other cropmark features (HER 124995) as well as archaeological remains not recorded as cropmarks.

6.7.19 It may be that all of the ditches relate to a field system contemporary with the enclosure, although the lack of dating evidence or stratigraphic relationships encourages caution. This work demonstrates that these features are not of Roman origin, and are probably very much earlier; the landscape of Postwick having been greatly utilised during the prehistoric period, from the Neolithic to the Bronze Age. The value of site 123955 has been assessed as medium and the magnitude of impact as moderate adverse.

Site 49758

6.7.20 Construction associated with the Postwick Hub section of the NDR is likely to have an impact on the archaeology. There are prehistoric archaeological features present and surviving in good condition beneath the topsoil. The archaeological anomalies were first detected by magnetometer survey (AS 2006) and confirmed with three trial trenches (NPS 2008).

6.7.21 The value of site 49758 has been therefore assessed as medium and the magnitude of impact as moderate adverse.

Saxon

Site 124298

6.7.22 Site 124298 (Trench 2) contained two pits and a ditch. This area will not be directly affected by the construction of the road. Recovered from one of the pits was a sherd of early Saxon pottery and the environmental sample taken contained cereal grains, charcoal, charred root/stem which may imply midden-type waste. Midden deposits imply settlement located relatively close by.

6.7.23 This site was very similar to that of site 35668 (Volume 2, Chapter 6: Cultural Heritage, Section C MMD-233906-DT-0891) in the fact that very little archaeological evidence was recovered but what was found has considerable value in the understanding of activity within the western part of the Broadland region. It lies within the area of St Faith's Fairstead from which numerous metal detected finds have been recovered. One of these finds was an early Saxon copper alloy wrist clasp from site (HER 8126) which is of interest because it places what was found during the evaluation into the context of wider early Saxon activity. The value of Site 124298 has been assessed to be Medium, and the magnitude of impact has been assessed to be negligible as the area lies outside of the 'footprint' of the new road. Other medieval ditches discovered at this site are within the route of the new road and have been assessed as low value with a moderate adverse magnitude of impact.

Medieval

Site 41884

6.7.24 This was a small site evaluated with just one trial trench which did not produce any archaeological evidence. The value of site 41884 has been assessed as negligible and the magnitude of impact as moderate adverse.

Site 124298

6.7.25 The trial trench evaluation confirmed the field boundaries as medieval, although with no clear evidence of habitation. The site has been assessed as of low value and the magnitude of impact will be moderate adverse.

Site 51049

6.7.26 To the west of site 51049, lies the probable site of the parish church of Little Rackheath (Holy Trinity) which was abandoned by the 16th century. It is highly probable that the features recorded at site 51049 are part of the deserted medieval settlement with the nucleus around or close by the parish

church. It is probable that the village became deserted during the reshaping of the landscape for Rackheath Park, as cropmark evidence recorded from within the park may pre-date the establishment of the park. This may have been due to topographical change or truncation by later military activity. The land slopes to the north, forming the southern edge of an east-west valley. The settlement was very likely abandoned by the 14th century as no pottery after this date was ascertained. The construction of the road will directly impact this site. The value of site 51049 has been assessed as medium and the magnitude of impact as moderately adverse.

Site 50501

6.7.27 An early Saxon pottery sherd was recovered from Rackheath, site 50501 (Volume 2, Chapter 6: Cultural Heritage, Section C MMD-233906-DT-0893), which may indicate an outlying settlement precursor to the deserted medieval village of Little Rackheath. This field was similar to site 51049 in that it did not have any cropmark evidence and very little was recovered during the fieldwalking and metal detecting survey. The geophysical evidence revealed bipolar magnetic anomalies which were most likely natural in origin. However, the results of the evaluation may go some way to suggest that the sub-surface features could have been part of, or within the area of, the deserted medieval village of Little Rackheath. Dating the site has proven problematic and some of the pit features may have been natural. The presence of early Saxon finds in this location may conform to the model of topographical location of early Saxon occupation which often occurs on the high grounds in a river valley on light well drained soils (Penn 1993). The construction of the road will directly impact this site. The value of site 50501 has been assessed as medium and the magnitude of impact as moderate adverse.

Post-medieval

Site 124299

6.7.28 This site indicated a medieval or post-medieval date range of field ditches which hold limited potential. The value of site 124299 has been assessed as low and the magnitude of impact as moderate adverse.

Undated/ambiguous

Site 50493

6.7.29 Although this site was originally considered an important WWII crash site, no evidence of any wreckage was established during the archaeological trial trench evaluation (NPS 2012) (Volume 2, Chapter 6: Cultural Heritage, Section C MMD-233906-DT-0889). Ten trenches were excavated along this route and often machining went through c. 1m deep colluvial deposit (s) with no sign of any wreckage materials. The value of site 50493 has been assessed as not significant and the magnitude of impact as moderate adverse.

Site 18126

6.7.30 Geophysical anomalies were clearly present and visible as cropmarks (NMP) but 3 trial trenches revealed no archaeological features. This area would therefore seem to not hold any further archaeological potential. The value of site 18126 has been assessed as not significant and the magnitude of impact as moderate adverse.

Site 49745

6.7.31 The site yielded very little archaeological evidence and is not considered to be important even though the site yielded a great variety of metal detected finds over the years associated with St Faith's Fairstead. The value of the site 49745 has been assessed as not significant and the magnitude of impact as moderate adverse.

Site 41874

6.7.32 Site 41874 Beeston St Andrew is to the east of the B1150 and Site 41884. The proposed route of the NDR crosses the postulated line of a Roman road within this field (NHER 7598). The road is marked on Fadens map of 1797 and is thought to have run between Brampton and Thorpe St Andrew. At this point the line of the road is marked by the thin north-west south-east 'Broadway'. A trench was placed across the postulated line of the Roman road but no trace of it was revealed. The road may have been ploughed away in recent years. Other trenches to test anomalies in this area proved largely negative. Site 41874 has been assessed as not significant with a moderate adverse magnitude of impact.

Site 124225

6.7.33 This area is covered by the footprint of the proposed road and adjacent balancing pond. This site consisted of four trenches of which two produced archaeological features and deposits of a likely modern date. The geophysical anomalies were weak. It is unlikely this area holds any further archaeological potential. The value of site 124225 has been assessed as low and the magnitude of impact as moderate adverse.

Site 49757

6.7.34 This site was subject to fieldwalking and flints and Roman pottery were recovered. The area was then evaluated with trial trenches which proved to be negative (NPS 2008). The site has been assessed as not significant and magnitude of impact as moderate adverse.

6.7.35 The table below summarises the archaeological sites within the study area affected by the proposed scheme. Working from west to east, the value of each site and the magnitude of impact have been assessed. Information on the relevant value and magnitude criteria are found in tables 6.1 & 6.2.

Table 6.9 Summary table of known archaeological sites affected by the construction of the proposed NDR road scheme

NHER/Site	Archaeological Resource	Value of Resource	Magnitude of impact from construction	Significance of construction effects
30315	Possible Iron Age Ditch and bank-on line of parish boundary	Medium	Moderate adverse	Moderate
30315	Field systems of possible IA date evaluated by trial trenches and further associated features seen in to the west	Medium	Moderate adverse	Moderate

NHER/Site	Archaeological Resource	Value of Resource	Magnitude of impact from construction	Significance of construction effects
124468	Prehistoric discrete features	Medium	Moderate adverse	Moderate
124223	Ditches and pits probably prehistoric.	Low	Moderate adverse	Slight
124224	Ditches & pits probably prehistoric	Low	Moderate adverse	Slight
18126	Cropmarks and geophysical anomalies shown on aerial photographs but not present in trial trenches	Negligible	Moderate adverse	Neutral
35668	Metal detected finds & post-medieval ditches	Low	Moderate adverse	Slight
35669	Small number of prehistoric ditches and pits	Low	Moderate adverse	Slight
123748	Possible Iron age track/Roman Road	Low	Moderate adverse	Slight
49748	Ditch or pit with early Neolithic pottery	Medium	Moderate adverse	Moderate

NHER/Site	Archaeological Resource	Value of Resource	Magnitude of impact from construction	Significance of construction effects
49748	14 trenches (out of 20) with ditches. Additional 2013 geophysical adjacent to site results showing enclosures	Low	Moderate adverse	Slight
123960	2 phases of prehistoric ditches	Low	Minor adverse	Slight
123955	Large prehistoric enclosure and cropmarks	Medium	Moderate adverse	Moderate
49758 (T1 & T3)	Rectilinear enclosure with ditches and pits of prehistoric origin- possibility of additional ring ditches in the area for the new lagoon	Medium	Moderate adverse in areas of landscaping and lagoon	Moderate
124298	Early Saxon pits and ditch	Medium	No change-trench with Saxon remains was outside of road footprint. Minor adverse impact over 'footprint' of	Slight within scheme boundary

NHER/Site	Archaeological Resource	Value of Resource	Magnitude of impact from construction	Significance of construction effects
			road	
124298	Medieval ditches and pits	Low within footprint of scheme	Moderate adverse	Slight
41884	Possible Roman road, but negative archaeological evidence	Negligible	Moderate adverse	Neutral
51049	Deserted medieval village - edge of Rackheath	Medium	Moderate adverse	Moderate
50501	Deserted medieval village- Rackheath	Medium	Moderate adverse	Moderate
124299	Medieval/post-medieval ditches	Low	Moderate adverse	Slight
50493	Possible WW II crash site, not identified in trial trenching	Negligible	Moderate adverse	Neutral
18131	Large rectilinear enclosure. Probably dates from the Bronze Age. Also prehistoric pits and burnt	Medium	Moderate adverse	Moderate

NHER/Site	Archaeological Resource	Value of Resource	Magnitude of impact from construction	Significance of construction effects
	mound recorded in trial trenches.			
49745	Medieval metal detector finds but no definite archaeology	Negligible	Moderate adverse	Neutral
41874	Medieval and post-medieval artefacts recovered during fieldwalking. No archaeological evidence in trenching	Negligible	Moderate adverse	Neutral
124225	Ditches & pits probably modern	Low	Moderate adverse	Slight
49757	Flints and Roman pottery from fieldwalking-trenches negative	Negligible	Moderate adverse	Neutral

Operational impacts on Archaeology

6.7.36 The operational effects on the archaeology are considered to be permanent and long term (an effect of 15 years or more). During the operation of the road, there would be no physical impacts on buried archaeological remains or other heritage assets arising from the operation of the NDR.

Historic Buildings

6.7.37 Construction and operation of new roads can affect historic buildings through physical impacts on the historic structures or changes to their setting. However, the NDR scheme has been designed to avoid any direct physical impacts on any buildings, including historic buildings. All of the impacts of the scheme on historic buildings are therefore impacts on their settings. Impacts on the setting of historic buildings can result from the construction and/or operation of a new road and can be beneficial or adverse. Impacts on setting can include:

- the interruption or improvement of important views to or from a historic building;
- the introduction or removal of large, prominent or intrusive structures within the setting of a historic building;
- the introduction or removal of visual intrusion, such as moving vehicles, the presence of road signs or lighting;
- significant changes in matters such as noise, dust, odour or air quality affecting the historic building's context and/or amenity value; and,
- the severance or restoration of relationships between associated historic buildings, such as a church and manor house.

Construction impacts on the setting of Historic Buildings

6.7.38 The construction impacts on the setting of historic buildings can be adverse if the views from or to historic buildings are affected during the construction of the road. While construction is taking place the impacts are considered to be temporary and short term (less than 3 years), but the finished construction of the road will make permanent landscape changes. Heavy plant movements will make significant changes in matters such as noise, dust, odour or air quality. In addition there will be low visual impacts from road signs.

6.7.39 The construction impacts on statutory listed buildings are set in Table 5.10 and locally important historic buildings are set out in Table 5.11.

6.7.40 The only buildings which the scheme has a direct impact on are two undesignated historic buildings in Rackheath Park which will be demolished. Rackheath Hall and the associated listed bridge will have their setting changed during the construction of the scheme. It is anticipated that Horsford

Hall, which is close to a proposed new roundabout (c.125m), will have some visual and audible impacts as a result of construction works.

Operational impacts on the setting of Historic Buildings

6.7.41 Impacts on setting can affect the continued use of a historic building by making it more or less attractive to users. Historic buildings which remain in active use are generally better maintained and more likely to survive in the long term.

6.7.42 Operational impacts may arise as a result:

- Maintenance of drainage ditches-removal of archaeological deposits (loss damage)
- Lighting- impact on setting of assets
- Traffic- damage to assets by pollutants and noise pollution
- Maintenance- damage to assets

6.7.43 Operational improvements may arise as a result of

- Improvement of lighting ambience
- Beneficial landscape changes such as professionally designed planting schemes.

6.7.44 The following table describes the significance of construction and operational effects on the historic buildings within the defined study area.

Table 6.10 Construction and operational effects on listed buildings.

Listed Buildings	NHER/ Listed building	Value of Asset	Approximate distance of receptor to the NDR	Potential construction Impacts	Potential Operational Impacts	Magnitude of impact from construction	Magnitude of change from operation	Significance of construction effects	Significance of operational effects
Poplars Farm	228423	Medium	500m	Poplars is screened by well established hedgerows. The visual and audible impacts from construction will be minimal	As Poplars is well screened the operational impacts will be minimal	Negligible adverse	Negligible adverse	Slight	Neutral
The Lindens, Horsford, (Grade II)	43921-228418	Medium	560m	Audible and construction visual impacts will	Operational impacts are considered to be	No change	No change	Neutral	Neutral

Listed Buildings	NHER/ Listed building	Value of Asset	Approximate distance of receptor to the NDR	Potential construction impacts	Potential Operational impacts	Magnitude of impact from construction	Magnitude of change from operation	Significance of construction effects	Significance of operational effects
Parish Church, Horsford (Grade II*)	7795-228419	High	160m	be neutral due to mature trees and hedgerow on south side of Drayton Lane which would screen any view of construction	neutral as The Lindens is well screened	Minor adverse	Negligible adverse	Slight	Slight

Listed Buildings	NHER/ Listed building	Value of Asset	Approximate distance of receptor to the NDR	Potential construction Impacts	Potential Operational Impacts	Magnitude of impact from construction	Magnitude of change from operation	Significance of construction effects	Significance of operational effects
Horsford Hall, Horsford (Grade II)	17520-228420	Medium	125m	Minimal as the Parish Church is well screened, construction activities may be audible	Operational impacts	Moderate adverse	Moderate adverse	Moderate	Moderate

Listed Buildings	NHER/ Listed building	Value of Asset	Approximate distance of receptor to the NDR	Potential construction Impacts	Potential Operational Impacts	Magnitude of impact from construction	Magnitude of change from operation	Significance of construction effects	Significance of operational effects
				<p>traffic and heavy plant movement may have some audible impacts. Visual impacts will be minimal as the work will be screened by mature trees and fence on the eastern side of Holt Road</p>					

Listed Buildings	NHER/ Listed building	Value of Asset	Approximate distance of receptor to the NDR	Potential construction Impacts	Potential Operational Impacts	Magnitude of impact from construction	Magnitude of change from operation	Significance of construction effects	Significance of operational effects
Little Orchard, Horsford (Grade II)	20966-228421	Medium	250m	Low audible construction impacts as the cottage will be well screened from the NDR by mature trees and hedgerows around its perimeter	Operational impacts are considered to be minimal as Little Orchard is well screened with mature hedgerows around its perimeter	Minor adverse	Negligible adverse	Slight	Slight
The Kennels, Horsham & Newton St Faith	43951-228099	Medium	650m	Low audible construction impacts but the cottage will be well	No operational impacts as The Kennels is	Minor adverse	No change	Slight	Neutral

Listed Buildings	NHER/ Listed building	Value of Asset	Approximate distance of receptor to the NDR	Potential construction impacts	Potential Operational impacts	Magnitude of impact from construction	Magnitude of change from operation	Significance of construction effects	Significance of operational effects
(Grade II)				screened from the NDR by mature trees and hedgerows around its perimeter	well screened with mature hedgerows around its perimeter				
The White House, Horsham & Newton St Faith (Grade II)	48738-228098	Medium	400m	There are clear views from Old Norwich Rd eastwards towards the proposed route. There will be distant	Views will be screened by planting. Expected operational impact from background noise during peak	Minor adverse	Minor adverse	Slight	Slight

Listed Buildings	NHER/ Listed building	Value of Asset	Approximate distance of receptor to the NDR	Potential construction impacts	Potential Operational impacts	Magnitude of impact from construction	Magnitude of change from operation	Significance of construction effects	Significance of operational effects
				views of construction works	travel times				
The Lilacs, Horsham & Newton St Faith (Grade II)	12250-228092	Medium	665m	Fields with low hedges between the cottage and the NDR. Construction impacts negligible	No operational impacts are predicted	Negligible adverse	No change	Slight	Neutral
Smeeth Farm house, Gt Plumstead (Grade II)	11826-228486 & 87 (barn)	Medium	576m	The farmhouse is well screened from the NDR	No operational impacts anticipated	Minor adverse	No change	Slight	Neutral

Listed Buildings	NHER/ Listed building	Value of Asset	Approximate distance of receptor to the NDR	Potential construction Impacts	Potential Operational Impacts	Magnitude of impact from construction	Magnitude of change from operation	Significance of construction effects	Significance of operational effects
Gateway to Spixworth hall (Grade II)	8022-359869	Medium	1km	No visual or audible impact	No impacts	No change	No change	Neutral	Neutral
Gateway to Rackheath Park (Grade II)	8173-228195	Medium	370m	Cast iron gate piers, with no gate. No construction impacts	No operational impact predicted	No change	No change	Neutral	Neutral
Walls to south Beeston St Andrew Hall (Grade II)	8174-228069	Medium	590m	There are no visual or audible impacts from construction	Low audible impacts from traffic movements and	No change	Negligible adverse	Neutral	Neutral

Listed Buildings	NHER/ Listed building	Value of Asset	Approximate distance of receptor to the NDR	Potential construction Impacts	Potential Operational Impacts	Magnitude of impact from construction	Magnitude of change from operation	Significance of construction effects	Significance of operational effects
Rackheath Hall (Grade II)	8172-228196	Medium	270m	anticipated	possible reduction in air quality.				
				The route passes very close to Rackheath Hall and will adversely affect the nearby Heath Wood. Although the buildings of Rackheath Hall are well enclosed by	Operational impacts will be from traffic, noise, dust and air quality	Moderate adverse	Moderate adverse	Moderate	Moderate

Listed Buildings	NHER/ Listed building	Value of Asset	Approximate distance of receptor to the NDR	Potential construction Impacts	Potential Operational Impacts	Magnitude of impact from construction	Magnitude of change from operation	Significance of construction effects	Significance of operational effects
Bridge 100m NE of Rackheath Hall (Grade II)	20138-228197	Medium	200	mature hedgerows there may be some audible impacts during earthmoving operations	Operational impacts will be from traffic, noise, dust and air quality	Moderate adverse	Moderate adverse	Moderate	Moderate

Listed Buildings	NHER/ Listed building	Value of Asset	Approximate distance of receptor to the NDR	Potential construction Impacts	Potential Operational Impacts	Magnitude of impact from construction	Magnitude of change from operation	Significance of construction effects	Significance of operational effects
Methodist Chapel	41948-228088	Medium	656m	Wood. Construction impacts will be audible and possibly partly visual which will impact setting	None expected	No change	No change	Neutral	Neutral

Listed Buildings	NHER/ Listed building	Value of Asset	Approximate distance of receptor to the NDR	Potential construction Impacts	Potential Operational Impacts	Magnitude of impact from construction	Magnitude of change from operation	Significance of construction effects	Significance of operational effects
				construction or audible impacts are anticipated					
The Clink, village lock up	21666-228095	Medium	740m	No significant construction or audible impacts are anticipated	None expected	No change	No change	Neutral	Neutral
Benedictine Priory of St Faith	8005-228083	High	700m	The post medieval house and barn on the priory site are surrounded	None expected	No change	No change	Neutral	Neutral

Listed Buildings	NHER/ Listed building	Value of Asset	Approximate distance of receptor to the NDR	Potential construction Impacts	Potential Operational Impacts	Magnitude of impact from construction	Magnitude of change from operation	Significance of construction effects	Significance of operational effects
South Lodge Cottage, Little Plumstead	21982-228483	Medium	367m	by dense mature trees on all sides. No construction or audible impacts are anticipated	Operational impacts are likely from traffic, noise, dust and air quality	Minor adverse	Minor adverse	Slight	Slight

Listed Buildings	NHER/ Listed building	Value of Asset	Approximate distance of receptor to the NDR	Potential construction impacts	Potential Operational impacts	Magnitude of impact from construction	Magnitude of change from operation	Significance of construction effects	Significance of operational effects
K6 Telephone Kiosk	48728-359870	Medium	450m	Minor audible construction impacts are	None expected	Negligible adverse	No change	Neutral	Neutral
				cottage by a mature hedgerow adjacent to the cottage (west side). There may be some audible impacts from construction activities					

Listed Buildings	NHER/ Listed building	Value of Asset	Approximate distance of receptor to the NDR	Potential construction Impacts	Potential Operational Impacts	Magnitude of impact from construction	Magnitude of change from operation	Significance of construction effects	Significance of operational effects
The Old Posthouse	48737-228097	Medium	455m	<p>anticipated</p> <p>Located in the centre of Horsham St Faith. The Chapel is well screened from the route. Audible construction impacts are anticipated during excavation of lagoon</p>	None expected	Negligible adverse	No change	Neutral	Neutral

Listed Buildings	NHER/ Listed building	Value of Asset	Approximate distance of receptor to the NDR	Potential construction Impacts	Potential Operational Impacts	Magnitude of impact from construction	Magnitude of change from operation	Significance of construction effects	Significance of operational effects
The Dog Public House	11528-228424	Medium	165m	The public house has well established hedges and some mature trees around its boundaries. Low audible and visual impacts during construction	Traffic noise at peak times is likely, although given the use as a public house, this will not have a significant impact on its value	Minor adverse	Negligible adverse	Slight	Neutral
Parish Church of Blessed Virgin & St	228082	High	617m	No significant construction or audible	None expected	No change	No change	Neutral	Neutral

Listed Buildings	NHER/ Listed building	Value of Asset	Approximate distance of receptor to the NDR	Potential construction Impacts	Potential Operational Impacts	Magnitude of impact from construction	Magnitude of change from operation	Significance of construction effects	Significance of operational effects
Andrew				impacts are anticipated					
Parish Church of St Peter	228070	High	560m	No significant construction or audible impacts are anticipated	None expected	No change	No change	Neutral	Neutral
Parish Church of All Saints	228194	High	766m	No significant construction or audible impacts are anticipated	None expected	No change	No change	Neutral	Neutral
Parish Church of all Saints	228419	High	665m	No significant construction	None expected	No change	No change	Neutral	Neutral

Listed Buildings	NHER/ Listed building	Value of Asset	Approximate distance of receptor to the NDR	Potential construction Impacts	Potential Operational Impacts	Magnitude of impact from construction	Magnitude of change from operation	Significance of construction effects	Significance of operational effects
in Postwick				or audible impacts are anticipated					
Church at St Andrew's Hospital	468956	Medium	541m	No significant construction or audible impacts are anticipated	None expected	No change	No change	Neutral	Neutral
Barn at the site of Spixworth Hall	1050874	Medium	700m	No significant construction or audible impacts are anticipated	None expected	No change	No change	Neutral	Neutral
Garden wall at	105087	Medium	700m	No significant	None	No change	No	Neutral	Neutral

Listed Buildings	NHER/ Listed building	Value of Asset	Approximate distance of receptor to the NDR	Potential construction Impacts	Potential Operational Impacts	Magnitude of impact from construction	Magnitude of change from operation	Significance of construction effects	Significance of operational effects
gatepiers south of barn and Gaffers cottage	5	m		construction or audible impacts are anticipated	expected		change		
Granary to west of barn	1050876	medium	700m	No significant construction or audible impacts are anticipated	None expected	No change	No change	Neutral	Neutral
2-5, Church Street	1050900	medium	635m	No significant construction or audible impacts are anticipated	None expected	No change	No change	Neutral	Neutral

Listed Buildings	NHER/ Listed building	Value of Asset	Approximate distance of receptor to the NDR	Potential construction Impacts	Potential Operational Impacts	Magnitude of impact from construction	Magnitude of change from operation	Significance of construction effects	Significance of operational effects
The King's Head Public House	1050901	medium	630m	No significant construction or audible impacts are anticipated	None expected	No change	No change	Neutral	Neutral
Meadow Farm House	1050902	medium	600m	No significant construction or audible impacts are anticipated	None expected	No change	No change	Neutral	Neutral
The Gildencroft	1050904	medium	600m	No significant construction or audible impacts are anticipated	None expected	No change	No change	Neutral	Neutral

Listed Buildings	NHER/ Listed building	Value of Asset	Approximate distance of receptor to the NDR	Potential construction Impacts	Potential Operational Impacts	Magnitude of impact from construction	Magnitude of change from operation	Significance of construction effects	Significance of operational effects
Grove Farm House	105148	medium	841m	No significant construction or audible impacts are anticipated	None expected	No change	No change	Neutral	Neutral
Corn Barn and Cart Shed at the Grove	105149	medium	840m	No significant construction or audible impacts are anticipated	None expected	No change	No change	Neutral	Neutral
Little Orchard	105154	medium	261m	The route passes close to the cottage but	Operational impacts are likely from traffic,	Minor adverse	Minor adverse	Slight	Slight

Listed Buildings	NHER/ Listed building	Value of Asset	Approximate distance of receptor to the NDR	Potential construction Impacts	Potential Operational Impacts	Magnitude of impact from construction	Magnitude of change from operation	Significance of construction effects	Significance of operational effects
Barn 50m north west	105155	Medium	620m	No significant	None	No change	No	Neutral	Neutral
				the construction impacts will be well screened from the cottage by a mature hedgerow. There may be some audible impacts from construction activities	noise, dust and air quality				

Listed Buildings	NHER/ Listed building	Value of Asset	Approximate distance of receptor to the NDR	Potential construction impacts	Potential Operational impacts	Magnitude of impact from construction	Magnitude of change from operation	Significance of construction effects	Significance of operational effects
of Low Farm House	0	m		construction or audible impacts are anticipated	expected		change		
Waytes House	1152491	Medium	545m	No significant construction or audible impacts are anticipated	None expected	No change	No change	Neutral	Neutral
Mill Farm House	1152508	Medium	783m	No significant construction or audible impacts are anticipated	None expected	No change	No change	Neutral	Neutral

Listed Buildings	NHER/ Listed building	Value of Asset	Approximate distance of receptor to the NDR	Potential construction Impacts	Potential Operational Impacts	Magnitude of impact from construction	Magnitude of change from operation	Significance of construction effects	Significance of operational effects
Church of St Mary the Virgin	1152889	Medium	700m	No significant construction or audible impacts are anticipated	None expected	No change	No change	Neutral	Neutral
Manor Farm Cottages	1170605	Medium	980m	No significant construction or audible impacts are anticipated	None expected	No change	No change	Neutral	Neutral
The Stower Grange	1170619	Medium	980m	No significant construction or audible impacts are anticipated	None expected	No change	No change	Neutral	Neutral

Listed Buildings	NHER/ Listed building	Value of Asset	Approximate distance of receptor to the NDR	Potential construction Impacts	Potential Operational Impacts	Magnitude of impact from construction	Magnitude of change from operation	Significance of construction effects	Significance of operational effects
Lower Farm House and attached barn	117082	Medium	876m	No significant construction or audible impacts are anticipated	None expected	No change	No change	Neutral	Neutral
Boatman's Foreman's Cottage	126340	Medium	522m	No significant construction or audible impacts are anticipated	None expected	No change	No change	Neutral	Neutral
Manor Farm House	137266	Medium	980m	No significant construction or audible impacts are anticipated	None expected	No change	No change	Neutral	Neutral

Listed Buildings	NHER/ Listed building	Value of Asset	Approximate distance of receptor to the NDR	Potential construction Impacts	Potential Operational Impacts	Magnitude of impact from construction	Magnitude of change from operation	Significance of construction effects	Significance of operational effects
				impacts are anticipated					
Barn and Byre at the Grove	137267	Medium	830m	No significant construction or audible impacts are anticipated	None expected	No change	No change	Neutral	Neutral
The Old Lodge	137268	Medium	780m	No significant construction or audible impacts are anticipated	None expected	No change	No change	Neutral	Neutral
The Church of	137268	Medium	690m	No significant construction	None expected	No change	No change	Neutral	Neutral

Listed Buildings	NHER/ Listed building	Value of Asset	Approximate distance of receptor to the NDR	Potential construction Impacts	Potential Operational Impacts	Magnitude of impact from construction	Magnitude of change from operation	Significance of construction effects	Significance of operational effects
All Saints				or audible impacts are anticipated					
St Andrew's Hospital	137270	Medium	540m	No significant construction or audible impacts are anticipated	None expected	No change	No change	Neutral	Neutral
Village Hall	137296	Medium	540m	No significant construction or audible impacts are anticipated	None expected	No change	No change	Neutral	Neutral
The Oaks	137296	Medium	540m	No significant	None	No change	No	Neutral	Neutral

Listed Buildings	NHER/ Listed building	Value of Asset	Approximate distance of receptor to the NDR	Potential construction impacts	Potential Operational impacts	Magnitude of impact from construction	Magnitude of change from operation	Significance of construction effects	Significance of operational effects
	1	m		construction or audible impacts are anticipated	expected		change		
Gaffers Cottage	1372985	Medium	900m	No significant construction or audible impacts are anticipated	None expected	No change	No change	Neutral	Neutral
Parish church of all saints	1170781	High	125m	There are no visual or audible impacts from construction anticipated	Low audible impacts from traffic movements and possible	No change	Negligible adverse	Neutral	Neutral

Listed Buildings	NHER/ Listed building	Value of Asset	Approximate distance of receptor to the NDR	Potential construction Impacts	Potential Operational Impacts	Magnitude of impact from construction	Magnitude of change from operation	Significance of construction effects	Significance of operational effects
					reduction in air quality.				

Table 6.11 Construction and operational Impacts of Proposed Scheme on non-designated Historic Buildings

Non - designated Historic Buildings	NHER Ref.	Value of Asset	Approximate distance of receptor to NDR	Potential construction Impacts	Operation impacts	Magnitude of Impact from construction	Magnitude of impact from operation	Significance of construction effects	Significance of operation effects
West Farm, Horsham St Faith	-	Low	50m	The route is open and unplanted where it passes Norwich airport. West farm would suffer visual and audible impacts during construction	Audible and visual impacts on setting from operation. West farm is c.50m from bunding on the route	Moderate Adverse	Moderate adverse	Slight	Slight
Red Hall farm complex	12258	Low	330m	Low visual and audible impacts as close to the	Low audible impacts from traffic	Minor Adverse	Minor adverse	Slight	Slight

Non - designated Historic Buildings	NHER Ref.	Value of Asset	Approximate distance of receptor to NDR	Potential construction Impacts	Operation impacts	Magnitude of Impact from construction	Magnitude of impact from operation	Significance of construction effects	Significance of operation effects
Late 19thC hydraulic ram	8176	Low	100m	scheme as the farm is well protected by surrounding mature hedgerows and trees	movement	Minor adverse	Moderate adverse	Neutral	Slight
				Visual impacts from construction but audible impacts of construction not significant due to type of asset	Operational impacts are likely from traffic, noise, dust, air quality, although none of these will affect the ability to				

Non - designated Historic Buildings	NHER Ref.	Value of Asset	Approximate distance of receptor to NDR	Potential construction Impacts	Operation impacts	Magnitude of Impact from construction	Magnitude of impact from operation	Significance of construction effects	Significance of operation effects
WWII Buildings, Rackheath Park	55989	Low	None	The route demolishes these WWII buildings	Remaining structures will have visual and audible impacts from NDR and traffic noise	Major adverse	Major adverse	Moderate	Moderate
Hall Farm, Rackheath	47126	Low	640m	Low visual and audible impacts during construction	Operational impacts are likely from traffic, noise, dust and air quality.	Moderate adverse	Moderate adverse	Slight	Slight

Non - designated Historic Buildings	NHER Ref.	Value of Asset	Approximate distance of receptor to NDR	Potential construction Impacts	Operation impacts	Magnitude of Impact from construction	Magnitude of impact from operation	Significance of construction effects	Significance of operation effects
Laurel Farm, Gt & Lt Plumstead	50041	Low	170m	Construction impacts on setting during earthmoving operations	Audible impacts from traffic movement	Moderate adverse	Moderate adverse	Slight	Slight
Great Plumstead Hall	21637	Low	470m	Low visual construction impact on setting considered to be low as mature trees surround the house	Audible impacts from traffic movement	Moderate adverse	Moderate adverse	Slight	Slight
St Andrew's Church, Beeston St Andrew	8142	Low	200m	Site of St Andrews Church. The construction	Operational impacts from traffic, noise, dust	Minor Adverse	Minor adverse	Slight	Slight

Non - designated Historic Buildings	NHER Ref.	Value of Asset	Approximate distance of receptor to NDR	Potential construction Impacts	Operation impacts	Magnitude of Impact from construction	Magnitude of impact from operation	Significance of construction effects	Significance of operation effects
Spixworth Hall	8022	Low	1km	of the road will be visible from the site. Audible impacts from, heavy plant are expected, but as the site survives below ground only the impacts are not considered significant	and air quality			Slight	Neutral

Non - designated Historic Buildings	NHER Ref.	Value of Asset	Approximate distance of receptor to NDR	Potential construction Impacts	Operation impacts	Magnitude of Impact from construction	Magnitude of impact from operation	Significance of construction effects	Significance of operation effects
Cottages				hedgerows and trees. Minimal visual and audible construction anticipated	movement unlikely at this distance				

Historic landscapes

6.7.45 The NDR traverses across historic landscapes which form the character of the local setting. At the western end of the route in the parish of Spixworth is a landscape of small fields and old lanes with boundaries lost during the 19th century. Towards the eastern end of the route was the former Mousehold Heath Area which with settlement traditionally restricted to its edges. The area was re-organised during parliamentary enclosure in 1800. The early clearance phase of construction will entail removal of some historic buildings in Rackheath Park (WWII structures and redundant farm buildings). Other historic buildings in close proximity to the works are those at West and Quaker Farms, although tranquillity is already low in those locations due to their close proximity to Norwich Airport.

Construction impacts on Historic Landscapes

6.7.46 The historic parklands in particular are likely to experience a significant and on-going reduction in tranquillity levels as the road is constructed within their existing boundaries. The construction of the NDR will have varying degrees of adverse effect during the construction of the road. Such effects can be caused by landscape changes brought about by ground reduction and landscaping.

6.7.47 The likely impacts of the scheme on the historic landscape units have been identified as:

- Temporary and permanent land-take due to road construction and operation
- Temporary and permanent severance due to road construction and operation
- Visual disruption during road construction and operation
- Noise and light pollution

Operational impacts on historic landscapes

6.7.48 The operational impacts of the NDR on the local historic landscapes will have varying degrees of adverse impact, and will be primarily from a result of traffic noise created when the road is in operation.

Table 6.13 Historic landscapes construction and operation significance on setting

Historic Landscapes	Value	Construction Impacts	Operational impacts	Magnitude of impact from construction	Magnitude of impact from operation	Significance of construction effects	Significance of operational effects
Spixworth Park	Medium	None anticipated	None anticipated	No change	No change	Neutral	Neutral
Red Hall (Beeston Old Hall) Park	Medium	Low audible impacts from road construction	Traffic and noise impacts during operation	Minor Adverse	Minor Adverse	Slight	Slight
Beeston Park	Medium	Severance of the northern third of the park; land-take for road construction and operation; audible and visual impacts during and post construction	Noise from traffic, lower air quality and pollution	Major Adverse	Moderate adverse	Large	Moderate
Sprowston	Medium	Low audible impacts	Noise from traffic,	Minor	Minor	Slight	Slight

Historic Landscapes	Value	Construction Impacts	Operational impacts	Magnitude of impact from construction	Magnitude of impact from operation	Significance of construction effects	Significance of operational effects
Lodge Park		from road construction	lower air quality and pollution	adverse	adverse		
Sprowston Hall Park	Low	No impacts	No impacts	No change	No change	Neutral	Neutral
Rackheath Park	Medium	Severance along eastern boundary of the park; land-take for road construction and operation	Moderate audible and visual impacts during operation. Impacts from traffic noise and air quality on roundabout on Wroxham Road on the north-eastern corner of Rackheath Park.	Moderate Adverse	Moderate Adverse	Moderate	Moderate

Historic Landscapes	Value	Construction Impacts	Operational impacts	Magnitude of impact from construction	Magnitude of impact from operation	Significance of construction effects	Significance of operational effects
Gt Plumstead Hall and Park	Low	Low audible and visual impacts during construction	Low audible and visual impacts from road operation	Minor adverse	Minor adverse	Slight	Slight
Horsham St Faith Airfield	Low	Severance and land-take for site compound. Relocation of museum.	Low audible and visual impacts from road operation	Moderate Adverse	Moderate adverse	Slight	Slight
Catton Hall Grade II* Registered Park and Garden	High	Scheme at nearly 2km distant, no impacts during construction	No visual impacts as scheme is too distant and significant views from park are to the south, not towards scheme. Any reduction in traffic along the inner ring road	No change	No change	Neutral	Neutral

Historic Landscapes	Value	Construction Impacts	Operational impacts	Magnitude of impact from construction	Magnitude of impact from operation	Significance of construction effects	Significance of operational effects
			will not have an impact on the park as it is well screened through its planting along its boundary.				

Climate Change

Table 6.14: Relationship of cultural heritage and climate change

Potential impacts on cultural heritage	Relationship to climate change resilience
Public access to historic assets may be impacted in a beneficial or negative way, with opportunities for heritage related education and tourism	No significant climate change adaptation issues
Loss of the physical and visual integrity of the site due to severance, such that key relationships are lost. This is particularly important where features are clustered together	No significant climate change adaptation issues
Loss/damage of all or part of above or below ground archaeological remains e.g. through demolition, excavation or disposal of soils or land-take	No significant climate change adaptation issues
Structural damage to historic buildings due to proximity of excavation, demolition works, vibration etc.	No significant climate change adaptation issues
Temporary or permanent change to the character or setting of designated or undesignated heritage asset from direct and or indirect impacts	Climate change could exacerbate changes to character or setting of historic assets and sites neighbouring the NDR
Increase or decrease in noise, vibration or dust such that the amenity or physical fabric of a nationally or regionally important site is either adversely affected or improved	Drought, high temperatures and wind can exacerbate issues such as dust generation.
Air pollution e.g. affecting masonry	Warmer and dryer seasonal climates can exacerbate the effects of air pollutants
Water table fluctuation e.g. can affect the preservation of archaeological features	Changes in precipitation can exacerbate fluctuations in water

Potential impacts on cultural heritage	Relationship to climate change resilience
	table levels.
Water pollution and soil contamination	Flooding from severe events can potentially cause water pollution and soil contamination

6.7.49 It is not considered that the scheme will exacerbate the effects of climate change on any heritage assets, and as such no specific mitigation measures for cultural heritage have been identified.

6.8 Conclusions

Archaeology

- 6.8.1 The construction impact on the archaeological resource along the line of the route will be in most cases moderately adverse. Topsoil stripping and landscaping works to achieve the required construction depth of the road will impact on buried archaeology which has been proved in most cases to be less than 0.50m beneath the present ground level.
- 6.8.2 Given the archaeological potential of the general area identified by this assessment study, it is likely that previously unknown archaeological sites and deposits exist within the study area. Aerial survey, combined with fieldwalking, metal-detector survey and geophysics has provided a good appreciation of the archaeology of an area on a landscape scale, but further surveys are required to ascertain the location and nature of archaeological remains across the proposed scheme.
- 6.8.3 By the very nature of the scheme, there will be a loss of unknown archaeological deposits if encountered during construction work but these will be fully recorded as part of the mitigation strategy.
- 6.8.4 The fundamental aim of archaeological mitigation is to avoid impacts on nationally important or highly significant remains, wherever possible, by aligning routes away from such sites, and no archaeological remains of high value have been located within the scheme boundaries. The large number of prehistoric sites identified along the route cannot be effectively avoided, as shifting the alignment of the road in any direction will impact on further cropmarks cannot be effectively avoided, as shifting the alignment of the road

in any direction will impact on further cropmarks and doubtless further heritage assets.

- 6.8.5 After careful consideration and assessment of the archaeological information gathered, this assessment has concluded that there are no scheduled monuments, or undesignated remains of equal value, that are likely to be affected by the proposed road scheme. This means that preservation of any of the identified sites in situ is not a requirement under any local plan policies or of those policies within the National Planning Policy Framework. An archaeological mitigation strategy will be produced and will set out the detailed requirements for recording below-ground archaeological deposits which will be impacted by the scheme
- 6.8.6 As physical preservation in situ is not possible in places, preservation by record will be necessary to record the locally important archaeological sites, which have been identified during fieldwalking, geophysical survey and trial trenching.

Historic Buildings

- 6.8.7 A total of 61 historic buildings were identified for assessment. The only direct impacts on historic buildings are the demolitions of some undesignated WWII structures at Rackheath, which are currently in poor condition. These structures will be recorded prior to their demolition.
- 6.8.8 The main statutory listed historic buildings which will have their setting affected significantly are Rackheath Hall (plus its bridge and gateway) and Horsford Hall. It is anticipated that there will be moderately adverse visual and audible impacts during construction and operation.

Historic Landscapes

- 6.8.9 To the north-east of Norwich, the proposed route passes through an area characterised by a cluster of historic parks and series of blocks of ancient woodland. None of the parkland is included on the English Heritage register of historic parkland. The parkland is generally of medium value reflecting 'averagely well-preserved historic landscapes with reasonable coherence'. Catton Hall grade II* Registered Park and Garden is located approximately 2km to the south of proposed scheme, within the urban area of Norwich. The impacts on this park have also been considered, however it is concluded that there is no change to the setting of the park and therefore no effect.

6.8.10 The impact of the proposed route causes a major adverse degree of severance to Beeston historic park. A second park at Rackheath will be adversely affected, but to a lesser degree. In view of the difficulty of mitigating against severance, it has not been possible to reduce the magnitude of impact through mitigation.

7. Landscape

7.1 Introduction

General

- 7.1.1 This chapter considers the likely significant effects that the scheme would have on the character and quality of the landscape, together with changes in people's views, particularly from residential properties. 'Landscape effects' is used as a term to define changes resulting from impacts of the proposed Scheme on the surrounding landscape or townscape, whereas 'visual effects' defines the changes in views for the local community.
- 7.1.2 The landscape evaluation in this chapter includes the classification of the landscape into broadly homogeneous units of character, and an assessment of their relative sensitivity to the changes that would result from the scheme. The sensitivity of the views from properties is also considered in order to determine significance criteria for the analysis, as described in the following sections.
- 7.1.3 The chapter is supported by figures and drawings in volume 2 including the landscape design (drawings MMD-233906-DT-0866 to MMD-233906-DT-0878 and MMD-233906-DT-0941), photomontages of the Scheme from viewpoints agreed with Norfolk County Council (drawings MMD-233906-DT-0879, MMD-233906-DT-0880 and Photomontage Locations 1 to 9), representative cross sections (drawings MMD-233906-DT-0956 to MMD-233906-DT-0960), details of the visual assessment (Zones of Visual Influence and Schedules; drawings MMD-233906-DT-0953 to MMD-233906-DT-0955) and field survey notes (Volume 2, Chapter 7: Landscape, Section G). The field survey has been carried out and updated at various times over a number of years from 2004 up to the present time.

Consultation, Scoping Report and Scoping Opinion

- 7.1.4 The Scheme has been subject to extensive consultation with a wide range of interested parties over a number of years, including as part of the process defining the scope of the Environmental Statement (ES). The ES Scoping Report (Volume 1, Appendix 4 Scoping Report) defined the key issues proposed to be covered in the Environmental Statement and described the methodologies to be followed. This chapter is based upon the outline set out in the Scoping Report. A Scoping Opinion was published by the Secretary of

State in April 2013, highlighting details to be covered in the ES. This chapter addresses the issues raised within the Scoping Opinion concerning landscape and visual effects.

7.2 Methodologies

Overall Approach

- 7.2.1 There are several sources of relevant guidance for assessing the landscape, townscape and visual impacts of new development projects. The primary guidance for assessing the landscape and visual effects of Trunk Road schemes is provided in the Department for Transport (DfT) Design Manual for Roads and Bridges (DMRB) Volume 11, as updated by Interim Advice Note 135/10. Although the NDR is not a trunk road, the DMRB is the primary guidance for assessing the landscape and visual effects of major road infrastructure, and has therefore been followed for this assessment.
- 7.2.2 Further guidance is also provided by the 'Guidelines for Landscape & Visual Impact Assessment' (GLVIA) published by the Institute of Environmental Assessment and the Landscape Institute (third edition, 2013), and detailed guidance for undertaking landscape character assessments to inform planning policy and decisions is provided in the 'Landscape Character Assessment Guidance for England and Scotland' (LCAG), published jointly by The Countryside Agency and Scottish Natural Heritage (2002). These have also been drawn upon as appropriate in developing the methodology for the assessment.
- 7.2.3 Consultation has been undertaken with the relevant consultees to inform the methodology used and the extent of the study area, wherever possible.

Study area

- 7.2.4 The study area for the Landscape and Visual assessment has been broadly taken as the area bounded by the 'Zone of Visual Influence' (ZVI) of the proposed scheme (see MMD-233906-DT-0953). This is a band extending up to 1km either side of the of the NDR (i.e. the distance beyond which views are unlikely to be significant) and its associated works (including temporary construction site areas), and is indicative of the area of land from which there is potentially a view of any part of the proposed road, its structures, or the traffic which will use it.
- 7.2.5 The ZVI was generated using Key Terra-Firma software, taking points along the route at 200m intervals. Hedgerows are assumed to be 2m high, existing

woodland 8m high and settlements 7m high. Vehicle heights are assumed to be a maximum of 5m high. A height of 6m has been assumed for the mature tree planting scheme at year 15.

- 7.2.6 The ZVI for the NDR is curtailed by topography, vegetation blocks and visual barriers such as housing development, and consequently there are no long distance views beyond which visual effects need to be considered.
- 7.2.7 However, the boundaries of the landscape character areas have been extended beyond the ZVI in order to set the NDR into a wider landscape context (see drawings MMD-233906-DT-0670 and MMD-233906-DT-0671). For the same reason, the figures showing topography (drawing MMD-233906-DT-0668) and landscape designations (drawing MMD-233906-DT-0669) extend beyond the ZVI.

Timescale

- 7.2.8 Landscape and visual effects have been assessed by comparing the predicted effects of the scheme with the situation if the scheme were not constructed (i.e. the landscape baseline as it would exist before the projected completion of the NDR in 2017). The assessment is considered at two distinct stages, namely, during construction and once the road is operational. Operational effects are further separated (following the DMRB methodology) into the year immediately after opening and 15 years hence, to allow for the screening effect of the maturing planting scheme. Effects are considered for winter in year 1 (to represent a 'worst case' scenario) and summer in year 15 (to allow for the screening effects of foliage, and hence a 'minimum effect' scenario). Effects are also considered in night time conditions to assess lighting impacts.

Methodology for the Assessment of Landscape Effects

Landscape Baseline Conditions

- 7.2.9 The term landscape commonly refers to the view or appearance of the land. However, both DMRB and GLIVIA use a fuller description of landscape as a combination of both cultural and physical characteristics or components, which give rise to patterns that are distinctive to particular localities and help to define a 'sense of place'. The landscape is not therefore simply a visual phenomenon but relies upon other influences including topography, land use

and management, ecology and historical and cultural associations. A similar approach can be adopted when considering built up or 'townscape' areas.

7.2.10 The landscape baseline has therefore been defined in terms of the specific landscape character types and areas that are found within the study area, reflecting the differing vegetation cover, settlement and field patterns and other landscape characteristics encountered along the route. These have been referenced to landscape character types and areas defined in previous national and local authority studies where appropriate, in order to set them into a broader landscape context.

7.2.11 The character areas and their associated boundaries were developed from fieldwork using the field survey sheet contained in LCAG as a template, which was then adapted to suit the specific characteristics of the landscape being considered. The survey sheets are included in Volume 2, Chapter 7: Landscape, Section G and provide the opportunity to record both the objective elements within the landscape (or townscape) in question and the subjective impressions of the viewer, together with a representative photograph for each landscape character area.

Magnitude of Impact Criteria for Landscape Character

7.2.12 The magnitude of impact is the degree of change that would arise if the NDR were to be constructed. Factors to consider are:

- the scale of the impact (e.g. would the change be large and widespread or small and localised?)
- the nature of the impact (e.g. would the change contrast markedly with the receiving landscape or blend in?)
- whether it is an adverse or beneficial change; and
- the timescale involved (i.e. of short duration or longer term).

7.2.13 Indicative criteria used for the assessment are given in Table 7.1.

Table 7.1 Magnitude and Nature of Impact and Typical Descriptors for Landscape Character (Source: DMRB Vol. 11)

Magnitude of Impact	Typical Criteria Descriptors
Major Adverse	Total loss or large scale damage to existing character or distinctive features and elements, and/or the addition of new but uncharacteristic conspicuous features and elements.
Moderate Adverse	Partial loss or noticeable damage to existing character or distinctive features and elements, and/or the addition of new but uncharacteristic noticeable features and elements.
Minor Adverse	Slight loss or damage to existing character or features and elements, and/or the addition of new but uncharacteristic features and elements.
Negligible Adverse	Barely noticeable loss or damage to existing character or features and elements, and/or the addition of new but uncharacteristic features and elements.
No Change	No noticeable loss, damage or alteration to character or features or elements.
Negligible Beneficial	Barely noticeable improvement of character by the restoration of existing features and elements, and/or the removal of uncharacteristic features and elements, or by the addition of new characteristic elements.
Minor Beneficial	Slight improvement of character by the restoration of existing features and elements, and/or the removal of uncharacteristic features and elements, or by the addition of new characteristic elements.
Moderate Beneficial	Partial or noticeable improvement of character by the restoration of existing features and elements, and/or the removal of uncharacteristic and noticeable features and elements, or by the addition of new characteristic features.

Major Beneficial	Large scale improvement of character by the restoration of features and elements, and/or the removal of uncharacteristic and conspicuous features and elements, or by the addition of new distinctive features.
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Landscape Sensitivity

7.2.14 Having identified the landscape character areas within the study area and the magnitude of impact arising from the scheme, an assessment of landscape sensitivity (i.e. the ability of the landscape to accommodate change arising from the NDR) has been carried out. This used the landscape character analysis to understand how the different character areas would be affected by the Scheme (i.e. by determining how the components that make up landscape character would be affected by the NDR). Whilst it is possible to record potentially sensitive landscape receptors as part of the baseline, it is considered more appropriate to consider landscape sensitivity as part of the assessment of the significance of effects, since it depends on the type of impact arising from the Scheme. Therefore, the landscape methodology assesses sensitivity in conjunction with the landscape impacts.

7.2.15 The features that make up the landscape (e.g. pattern, tranquillity, cultural elements and land cover) have been assessed as to their ability to accommodate change of the type and scale proposed, using the indicative criteria in Table 7.2.

Table 7.2 Landscape Sensitivity and Typical Examples (Source: DMRB Vol. 11)

Sensitivity	Typical Descriptors and Examples
High	<p>Landscapes which by nature of their character would be unable to accommodate change of the type proposed. Typically these would be;</p> <p>Of high quality with distinctive elements and features making a positive contribution to character and sense of place.</p> <p>Likely to be designated, but the aspects which underpin such value may also be present outside designated areas, especially at the local scale.</p> <p>Areas of special recognised value through use, perception or historic</p>

Sensitivity	Typical Descriptors and Examples
	<p>and cultural associations.</p> <p>Likely to contain features and elements that are rare and could not be replaced.</p>
Moderate	<p>Landscapes which by nature of their character would be able to partly accommodate change of the type proposed. Typically these would be;</p> <p>Comprised commonplace elements and features creating generally unremarkable character but with some sense of place.</p> <p>Locally designated, or their value may be expressed through non-statutory local publications.</p> <p>Containing some features of value through use, perception or historic and cultural associations.</p> <p>Likely to contain some features and elements that could not be replaced.</p>
Low	<p>Landscapes which by nature of their character would be able to accommodate change of the type proposed. Typically these would be;</p> <p>Comprised some features and elements that are discordant, derelict or in decline, resulting in indistinct character with little or no sense of place.</p> <p>Not designated.</p> <p>Containing few, if any, features of value through use, perception or historic and cultural associations.</p> <p>Likely to contain few, if any, features and elements that could not be replaced.</p>

Significance of Effects on Landscape Character

7.2.16 The evaluation of the significance of the landscape effects of the Scheme is derived by assessing the sensitivity of the landscape against the magnitude of impact (bearing in mind the effectiveness of the mitigation measures), as shown in the matrix in Table 3. Effects that fall within the categories of ‘moderate’, ‘large’ and ‘very large’ are deemed to be significant.

7.2.17 It should be noted that environmental effects can be either beneficial or adverse, and that in some circumstances the addition of new features (e.g. ‘gateway features’ such as art work or a distinctive bridge design) can enhance the landscape, resulting in a significant beneficial effect. Typical descriptors of the significance of effect categories in the matrix are provided in Table 7.3.

Table 7.3: Significance of Effect Categories (Source: DMRB Vol. 11)

Magnitude of Impact						
Landscape Sensitivity		No Change	Negligible	Minor	Moderate	Major
	High	Neutral	Slight	Slight/Moderate	Moderate/Large	Large/Very Large
	Moderate	Neutral	Neutral/Slight	Slight	Moderate	Moderate/Large
	Low	Neutral	Neutral/Slight	Neutral/Slight	Slight	Slight/Moderate

Table 7.4 Typical Descriptors of Significance of Effect Categories for Landscape Character (Source: DMRB Vol. 11)

Significance Category	Typical Descriptors of Effect
Very large beneficial (positive) effect	<p>The project would:</p> <p>greatly enhance the character (including quality and value) of the landscape.</p> <p>create an iconic high quality feature and/or series of elements.</p> <p>enable a sense of place to be created or greatly enhanced.</p>
Large beneficial (positive) effect	<p>The project would:</p> <p>enhance the character (including quality and value) of the landscape.</p> <p>enable the restoration of characteristic features and elements lost as a result of changes from inappropriate management or development.</p> <p>enable a sense of place to be enhanced.</p>
Moderate beneficial (positive) effect	<p>The project would:</p> <p>improve the character (including quality and value) of the landscape.</p> <p>enable the restoration of characteristic features and elements partially lost or diminished as a result of changes from inappropriate management or development.</p> <p>enable a sense of place to be restored.</p>
Slight beneficial (positive) effect	<p>The project would:</p> <p>complement the character (including quality and value) of the landscape.</p> <p>maintain or enhance characteristic features and elements.</p> <p>enable some sense of place to be restored.</p>
Neutral effect	<p>The project would:</p> <p>maintain the character (including quality and value) of the landscape.</p>

Significance Category	Typical Descriptors of Effect
	<p>blend in with characteristic features and elements.</p> <p>enable a sense of place to be retained.</p>
Slight adverse (negative) effect	<p>The project would:</p> <p>not quite fit the character (including quality and value) of the landscape.</p> <p>be at variance with characteristic features and elements.</p> <p>detract from a sense of place.</p>
Moderate adverse (negative) effect	<p>The project would:</p> <p>conflict with the character (including quality and value) of the landscape.</p> <p>have an adverse impact on characteristic features or elements.</p> <p>diminish a sense of place.</p>
Large adverse (negative) effect	<p>The project would:</p> <p>be at considerable variance with the character (including quality and value) of the landscape.</p> <p>degrade or diminish the integrity of a range of characteristic features and elements.</p> <p>damage a sense of place.</p>
Very large adverse (negative) effect	<p>The project would:</p> <p>be at complete variance with the character (including quality and value) of the landscape.</p> <p>cause the integrity of characteristic features and elements to be lost.</p> <p>cause a sense of place to be lost.</p>

Methodology for the Assessment of Visual Impact

Visual Baseline Conditions and Sensitivity to Change

7.2.18 The baseline for visual impact has been determined through gaining an understanding of the visual amenity of the area, which is informed by the Landscape Character Assessment, and the potential extent of visibility of the project, which is determined from the ZVI. Field work has then been carried out using the DMRB methodology to determine the extent of visibility of the Scheme from affected receptors. This has been carried out using public rights of way, and has therefore involved a degree of extrapolation and judgement in determining the actual extent of visibility of the Scheme.

7.2.19 In accordance with the DMRB methodology, unlike landscape sensitivity (which depends on the type of change proposed), the sensitivity of visual receptors (i.e. people, viewers) can reasonably be assumed in advance of any potential change, and have therefore been assessed as part of the visual baseline studies. Visual receptors include people in their homes, users of Public Rights of Way (PROW) and other areas of open space or recreational landscapes, people at work and people travelling along roads or railway lines. Indicative levels of visual sensitivity and typical examples or related receptors are provided in Table 7.5.

7.2.20 The identification of various categories of visual receptor and the assumed visual sensitivity of each forms part of the visual baseline against which the change in the view brought about by the proposed Scheme is assessed.

Table 7.5 Visual Sensitivity and Typical Receptors (Source: DMRB Vol. 11)

Sensitivity	Type
High	Residential properties. Users of Public Rights of Way or other recreational trails (e.g. National Trails, footpaths, bridleways etc.). Users of recreational facilities where the purpose of that recreation is enjoyment of the countryside (e.g. Country Parks, National Trust or other access land etc.).
Moderate	Outdoor workers Users of scenic roads, railways or waterways or users of

Sensitivity	Type
	designated tourist routes. Schools and other institutional buildings, and their outdoor areas.
Low	Indoor workers Users of main roads (e.g. trunk roads) or passengers in public transport on main arterial routes. Users of recreational facilities where the purpose of that recreation is not related to the view (e.g. sports facilities).

Magnitude of Impact Criteria for Visual Amenity

7.2.21 The magnitude of impact, or degree of change, arising from the NDR will depend on a number of factors such as the scale and nature of the proposed change, the proximity of the new works to the receptor and the number of people / receptors affected. The criteria in Table 7.6 have been used to define the magnitude of the visual impacts on identified receptors.

Table 7.6: Magnitude of Impact and Typical Descriptors (Source: DMRB Vol. 11)

Magnitude	Description
Major	The project, or a part of it, would become the dominant feature or focal point of the view.
Moderate	The project, or a part of it, would form a noticeable feature or element of the view which is readily apparent to the receptor.
Minor	The project, or a part of it, would be perceptible but not alter the overall balance of features and elements that comprise the existing view.
Negligible	Only a very small part of the project would be discernable, or it is at such a distance that it would form a barely noticeable feature or element of the view.
No change	No part of the project, or work or activity associated with it, is discernible.

Significance of Effects on Visual Amenity

7.2.22 In determining the significance of visual effects, the sensitivity of potential visual receptors within the ZVI is combined with the magnitude of change. This depends on the location, context and expectations of the viewer (e.g. the occupier of a residential property with open views would be potentially highly sensitive to any change, whereas an office worker within an urban context would be less sensitive).

7.2.23 The evaluation of the significance of the visual effects of the project is derived by assessing the sensitivity of the receptor (Table 7.5) against the degree of change in the view resulting from the project (Table 7.6). These aspects can be combined to form a significance matrix as shown in Table 7.7. Typical descriptors of the significance levels in the matrix are provided in Table 7.8.

7.2.24 Effects that fall within the categories of ‘moderate’, ‘large’ and ‘very large’ are deemed to be significant. In general terms a major magnitude of change on a highly sensitive receptor will produce an effect of large or very large significance, particularly if a large number of receptors are affected, and a minor magnitude of change on a less sensitive receptor will produce an effect of slight or neutral significance. Major changes for less sensitive receptors and minor changes for more sensitive receptors could also produce significant levels of effect.

Table 7.7 Significance of Effect Categories (Source: DMRB Vol. 11)

Magnitude of Impact						
Visual Sensitivity		No Change	Negligible	Minor	Moderate	Major
	High	Neutral	Slight	Slight/Moderate	Moderate/Large	Large/Very Large
	Moderate	Neutral	Neutral/Slight	Slight	Slight/Moderate	Moderate/Large
	Low	Neutral	Neutral/Slight	Neutral/Slight	Slight	Slight/Moderate

Table 7.8 Typical Descriptors of the Significance of Effect Categories (Source: DMRB Vol.11)

Significance	Typical Descriptors of Effect
Very large Beneficial	The project would create an iconic new feature that would greatly enhance the view.
Large Beneficial	The project would lead to a major improvement in a view from a highly sensitive receptor.
Moderate Beneficial	The proposals would cause obvious improvement to a view from a moderately sensitive receptor, or perceptible improvement to a view from a more sensitive receptor.
Slight Beneficial	The project would cause limited improvement to a view from a receptor of medium sensitivity, or would cause greater improvement to a view from a receptor of low sensitivity.
Neutral	No perceptible change in the view.
Slight Adverse	The project would cause limited deterioration to a view from a receptor of medium sensitivity, or cause greater deterioration to a view from a receptor of low sensitivity.
Moderate Adverse	The project would cause obvious deterioration to a view from a moderately sensitive receptor, or perceptible damage to a view from a more sensitive receptor.
Large Adverse	The project would cause major deterioration to a view from a highly sensitive receptor, and would constitute a major discordant element in the view.
Very Large Adverse	The project would cause the loss of views from a highly sensitive receptor, and would constitute a dominant discordant feature in the view.

7.3 Context

Technical

- 7.3.1 Natural England has divided the country into 159 Natural Character Areas, each of which is defined by a unique combination of landscape, biodiversity, geodiversity and cultural and economic activity. The study area for the route falls within the southernmost part of Natural Character Area 78: Central North Norfolk. This is a large area covering over 70 000 hectares which essentially extends from Norwich to the North Norfolk Coast, and is largely rural in character. However, of relevance to this assessment is the fact that it is noted that urbanisation dominates close to the northern edge of Norwich, and this is a feature of the study area for the NDR.
- 7.3.2 Several studies have been carried out in the past which cover parts of the study area and are of relevance to the landscape;
- In 1995 Norfolk County Council produced an assessment of the landscape character of the county which was published as a consultation draft under the title Norfolk Countryside Conservation Strategy Landscape Assessment (NLA). This was a broad assessment reflecting the large scale character areas defined by the Natural Character Area map.
 - In 1999 Broadland District Council (BDC) commissioned Chris Blandford Associates (CBA) to carry out a landscape assessment of the district to help define areas of important landscape quality, and this work has informed the designation of the 'Areas of Landscape Value' throughout the District.
 - In 2007 CBA produced a Green Infrastructure Strategy for the Norwich area on behalf of the Greater Norwich Development Partnership, The aim of the Strategy is "to create a bold vision for the Greater Norwich Area and to establish a strategy for green infrastructure that will complement and support good quality housing and substantial economic growth by: providing high quality, accessible green infrastructure within a comprehensive landscape structure; promoting ecological networks and continuity and links between habitats; improving quality of life; helping to address climate change; improving access to habitats and greenspace; and encouraging community wellbeing." (pg 2).
 - In 2007, BDC commissioned CBA to produce an updated landscape character assessment of the district, which was published in May 2008. This report updated the earlier landscape character study in line with the 2002 LCAG methodology, but with the new aim of determining how sustainable development can be accommodated into the landscape of the district. This

work has since been developed into the 'Landscape Character Assessment Supplementary Planning Document' by BDC, which went to public consultation in November/December 2011 and was adopted on 21st October 2013.

- 7.3.3 Landscape studies were included in the Wensum Valley Project strategies, the results of which were broadly confirmed by the BDC studies. The findings of the NLA study were used in the 1999 BDC study, which divided Broadland District into thirteen 'character zones' (of which five cover the study area for this assessment), each divided into specific 'local character areas'. The 2008 BDC study carried a broader remit (i.e. informing sustainable development policy) and consolidated this earlier work into six broad 'landscape character types' (of which three cover the study area), which were also divided into 'landscape character areas'.
- 7.3.4 For the purposes of the baseline for this assessment the 1999 BDC study was found to be the most useful, since it contains a finer level of detail than the 2008 study and its remit to inform Areas of Landscape Value was more appropriate in informing the baseline studies for the NDR, rather than the focus on sustainable development found in the later BDC reports. The findings of the BDC studies have been cross referenced where appropriate in this assessment (the BDC character areas are shown in drawing MMD-233906-DT-0669).
- 7.3.5 The NDR would pass through the area covered by the remit of the Green Infrastructure Strategy for the Norwich area. The landscape design for the NDR has been prepared with the Green Infrastructure Strategy in mind, and the extensive mitigation proposed will help to meet the aims of the Strategy.

Planning and Legislative Context

General

- 7.3.6 This section identifies statutory designations and planning policy in so far as they relate to the landscape and visual effects of the NDR.
- 7.3.7 With the exception of Norwich Airport (which is covered by Norwich City Council) the study area falls within Broadland District. There are no nationally designated areas within the study area which relate to landscape, although parts of the study area have been designated as 'Areas of Landscape Value' by Broadland District Council (see drawing MMD-233906-DT-0669).

- 7.3.8 The Broads Authority Executive Area lies to the north and south of the scheme, the closest part of the boundary lying to the south of Postwick where it follows the flood plain of the River Yare, 0.5 km away from the intersection of the NDR with the A47 trunk road. In the north, the closest part of the boundary of the Broads area to the NDR lies 1.5km to the north of the Springs at Rackheath (see drawing MMD-233906-DT-0669). Due to a combination of distance, intervening vegetation, undulating topography and the existing urban character of the Postwick Junction, the Scheme will not have any significant landscape or visual effects on the Broads Authority Area. This is confirmed by the extent of visibility as shown on the ZVI drawings (MMD-233906-DT-0953 to MMD-233906-DT-0955).
- 7.3.9 There is one Registered Park and Garden close to the study area; Catton Park is a Grade 2 listed historic parkland lying to the south of the scheme within the northern suburbs of Norwich (see drawing MMD-233906-DT-0669). The northern boundary of the Park lies 2km to the south of the proposed NDR where it passes to the south of Spixworth (see drawing MMD-233906-DT-0669). Due to the presence of intervening housing developments and vegetation, the scheme will not have any landscape or visual effects on Catton Park. This finding is confirmed by the ZVI see drawings MMD-233906-DT-0953 to MMD-233906-DT-0955 in vol 2, which shows that no views of Catton Park are possible from the Scheme for either construction, year 1 or year 15.
- 7.3.10 Both the adopted and the emerging development plan identify the Norwich area as the focus for future major growth and development. The emerging Joint Core Strategy covering the Norwich, Broadland and South Norfolk areas, in particular, proposes at least 7000 dwellings by 2026 (rising to around 10,000 eventually) in the vicinity of Rackheath, to the north east of Norwich. The Beyond Green Development between Spixworth and the edge of Norwich would encompass parts of Beeston Park. It is likely that Parkland would be retained within the housing areas and new areas of heathland would be created as a stepping stone to Mousehold Heath (on the edge of Norwich), in conjunction with the Green Infrastructure Strategy.

National planning policy

- 7.3.11 The National Planning Policy Framework (NPPF) sets out the Government's planning policies for England by providing a framework within which councils can provide their own distinctive local plans. Of relevance to landscape is Chapter 11: Conserving and Enhancing the Natural Environment, part of

which provides guidance on protecting and enhancing valued landscapes. (see, in particular, paragraphs 115 and 116).

7.3.12 The NDR will comply with the NPPF by avoiding the highest quality landscapes (i.e. The Broads area) and by providing extensive mitigation to minimise landscape effects on important local landscapes.

Regional planning policy

7.3.13 The following policies from the Joint Core Strategy for Broadland, Norwich and Norfolk (as amended February 2013) have been considered:

7.3.14 Policy 1 addresses climate change and the protection of environmental assets. One of the key features of this policy is the need to provide additional green infrastructure to reduce fragmentation of habitat and enhance the recreational resource. The landscape scheme provided by the NDR (see drawings MMD-233906-DT-0866 to MMD-233906-DT-0878 and MMD-233906-DT-0941) will help to further this aim by increasing the overall area of woodland that currently exists in the locality, providing a green network along this new transport corridor.

7.3.15 Policy 2 promotes the need for good design within new development and highlights the need for landscaping that reflects local distinctiveness and landscape character. This reinforces Spatial Planning Objective 9 which outlines the unique characteristics of the area covered by the JCS and states that it is a priority to maintain and improve these special qualities. The landscape character assessment carried out for the NDR informs the landscape design and complies with this policy.

7.3.16 Policy 12 addresses the importance of Green Infrastructure for the Norwich urban area and fringe parishes, including the protection of the landscape setting of the urban area and the importance of tree planting to enhance amenity and habitat. The mitigation design for the NDR seeks to comply with this policy by providing a green wooded corridor which will link to existing green infrastructure.

Local planning policy

7.3.17 The following policies from the Broadland District Council Local Plan (Replacement, adopted 2006) have been considered:

- 7.3.18 Policy ENV 8 aims to protect the distinctive character of Areas of Landscape Value in the District. The landscape design of the NDR has been prepared with the aim of maintaining local character within Areas of Landscape Value by using mitigation such as mounding and planting appropriate to these areas.
- 7.3.19 Policy ENV 10 aims to protect and maintain the visual qualities of historic parklands. The landscape design of the NDR has been prepared with the aim of minimising the impact on local parkland areas (i.e. Beeston and Rackheath Parks) though the use of appropriate mitigation such as mounding and planting which would blend into the local parkland landscape.
- 7.3.20 Policy TRA 17 states that new highways will incorporate appropriate landscaping, making use of native species where possible. The landscape design for the NDR would fully comply with this policy.
- 7.3.21 Policy CS1 from the Broads Core Strategy (adopted 2007) has also been considered, which aims to protect the distinctive qualities of the Broads landscape. As noted in para 9.3.8, the NDR would not affect the landscape quality of the Broads and policy CS1 is not relevant.

Climate Change

- 7.3.22 During the lifetime of the Scheme it is expected than climate change will have an effect on the landscape of the NDR. Such changes could include the need for planting to cope with increased temperature extremes and damage from storm events such as high winds and high rainfall. It is anticipated that the landscape scheme will adapt naturally to climate change as it matures. The planting will be actively maintained by the local authority such that any specific species failures attributed to changing climate will be substituted by more appropriate species if and when required. However, it is anticipated that the wide range of native species used in the planting scheme will provide a high degree of natural resilience to climate change.

Design Tolerances

- 7.3.23 The engineering design has a general tolerance of 250mm in terms of lateral and vertical movement, which would not make any material difference to the findings of the landscape and visual assessment.

7.3.24 For the following roundabout junctions the vertical tolerances are increased to 500mm; Fir Covert Road, Reepham Road, Drayton Lane, Norwich Airport, Wroxham Road, Salhouse Road, Plumstead Road (north) and Postwick North East. These potential increases would also not make any material difference to the findings of the landscape and visual assessment.

7.4 Baseline Conditions

Introduction

- 7.4.1 The centre of Norwich consists of a significant sized commercial environment centred on a historic medieval core. On the edges of the city are extensive urban fringes typically consisting of relatively modern residential suburbs of rather uniform visual character. Away from the urban area the surrounding villages are generally historic in character with varied features such as ancient churches and historic buildings and with a strong sense of history associated with their setting within the landscape.
- 7.4.2 The topography of the area is shown in Volume 2, Chapter 7: Landscape, Section C, drawing MMD-233906-DT-0668. At the western end of the route corridor, commencing at the A1067, the land is undulating and blocks of deciduous woodland dominate the view. Westwards towards Thorpe Marriot the character starts to change on account of flatter topography dominated by large coniferous plantations, providing a considerable degree of enclosure. The landscape then becomes much more open and featureless towards the A140.
- 7.4.3 The study corridor is then dominated by the airport, which occupies a flat plateau area surrounded by open arable land which is largely devoid of significant landscape features. Just to the north of the airport, but largely screened from it by a low ridge, lies the attractive village of Horsham St. Faith.
- 7.4.4 Beyond here landscape character once again becomes more enclosed as it passes through a wooded landscape characterised by the presence of large parklands, noticeably Beeston Park and Rackheath Hall, and has an attractive landscape quality. Beyond Rackheath the character begins to change further, with a higher degree of woodland cover and more undulating landform.
- 7.4.5 The eastern end of the corridor is characterised by flatter topography and a much more open landscape of arable farmland. The route terminates at the A47 in the vicinity of Broadland Business Park where the landscape becomes more urban in character.

Lighting and Tranquillity

- 7.4.6 Despite the close proximity to Norwich, the route would pass through fairly tranquil countryside, particularly in the vicinity of the wooded parkland areas of Rackheath and Beeston.
- 7.4.7 The airport in the vicinity of the route has a remote feel to it on account of its open character and lack of built development. However, this feeling is broken by the noise of aircraft activity on a regular basis.
- 7.4.8 In general, the high degree of open arable cultivation along the route corridor gives the impression of a sparsely populated area, although in fact there are many small hamlets and isolated properties spread throughout the area, and the small rural roads that link these are well trafficked. This fact is evidenced at night, where lighting from houses and associated localised street lighting are very much in evidence. There is also considerable sky glow from Norwich to the south.
- 7.4.9 The northern urban fringe of Norwich (including Taverham and Drayton) is defined in Norfolk County Council's Environmental Lighting Policy as being within the well lit 'urban area and their suburbs' category. Horsford and Spixworth lie within the 'Market Towns and existing well lit villages' category, and the remaining parts of the study area (including the footprint for the NDR) are within the 'Rural Dark Landscapes' category. However, the only part of the NDR to be lit is the Postwick Hub. Since this area is already well lit (from the existing business development and the A47 junction) lighting impacts arising from the NDR will predominantly be from vehicle headlights.

Landscape Character

- 7.4.10 The boundaries of the landscape character areas are shown in Volume 2, Chapter 7: Landscape, Section E, drawings MMD-233906-DT-0670 and MMD-233906-DT-0671, and a representative photograph (together with field survey notes following the LCAG methodology) for each area included in Volume 2, Chapter 7: Landscape, Section G. A description of the generic landscape character types and specific landscape character areas within the study area are as follows:

Settlements (landscape character type S)

7.4.11 Built up areas can be generically classed together as a single landscape character type. However, there are differences in character across the spectrum of the built environment, ranging from modern planned settlements of uniform character to historic villages with a more varied architecture, each of which would form a distinct landscape character area. The individual settlement landscape character areas vary considerably across the study area and are as follows;

Thorpe Marriott (landscape character area S1)

7.4.12 This large settlement was constructed entirely from new in the 1990s as an overflow housing development for Norwich. Like the other modern developments of Thorpe End and Spixworth, the boundary of the built up area is very tightly controlled and sharply delineated, and is screened from the countryside on the north and west sides by a dense coniferous shelter belt, which has now reached maturity. This development joins with Taverham to the south, but is separated from it by the green corridor of Marriott's Way and its associated grassland recreational areas.

Horsford (landscape character area S2)

7.4.13 This village has steadily expanded since the 1930s along the B1149 Holt Road, and now encompasses several farm buildings and cottages of older date along its margins. Like Horsham St. Faith, this village has also been allowed to develop in a piecemeal fashion over the years and also has an informal development pattern.

Horsham St. Faith (landscape character area S3)

7.4.14 This is an ancient village with a historic core surrounded by a mix of housing styles, many of which have established mature gardens. Unlike the more modern planned developments of Thorpe End and Spixworth, the village has developed in a piecemeal fashion over many years and therefore has a more informal development pattern.

Spixworth (landscape character area S4)

7.4.15 Spixworth was originally a small village centred on the parish church, with Spixworth Hall and associated parkland lying adjacent immediately to the

west. However, since the 1930s a large residential settlement has been created to the southeast in response to housing pressure in Norwich, which has expanded in recent years to create a uniform character of single and two-storey detached and semi detached dwellings. The boundary of the built up area is very tightly controlled and sharply delineated to the south.

Rackheath (landscape character area S5)

7.4.16 Rackheath is a rather spread out settlement that includes an industrial estate and a large area of housing in between the Wroxham and Salhouse roads. Housing comprises a mix of styles ranging from older bungalows to modern detached two-storey dwellings. The industrial estate is on land that was formerly used as a Second World War airfield, and concrete tracks and building remains from this period still survive in the woodland to the south of the village.

Thorpe End (landscape character area S6)

7.4.17 Thorpe End was originally conceived and built as a 'garden village', with a higher degree of open space and landscaping than would normally be provided for such a development. The original village was constructed largely to the south of the Plumstead Road and consisted of detached dwellings with large gardens set within the context of tree lined avenues. The village has been extended to the north of Plumstead road in recent years, using high standards of paving and landscaping in keeping with the 'garden village' concept.

Postwick (landscape character area S7)

7.4.18 Postwick is an old village with a tightly defined core clustered around the parish church. It lies to the south of the A47 on land that falls gently towards the River Yare floodplain. Properties on the northern edge of the village tend to be fairly large with mature well wooded gardens and boundaries.

Norwich Urban Fringe (landscape character area S8)

7.4.19 This area occurs on the outskirts of Norwich and largely comprises the built edge of the suburbs where they adjoin the surrounding farmland, although in some places the boundary is less abrupt where cemeteries, playing fields or

woodland lie in between. The northern fringe of Norwich is generally characterised by newer residential development dating from the 1930s onwards, but with substantial expansion in recent years. This has led to a tendency for some settlements to become joined up, particularly along the arterial roads. The most noticeable example of this is Hellesdon, Drayton and Taverham along the A1067, which have all been classed as part of this zone for the purposes of this study.

Transport Infrastructure (landscape character type T)

7.4.20 This landscape character type is characterised by strongly delineated boundaries which define its role as an area for specific transportation uses, namely the landscape character areas of Norwich Airport and the A47 trunk road.

Norwich Airport (landscape character area T1)

7.4.21 The route of the NDR passes along the northern edge of Norwich Airport, which is a largely featureless and expansive open area in stark contrast to the busy terminal area to the south. Norwich Aviation Museum occupies part of the site and there are a few airport buildings in evidence, including the control tower and the complex of building and structures that forms the Petans safety training business.

The A47 corridor (landscape character area T2)

7.4.22 The A47 Norwich Southern Bypass with its associated earthworks and landscape planting forms a dominant linear landscape feature with a quite distinct character. The scale of the road and its associated infrastructure, such as overbridges and lighting columns, creates an urban feel around the eastern end of the study area, particularly as other development in the vicinity (such as the expanding Broadland Business Park and the Postwick Park and Ride site) reinforce this urban character. However, the area around the Park and Ride site forms part of the area designated as an Area of Landscape Value.

Wensum Valley (landscape character type WV)

7.4.23 The River Wensum occupies a broad gently sloping shallow valley as it flows eastwards towards the centre of Norwich and is dominated by wet pasture

and marshland for the most part. As it reaches the urban fringe the land use changes to reflect this, with recreational features such as playing fields and golf courses becoming evident. The edge of the study area affects the edge of one such character area as follows:

Wensum Valley (landscape character area WV1)

7.4.24 The area lying immediately to the south of the A1067 (at the commencement of the scheme) slopes down to meet the river Wensum, and contains a golf course. There are a few mature trees and short hedgerow lengths left as remnant features from previous farming use, but the overall character is now dominated by the greens, fairways and bunkers of the golf course. This character area forms part of character zone B in the 1999 BDC study (subdivided as B3), and described as 'comprising of a stretch of the River Wensum between Lenwade and Norwich, this character area includes the river floodplain, its northern and southern slopes and a tributary of the river extending up to the town of Reepham' and was confirmed in the 2008 BDC study (where it is now numbered as landscape character area A1). Much of this area is designated as an Area of Landscape Value by Broadland District Council.

Gravel Hills (landscape character type GH)

7.4.25 This character type is defined by a ridge formed of gravelly materials of glacial origins, forming a distinct topographical feature which broadly lies in a north south orientation at the western end of the corridor and is cut through by the Wensum valley. It is characterised by steep slopes covered in mature deciduous woodland interspersed by small arable fields. The Scheme affects the northern edge of this broad landscape character type, affecting one specific landscape character area as follows.

Gravel Hills (landscape character area GH1)

7.4.26 This character area occurs at the western edge of the scheme where steep slopes covered in mature deciduous woodland mark the transition between the river Wensum valley and the arable plateau land further to the north. This area also forms part of character zone B in the 1999 BDC study (A1 in the 2008 study), subdivided as area B2, and much of it is designated as an Area of Landscape Value by Broadland District Council.

Expansive Largely Open Arable Farmland (landscape character type OA)

7.4.27 This landscape character type contains land in intensive arable cultivation and is characterised by a lack of small scale topographic or vegetation features, creating the feeling of an expansive open area of landscape. This area encompasses the majority of the 1999 BDC study character zone I (western part of E3 in the 2008 study), defined as ‘an area of essentially open land in mixed use forming a landscape buffer between the urban edge of Norwich and the woodlands and plantations to the north’. Within this broad character type three distinct character areas have been identified for this study as follows:

In the vicinity of Marriotts Way (landscape character area OA1)

7.4.28 This area of arable plateau has a different character than that lying further to the east on account of the sense of enclosure provided by the coniferous shelterbelt surrounding Thorpe Marriott and the coniferous plantation of Drayton Drewray to the north. Further enclosure is provided by the route of Marriotts Way, which occupies the well vegetated route of a former railway line. This area is classed as the western part of I1 in the 1999 BDC study (western part of E3 in the 2008 study), which does not make a distinction between this area and OA2 (described below) reflecting the broader approach of the district wide BDC studies. Some of this area (to the north of Reepham Road) is designated as an Area of Landscape Value by Broadland District Council.

Thorpe Marriott to Horsham St. Faith (landscape character area OA2)

7.4.29 The open arable plateau continues eastwards towards the A140 and across to the airport near Horsham St. Faith, with the land falling away on either side of the Reepham Road which forms a shallow ridge line through the centre of this character zone. This area has a very expansive and open feeling, with few landscape features, although localised farm buildings and houses on the edge of Horsford and Thorpe Marriott provide the occasional focal point. This area is covered by the eastern part of area I1 and part of I2 in the 1999 BDC study (E3 in the 2008 study).

North of Norwich Airport (landscape character area OA3)

7.4.30 This area is a continuation of the open plateau area, and occupies the area between Horsham St. Faith and the airport boundary, extending eastwards towards Spixworth and effectively merging into the airport to the south. The airport is given a separate character area (see T1 above) on account of the dominating influence of aviation activities, although the airport boundary and associated buildings and operations (including the static aircraft exhibits associated with Norwich Aviation Museum and the Petans complex) tend to influence and dominate the character of this particular area. This area is subdivided as parts of area I2 and I3 in the 1999 BDC study (E3 in the 2008 study).

Partly Enclosed Arable Farmland (landscape character type EA)

7.4.31 This character type forms the largest part of the eastern side of the study area and is characterized by generally flat topography in arable cultivation, but with a high density of hedges and small woodland blocks. Isolated properties and farms with mature well vegetated gardens are spread throughout the area, helping to reinforce the feeling of a landscape with a fairly high level of vegetation cover. Much of this area adjoins the urban fringe of Norwich and 'semi urban' land uses such as Sprowston Manor golf course, playing fields and cemeteries also help to define the landscape character. Within this broad landscape character type there are four distinct character areas as follows:

Spixworth Park (landscape character area EA1)

7.4.32 This area is centred on the remains of Spixworth Park. Although the parkland is now mostly in arable cultivation, many of the original shelterbelts and copses are still intact, giving this area an enclosed wooded feel which is quite distinct from the surrounding area. The 1999 BDC study included this area as part of the 'open arable' category described above, but gave it a separate subcategory (I3) to reflect this change in character (although within the larger character areas in the 2008 report it is included within area E3).

Adjacent to Norwich Urban Fringe (landscape character area EA2)

7.4.33 Between the urban edge of Norwich and the more rural character areas lying further to the north lies an area of mixed use and varying character, ranging from areas of arable land bounded by large housing developments such as near Spixworth, through to well wooded enclosed areas such as that near Sprowston Manor Golf Course. A distinctive factor of this area is that urban

elements are a dominant component of the arable landscape, and it is this which influences the landscape character, be it a playing field, cemetery, golf course or housing development. The 1999 BDC study classed the majority of this area as J1 (E3 in the 2008 report), a subdivision of zone J which includes the parklands lying to the north (which are subdivided as E4 in the 2008 report), and was summarised as ‘this tract of land extends north east from Norwich and encompasses former areas of heathland that today are under arable cultivation, along with an area of historic parkland and a number of recently expanded settlements’. The coniferous plantations adjacent to the Salhouse and Plumstead Roads are designated as an Area of Landscape Value by Broadland District Council.

In the vicinity of the Railway Crossing (landscape character area EA3)

7.4.34 In between Thorpe End and New Rackheath arable cultivation is interspersed with rough grazing pasture and the character of the landscape changes accordingly, becoming noticeably more open. This area is also dominated by the busy Norwich to Plumstead Road and the railway line, and consequently does not have the same remote rural character as EA1. This area forms part of zone J in the 1999 BDC study, and was given the subdivision of J4 (E4 in the 2008 report).

North of the A47 (landscape character area EA4)

7.4.35 This area is in intensive arable cultivation characterised by large flat fields, but with dense hedgerows and mature hedgerow trees alongside the roads and tracks that cross the area. In addition there are several properties with large mature grounds in the area, which reinforce the feeling of enclosure. Principally these are Smee House Nursery, Red House and Oaks Farm. This area forms part of the western side of a larger character zone (zone L, subdivided as L1 in the 1999 BDC report) which was defined as ‘this undulating landscape extends eastwards from the edge of Norwich, forming a wide belt adjacent to the River Yare. Typical urban fringe developments and numerous commuter settlements contrast with areas of high quality farmland, woodland and minor river valleys’ (in the 2008 report, this area is included as part of E3, which tends to form a narrow belt adjoining the northern urban fringe of Norwich).

Enclosed Well Wooded Arable Farmland (landscape character type WA)

7.4.36 This landscape character type is characterised by extensive woodland cover resulting from the presence of three former estates that effectively form a contiguous landscape; Beeston Park (still extant though much of the former parkland is ploughed), Rackheath Hall (now converted to apartments but mature largely deciduous shelterbelts still remain within a farmed landscape), and Sprowston Manor (former parkland converted to golf course, though many parkland features remain). Beeston and Rackheath Parks are directly affected by the route and are described below, together with a smaller area of parkland at Red Hall and the adjoining landscape centred on 'The Springs at Rackheath' to the north. Sprowston Manor is included as part of character area EA2 on account of the urbanising influence of the conversion of much of the former parkland to golf course, but the more natural northern boundary woodlands and shelter belts are included within this character type. The area is encompassed by the central part of character zone J in the 1999 BDC study, and is mostly subdivided as J2 (E4 in the 2008 study).

Red Hall (landscape character area WA1)

7.4.37 This is a very small area lying on the western edge of this character area, separated from Beeston Park to the east by the busy B1150 North Walsham Road. It is a distinctive small scale parkland enclave in strong contrast to the surrounding arable land, and comprises pasture (used as horse paddocks) with mature specimen trees surrounded by mature woodland. The 1999 BDC study did not subdivide this area from the arable area I3 (E3 in the 2008 study) on account of the broader scope of that study, but as this area stands in marked contrast to the surrounding intensive arable cultivation it has been given a separate subdivision for the purposes of this study.

Beeston Park (landscape character area WA2)

7.4.38 This distinct character area is centred on Beeston Hall which is bounded by mature deciduous shelterbelts. The main frontage of the Hall to the south faces an area of parkland that is maintained in its original condition with grassland and parkland trees. To the north the original parkland is ploughed, although the surrounding shelterbelts give it a distinct well wooded character. This area forms the western part of subzone J2 in the 1999 BDC study (E4 in the 2008 study). This area is designated as an Area of Landscape Value by Broadland District Council.

The Springs at Rackheath (landscape character area WA3)

7.4.39 The Beeston Hall estate is contiguous with an area of well wooded landscape on distinctive undulating topography extending towards Rackheath and bounded by the A1151 Wroxham Road. This area is centred on an area of wet woodland ('The Springs at Rackheath'), which is important in defining the character of this area, and which forms the eastern part of J2 in the 1999 BDC study (E4 in the 2008 study). This area is designated as an Area of Landscape Value by Broadland District Council.

Rackheath Park (landscape character area WA4)

7.4.40 Although the original parkland is now all ploughed, the original shelterbelts remain and these, combined with the undulating topography, create a distinctive landscape character zone, forming the southern part of subzone J2 in the 1999 BDC study (E4 in the 2008 study). This area is designated as an Area of Landscape Value by Broadland District Council.

Woodland (landscape character type W)

7.4.41 Within the broad landscape character type of woodland there are two areas of dense woodland directly affected by the route, both with very different and distinct landscape characters as follows:

Drayton Drewary (landscape character area W1)

7.4.42 This woodland is mature coniferous plantation which forms part of a large network of interconnected blocks which are centred around the area to the north of Horsford, all of which are largely of coniferous composition and are extensively used for informal recreation. Towards the centre of Drayton Drewary, however, the woodland changes to deciduous woodland dominated by birch, interspersed with some open patches of grazing land. This woodland forms the southern boundary of character area E in the 1999 BDC study (B1 in the 2008 study) subdivided as area E3 and described as 'north-west of Norwich, the distinct soils of this character area create a unique landscape of woodland and plantations, interspersed with arable farmland'. This area is designated as an Area of Landscape Value by Broadland District Council.

Hall Farm (landscape character area W2)

7.4.43 This is an area of deciduous woodland that has been allowed to establish to the south of Rackheath Park in the vicinity of the semi derelict Hall Farm. During the war airmen from nearby Rackheath airfield were billeted at Rackheath Hall and the presence of wartime buildings and concrete access tracks throughout this area gives it a distinct character, particularly where the vegetation has grown up around such remains. The area also contains some isolated residential properties and small industrial units, and forms the southernmost part of area J2 in the 1999 BDC study (E4 in the 2008 study). This area is designated as an Area of Landscape Value by Broadland District Council.

7.5 Mitigation

Objectives

- 7.5.1 Mitigation of the scheme has involved optimising the route alignment in order to retain existing features or vegetation of interest and reduce visual impact. This has involved lowering the vertical alignment and adjusting the horizontal alignment where possible in order to minimise landscape and visual intrusion, subject to engineering considerations.
- 7.5.2 An extensive landscaping scheme has been designed (see drawings MMD-233906-DT-0866 to MMD-233906-DT-0878 and MMD-233906-DT0941) in order to integrate the road into the surrounding landscape as far as possible, and to reduce visual effects near housing. This has involved extensive mounding and grading out of side slopes to blend the road as far as possible into the surrounding topography, together with linking the road planting with adjoining existing vegetation. New planting has been provided in excess of the 6 to 1 replacement ratio recommended by the Forestry Commission, and the species chosen will be mostly native and deciduous to reflect those found in the immediate locality.
- 7.5.3 In the vicinity of the airport (approximately 2 km either side of Horsham St. Faith) the planting mixes would be adjusted to reduce the risk of bird strike hazards to aircraft; shrub planting would be kept trimmed to 2 m in height and the percentage of large trees reduced. In addition, the proportion of berry producing shrubs would also be reduced, to avoid attracting large flocks of birds which could prove hazardous to aircraft.
- 7.5.4 Effective mitigation measures for short-term construction impacts are difficult due to the short time scale for the proposed implementation of the works. This would preclude effective screening through planting. However, good and effective site management will ensure that waste materials and debris are

controlled to avoid items from blowing off site. Careful planning and management of the construction process will minimise the loss of existing trees and shrubs. Such careful site planning and management will be achieved through the Construction Environmental Management Plan (CEMP). Volume 2, Chapter 24: Construction Environmental Management Plan (CEMP).

- 7.5.5 The construction sequence has been optimised to avoid double handling of material and excessive vehicle movements (e.g. the earthworks balance is designed such that only localised movement of material will be necessary along individual stretches of the new road).
- 7.5.6 The landscape planting would be carried out as part of the main engineering contract, and would include maintenance for two years after the initial planting (to include replacement of plant failures and weed control). After that the County Council would be responsible for the longer term maintenance of the planting scheme. Details of the ongoing landscape management requirements will be set out in a separate landscape management plan.

Landscape Design

- 7.5.7 The landscape design is shown in DCO Document 2.8 Detailed Landscape Planting Proposals, drawings MMD-233906-DT-0866 to MMD-233906-DT-0941 and MMD-233906-DT-0941. This is further illustrated by cross sections which are shown in DCO Document 2.9 Indicative Sections, drawings MMD-233906-DT-0956 to MMD-233906-DT-0960.
- 7.5.8 Between the A1067 Fakenham Road and Reepham Road extensive planting of the side slopes will help to blend the road into this well wooded valley landscape and screen it from the isolated properties in the vicinity. A combined ecological and landscape mitigation area is proposed to link some of the existing woodland areas, which would comprise a mixture of woodland, scrub and grassland (see cross section 1). This design theme continues through to the woodland at Drayton Drewray, where additional planting and mounding are provided as compensation for woodland lost and to strengthen the screen from Thorpe Marriot (see cross section 2). Additional planting of severed field corners is also proposed where the route passes under Marriots Way to help compensate for the loss of vegetation along the cycle path. A cycle path is proposed along the back of the mounding to link Furze Lane and Marriotts Way to Reepham Road and Drayton Drewray.

- 7.5.9 From Reepham Road the route crosses open arable land, and linear strips of planting are proposed alongside the NDR to link the road into the existing hedge structure. Larger blocks of planting are provided to fill in severed field corners, which in conjunction with mounding would help to integrate the NDR into this open landscape (see cross section 3). This concept continues through to the junction with the A140, where the opportunity is taken to provide extensive woodland planting to help blend this large structure into the landscape.
- 7.5.10 The route is left open and largely unplanted where it passes Norwich airport, although localised mounding is provided to screen West Farm from the route. Where the route passes Horsham St. Faith mounding would be provided to screen the road from view.
- 7.5.11 Beyond the airport the landscape becomes more enclosed, and the roadside planting would become denser to reflect this local character, particularly in the vicinity of the Buxton road crossing where extensive planting would be used in conjunction with earth mounding to screen the route from view and link it into the coniferous shelter belt to the south of Spixworth (see cross section 4). Further mounding would be provided where the route crosses the B1150 North Walsham Road to screen the scheme from houses on the edge of Spixworth (see cross section 5).
- 7.5.12 Where the route crosses the former parkland to the north of Beeston Hall, a gentle graded mound would screen views of the NDR from the Hall without appearing intrusive within this sensitive landscape. Planting would be restricted to clumps of specimen trees to reinforce the parkland feel. Further east however, a combination of mounding and dense planting would be provided to screen the route from the estate cottages.
- 7.5.13 On passing Beeston Lane, the route would then be screened by mounding and planting from properties to the south. Land in proximity to the proposed A1151 Wroxham Road Roundabout would be used to provide landscape and ecological mitigation, providing a habitat link between the two woodlands (see cross section 6).
- 7.5.14 After crossing the A1151 Wroxham Road the route will be heavily planted to reflect the surrounding woodland blocks in the vicinity of Rackheath Park, and to help screen it from nearby properties. Planting is augmented by mounding in places to help achieve this aim.
- 7.5.15 Beyond Salhouse Road the route rises to cross the Norwich to Sheringham railway line, and extensive dense planting is proposed on the lower

embankment slopes to help reduce the impact of the route in this flat landscape. A low mound along the crest will screen views of cars from surrounding properties (see cross section 7).

7.5.16 The route then crosses a fairly open arable landscape, with isolated farms and houses. Localised mounding and dense planting will be used to screen properties where needed along the route (see cross section 8).

7.5.17 The route terminates at the A47 Postwick junction, and dense planting will be used as appropriate to help to blend the new highway structures into the landscape.

7.6 Assessment of Landscape Impacts

Introduction

7.6.1 This section assesses the significance of the effects of the proposals on the character of the landscape. The assessment is based upon consideration of the magnitude of change brought about by the scheme and the sensitivity of the landscape through which the NDR would pass. Photomontage visualisations of how the completed scheme will look from various locations have been agreed with Norfolk County Council and are included in Volume 2, Chapter 7: Landscape, Section J and K, drawings MMD-233906-DT-0879, MMD-233906-DT-0880 and Photomontage Locations 1 to 9.

Construction Impacts

7.6.2 Although construction impacts are of a temporary nature and short term, localised impacts on landscape character could be moderately adverse during the construction process. Such impacts would include the presence of site compounds and operations such as temporary earthmoving stockpiles and bridge construction scaffolding. In general, the movement of plant and materials necessary to construct the NDR will occur along the route within the boundary of the road, giving rise to adverse impacts throughout the construction period along the entire length of the route. However, specific additional impacts will also occur at certain locations where major works (such as the creation of new bridge crossings) could potentially give rise to significant effects.

7.6.3 Night time impacts will be minor since work will be largely limited to day light hours (7am to 7pm). The site compounds will be lit at night for security reasons, but since these are situated close to existing main road access points, impacts will not be significant.

7.6.4 The locations of compounds, storage areas and borrow pits are shown on the drawings R1C093-R1-5014 to R1C093-R1-5026 and explained further in chapter 2. The following paragraphs outline specific construction impacts that could occur along the various sections of the route.

A1067 to Fir Covert Road (ch 0 to 1700)

7.6.5 A small site compound is proposed adjacent to the new roundabout with the A1067 to facilitate construction of the new junction. These works will be seen within the context of the existing A1067, resulting in a moderate impact in a moderately sensitive landscape, giving rise to moderate adverse effects on landscape character during the construction period.

7.6.6 Two construction site areas (one involving a gas main diversion at ch. 1200 and the other a topsoil storage area at ch. 1600) are proposed alongside the route in the vicinity of Spring Farm and Fir Covert Road, which will give rise to additional vehicle movements in this vicinity. However, the combination of topography and existing woodland cover would reduce the magnitude of impact to moderate adverse levels, which in a landscape that is judged to be moderately sensitive to this type of change would result in moderate adverse effects overall during the construction period.

Fir Covert Road to Reepham Road (ch 1700 to 2900)

7.6.7 The bridge over Marriotts Way will involve a small site compound with an associated materials storage area. The construction of the bridge would cause a major impact in this fairly open landscape, due to the presence of moving vehicles and lifting equipment. However, landscape sensitivity is regarded as being 'low' on account of the overall lack of any distinctive landscape features, and overall therefore a moderate adverse landscape effect is predicted during the construction period.

Reepham Road to A140 (ch 2900 to 6800)

7.6.8 Small localised site compounds and storage areas will be located in the vicinity of the new roundabout junction with Reepham Road, but within the context of this busy local route the impact of additional vehicle movements is regarded as minor. Similarly, the site compound adjacent to Drayton Lane (ch. 5300) would also be within the context of the existing busy Reepham Road. The impact of this compound would also be reduced by the provision of

temporary mitigation mounding along the compound boundary, resulting in a minor adverse magnitude of impact.

7.6.9 Construction of the large grade separated junction with the A140 would be a major engineering undertaking, requiring the provision of an adjacent site compound. However, these works would be carried out within the context of the busy existing road network, and the magnitude of impact is therefore regarded as being moderate adverse.

7.6.10 The landscape over this section of the route is regarded as being of low sensitivity to change on account of the urbanising effect of Thorpe Marriott, the busy local road network, various industrial units and a lack of distinctive landscape features. Taken overall, landscape effects resulting from the construction of the NDR over this section are regarded as being slight adverse.

A140 to Quaker Lane (ch 6800 to 9750)

7.6.11 The main construction site compound for the western part of the NDR is located near to the A140 junction on unused airport land. There would be a large number of construction vehicles leaving and entering the compound, but its location is within the context of the busy existing road network. The impact of this compound would be further reduced by the provision of temporary mitigation mounding along the compound boundary, resulting in a minor adverse magnitude of impact.

7.6.12 A temporary topsoil storage area would be located adjacent to the airport roundabout at ch. 9200, but the impact of this would be no more than moderate adverse within the context of the main NDR earthmoving works.

7.6.13 The landscape sensitivity over this stretch is 'low' on account of the presence of the airport and lack of distinctive landscape features, resulting in slight adverse effects overall.

Quaker Lane to B1150 (ch 9750 to 12100)

7.6.14 Bridge construction over the NDR along Buxton Road would involve a small site compound with associated materials storage area at ch. 10800, which together with a borrow pit on the south side of the NDR at ch.11200 would cause a moderate adverse landscape impact during the construction period,

primarily through the movement of earthmoving vehicles, although temporary mitigation mounding would be provided around the borrow pit.

7.6.15 The main construction site compound for the eastern part of the route is located adjacent to the B1150 at ch. 12000. Temporary screen mounding would be provided around the boundary of this compound, but due to its large size it would have a moderate landscape impact, despite the presence of the busy B1150 nearby.

7.6.16 The landscape over this section of the route is regarded as being of moderate sensitivity on account of the distinctive landscape feature of the mature woodland belt through which the NDR would pass, resulting in moderate adverse landscape effects overall throughout the construction period over this section of the NDR.

B1150 to Salhouse Road (ch 12100 to 16100)

7.6.17 The construction of the shallow earth mounding adjacent to Beeston Park would have a moderate landscape impact until it is completed, largely on account of the presence of earthmoving vehicles. Two small site compounds are located at Gazebo Farm (ch. 15400) and adjacent to Salhouse Road (ch. 16000), but their impact would be minor within the context of the main construction works which is regarded as being moderate adverse overall on account of the extensive earthworks required over this section of the route (i.e. screen mounding up to Wroxham Road at ch. 14200 and cutting slope excavation beyond to Salhouse Road). This is a landscape of moderate sensitivity on account of the distinctive features of undulating topography combined with mature woodland, resulting in moderate adverse effects on landscape character during the construction period.

Salhouse Road to Plumstead Road (ch 16100 to 17000)

7.6.18 The main work element over this length of the NDR would be construction of the railway crossing. This would cause a major impact which would be difficult to mitigate during the period of its construction on account of its prominent position in an open landscape, together with the presence of the construction compounds and vehicles in the immediate vicinity. However, the landscape is of low sensitivity due to the presence of man made elements such as the railway line and adjacent roads with their associated traffic, resulting in an overall moderate adverse landscape effect for the duration of the bridge construction.

Plumstead Road to Smee Lane (ch 17000 to 19000)

7.6.19 Other than the provision of a small topsoil storage area adjacent to the NDR at ch. 18300, the main construction impact over this section will be disruption caused by vehicle movements in the creation of the screen mounding which is necessary along the along almost the entire length. This would result in a moderate impact on an attractive landscape of moderate sensitivity, giving rise to moderate adverse effects on the landscape character of this section of the route for the duration of the construction period.

Smee Lane to A47 (ch 19000 to 20400)

7.6.20 This short section of the route would involve the construction of Postwick Hub and associated links to the A47 trunk road. These works would be within the context of the urban edge of Norwich and a busy traffic interchange, constituting a moderate impact in a landscape of low sensitivity, with consequently slight adverse landscape effects.

Operational impacts

7.6.21 Operational impacts are those which will occur once the NDR has been completed, comprising the effect that the new infrastructure would have on the landscape, together with the impact of the vehicles that would use it. Two scenarios are considered; 'year 1' is the situation that will exist immediately after the road has opened, whilst 'year 15' considers the situation when the mitigation planting will have matured. In year 1 the scheme will appear quite noticeable, with mounding and solid barriers in place but without any appreciable effects from planting. In contrast, by year 15 the NDR will be well vegetated and will blend into the landscape. Night time effects are also considered, principally the impacts of vehicle headlights since the only area to be street lit will be the Postwick junction.

A1067 to Fir Covert Road (ch 0 to 1700)

7.6.22 From the A1067 the NDR will swing north east to follow a secluded shallow valley along the foot of the wooded Deighton Hills, before swinging east to cross Fir Covert Road (see photomontage location 1). The NDR will pass through a currently undisturbed and attractive area of countryside (which

forms the edge of an Area of Landscape Value defined by Broadland District Council), but would follow the topography and be well screened by the surrounding woodland, which would be augmented by additional mitigation planting. Since the NDR would follow the grain of the land and fit well within the valley, it is regarded as having a moderate adverse impact in a moderately sensitive landscape, resulting in moderately adverse effects on the landscape character of this stretch of the NDR in year 1, reducing to 'slight adverse' in year 15 once the mitigation planting has matured. Night time impacts will be 'slight adverse' arising from vehicle headlights along this length of the route.

Fir Covert Road to Reepham Road (ch 1700 to 2900)

7.6.23 From Fir Covert Road, the NDR would cross open fields to pass under Marriotts Way to join the Reepham Road at a roundabout junction. This section would be in cutting for much of its length, although the Marriotts way would be prominent where it rises to cross over the NDR on a bridge (see photomontage location 2). Despite the mitigation planting, this would be a prominent feature that would be out of character in this flat landscape, and is regarded as having a major adverse impact. However, the landscape through which this section runs is regarded as being of low sensitivity due to the encroachment of roads and buildings, and the landscape effect over this length is therefore considered to be moderately adverse in year 1, reducing to 'slight adverse' in year 15 once the mitigation planting has matured. Night time impacts will be 'slight adverse' arising from vehicle headlights along this length of the route.

Reepham Road to A140 (ch 2900 to 6800)

7.6.24 From Reepham Road the NDR would cut through the corner of a coniferous plantation on the edge of Drayton Drewray before crossing open fields to the north of Thorpe Marriott (see photomontage location 3). The woodland lost at Drayton Drewray is entirely of coniferous plantation, and the more interesting area with a higher deciduous tree component interspersed with grassland glades and patches of scrubland further to the north would be unaffected. The NDR would generally fit well into this flat landscape interspersed with large woodland blocks, which is consequently regarded as being of low sensitivity to the type of change proposed. The magnitude of impact is regarded as moderate adverse, which would therefore result in landscape effects that are slight adverse in year 1, reducing the 'neutral' in year 15 once the mitigation

planting has fully matured. Night time impacts will be 'slight adverse' arising from glimpses of vehicle headlights.

7.6.25 Beyond Drayton Drewray the NDR follows a low ridge across open arable land to the A140, running roughly parallel with the busy Reepham Road before crossing the A140 Cromer Road. Due to the nearby presence of these major roads through a largely open landscape, it is regarded as being of low sensitivity. The NDR would be largely screened by mounding over much of this length, but its position along the top of the low ridge line is regarded as having a moderate impact. However, combined with the low sensitivity of the landscape, operational phase landscape effects along this stretch are regarded as being 'slight adverse' in year 1, and therefore not significant. These effects would however remain in year 15, despite the mitigation planting, due to the position of the NDR along the ridge line. Night time impacts will be 'slight adverse' arising from vehicle headlights along this length of the route.

A140 to Quaker Lane (ch 6800 to 9750)

7.6.26 The impact of the A140 junction is reduced by the fact that it is sited largely on the line of the existing A140, which already carries a significant amount of traffic, and the landscape is therefore regarded as being of low sensitivity to the addition of the NDR (see photomontage location 4). However, the addition of further infrastructure into this road dominated location is regarded as having a moderate magnitude of change on account of the increased scale and height of the new junction, with the A140 being carried over the NDR. Combining sensitivity with magnitude of impact would result in slight adverse landscape effects at this location in year 1, which would remain at year 15 on account of the scale of the new junction. Night time impacts would however be 'neutral', on account of the large numbers of vehicles which already use the existing junction at this location.

7.6.27 The NDR would then follow the northern boundary of the airport, where the presence of new mounding to screen the NDR and limited opportunities for planting due to the operational requirements of the airport would have a moderate magnitude of impact in this open landscape (see photomontage location 5). However, the presence of the airport and the open featureless quality of the surrounding landscape is regarded as being of low sensitivity, and overall landscape effects are therefore regarded as being slight adverse for both year 1 and year 15. Since the route is either mounded or in cutting over this length, night time impacts are regarded as 'neutral'.

Quaker Lane to B1150 (ch 9750 to 12100)

7.6.28 The route then passes to the south of Quaker Farm before crossing Buxton Road, which would be taken over the NDR on a bridge resulting in a fairly localised but major degree of change (see photomontage location 6). The landscape here has an attractive well wooded quality and is more tranquil, despite the presence of nearby housing and local roads, and is therefore regarded as being of moderate sensitivity. However, the surrounding woodland provides extensive mitigation opportunities for large woodland belts to be provided to link with the existing vegetation, particularly around the coniferous shelterbelt near Spixworth. Together with screen mounding this will help to blend the NDR into the landscape and overall effects are regarded as moderate adverse in year 1, reducing to slight adverse in year 15 once the mitigation planting is fully mature. Night time impacts will be 'slight adverse' arising from glimpses of vehicle headlights.

B1150 to Salhouse Road (ch 12100 to 16100)

7.6.29 From the B1150 the route would cross the northern part of former parkland (now arable farmland) surrounding Beeston Hall, before crossing open fields to join the A1151 Wroxham Road at a roundabout. Mounding would be provided to screen views of the NDR from the rear of Beeston Hall, which would be gently graded to blend into the existing contours so as to be as unobtrusive as possible. The mitigation provided as the scheme crosses Beeston Park will reduce the effects on this landscape of moderate sensitivity to slight adverse for both year 1 and year 15, although beyond Beeston Park the impact will be moderate adverse in year 1, reducing to 'slight adverse' by year 15 as the dense mitigation planting matures. Night time impacts will be 'neutral' past Beeston Park on account of the screening effect of the mounding, and 'slight adverse' further along the route due to glimpses of vehicle headlights.

7.6.30 From the Wroxham road, the route would follow the valley floor before rising to pass through woodland between the village of Rackheath and Rackheath Hall to join the Salhouse Road at a new roundabout. This is an attractive well wooded area (reflected in its designation as an 'Area of Landscape Value' by Broadland District Council), although the close proximity of housing and urban influences reduces the landscape sensitivity to 'moderate'. The extensive woodland planting proposed as mitigation is regarded as being effective,

resulting in landscape effects that are 'moderate adverse' in year 1, reducing to 'slight adverse' by year 15. Night time impacts will be 'slight adverse' arising from vehicle headlights along this length of the route.

Salhouse Road to Plumstead Road (ch 16100 to 17000)

7.6.31 From Salhouse Road the landscape character changes to become flat, open and largely featureless, and is considered to be of low sensitivity on account of the surrounding urban influences, principally housing development and busy local roads. However, at 9.3 metres above existing ground level the NDR would be very intrusive where it rises to cross the railway line, resulting in a 'major' magnitude of impact (see photomontage location 7). A combination of earth shaping, screen fencing and planting would be used to help screen the road, resulting in a 'moderate adverse' effect on landscape character in year 1, which due to the height of this feature would remain at year 15. The screening effects of the mounding and parapets would however reduce night time effects from vehicle headlights to 'slight adverse'.

Plumstead Road to Smee Lane (ch 17000 to 19000)

7.6.32 The NDR crosses Plumstead Road at a new roundabout before passing through tranquil arable farmland, punctuated by farm buildings, mature woodland copses and country lanes, resulting in an attractive landscape of moderate sensitivity. A combination of mounding and planting would be used over this length to help screen the NDR, resulting in moderate adverse landscape effects in year 1, reducing to 'slight adverse' by year 15 as the mitigation matures (see photomontage location 8). Night time impacts will be 'slight adverse' arising from vehicle headlights along this length of the route.

Smee Lane to A47 (ch 19000 to 20400)

7.6.33 From Smee Lane the landscape becomes more open and the urban influences of business parks on the edge of Norwich become more prominent, ultimately culminating in the overall dominance of the A47 junction infrastructure. This is a landscape of low sensitivity to change that would be subjected to a moderate impact, resulting in slight adverse landscape effects arising from the NDR in year 1, which would remain at year 15 on account of the scale of the new infrastructure (see photomontage location 9). Night time impacts arising from the new junction lighting and vehicle headlights are

regarded as being only 'slight adverse' on account of the large amount of street lighting and vehicle movements that already exist in the locality.

Maintenance impacts

7.6.34 Periodic maintenance would be required to the planting along the NDR to ensure that the landscape continued to meet its design intentions. Some operations (such as grass mowing) would be carried out on a regular basis, whereas others (such as tree thinning works) would be less frequent.

7.6.35 Thinning operations would be carried out at approximately five to ten year intervals on a rolling programme such that only short sections of road would be affected at any one time. The density of the trees and shrubs would be reduced as they grow to maturity to allow the best specimens to develop, providing a varied woodland structure of attractive visual appearance and of greater benefit to wildlife.

7.6.36 Owing to the minor magnitude of impact of these works and the small scale piecemeal nature of their implementation, the effects of landscape maintenance are regarded as being only 'slight adverse' at worst and therefore not significant.

7.7 Assessment of Visual Effects

General

7.7.1 This section assesses the visual impact of the proposals and how the view will be affected from residential properties, public rights of way, commercial properties, and transport routes (road and rail). Following the methodology, all residential properties and users of public rights of way are regarded as being of high sensitivity, whilst users of commercial properties and transport routes are regarded as being of low sensitivity.

7.7.2 Details of the visual effects of the scheme are shown in Volume 2, Chapter 7, Section B, drawings MMD-233906-DT-0656 to MMD-233906-DT-0667 and detailed on the visual intrusion schedules in Volume 2. It should be noted that the drawings and schedules concentrate on receptors likely to have noticeable views of the Scheme. However, due to survey constraints (i.e. limited to public rights of way) it is possible that some receptors may have distant or fragmented views of the Scheme that are not recorded on the schedules, although since these will be 'slight adverse' at worst they are not regarded as being significant. The schedules also refer to some receptors as having a 'neutral' effect; these have been highlighted because they are close

to the Scheme, and a noticeable effect is therefore to be anticipated, but existing screening precludes this. Where this occurs the reasons are given in the comments column of the schedules. References given in the text relate to entries in the schedules (note that some references refer to more than one property where these are grouped together for convenience in the schedules).

Zone of Visual Influence

- 7.7.3 The Zone of Visual Influence (ZVI) is the approximate area from within which views of the NDR (i.e. the road and its associated infrastructure, and traffic upon it) might be possible (bearing in mind the assumptions used to develop the model, as detailed in the methodology section), and is shown in Volume 2, Chapter 7, Section F, drawings MMD-233906-DT-0953 to MMD-233906-DT-0955. Three ZVI's have been prepared; the first to represent the situation for the construction stage, the second to represent the Scheme in the first year of opening (i.e. before the planting has established) and thirdly to show the Scheme 15 years after opening, by which time the new planting will be fully effective.
- 7.7.4 During construction and in year 1 the ZVI is quite broad, becoming gradually more enclosed as the mitigation planting matures towards year 15. Initially the construction site will be quite visible but become gradually more screened as the Scheme reaches completion and the mounding and cutting slopes are formed. However, the bare unplanted mounding will in itself draw attention to the road and this is reflected in the ZVI. By year 15 much of this mounding will be fully hidden by mature planting, particularly in areas where there is already a high degree of existing mature tree cover, and the road will effectively blend into the surrounding landscape resulting in a ZVI that is more closely aligned with the Scheme.
- 7.7.5 In general, at the western end of the scheme the ZVI is curtailed by the large woodland blocks in the area, and this largely continues until the NDR passes Thorpe Marriott. From here the woodland stops and the ZVI opens out, reflecting open views across the flat arable landscape, which continues to the A140 junction. In the vicinity of the airport traffic would be screened from view by mounding, but the mounding itself would mark the location of the road and the ZVI reflects this. In contrast, the gently graded mounding across Beeston Park would not be so noticeable and the ZVI is more closely aligned with the road width in this location. The ZVI is constrained by the screening effects of existing woodland in the vicinity of Rackheath, before broadening out again to

reflect views across more open arable land as the NDR traverses eastwards to the end of the Scheme.

Construction impacts

- 7.7.6 Although construction impacts are of a temporary nature and short term, visual effects would in general be moderately adverse during the construction process due to the continued presence of active construction plant and operations involved in earthmoving and carriageway construction throughout the length of the route. In addition, localised works such as bridge construction would cause additional impact for certain locations along the route which are highlighted in the sections that follow.
- 7.7.7 The location of construction compounds, storage areas and borrow pits are shown on drawings R1C093-R1-5014 to R1C093-R1-5026. The presence of such compounds would have a visually intrusive effect on nearby receptors in localised areas for the duration of the construction period, although temporary screen mounding would be provided along the boundaries to screen views of vehicles and personnel within these areas from nearby receptors.
- 7.7.8 The following paragraphs outline specific construction impacts that could occur along the various sections of the route.

A1067 to Fir Covert Road (ch 0 to 1700)

- 7.7.9 Construction of the new junction with the A1067 would give rise to large adverse visual effects for three properties along the A1067 to the south east of the works (1/1, 1/2 and 1/3) and for users of a 'Road used as a Public Path' (RUPP) linking the A1067 to the Deighton Lodge access road (R1). This is due to the large extent of works and associated traffic management needed to construct the new roundabout and tie in with the existing A1067, together with the fact that the rear views of these properties would directly look across to the construction site. Furthermore, due to their elevated position it would not be possible to provide effective temporary screening. Road users on the A1067 would also be affected by the roundabout construction, but due to their low visual sensitivity this effect is considered to be only 'slight adverse'.
- 7.7.10 Two construction site areas (one involving a gas main diversion at ch. 1200 and the other a topsoil storage area at ch. 1600) are proposed alongside the route in the vicinity of Spring Farm and Fir Covert Road, which will give rise to additional vehicle movements in this vicinity with consequent moderate

adverse visual effects on Spring Farm (2/4) and Meadow View (a bungalow on Fir Covert Road; 2/5).

Fir Covert Road to Reepham Road (ch 1700 to 2900)

7.7.11 Three properties along Fir Covert Road would be adversely affected; one lies very close to the works with large adverse effects (2/6). The other lies further away and would be moderately adversely affected for the duration of the works (2/1). The third property lies close to the works but extensive boundary vegetation reduces the visual effects to 'slight adverse' (2/3). A garden centre (C1) and PLG farm supplies (C2) are located close to the works on Fir Covert Road but impacts are expected to be 'neutral' on account of their low sensitivity and the screening effect of intervening storage buildings. Road users on Fir Covert Road would also be affected by the roundabout construction, but due to their low visual sensitivity this effect is considered to be only 'slight adverse'.

7.7.12 Construction of the bridge over Marriotts Way and the roundabout with Reepham Road will involve small site compounds with associated materials storage areas, and these, together with the general road construction will cause large adverse visual effects for two nearby properties along Breck Farm Lane (2/7 and 2/8) and for users of Marriotts Way (R2). A third property at the same location would not be affected due to extensive mature vegetation along the boundary that would effectively screen the works from view (2/9). Road users on Breck Lane and Reepham Road would also be affected by the NDR crossing and roundabout construction respectively, but due to their low visual sensitivity this effect is considered to be only 'slight adverse'.

Reepham Road to A140 (ch 2900 to 6800)

7.7.13 The route would pass the edge of Thorpe Marriott, but the existing shelter belt around the boundary of the settlement would preclude views of the construction works. However, ten properties on the edge of Horsford to the north (3/2 to 3/5 and 4/1) would have direct views across to the construction site, although due to the distance involved effects are regarded as being only 'slight adverse' and therefore not significant. Two RUPP's will be affected by the NDR and be largely adversely affected; R3 will terminate at the new Reepham Road roundabout and R4 bridged over the NDR near Bell Farm. The NDR would run along the rear of a commercial property (C3) with 'slight adverse' effects.

7.7.14 Construction of this section of the NDR would cross largely open land and would have a large adverse effect on five isolated properties that lie close to the route (3/1, 4/5, 5/1 and 5/2). Three of these would overlook construction of the new grade separated junction with the A140 (5/1 and 5/2).

7.7.15 The NDR would run largely parallel with the Reepham Road over this length but due to the low sensitivity of road users and the distance involved effects are regarded as 'neutral'. Since the works would directly affect the A140 however the effect on road users is considered to be 'slight adverse' in visual terms.

A140 to Quaker Lane (ch 6800 to 9750)

7.7.16 The main construction site compound for the western part of the route is located adjacent to the A140 junction and on unused airport land. A screen mound would be constructed early in the process to protect West Farm and associated properties lying adjacent to this area, resulting in moderate adverse visual effects for four properties during construction (5/3). Norwich Aviation Museum (C4) will require relocation on account of the works, resulting in 'large adverse' visual effects. The airport control tower is located close to the works (C5) but faces away from the Scheme with 'slight adverse' effects.

7.7.17 Thirty nine properties along Old Norwich Road and Spixworth Road on the edge of Horsham St Faith would be adversely affected by visual impact as their outlook is across to the construction site of the NDR (6/1 to 6/19). Eight properties (6/1 and 6/3 to 6/6) would have relatively close direct views across to the construction site with consequent large adverse effects until the screen mounding is completed. A further twenty five properties (6/7 to 6/9, 6/11 and 6/13 to 6/16) would be moderately adversely affected, having an outlook across to the NDR, although the works would be further in the distance.

7.7.18 A garage and car workshop (C6) located on the Old Norwich Road and the Petans complex (C7) located on the airport would experience 'slight adverse' visual effects, as would users of the Petans access road and Old Norwich Road where the NDR crosses these roads.

Quaker Lane to B1150 (ch 9750 to 12100)

7.7.19 Two cottages on Quaker Lane (7/2) would lie very close to the route with a direct outlook, with consequently large adverse visual effects. Construction of

the bridge over the NDR along Buxton Road would be very close to two properties, also with large adverse effects (7/3), and a further five properties on Buxton Road would be adversely affected by the borrow pit area and. This would be sited on the other side of the road and be partially screened by existing boundary vegetation; three properties would have large adverse effects (7/4 and 7/5) and two moderate adverse effects (7/4), with a further seven properties being unaffected on account of this screening (7/6). Road users of Quaker Lane and Buxton Road would experience 'slight adverse' effects where the NDR crosses these roads.

7.7.20 Eighteen properties on the edge of Spixworth would be adversely affected during the construction period (7/9 to 7/11). Mitigation measures would be provided comprising the early construction of temporary screen mounds to shield properties from views of the bulk of the working area, reducing these temporary impacts to moderate adverse levels for eleven properties (7/8) and slight adverse for the remaining seven (7/9 to 7/11).

B1150 to Salhouse Road (ch 12100 to 16100)

7.7.21 Four cottages within Beeston Park (8/5 and 8/6) would be moderately adversely affected by views of the construction works, although Beeston Hall (8/3) would only be slightly affected due to its further distance from the works. One further cottage lies close to the works and would have large adverse effects during the construction period (8/4). Users of the B1150 and adjacent farm shop (C8) would experience 'slight adverse' effects due to the roundabout construction.

7.7.22 Construction of the mounding to the west of Wroxham Road, together with the roundabout junction, would adversely affect six isolated properties. Three of these would be largely adversely affected; two lie in close proximity to the works (9/4 and 9/6) and one will have direct views across downwards sloping ground into the construction site (9/3). Users of the Wroxham Road would experience 'slight adverse' effects due to the roundabout construction.

7.7.23 The route would affect the outlook from properties on the edge of Sir Edward Stacey Road and Trinity Close, which look out across a small valley over the route of the NDR to woodland surrounding Rackheath Park to the west. Seven properties would have large adverse effects during construction (9/8 to 9/10) with moderate adverse effects for the remaining three properties (9/7, 9/11 and 9/12).

7.7.24 Thirty two properties on the edge of Rackheath along Green Lane West would have slight adverse effects during construction as the route emerges from cutting and existing woodland cover out into open ground on the edge of the village (10/2 to 10/10). Effects are reduced by intervening vegetation, notably the tall boundary hedge running along the western boundary of Green Lane West. Road users of Green Lane West would be unaffected by the NDR on account of this vegetation with a 'neutral' effect. A small car restoration workshop (C9) lies close to the NDR off Newmans Lane, resulting in 'slight adverse' visual effects.

Salhouse Road to Plumstead Road (ch 16100 to 17000)

7.7.25 The main work element over this length of the route would be construction of the railway crossing. Construction of this would cause large adverse visual impacts which would be difficult to mitigate during the construction period on account of its prominent position in an open landscape, together with the presence of the construction compound in the immediate vicinity.

7.7.26 Thirty properties along Green Lane East on the edge of Rackheath would be adversely affected; six in the 'large adverse' category (10/17, 10/19 to 10/24) and a further three moderately adversely affected (10/16, 10/18 and 10/26). Existing boundary vegetation screens views for the remaining properties and reduces the effects to 'slight adverse'.

7.7.27 The 'Sole and Heel' public house (C10) is situated on the corner of Green Lane East and Salhouse Road and would experience 'slight adverse' visual effects. Road users of Green Lane East would also experience 'slight adverse' visual effects on account of the new bridge construction. However, since rail users on the Norwich to Sheringham line would catch only a momentary glimpse of the NDR, effects on rail users are regarded as 'neutral'.

7.7.28 Eleven properties on the edge of Thorpe End would be affected; all would have direct open views across to the works and fall within the 'large adverse' category (11/7). Newmans Farmhouse, though close to the works, would be largely screened by the surrounding farm buildings and be moderately adversely affected (11/6).

Plumstead Road to Smee Lane (ch 17000 to 19000)

7.7.29 Nine properties along Broad Lane and Plumstead Road at the eastern edge of Rackheath would have views across to the new junction of the NDR with

Plumstead Road, resulting in moderate adverse visual effects during construction for the eight properties on the west side of Broad Lane whose rear windows would overlook the new works (11/1 to 11/4). Eight properties on the edge of Thorpe End would be similarly affected, but effects would be only slight adverse due to the greater distance from the works (11/8 to 11/12). Road users of Plumstead Road would experience 'slight adverse' visual effects on account of the roundabout construction.

7.7.30 There are ten further properties along this length of the NDR that would be affected by the construction of the route. Six of these lie close to the route; four would have 'large adverse' visual effects ((11/5, 11/13, 11/15 and 11/16) as they have open and direct views across to the construction works (especially 'Railway Crossing', 11/5, which lies adjacent to the new rail bridge), whilst the other two will be partially screened by existing vegetation and will be moderately adversely affected (11/14 and 11/17). The remaining four properties lie further away and would be slightly adversely affected (12/1 to 12/4).

7.7.31 Users of the short footpath linking Middle Road to Low Road (R5) will experience 'large adverse' effects due to their high sensitivity and the close proximity of the NDR, as will users of the adjacent footpath (R6), which will be crossed by the NDR. Road users of Middle Road and Low Road are of low sensitivity and effects would therefore be 'slight adverse' where the NDR crosses these roads.

Smee Lane to A47 (ch 19000 to 20400)

7.7.32 Six properties lie within the confines of the former Heath Farm (two of which are recent 'barn conversion' developments), situated within the centre of the Postwick Hub development. Due to their close proximity to the works, five of these would be within the 'large adverse' category (12/5 to 12/8). A cottage within the centre of the group (12/9) is well screened and would only be slightly adversely affected.

7.7.33 Users of the footpath linking Smee Lane to the A47 (R7) will experience 'large adverse' effects due to their high sensitivity and the close proximity of the NDR. Road users of Smee lane and the A47, with associated links to the Postwick Hub, are of low sensitivity and effects would therefore be 'slight adverse' where the NDR crosses and joins into these roads.

Operational impacts on Residential Properties

A1067 to Fir Covert Road (ch 0 to 1700)

- 7.7.34 Screen planting and landscaping works around the new lagoons adjacent to the new A1067 roundabout would reduce adverse visual effects for three properties along the A1067 (1/2 to 1/4) from 'large adverse' in year 1 to 'moderate adverse' in year 15 once the planting has matured.
- 7.7.35 Mounding combined with extensive screen planting would reduce visual effects from 'moderate' to 'slight adverse' for Spring Farm (2/4) and to 'slight adverse' or 'neutral' for properties along Fir Covert Road (2/1 to 2/5) for year 1 to year 15 respectively. However, one property (2/6) would remain moderately adversely affected at year 15, on account of its close proximity to the NDR.
- 7.7.36 Night time effects arising from vehicle headlights would be 'slight adverse' in year 1 reducing to 'neutral' in year 15 once the screen planning has fully matured.

Fir Covert Road to Reepham Road (ch 1700 to 2900)

- 7.7.37 The bridge over Marriotts Way and the short link to the roundabout with Reepham Road will result in a reduction from 'large adverse' in year 1 to 'moderate adverse' visual effects in year 15 for two nearby properties along Breck Farm Lane (2/7 and 2/8) once the screen planting has matured. A third property at the same location would not be affected due to extensive mature vegetation along the boundary that would effectively screen the works from view.
- 7.7.38 Night time effects arising from vehicle headlights would be 'slight adverse' in year 1 reducing to 'neutral' in year 15 once the screen planning has fully matured.

Reepham Road to A140 (ch 2900 to 6800)

- 7.7.39 Extensive mounding and planting would generally reduce visual effects along this section of the NDR to 'slight adverse' or 'neutral' by year 15, (reducing from 'large' or 'moderate adverse' in year 1). However, visual effects on 'The Homestead' (a bungalow on Drayton Lane; 4/5) would remain 'large adverse', even at year 15, due to its close proximity to both the NDR and the link road to the B1149, as would effects on 'New Home Farm' (5/1), which lies immediately adjacent to the link road onto the new A140 junction. Three other properties (3/1 and 5/2) would reduce from 'large adverse' effects in year 1 as

the mitigation planting matures, but would remain 'moderate adverse' at year 15 on account of their close proximity to the new road.

7.7.40 Ten properties on the edge of Horsford to the north (3/2 to 3/5 and 4/1) would have direct views across to the new NDR, which due to the distance involved would be 'slight adverse' in terms of visual effect in year 1. This effect would largely remain at year 15 since the NDR mounding would still be visible along the top of a low ridge.

7.7.41 Night time effects arising from vehicle headlights would be 'slight adverse' in year 1 reducing to 'neutral' in year 15 once the screen planting has fully matured.

A140 to Quaker Lane (ch 6800 to 9750)

7.7.42 Visual effects for the four properties protected by the screen mounding at West Farm (5/3) would remain 'moderate adverse' for both year 1 and year 15 on account of the closeness of the mounding to the properties, which itself would form an intrusive feature.

7.7.43 Thirty nine properties along Old Norwich Road and Spixworth Road on the edge of Horsham St Faith (6/1 to 6/16) would be adversely affected by visual impact as their outlook is across open fields to the NDR. Sixteen properties would be moderately adversely affected in year 1 (6/1, 6/3 to 6/9 and 6/11), and nineteen slightly affected in year 1 (6/10 and 6/12 to 6/16), having a direct outlook across to the NDR, although the works would be in the distance. The lack of planting (due to airport operational constraints) and the visual presence of the screen mounding would mean that these levels of visual effect would remain at year 15.

7.7.44 Night time effects arising from vehicle headlights would be 'neutral' for both year 1 and year 15 on account of the immediate effectiveness of the screen mounding.

Quaker Lane to B1150 (ch 9750 to 12100)

7.7.45 Two cottages on Quaker Lane (7/2) would lie very close to the route with a direct outlook, with consequently large adverse visual effects for both year 1 and year 15. The bridge carrying Buxton Road over the NDR would be very close to two properties (7/3), also with large adverse effects at year 1 and year 15, and a further five properties on Buxton Road would be adversely

affected; three (7/5 and 7/7) moderately adversely affected in year 1 reducing to 'slight adverse' by year 15 as the mitigation planting matures, and the other two (7/4) reducing from 'slight adverse' in year 1 to 'neutral' by year 15.

7.7.46 Eighteen properties on the edge of Spixworth (7/8 to 7/11) would be adversely affected. Extensive mitigation planting and mounding is proposed, reducing levels from 'moderate adverse' (eleven properties; 7/8) and 'slight adverse' (seven properties; 7/9 to 7/11) in year 1 to 'slight adverse' and 'neutral' respectively as the mitigation planting matures.

7.7.47 Night time effects arising from vehicle headlights would be 'slight adverse' in year 1 reducing to 'neutral' in year 15 once the screen planting has fully matured.

B1150 to Salhouse Road (ch 12100 to 16100)

7.7.48 Five cottages within Beeston Park (8/4 to 8/6) would be moderately adversely affected by views of the NDR in year 1, although four of these (8/5 and 8/6) are distant from the road and effects would reduce to 'slight adverse' for these by year 15 as the mitigation planting matures, remaining 'moderate adverse' for the other property (8/4) due to its close proximity to the NDR. Beeston Hall (8/3) is fairly distant from the NDR and visual effects on the rear of the hall would be 'slight adverse' for both year 1 and year 15.

7.7.49 The NDR west of Wroxham Road (together with its roundabout junction) would adversely affect six isolated properties. Three of these (9/3, 9/4 and 9/6) would be largely adversely affected in year 1; two lie in close proximity to the NDR (9/4 and 9/6) and one has direct views across downwards sloping ground to the Scheme (9/3). As the mitigation planting matures these effects would reduce to 'moderate adverse' for two of the properties (9/3 and 9/4) by year 15, but Belmont House (which lies close to the roundabout junction with Wroxham Road; 9/6) would remain 'large adverse', even at year 15.

7.7.50 The route would affect the outlook from properties on the edge of Sir Edward Stacey Road and Trinity Close, which look out across a small valley over the route of the NDR to woodland surrounding Rackheath Park to the west. Nine properties (9/8 to 9/12) would be moderately adversely affected and one (9/7) slightly affected in year 1, reducing to 'slight' and 'neutral' respectively by year 15 once the mitigation planting has matured.

7.7.51 Thirty two properties on the edge of Rackheath along Green Lane West (10/2 to 10/10) would be adversely affected by the NDR as the route emerges from

cutting and existing woodland cover out into open ground on the edge of the village. However, intervening vegetation (notably the tall boundary hedge running along the western boundary of Green Lane West) would reduce visual effects to 'slight adverse' in year 1, reducing to 'neutral' by year 15 once the NDR mitigation planting has matured.

7.7.52 Night time effects arising from vehicle headlights would be 'slight adverse' in year 1 reducing to 'neutral' in year 15 once the screen planting has fully matured.

Salhouse Road to Plumstead Road (ch 16100 to 17000)

7.7.53 The main feature of the NDR over this section of the route is the crossing of the Norwich to Sheringham rail line. Thirty properties along Green Lane East on the edge of Rackheath (10/11 to 10/26) would be adversely affected in year 1; six (10/17, 10/19, 10/20, 10/23 and 10/24) in the 'large adverse' category and a further three (10/16, 10/18 and 10/26) moderately adversely affected. Existing boundary vegetation screens views for the remaining properties and reduces the effects of the impact to 'slight adverse'. By year 15 these effects would have reduced to six 'moderate adverse' (10/17, 10/19, 10/20, 10/23 and 10/24), three 'slight adverse' (10/16, 10/18 and 10/26) and twenty-one 'neutral' (10/11 to 10/15), as the mitigation planting matures.

7.7.54 Eleven properties (11/7) on the edge of Thorpe End would be adversely affected; all would have direct open views across to the works and fall within the 'large adverse' category, reducing to 'moderate adverse' by year 15. Newmans Farmhouse (11/6), though close to the works, would be largely screened by the surrounding farm buildings and be moderately adversely affected in year 1, reducing to 'slight adverse' by year 15.

7.7.55 Night time effects arising from vehicle headlights would be 'slight adverse' for both year 1 and year 15 due to the elevation of the road as it crosses the rail way line, even once the screen planting has fully matured.

Plumstead Road to Smee Lane (ch 17000 to 19000)

7.7.56 Nine properties along Broad Lane and Plumstead Road (11/1 to 11/4) at the eastern edge of Rackheath would have views across to the new junction of the NDR with Plumstead Road, resulting in moderate adverse visual effects in year 1 for the eight properties on the west side of Broad Lane (11/2 to 11/4) whose rear windows would overlook the new junction, reducing to 'slight

adverse' effects by year 15 as the mitigation matures. Effects for the remaining property (11/1) would reduce from 'slight adverse' to 'neutral' by year 15.

7.7.57 Eight properties on the edge of Thorpe End (11/8 to 11/12) would have 'slight adverse' effects in year 1, due to their large distance (0.5km) from the NDR, combined with the screening effects of intervening vegetation. However, these effects would remain at year 15 as the line of the NDR would still be visible in the vista.

7.7.58 There are ten further properties along this length of the NDR that would be affected by the route. Six of these (11/5 and 11/13 to 11/16) lie close to the route; four (11/5, 11/15 and 11/16) would have 'large adverse' visual effects in year 1 as they have open and direct views across to the road, though these effects would reduce to 'moderate adverse' levels for three of these properties (11/15 and 11/16) by year 15 once the mitigation planting has matured. The property known as 'Railway Crossing' (11/5) would remain 'large adverse', even at year 15, on account of its position directly adjacent to the new railway bridge.

7.7.59 The other two properties (11/13 and 11/14) are partially screened by existing vegetation and are regarded as being moderately adversely affected in year 1, reducing to 'slight adverse' by year 15. The remaining four properties (11/17, 12/1, 12/2 and 12/4) lie further away and would be slightly adversely affected in year 1, reducing to 'neutral' by year 15.

7.7.60 Night time effects arising from vehicle headlights would be 'slight adverse' in year 1 reducing to 'neutral' in year 15 once the screen planning has fully matured.

Smee Lane to A47 (ch 19000 to 20400)

7.7.61 Six properties lie within the confines of the former Heath Farm (two of which are recent 'barn conversion' developments), situated within the centre of the Postwick Hub development. Due to their close proximity to the NDR, five of these (12/5 to 12/8) would be within the 'large adverse' category in year 1, though this would reduce to 'moderate adverse' by year 15 as the mitigation matures. A cottage within the centre of the group (12/9) is well screened and would be moderately adversely affected in year 1, reducing to 'slight adverse' by year 15.

7.7.62 Night time effects arising from vehicle headlights and the lighting of the Postwick junction are regarded as 'slight adverse' for both year 1 and year 15, since the additional lighting will be seen within the context of an already lit and well trafficked junction.

Operational impacts on Commercial Properties

7.7.63 There are few commercial properties that would be affected by the new route (a total of ten in all), which is a reflection of the character of the area which is largely defined by housing development and rural farmland. The majority of these would have only 'slight adverse' effects due to the low sensitivity of the receptor for both year 1 and year 15, despite their close proximity to the Scheme.

7.7.64 The exception to this is the aviation museum located adjacent to the airport to the south of Horsham St Faith. This is regarded as a moderately sensitive receptor as the nature of the museum invites quiet reflection and many of the exhibits are outdoors due to their size. Since these would require relocation to facilitate the NDR the magnitude of impact would be major, and this is considered to result in a large adverse significance of effect, which would remain throughout the lifetime of the NDR (i.e. for both year 1 and year 15).

Operational impacts on Public Access Routes

7.7.65 There are few Public Rights of Way that would be affected by the new route (a total of seven in all), which is a reflection of the fact that the area as a whole has a sparse footpath coverage.

7.7.66 Three of these are 'Roads used as Public Paths' which are crossed by the NDR; R1 (from the A1067 to Deighton Lodge access road) would be largely adversely affected in year 1, reducing to 'moderate adverse' in year 15 as the mitigation planting matures. R3 will be shortened by 60m by the new roundabout junction with Reepham Road and R4 will be bridged over the NDR near Bell Farm. Both of these would be largely adversely affected in year 1, although these effects will reduce to 'moderate adverse' at year 15 due to screening effect of the mitigation planting.

7.7.67 R2 is the regionally important Marriotts Way cycle route, part of which would be largely adversely affected in year 1, reducing to 'moderate adverse' in year 15 once the screen planting is fully effective.

7.7.68 The remaining three routes are R5 (footpath from Middle Road to Low Road), R6 (footpath from Low Road to Smee Lane) and R7 (footpath from Smee Lane to A47). These would be largely adversely affected in year 1, reducing to moderately adversely affected by year 15 due to the screening effect of the planting scheme.

7.7.69 Road and rail users within the study area are 'low sensitivity' receptors and consequently would only experience effects ranging from 'slight adverse' to 'neutral' as a result of the Scheme. Due to the close proximity of these routes to the NDR these effects would remain for both year 1 and year 15.

7.8 Conclusions

7.8.1 The predominant landscape character along the NDR is generally one of fairly open arable farmland with urban fringe influences such as housing development, Norwich Airport and the Broadland Business Park. However, a higher quality area is centred around the former parklands of Beeston and Rackheath Halls, where the landscape is characterised by a larger woodland component on more undulating topography.

7.8.2 Despite the close proximity to Norwich the route would pass through fairly tranquil countryside, particularly in the vicinity of the wooded parkland areas of Rackheath and Beeston. In general, the high degree of open arable cultivation along the route corridor gives the impression of a sparsely populated area, although in fact there are many small hamlets and isolated properties spread throughout the area, and the small rural roads that link these are well trafficked.

7.8.3 Extensive mitigation planting and screen mounding is proposed along the route which would help to blend the new road into the landscape and screen it from affected properties.

7.8.4 Tables 9, 10 and 11 summarise the landscape and visual effects of the Scheme for the various sections of the NDR, for construction, year 1, year 15 and night time impacts.

7.8.5 Landscape effects will generally be moderately adverse during the construction period and in the first year of opening, reducing to slightly adverse by year 15 once the mitigation planting has matured. Night time impacts will generally be slightly adverse.

7.8.6 Some 227 residential properties would be adversely visually affected, of which about half would be in the 'large' and 'moderate' adverse categories during

construction and in the first year of the road opening. These levels will drop to 'moderate', 'slight' or 'neutral' for the majority of these properties by year 15 as the mitigation planting matures.

- 7.8.7 There are only seven Public Rights of Way (PROW) and ten commercial properties affected by the Scheme. The PROWs would be largely adversely affected for construction and year 1 due to their close proximity to the NDR, reducing to 'moderate adverse' by year 15 once the mitigation planting has matured. Due to their low sensitivity, commercial properties would be only slightly adversely affected for construction, year 1 and year 15, with the exception of Norwich Aviation Museum which would be largely adversely affected due to the need to relocate the Museum as a result of the Scheme.
- 7.8.8 Combining the above sections to consider the route as a whole, on balance the overall effects in terms of landscape impacts are considered to be moderately adverse as a result of the Scheme for the construction period and in year 1, reducing to slightly adverse by year 15 as the mitigation planting matures. For visual effects, the balance lies between largely and moderately adverse during construction and in year 1, reducing to moderately or slightly adverse by year 15 as the planting scheme matures.

Table 7.9 Summary of Landscape Effects

Location	Sensitivity	Magnitude of Impact	Significance of Effect (Construction)	Significance of Effect (Year 1)	Significance of Effect (Year 15)	Significance of Effect (Night time)
A1067 to Fir Covert Road (ch 0 to 1700)	Moderate	Moderate	Moderate	Moderate	Slight	Slight
Fir Covert Road to Reepham Road (ch 1700 to 2900)	Low	Major	Moderate	Moderate	Slight	Slight
Reepham Road to A140 (ch 2900 to 6800)	Low	Moderate	Slight	Slight	Slight	Slight
A140 to Quaker	Low	Moderate	Slight	Slight	Slight	Neutral

Location	Sensitivity	Magnitude of Impact	Significance of Effect (Construction)	Significance of Effect (Year 1)	Significance of Effect (Year 15)	Significance of Effect (Night time)
Lane (ch 6800 to 9750)						
Quaker Lane to B1150 (ch 9750 to 12100)	Moderate	Moderate	Moderate	Moderate	Slight	Slight
B1150 to Salhouse Road (ch 12100 to 16100)	Moderate	Moderate	Moderate	Moderate	Slight	Slight
Salhouse Road to Plumstead Road (ch 16100 to	Low	Major	Moderate	Moderate	Moderate	Slight

Location	Sensitivity	Magnitude of Impact	Significance of Effect (Construction)	Significance of Effect (Year 1)	Significance of Effect (Year 15)	Significance of Effect (Night time)
17000)						
Plumstead Road to Smees Lane (ch 17000 to 19000)	Moderate	Moderate	Moderate	Moderate	Slight	Slight
Smees Lane to A47 (ch 19000 to 20400)	Low	Moderate	Slight	Slight	Slight	Slight

Table 7.10 Summary of Visual Effects on Residential Properties

Location	Number of properties affected	Significance of effect (Construction)	Significance of effect (Year 1)	Significance of effect (Year 15)	Significance of effect (Night time)
A1067 to Fir Covert Road (ch 0 to 1700)	8	3 Large	3 Large	3 Moderate	7 Slight
		4 Moderate	4 Moderate	4 Slight	1 Neutral
		1 Slight	1 Slight	1 Neutral	
Fir Covert Road to Reepham Road (ch 1700 to 2900)	6	3 Large	3 Large	3 Moderate	3 Slight
		1 Slight	1 Slight	3 Neutral	3 Neutral
		2 Neutral	2 Neutral		
Reepham Road to A140 (ch 2900 to 6800)	18	5 Large	5 Large	2 Large	14 Slight
		10 Slight	10 Slight	3 Moderate	4 Neutral
		3 Neutral	3 Neutral	9 Slight	
				4 Neutral	

Location	Number of properties affected	Significance of effect (Construction)	Significance of effect (Year 1)	Significance of effect (Year 15)	Significance of effect (Night time)
A140 to Quaker Lane (ch 6800 to 9750)	43	8 Large	20 Moderate	20 Moderate	43 Neutral
		25 Moderate	19 Slight	19 Slight	
		6 Slight	4 Neutral	4 Neutral	
		4 Neutral			
Quaker Lane to B1150 (ch 9750 to 12100)	37	7 Large	4 Large	4 Large	17 Slight
		13 Moderate	13 Moderate	13 Slight	20 Neutral
		8 Slight	11 Slight	20 Neutral	
		9 Neutral	9 Neutral		
B1150 to Salhouse Road (ch 12100 to	55	11 Large	3 Large	1 Large	20 Slight
		9 Moderate	15 Moderate	3 Moderate	35 Neutral
		34 Slight	36 Slight	16 Slight	

Location	Number of properties affected	Significance of effect (Construction)	Significance of effect (Year 1)	Significance of effect (Year 15)	Significance of effect (Night time)
16100)		1 Neutral	1 Neutral	35 Neutral	
Salhouse Road to Plumstead Road (ch 16100 to 17000)	46	17 Large 4 Moderate 21 Slight 4 Neutral	17 Large 4 Moderate 21 Slight 4 Neutral	1 Large 16 Moderate 4 Slight 25 Neutral	21 Slight 25 Neutral
Plumstead Road to Smeel Lane (ch 17000 to 19000)	28	4 Large 10 Moderate 13 Slight 1 Neutral	4 Large 10 Moderate 13 Slight 1 Neutral	1 Large 3 Moderate 18 Slight 6 Neutral	22 Slight 6 Neutral
Smeel Lane to A47 (ch 19000 to	6	5 Large 1 Slight	5 Large 1 Slight	5 Moderate 1 Neutral	5 Slight 1 Neutral

Location	Number of properties affected	Significance of effect (Construction)	Significance of effect (Year 1)	Significance of effect (Year 15)	Significance of effect (Night time)
20400)					
Totals	247 (i.e. 227 affected plus 20 'Neutral' in year 1)	63 Large 65 Moderate 95 Slight 24 Neutral	45 Large 67 Moderate 115 Slight 20 Neutral	8 Large 57 Moderate 84 Slight 98 Neutral	109 Slight 138 Neutral

Table 7.11 Summary of Visual Effects on Other Users

Location	Number affected	Significance of effect (Construction)	Significance of effect (Year 1)	Significance of effect (Year 15)	Significance of effect (Night time)
<i>A1067 to Fir Covert Road (ch 0 to 1700)</i>	1 footpath and 2 commercial properties	1 Large (footpath) 2 Neutral	1 Large (footpath) 2 Neutral	1 Moderate (footpath) 2 Neutral	1 Slight (footpath) 2 Neutral
<i>Fir Covert Road to Reepham Road (ch 1700 to 2900)</i>	1 footpath (Marriotts Way)	1 Large	1 Large	1 Moderate	1 Slight
<i>Reepham Road to A140 (ch 2900 to 6800)</i>	2 footpath and 1 commercial properties	2 Large (footpaths) 1 Slight	2 Large (footpaths) 1 Slight	2 Moderate (footpaths) 1 Neutral	2 Slight (footpaths) 1 Neutral
<i>A140 to Quaker Lane (ch 6800 to 9750)</i>	4 commercial properties	1 Large (aviation museum) 3 Slight	1 Large (aviation museum) 3 Slight	1 Large (aviation museum) 3 Slight	4 Slight
<i>Quaker Lane to B1150 (ch 9750 to 12100)</i>	0	0	0	0	0
<i>B1150 to Salhouse Road (ch</i>	2 commercial	2 Slight	2 Slight	2 Slight	2 Slight

Location	Number affected	Significance of effect (Construction)	Significance of effect (Year 1)	Significance of effect (Year 15)	Significance of effect (Night time)
<i>12100 to 16100)</i>	properties				
<i>Salhouse Road to Plumstead Road (ch 16100 to 17000)</i>	1 commercial property	1 Slight	1 Slight	1 Neutral	1 Neutral
<i>Plumstead Road to Sme Lane (ch 17000 to 19000)</i>	2 footpaths	2 Large	2 Large	2 Moderate	2 Slight
<i>Sme Lane to A47 (ch 19000 to 20400)</i>	1 footpath	1 Large	1 Large	1 Moderate	1 Slight
<i>Totals</i>	17 (i.e, 15 affected and 2 neutral)	8 Large 7 Slight 2 Neutral	8 Large 7 Slight 2 Neutral	1 Large 7 Moderate 5 Slight 4 Neutral	13 Slight 4 Neutral

8. Nature Conservation

8.1 Summary

- 8.1.1 This chapter considers the ecological assets that have the potential to be affected by the proposed Scheme.
- 8.1.2 Desk-based studies into Statutory Designated Sites and protected areas have been carried out alongside extensive field surveys of species and habitats, most of which are protected by UK and EU laws. These surveys have taken place over several seasons in many cases, and have allowed us to gain a detailed understanding of the populations within the Zone of Influence (the area in which the proposed Scheme could potentially impact on ecological features).
- 8.1.3 As is best practice, the assessments in the Ecology chapter of this Environmental Statement only considers those ecological receptors that are of sufficient conservation value and potentially vulnerable to Significant impacts arising from the proposed development. These are termed Valued Ecological Receptors.
- 8.1.4 Valued Ecological Receptors that have been assessed include Statutory Designated Sites such as Special Areas for Conservation (SAC) and Sites of Special Scientific Interest (SSSI), and other Designated Sites like County Wildlife Sites (CWS) and Roadside Nature Reserves (RNR). Some of these are directly affected, some indirectly affected, and some not affected at all.
- 8.1.5 Several species of bat are known to use many areas to be affected by the proposed Scheme, roosting in buildings and trees that would be directly and indirectly affected. Bats and their roosts are protected by UK and EU law. Great crested newts are known to exist at three locations, although just one breeding pond is directly affected. Great crested newts are, similar to bats, protected under UK and EU law.
- 8.1.6 A number of badger populations are known to exist around the proposed Scheme. Breeding bird populations are ubiquitous throughout the landscape, their population densities and mixes varying with habitat type and quality. Barn owls, as a particularly sensitive bird species, are given specific consideration. Aquatic invertebrates at Ladies Wood, Church Carr & Springs CWS are considered, as are those sensitive habitats suitable for terrestrial invertebrates.

- 8.1.7 Mitigation measures have been incorporated into the proposed Scheme design to eliminate or reduce impacts on the above Valued Ecological Resources as far as possible. A landscaping scheme has been designed to provide as much benefit to Valued Ecological Receptors as possible, in terms of its species mix, its form and layout, timing of planting and the size/type of species planted. A number of crossings for bats are proposed. These include wire gantries across the carriageway, two bridges that will include hedgerows across them, an underpass, and modified standard bridge designs to include dark corridors to encourage use by bats.
- 8.1.8 New bat roosts would be provided where existing roosts would be lost. Great crested newts that use the one pond to be lost to the proposed Scheme would be relocated to new ponds nearby, and temporary fencing would be erected to ensure that they did not enter into the construction area.
- 8.1.9 Badger fencing would be installed where necessary, to ensure that badgers did not enter onto the carriageway. All habitat clearance would be carried out at such a time, and in such a manner as to ensure that no impacts were caused to breeding birds and any other species present. Numerous other mitigation measures are also proposed.
- 8.1.10 Assessments of the overall effects on Valued Ecological Receptors have been carried out for the Construction phase, and for the Operational phase, which includes the Opening Year of the proposed Scheme and for the Design Year, fifteen years hence. Construction phase impacts include the permanent and temporary habitat loss and severance, and the disturbance due to the presence of plant machinery, people, and construction processes. Operational phase impacts include the presence of traffic using the proposed Scheme, with the associated disturbance in terms of noise etc. Also considered at this stage is the mitigating effect of the extensive landscaping scheme that will be installed towards the end of the Construction phase, and its maturation between Opening Year and Design Year, during which time it will become established as viable habitats for many species.
- 8.1.11 During the Construction phase, the proposed Scheme is predicted to have Significant adverse effects on:
- Fakenham Road RNR;
 - Important Hedgerows (under the Hedgerow Regulations 1997);
 - Bats, or more specifically directly affected roosts in buildings, directly affected roosts in trees, and significant flight paths and areas of activity; and

- Breeding bird species of both High and Medium conservation value;
- 8.1.12 During the Operational phase of the proposed Scheme, Significant adverse effects are predicted to remain in place only for the bats using the significant flight paths along Marriott's Way, at Year 1 only. By year 15 the effects on this flight route would no longer be Significant. No other Significant adverse effects are predicted during the Construction phase.
- 8.1.13 By the Design Year, Significant beneficial effects are predicted for terrestrial invertebrate habitats at the Springs.

8.2 Introduction

Scope of the Assessment

- 8.2.1 Ecology is the study of the interactions of biodiversity and their environment, and nature conservation is concerned with maintaining a favourable conservation status of a species, population, habitat or ecosystem.
- 8.2.2 This chapter considers the ecological assets that have the potential to be affected by the proposed Scheme. It identifies the relevant framework of nature conservation legislation, policies and guidance, gives an in-depth description of the ecological baseline within an identified study area, defines all the mitigation measures included as part of the proposed Scheme, and finally identifies and assesses all potential significant impacts.
- 8.2.3 The remainder of this chapter is structured as follows:
- Section 1.2 describes the methods of assessment for key ecological receptors and likely impacts;
 - Section 1.3 identifies the key ecological receptors and describes the existing baseline conditions;
 - Section 1.4 describes the proposed mitigation and compensation strategy;
 - Section 1.5 summarises the impacts after mitigation and compensation; and
 - Section 1.6 identifies the cumulative impacts from other committed developments in the area.
- 8.2.4 Alongside the assessments in this chapter, potential impacts on Natura 2000 sites (Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) designated under the Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora and the Directive 2009/147/EC on the Conservation of Wild Birds respectively) are

considered further in the Habitats Regulations Assessment, located in Volume 2, Chapter 17, Section A of the ES. This is a requirement of The Conservation of Habitats and Species Regulations 2010 (known as the Habitats Regulations), which transpose the above EU Directive into UK legislation, and more specifically the Infrastructure Planning (Applications: Prescribed Forms and Procedures) Regulations 2009 (known as the APFP Regulations), which transpose the Habitats Regulations into the NSIP process, which the proposed Scheme is subject to.

Zone of Influence

8.2.5 Current guidance on ecological assessments recommends that all ecological features that occur within a zone of influence (Zol) around the proposed development are investigated (IEEM, 2006). The potential Zol includes:

- Areas directly within the land take for the proposed development and access;
- Areas which will be temporarily affected during construction;
- Areas likely to be impacted by hydrological disruption; and
- Areas where there is a risk of pollution or noise disturbance during construction and/or operation.

8.2.6 For the NDR the Zol is a corridor along the route, the width of which depends on the sensitivity of the relevant habitat or species being considered to disturbance and change in biophysical conditions resulting from the construction and operation of the NDR. The different Zol for different ecological features along the NDR were established in the Scoping Report, which was issued to Natural England earlier in the EIA process. No issues or concerns with the Zols were received. The individual Zols are set out in Table 8.1 below:

Table 8.1 Ecological Features and Zones of Influence

Ecological feature/receptor	Zone of Influence (Zol)
International designated sites	2 km (30 km for sites supporting bats)
National designated sites	2 km
Regional/ County Wildlife Sites	1 km
Local Nature Reserves	1 km
Phase 1 Habitats	1 km
Woodland flora	Site specific (see Section 8.4 Baseline for details)
Grassland flora	Site specific (see Section 8.4 Baseline for details)
Hedgerows	250 m
Aquatic Invertebrates	Site specific (see Section 8.4 Baseline for details)
Badger (<i>Meles meles</i>)	500 m
Barn owl (<i>Tyto alba</i>)	500 m
Bats (potential roost sites in high potential buildings)	1 km
Bats (potential roost sites in high potential trees)	500 m
Bats (foraging routes/activity)	1 km
Breeding Birds	500 m
Over-wintering Birds	500 m
Brown Hare (<i>Lepus europaeus</i>)	500 m
Deer	500 m
Great Crested Newt (<i>Triturus cristatus</i>)	1 km

Ecological feature/receptor	Zone of Influence (Zol)
Reptiles	500 m
Terrestrial Invertebrates	Site specific (see Section 8.4 Baseline for details)
Water Vole (<i>Arvicola amphibius</i>) and Otter (<i>Lutra lutra</i>)	Site specific (see Section 8.4 Baseline for details)

Source: Northern Distributor Road Scoping Report, Mott MacDonald, 233906DT/BSE/NOR/012/A February 2013

8.2.7 In accordance with both standard EIA methodology and the Infrastructure Planning (Environmental Impact Assessment) Regulations 2009 the NDR proposal has been through a Scoping process with the Planning Inspectorate, who manage the application process on behalf of the Secretary of State in respect of Nationally Significant Infrastructure Projects (NSIPs). The Scoping Report is included in in Appendix 4 of this volume of the ES.

8.2.8 The Scoping process provided the applicant, Norfolk County Council, the opportunity to ask the Planning Inspectorate for a formal written Scoping Opinion on the information to be included in the ES. The Scoping Opinion was informed, at least partly, through consultation with a number of prescribed bodies. The Scoping Opinion, which includes advice and recommendations relating to the proposed Ecology survey and assessment work, can be found in the report from the Planning Inspectorate entitled Scoping Opinion Proposed Norwich Northern Distributor Road, which is provided in Appendix 5 of this volume of the ES.

8.2.9 Following the receipt of the Scoping Opinion, further consultation has been undertaken with the Natural England Case Officer for the proposed Scheme as necessary, during the design, mitigation formulation and impact assessment processes. This has built on the historical consultations in previous iterations of the proposed Scheme, which has afforded us a good working knowledge as to the requirements and working processes of Natural England.

8.2.10 Consultation has also been undertaken with the County Ecologist at Norfolk County Council, particularly in terms of facilitating liaison with other developers. The most notable of these has been the developers Beyond Green, who have recently received outline planning permission for 3,525

houses. There has been consultation with the ecologists working for Beyond Green, to ensure that ecology survey results of the adjacent/overlapping survey areas are consistent in a wider landscape context.

Regulatory and Policy Context

Legislative Requirements

8.2.11 Many habitats and species are protected to varying degrees through national and international legislation. Advice relating to wildlife is also given in various policy documents. The main international legislation and policy guidance relevant to this chapter is contained within the following documents.

- Convention on Biological Diversity (CBD) 1992
- The Convention on Wetlands of International Importance, especially as Waterfowl Habitat (Ramsar) 1971
- EC Directive on the Conservation of Natural Habitats and of Wild Flora and Fauna (Habitats Directive 1992) as amended (92/43/EEC)
- EC Directive on the Conservation of Wild Birds (Birds Directive 1979) as amended (79/409/EEC)
- Bern Convention on the Conservation of European Wildlife and Natural Habitats (1979) as amended
- Bonn Convention on the Conservation of Migratory Species of Wild Animals (1979) as amended
- Bonn Convention on the Conservation of Migratory Species of Wild Animals - Agreement on the Conservation of Bats in Europe (1999) as amended

8.2.12 The main piece of UK legislation on nature conservation is the Wildlife and Countryside Act 1981 (as amended) (WCA 1981). Other relevant national legislation includes:

- Environmental Protection Act 1990
- The Conservation of Habitats and Species Regulations 2010
- Protection of Badgers Act 1992
- Wild Mammals (Protection) Act 1996

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- Countryside and Rights of Way (CRoW) Act 2000
 - Natural Environment and Rural Communities (NERC) Act 2006
 - The Hedgerow Regulations 1997
 - Environment Act 1995

Planning Policy Requirements

8.2.13 The National Planning Policy Framework (NPPF) replaced various Planning Policy Guidance Notes, Planning Policy Statements etc. resulting in a more streamlined set of documents at a national level, to which 'lower level' plans, policies and projects should adhere as appropriate. Regard has been had in this assessment to relevant policy contained within the NPPF.

8.2.14 Chapter 11 of the NPPF 'Conserving and enhancing the natural environment' sets out the Government's policies on biodiversity, landscape and geological conservation. In summary, with regards to ecology and biodiversity, the NPPF requires that the planning system should, amongst other things:

- minimise impacts on biodiversity and provide net gains in biodiversity where possible (paragraph 109);
- recognise the wider benefits of ecosystem services (paragraph 109);
- encourage opportunities to incorporate biodiversity in and around developments (paragraph 118);
- refuse planning permission if significant harm cannot be avoided, adequately mitigated, or, as a last resort, compensated for (paragraph 118);
- not normally permit proposed development on land within or outside a Site of Special Scientific Interest (SSSI) which would be likely to have an adverse effect on the SSSI (either individually or in combination with other developments) (paragraph 118);
- refuse planning permission if development would result in the loss or deterioration of irreplaceable habitats, including ancient woodland and the loss of aged or veteran trees found outside ancient woodland, unless the need for, and benefits of, the development in that location clearly outweigh the loss (paragraph 118); and
- afford the following wildlife sites the same protection as European sites:

- potential Special Protection Areas and possible Special Areas of Conservation;
- listed or proposed Ramsar sites; and
- sites identified, or required, as compensatory measures for adverse effects on European sites, potential Special Protection Areas, possible Special Areas of Conservation, and listed or proposed Ramsar sites.

Local Development Framework and Local Plans

- Non-statutory policies and plans that are relevant to the proposed Scheme are:
- Greater Norwich Development Partnership Joint Core Strategy;
- Green Infrastructure Plan and Implementation Plan;
- Breckland District Council Area Action Plan, currently being formulated;
- Habitats and Species of Principle Importance (previously UK Biodiversity Action Plans); and
- Local Biodiversity Action Plans

Biodiversity Action Plans

8.2.15 In the recent past the UK BAP (www.ukbap.org.uk) was used to describe, protect and enhance the UK's biological resources. UK BAP and local BAP habitats and species have been a material consideration in the planning process, and so likely significant impacts on these ecological receptors should therefore be assessed and mitigation devised if necessary.

8.2.16 The original lists of UK BAP priority species and habitats were created between 1995 and 1999, and were subsequently updated in 2007, following a 2-year review of UK BAP processes and priorities, which included a review of the UK priority species and habitats lists. The aim of the 'Species and Habitats Review' was to ensure that the UK BAP lists of priority species and habitats remained up-to-date and focussed on the correct priorities.

8.2.17 This was the first full review of the lists, generated over 10 years previously, and provided an opportunity to take into account emerging new priorities, conservation successes, and the huge amount of new information that had

been gathered since the original lists were created. Selection of priority species and habitats for the priority lists followed consideration by expert working groups against a set of selection criteria, based on international importance, rapid decline, high risk, and habitats of importance for key species. Following the review, the number of priority species increased from less than 600 to 1150, and the number of priority habitats increased from 49 to 65.

8.2.18 As a result of new drivers and requirements, the 'UK Post-2010 Biodiversity Framework', published in July 2012, has now succeeded the UK BAP. A key aspect of this new mechanism has been the devolution of UK habitat and species action plan lists to individual countries, meaning that Natural England now maintains these lists for England. These lists now link to the Habitats and Species of Principal Importance in England, as detailed in Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006.

8.2.19 Those habitats and species of Principal Importance that are considered likely to be significantly impacted by the proposed Scheme, as they exist either within the proposed Scheme footprint or the ZoI, are listed below. Note the assessment considers all potentially affected ecological receptors (not just those of Principal Importance) as set out in the following section.

8.2.20 Habitats of Principle Importance:

- Arable field margins;
- Hedgerows;
- Mesotrophic lakes;
- Eutrophic standing waters;
- Rivers;
- Ponds;
- Lowland meadows;
- Wood-pasture and parkland;
- Lowland mixed deciduous woodland; and
- Coastal and floodplain grazing marsh;

8.2.21 Species of Principle Importance:

- common toad (*Bufo bufo*);
- great crested newt (*Triturus cristatus*);
- bullfinch (*Pyrrhula pyrrhula*);
- cuckoo (*Cuculus canorus*);
- dunnock (*Prunella modularis*);
- grey partridge (*Perdix perdix*);
- house sparrow (*Passer domesticus*);
- linnet (*Carduelis cannabina*);
- marsh tit (*Poecile palustris*);
- reed bunting (*Emberiza schoeniclus*);
- skylark (*Alauda arvensis*);
- song thrush (*Turdus philomelos*);
- spotted flycatcher (*Muscicapa striata*);
- starling (*Sturnus vulgaris*);
- yellow wagtail (*Motacilla flava*);
- yellowhammer (*Emberiza citronella*);

8.2.22 Despite the UKBAP lists being superseded, the Local Biodiversity Action Plan (LBAP) mechanism remains current. The relevant local biodiversity policy is the Norfolk Biodiversity Action Plan. The habitat and species for which action plans have been prepared, and which are likely to occur within the Zol, are listed below:

8.2.23 LBAP Habitat Action Plans:

- cereal field margins;
- hedgerows;
- lowland meadows and pasture;
- lowland wood pasture and parkland;

- lowland mixed deciduous woodland;
- mesotrophic lakes;
- ponds;

8.2.24 LBAP Species Action Plans:

- water vole (*Arvicola amphibious*);
- otter (*Lutra lutra*);
- brown hare (*Lepus europaeus*);
- barbastelle (*Barbastella barbastellus*);
- brown long eared bat (*Plecotus auritus*);
- noctule bat (*Nyctalus noctula*);
- soprano pipistrelle (*Pipistrellus pygmaeus*);
- barn owl (*Tyto alba*);
- skylark (*Alauda arvensis*);
- song thrush (*Turdus philomelos*);
- swift (*Apus apus*);
- tree sparrow (*Passer montanus*);
- great-crested newt (*Triturus cristatus*);
- white-clawed crayfish (*Austropotamobius pallipes*);
- Desmoulin's whorl snail (*Vertigo moulinsiana*);

8.3 Methodology

General Approach

8.3.1 Current guidance and best practice, predominantly the Chartered Institute for Ecology and Environmental Management (CIEEM, previously IEEM, before receiving royal charter in 2013) Guidelines for Ecological Impact Assessment in the United Kingdom (referred to in the remainder of the report as the CIEEM Guidelines) indicates that an assessment of impacts on ecological assets should focus on those receptors of sufficient ecological value (i.e. key

receptors) within the Zol that could potentially be subject to significant ecological impacts. Nevertheless, some species and habitats, which are not 'valued' receptors with regard to nature conservation still warrant consideration during assessment, and during the development of the proposed Scheme design and mitigation, on the basis of their legal protection, their implications in respect of biodiversity policies, and their ecological value at a local scale. This final criterion ensures a more complete, comprehensive assessment in terms of the geography of receptors within the Zol, and allows a robust, ecologically coherent suite of mitigation measures to be formulated, that addresses and caters for virtually all ecological receptors, and not just those that are likely to be Significantly affected.

- 8.3.2 The identification and assessment of the ecological receptors and likely significant impacts have been undertaken using the methods described below. More detail of the species - and habitat - specific survey methodologies can be found in the technical reports in the Appendices accompanying this chapter (see Environmental Statement, Volume 2, Chapter 8, Sections A to O).

Evaluation of Baseline Conditions

- 8.3.3 A number of standard methods were followed to enable an evaluation of the baseline conditions within the Zol. These included a desk study, an Extended Phase 1 Habitat Survey and an extensive suite of subsequent surveys, detailing both habitats and protected species.
- 8.3.4 The history of the proposed Scheme is such that the ecological surveys to inform the production of the Environmental Statement are the final phase of a progressive sequence of surveys that have taken place over recent seasons, increasing in the level of detail and intensity through each round. The most recent rounds of surveys have been preceded by those carried out to inform various rounds of assessment, as described below.
- 8.3.5 The first surveys were carried out to inform Stage One and Stage Two Environmental Impact Assessments, and were undertaken in line with methodologies as prescribed in the Design Manual for Roads and Bridges. These were produced in 2003 and 2005 respectively. Both of these assessments included ecological surveys, of depth and geographical range appropriate to the level of detail that each assessment required. They were carried out primarily to contribute to the proposed Scheme selection process, whereby a number of route options were identified, compared, assessed and

refined. This work provided a good basic understanding of the ecological baseline.

- 8.3.6 After the production of the two above reports, a Stage 'Two and a Half' Environmental Impact Assessment was also carried out, in 2005. It was produced to provide further confidence in the route selection process undertaken at Stage Two, and to provide the basis for a robust decision-making process and the proposed Scheme design progressed. In terms of the ecological baseline, this assessment provided a further round of surveys, bolstering the knowledge of the ecological baseline further.
- 8.3.7 Full, detailed ecological surveys were undertaken in 2009 and 2010 to inform the production of an Environmental Statement that was to accompany a planning application for a precursor to the proposed Scheme. This planning application was, however, not submitted and the development of the proposed Scheme was effectively put on hold for at least two years between 2010 and 2012.
- 8.3.8 On recommencement of work on the proposed Scheme in 2012, it was necessary to revise and refresh many of the more sensitive protected species and habitat surveys, in order that the Environmental Statement could be produced using robust, valid data. Further detailed ecological surveys were therefore undertaken in 2012 and 2013.
- 8.3.9 The history of the proposed Scheme described above, and the implicated programme of ecological surveys, means that in some cases the protected species and habitat surveys have been carried out, refreshed and revised several times. Those species which are likely to be significantly impacted have received the most survey effort. The above description demonstrates that the available baseline information obtained is more than sufficient for assessment purposes.

Desk Study

- 8.3.10 The identification of the baseline environment was informed by a desk study which included a review of the designated sites, habitats, and protected and notable species within two kilometres of the proposed Scheme. This was undertaken by searching available publications, reports and online databases from Multi-Agency Geographic Information for the Countryside (MAGIC), Nature on the Map, Joint Nature Conservation Committee (JNCC), Natural England, UK BAP and Norfolk BAP websites.

- 8.3.11 Historical records of protected, notable and invasive species, as well as information on non-statutory designated sites, were obtained from the Norfolk Biodiversity Information Service and were reviewed as part of the desk study.
- 8.3.12 Desk-based studies, including a review of Designated Sites, were undertaken for each of the three previous stages of EIA, then updated in 2009, and again in 2012. Further assessment of Statutory Designated Sites is also included in the Habitats Regulations Assessment, in Volume 2, Chapter 17, Section A.

Habitats

- 8.3.13 Basic information on those habitat surveys carried out to inform the ES is given below. For full information, including detailed methodologies see the individual Technical Reports in Volume 2, Chapter 8, Sections A to P.
- 8.3.14 An initial Phase 1 Habitat Survey was carried out in 2005, and repeated in 2009. An update took place in spring 2012. The habitat types within the survey corridor were identified and mapped in compliance with the 'Handbook for Phase 1 Habitat Survey: a Technique for Environmental Audit' (JNCC, 2010). Botanical nomenclature in this chapter follows Stace (2010) for both Latin and English names. Latin names are only mentioned the first time a species is named in the chapter.
- 8.3.15 Detailed flora surveys, to National Vegetation Classification methodology, were undertaken in 2005. These included sensitive, valuable areas of woodland and grassland. Surveys were repeated in 2009, at which time arable field margin surveys were also undertaken. No land-use or other changes have occurred at these sites, so it is not necessary to update these surveys.
- 8.3.16 A hedgerow survey was carried out in 2006. It was updated in 2007 and 2009, and again as part of the Phase 1 Habitat Survey update in 2012 to ensure that all conclusions and recommendations remained accurate.
- 8.3.17 Trees were initially surveyed in 2007. The survey data was updated in 2009. In addition, an Arboricultural Implications Assessment (AIA) to British Standard 5837:2012 has been produced, which includes surveys and assessments from 2012 and 2013. The AIA is included in Volume 2, Chapter 20, Section A. The conclusions of the AIA have been considered in the assessment of impacts and effects on trees and woodlands as necessary.
- 8.3.18 Note that it has not been necessary or appropriate to consider the information in the AIA as part of this assessment, as the potential impacts on trees have

been identified and assessed as part of the Habitats and Species assessment process as appropriate.

Species

8.3.19 As with habitats, basic information on the suite of protected species surveys carried out to inform the ES is provided below. For full information, including detailed methodologies, see the individual Technical Reports in Reports in Volume 2, Chapter 8, Sections A to P.

Bats

8.3.20 Bats and their roosts have been surveyed extensively. The following surveys were carried out, in accordance with the CIEEM Guidelines and Bat Conservation Trust (BCT) document Bat Surveys: Good Practice Guidelines (2nd Edition, 2012) referred to as the BCT guidelines.

8.3.21 All trees and buildings within the relevant Zol were subject to an initial assessment in 2009, with all trees and buildings with high potential for bats within 50 metres of the proposed Scheme boundary subject to survey in 2009, 2010 and 2012. These involved a combination of emergence/re-entry surveys, internal building inspections, activity (transect) surveys, static monitoring (manned and unmanned) and, in 2010 and 2012, tree climbing where appropriate.

8.3.22 Dusk/dawn surveys have been carried out for those trees not surveyed in 2012 due to access constraints and other issues. This includes the high potential and confirmed roost trees identified in the 2012 tree climbing but not surveyed in 2012, confirmed roost trees under the footprint and any trees to be directly impacted by works (lighting, noise etc.).

8.3.23 Hibernation surveys of suitable buildings/structures were carried out over the winter period in 2008/09 and 2011/12. In 2009 an extensive radio-tracking survey took place at the western end of the proposed Scheme. This was supplemented in 2012 with a similarly extensive radio-tracking survey towards the eastern end of the proposed Scheme. A third radio tracking survey took place in spring 2013.

8.3.24 Static monitoring also took place throughout the 2013 season, to supplement and update the static monitoring previously carried out. This was carried out

at known and suspected sensitive locations along the proposed Scheme (including updates of static monitoring locations surveyed in 2009/2010).

8.3.25 Other Protected Species

8.3.26 Badger (*Meles meles*) surveys took place in 2007, and were updated in 2009. They were then repeated in 2012. In each case initial surveys took place over the winter period, when vegetation was low enough to allow setts to be easily found. Subsequent surveys took place in the following summer seasons to identify usage. Setts, foraging routes, latrine sites and other field signs were mapped.

8.3.27 Great crested newt (*Triturus cristatus*) surveys initially took place in 2004, with updates in 2005, 2007 and 2009. They were then repeated in 2012. The full surveys involved an initial Habitat Suitability Index assessment, with subsequent presence/absence surveys undertaken at all those ponds likely to offer suitable breeding habitat for great crested newts.

8.3.28 The unusual weather conditions in the spring and summer of 2012 meant that a proportion of the great crested newt surveys were carried out in sub-optimal conditions. Accordingly, surveys have been carried out during the 2013 season in order to supplement the existing data. Rather than a blanket survey of all suitable ponds within the Zol as in 2012, these surveys focussed on those ponds that were dry in 2012, and those where impacts were predicted. Further surveys to inform the necessary European Protected Species licence applications took place where necessary.

8.3.29 Breeding bird surveys were initially completed in 2007, and updated in 2009. The surveys were repeated in 2012. Surveys followed the modified BTO Common Bird Census survey technique. Overwintering birds were assessed through a desk-based survey in 2007 and updated in 2009.

8.3.30 An on-site wintering bird survey took place during Jan/Feb 2013, to supplement the previous desk-based data reviews that have so far been completed. It was undertaken over a three week period, with a series of transects walked, each taking one day. Each transect was walked twice.

8.3.31 Barn owls (*Tyto alba*), as a species listed in Schedule One of the Wildlife and Countryside Act 1981, were surveyed in 2007. This was updated in 2009, and further records obtained in 2012. Surveys included visits and inspections of suitable nesting sites for barn owls (by a qualified ecologist with a barn owl disturbance licence).

- 8.3.32 Aquatic invertebrates at The Springs County Wildlife Site were first surveyed in 2005, and repeated in 2006/7. Further surveys were undertaken in 2013, as the previous dataset required updating. At the same time, surveys for Desmoulin's whorl snail (*Vertigo moulinsiana*) were repeated, to allow an accurate assessment of the impacts on this sensitive species to be made.
- 8.3.33 Terrestrial invertebrate surveys took place in 2007, and were updated in 2010. In 2012, as part of the Phase 1 Habitat Survey, assessments of terrestrial invertebrates were carried out by focusing on assessing the value of the habitats along the route of the NDR. This was carried out with a view to assessing the likely impacts and informing appropriate compensation measures, including habitat creation. The focus was to consider the wider importance of the landscape for terrestrial invertebrates, and not individual species.
- 8.3.34 Reptile surveys initially took place in 2007, and were repeated in 2010. The results were somewhat localised, with small populations observed in only a few locations. No further specific reptile surveys are necessary; the distribution of the reptiles is closely and predictably tied to suitable habitats, which have been mapped and updated as part of the Phase 1 Habitat Survey.
- 8.3.35 Water vole (*Arvicola amphibius*) and otter (*Lutra lutra*) surveys took place in 2006 and 2007. Otter populations were observed on the River Wensum and associated watercourses, although this was sufficiently far from the proposed Scheme, with no corridors of movement through the landscape that would be affected by the proposed Scheme, that no further surveys are considered necessary. No evidence of otter was identified anywhere else on the proposed Scheme. Also, no evidence of water voles was identified on the few suitable watercourses impacted by the proposed Scheme.

Other, Unprotected Species

- 8.3.36 Brown hares (*Lepus europaeus*) were surveyed in 2007, with a very small, transient population recorded. No subsequent surveys have taken place as hares are regarded as unlikely to be significantly affected by the proposed Scheme due to their very limited population locally, and because they are not a protected species.
- 8.3.37 Deer surveys also took place in 2007. No subsequent surveys have taken place as similar to the brown hare, deer are not a protected species. In addition to being required to help identify and assess potential impacts on species, the deer surveys were also aimed at allowing the project team to

identify locations along the route where deer/vehicle collisions are potentially most likely, to inform the proposed Scheme signing and mitigation design.

Assessment of Nature Conservation Value

8.3.38 The ecological assessment undertaken as part of the Environmental Statement follows the requirements set out in DMRB Volume 11, Section 3, Part 4. It is based on the methodology reported in the Scoping Report and on discussions with Natural England and the Environment Agency, and draws on the ecological impact assessment methodology set out in the CIEEM Guidelines.

8.3.39 The evaluation of the value of ecological assets is based on the criteria given in WebTAG Sub-Objective 3.3.10, the Biodiversity Sub-Objective, as detailed in Table 8.2 below.

Table 8.2 Criteria for Determining Nature Conservation Value of Features

Value	Criteria	Examples
Very High	High importance and rarity, international scale and limited potential for substitution.	<p>High importance and rarity, international scale and limited potential for substitution.</p> <p>An internationally designated site or candidate site; a viable area of a habitat type listed in Annex I of the Habitats Directive, or smaller areas of such habitat which are essential to maintain the viability of a larger whole.</p> <p>Any regularly occurring population of an internationally important species, which is threatened or rare in the UK i.e. UK BAP, red data book species.</p>
High	High importance and rarity, national scale, or regional scale with limited potential for substitution.	<p>A nationally designated site or a discrete area, which meets the published selection criteria for national designation, including Ancient Woodland on NE register.</p> <p>A viable area of a priority habitat identified in the UK BAP.</p>

Value	Criteria	Examples
		Any regularly occurring population of a nationally or regionally important species which is threatened or rare in the county (local BAP).
Medium	High or medium importance and rarity, local or regional scale, and limited potential for substitution.	Any regularly occurring, locally and regionally significant population of a species listed as being nationally scarce. Any County and other sites which the designating authority has determined meet the published ecological selection criteria for designation, including County Wildlife Sites. A regularly occurring, locally significant number of a County and regional important species.
Low	Low or medium importance and rarity, local scale.	A diverse and/or ecologically valuable hedgerow network. Local designated sites including Roadside Nature Reserves.
Negligible	Very low importance and rarity, local scale.	Other sites, species or habitats with little or no local biodiversity and earth heritage interest.

Source: Adapted from HA 205/08 – Design Manual for Roads and Bridges Volume 11 Section 2 Part 5 and Unit 3.3.10 The Biodiversity Sub-Objective Table 1

Identification of the Magnitude of Potential Impacts

8.3.40 As with the assessment of Nature Conservation Value above, the determination of the magnitude of potential impacts is based on the criteria given in WebTAG Sub-Objective 3.3.10, the Biodiversity Sub-Objective, and the IEEM guidance, as detailed in Table 8.3 below.

8.3.41 All potential impacts arising from the proposed Scheme are considered: direct or indirect, temporary, short term or long-term. The duration, timing, frequency and reversibility of predicted impacts are also considered. Duration refers to the time for which the impact is expected to last prior to recovery or replacement of the resource or feature. It is more appropriate to define

durations of impact in relation to ecological characteristics (for example species lifecycles), as opposed to human timeframes.

8.3.42 The timing of predicted impacts is also important. Some changes may only cause an impact if they coincide with critical life-stages or seasons (for example, the bird nesting season). This may be avoided by careful scheduling of the relevant activities.

8.3.43 The effects of any environmental mitigation measures, including alterations to the proposed Scheme design, have been taken into account.

8.3.44 Impacts have been assessed for all ecological features (species, habitats and designated sites) and ecosystem services in the proposed Scheme corridor identified during the assessment which are considered to be significant.

Table 8.3 Criteria for Determining Magnitude of Impact

Magnitude	Criteria
Major negative	The proposal (either on its own or with other proposals) may adversely affect the integrity of the site, in terms of the coherence of its ecological structure and function, across its whole area, that enables it to sustain the habitat, complex of habitats and/or the population levels of species of interest.
Intermediate negative	The site's integrity will not be adversely affected, but the effect on the site is likely to be significant in terms of its ecological objectives. However if, in the light of full information, it cannot be clearly demonstrated that the proposal will not have an adverse effect on integrity, then the impact should be assessed as major negative.
Minor negative	Neither of the above apply, but some minor negative impact is evident. (In the case of Natura 2000 sites a further appropriate assessment may be necessary if detailed plans are not yet available).
Neutral	No observable impact in either direction.
Positive	Impacts which provide a net gain for wildlife overall.

Source: Adapted from HA 205/08 – Design Manual for Roads and Bridges Volume 11 Section 2 Part 5 and Unit 3.3.10 The Biodiversity Sub-Objective Table 2

8.3.45 The CIEEM guidance states that professional judgement should be used when valuing the importance of ecological features and the magnitude of potential impacts (rather than relying fully on specific categorisation of impacts such as WebTAG). This means that the WebTAG criteria should be used as a guide only, with the ecologist carrying out the assessment able to alter values and impacts if, in their professional judgement, this is appropriate and would most accurately reflect the likely impacts of the proposed Scheme.

Mitigation and Monitoring Measures

8.3.46 EIA best practice, and more specifically the process required by the Highways Agency Advice Note HA200/08 Aims and Objectives of Environmental Assessment (DMRB Vol11 Section 1) (which superseded Interim Advice Note 76/06, of the same title) and Advice Note HA205/08 Assessment and Management of Environmental Effects (which superseded Interim Advice Note 81/06 Management of Environmental Effects), is reliant on the design of the proposed Scheme being an iterative process, with on-going, regular input from those environmental specialists within the EIA process into the evolving design. This allows environmental issues to be considered and addressed at the earliest possible stage, and moves away from older practices whereby mitigation measures were 'bolted on' to a semi-finalised design.

8.3.47 This mechanism is reflected in the assessment process, whereby the impacts are assessed on the premise that mitigation measures are an inherent part of the proposed Scheme. This means that it is no longer good practice to assess pre-mitigation impacts, and then follow these with residual impacts. Instead, the single-phase process works on the premise that the mitigation is the default design, and one set of impacts and effects are assessed.

8.3.48 Mitigation measures have been incorporated into the design of the NDR to where possible avoid or minimise any adverse impacts on the ecological features within the ZoI. Where significant adverse impacts are considered likely, compensation measures have been devised during the EIA process as appropriate.

8.3.49 Mitigation, compensation and biodiversity enhancement measures for this project have been devised using the CIEEM guidelines, consultation with Natural England and other stakeholders, and through the application of best practice.

Pre and During Construction Mitigation

8.3.50 Where construction-phase impacts (including those that may occur during initial pre-construction preparatory activity) are predicted, mitigation measures have been formulated to address these.

Post-Construction Mitigation

8.3.51 Post-construction, permanent mitigation is also identified where significant impacts are predicted. There has been concerted effort to design post-construction mitigation measures, such that they can be installed during the first stages of construction. This has the dual benefits of allowing them to establish and become a part of the wider landscape earlier than they would otherwise, and it also reduces the need to provide temporary mitigation, which would then be removed and replaced by permanent features and measures.

8.3.52 Ecological mitigation is closely tied to the mitigation measures proposed through other environmental discipline assessments, most notably landscape, whereby the landscape design plays an inherent part of mitigation for the loss and severance of habitats.

Assessment of Environmental Effects

8.3.53 The impact magnitude and the nature conservation value of the relevant ecological feature are combined to determine the likely Significance of each effect. This is carried out using the matrix detailed in Table 8.4 below. Those effects that are Moderate, Large or Very Large, are considered to be ecologically Significant. The CIEEM guidelines define an ecologically significant effect as an effect (negative or positive) on the integrity of a defined site or ecosystem and/or the conservation status of habitats or species within a geographical area. This links back to the criteria for determining the Nature Conservation Value of features, meaning that Significant effects can be considered to be so at the geographical scale at which the Conservation Value relates.

Table 8.4 Assessing the Significance of Potential Effects

Magnitude of Potential Impact	Nature Conservation Value of Features				
	Very High	High	Medium	Low	Negligible
Major Negative	Very large adverse	Very large adverse	Moderate adverse	Slight adverse	Neutral
Intermediate Negative	Large adverse	Large adverse	Moderate adverse	Slight adverse	Neutral
Minor Negative	Slight adverse	Slight adverse	Slight adverse	Slight adverse	Neutral
Neutral	Neutral	Neutral	Neutral	Neutral	Neutral
Positive	Large beneficial	Large beneficial	Moderate beneficial	Slight beneficial	Neutral

Source: Adapted from HA 205/08 – Design Manual for Roads and Bridges Volume 11 Section 2 Part 5 and Unit 3.3.10 The Biodiversity Sub-Objective Table 3

8.3.54 The above matrix places the overall effects on an ecological asset into one of five criteria – Neutral, Slight, Moderate, Large and Very Large. These could be either adverse or beneficial effects. Table 8.5 below provides qualitative descriptions as to these five criteria, and indicates the extent to which the ecological assets in these criteria are likely to have been considered during the decision-making process.

Table 8.5 Description of the Significance of Effect Categories

Significance category	Typical description of effect
Very Large	<p>Only adverse effects are normally assigned this level of significance.</p> <p>They represent key factors in the decision making process.</p> <p>These effects are generally, but not exclusively, associated with sites or features of international importance that are likely to suffer a most damaging impact and loss of resource integrity.</p> <p>However, a major change in a site or feature of local importance may also enter this category.</p>
Large	<p>These beneficial or adverse effects are considered to be very important considerations and are likely to be material in the decision-making process.</p>
Moderate	<p>These beneficial or adverse effects may be important, but are unlikely to be highly important to the decision making factors.</p> <p>The cumulative effects of such factors may influence the decision making if they lead to an increase in the overall adverse effect on a particular resource or receptor.</p>
Slight	<p>These beneficial or adverse effects may be raised as local factors.</p> <p>They are unlikely to be critical in the decision making process, but are important in enhancing the subsequent design of the project.</p>
Neutral	<p>No effects or those that are beneath levels of perception, within normal bounds of variation or with the margin of forecasting error.</p>

Source: Adapted from HA 205/08 – Design Manual for Roads and Bridges Volume 11 Section 2 Part 5

Confidence in Predictions

8.3.55 Owing to the potential unknowns and uncertainties in the assessment process, each predicted overall effect on ecological resources is given a confidence level, to indicate the certainty (or otherwise) of the prediction. In each case it takes into account the timescales being considered, the vulnerability of the ecological resource, its robustness/sensitivity to change.

Table 8.6 Confidence in Predictions

Confidence level	Criteria
Certain	Probability estimated at 95% chance or higher
Probable	Probability estimated above 50% and below 95%
Unlikely	Probability estimated above 5% but less than 50%
Extremely unlikely	Probability estimated at less than 5%

Phases of the Project

8.3.56 The significance of effects has been considered during the following phases of the project:

Construction Phase

8.3.57 For effects during this phase, account has been taken of the operations required to construct the proposed development including the sites for Contractors' compounds, haul routes and borrow and disposal areas. Further details of the proposed Scheme construction are set out in Volume 2, Chapter 2.

Operational Phase

8.3.58 For effects during this phase, consideration has been given to the land take required to construct the project together with any drainage and other ancillary

works. The impact of traffic and other related effects on the designated sites, habitat and species, and the on-going, long term maintenance requirements and actions have also been considered.

8.4 Baseline Conditions

8.4.1 This section presents descriptions of the key and protected ecological receptors in the relevant Zol. More detailed descriptions and survey data and maps are presented in the various Technical Reports on each of the surveys and species types, in Volume 2, Chapter 8, Sections B to O.

Designated Sites

8.4.2 There are six statutory designated sites within 2km of the proposed Scheme. There are 16 non-statutory designated sites, and 13 ancient woodlands within 2km of the proposed Scheme. These are shown on the Environmental Constraints Map, drawing number MMD-233906-DT-0881 Environmental Constraints - Ecology, in Appendix 2 of this volume of the ES. Their citations can be found in Volume 2, Chapter 8, Section A; summaries are provided in the sections below:

Statutory Designated Sites

8.4.3 The Broadland Ramsar Site is located approximately 1.9 km from the proposed Scheme, south east of the Postwick junction. It covers 5462.4 hectares, and is designated for its wetland habitats, and for overwintering bird species including Tundra swan (*Cygnus columbianus bewickii*), Eurasian wigeon (*Anas penelope*), gadwall (*Anas strepera strepera*) and northern shoveler (*Anas clypeata*). The citation for this designation also makes reference to notable flora including fen orchid (*Liparis loeselii*) and floating water-plantain (*Luronium natans*), and to notable fauna including marsh harrier (*Circus aeruginosus*), bittern (*Botaurus stellaris stellaris*), otter and Desmoulin's whorl snail. Broadland Ramsar Site is of Very High conservation value.

8.4.4 Broadland Special Protection Area (SPA) is coincident with the Broadland Ramsar Site. It is designated for a number of breeding species, including bittern and marsh harrier, and for several overwintering bird species, including Bewick's swan, ruff (*Philomachus pugnax*), gadwall and shoveler. Broadland SPA is of Very High conservation value.

- 8.4.5 The Broads Special Area for Conservation (SAC) is broadly coincident with both the Broadland Ramsar site and Broadland SPA. It covers an area of some 5890 hectares, and is designated for a wealth of habitats and species. The habitats cited in the designation include those of the watercourses and water bodies, and the associated fens and woodland. Species include Desmoulin's whorl snail, fen orchid and ramshorn snail (*Anisus vorticulus*). The Broads SAC is of Very High conservation value.
- 8.4.6 The River Wensum SAC is located 300 metres south of the proposed Scheme, at its western end, where it ties in with the existing A1067 Fakenham Road. In geographical terms, the designation relates predominantly to the main river body itself, and covers the stretch from its springs upstream of Fakenham to Hellesdon Mill on the western edge of Norwich. It is designated for its *Ranunculus* vegetation, and due to the presence of white-clawed crayfish (*Austropotamobius pallipes*), Desmoulin's whorl snail, brook lamprey (*Lampetra planeri*), and bullhead (*Cottus gobio*). The River Wensum SAC is of Very High conservation value.
- 8.4.7 The River Wensum SSSI, coincident with the Wensum SAC, is designated for its status as an enriched, calcareous lowland river. It is probably the best whole river of its type in nature conservation terms in the United Kingdom. The upper reaches are fed by springs that rise from the chalk and by run-off from calcareous soils rich in plant nutrients. This gives rise to dense beds of submerged and emergent vegetation characteristic of a chalk stream. Lower down, the chalk is overlain with boulder clay and river gravels, resulting in aquatic plant communities more typical of a slow-flowing river on mixed substrate.
- 8.4.8 It provides habitat for a diverse fish population, including brown trout (*Salmo trutta fario*) in its upper reaches, with a sizeable diversity of macrophytes and semi-aquatic vegetation, the communities of which vary in composition along the course of the river, reflecting the above described changes in underlying geology. An abundant and diverse invertebrate fauna is also known to exist along the course of the river. The River Wensum SSSI is of High conservation value.
- 8.4.9 The proposed Scheme is approximately 1.9 km from the Mid-Yare National Nature Reserve (NNR). The NNR covers 783 hectares, and is designated primarily for its peatland habitats, although it also makes reference to its full range of Broadland habitats, including broads, dykes, tall fen, fen-meadows and alder-willow woodland. Also of note is the range of invertebrates, including the swallowtail butterfly (*Papilio machaon*) and Norfolk hawker

dragonfly (*Aeshna isosceles*), and bird species; many of the UK's Cetti's warblers (*Cettia cetti*) live in the NNR. It is also a breeding site for marsh harriers and bearded tits (*Panurus biarmicus*). During the winter the lowland wet grasslands are host to wigeon (*Anas penelope*), white-fronted geese (*Anser albifrons*) and bean geese (*Anser fabalis*). In the spring and summer the fen-meadows and wet grasslands are breeding grounds for lapwing (*Vanellus vanellus*), redshank (*Tringa totanus*) and snipe (*Gallinago gallinago*). The Mid-Yare NNR is of High conservation value.

8.4.10 Two Local Nature Reserves (LNR) are located within 2km of the proposed Scheme. Whitlingham Marsh LNR is located approximately 550 metres to the west of the Postwick junction. This 15 hectare site is designated primarily for its reed-bed habitat and associated species of flora and fauna. It is of Medium conservation value.

8.4.11 Whitlingham LNR is approximately 1.5 km to the west of the Postwick junction. This 100 hectare site is designated for its reed-bed habitats, as with Whitlingham Marsh LNR above. It is also of Medium conservation value.

Non-Statutory Designated Sites

8.4.12 There are fifteen County Wildlife Sites within 1 km of the proposed Scheme. These are detailed below. As with above, their full citations can be found in Volume 2, Chapter 8, Section A.

8.4.13 The River Wensum Pastures CWS (Ref. 2070) is located 450 metres west of the extreme western end of the proposed Scheme. It covers an area of 37 hectares, and is an area of predominately improved cattle-grazed pasture adjacent to the River Wensum SSSI, crossed by a network of drains supporting a species-rich flora associated with aquatic habitats. It lies on the flat Wensum floodplain and is subject to periodic flooding. Parts of the site are undulating in relief and ephemeral ponds form in some of the hollows. Low lying neutral grassland is dominated by coarse grasses to a short sward. There are tree lines and occasional trees and scrub scattered across the site. Species include grey poplar (*Poplar x canescens*), oak and crack willow (*Salix fragilis*).

8.4.14 Attlebridge Hills CWS (Ref. 1344) is located 40 metres from the proposed Scheme footprint. This site, approximately 24 hectares in size, is a varied structure, broad-leaved semi-natural woodland. The canopy is dominated by mature oak (*Quercus robur*), sycamore (*Acer pseudoplatanus*), sweet chestnut (*Castanea sativa*) with extensive areas of mixed coppice of hazel

(*Corylus avellana*), sycamore and sweet chestnut. The ground flora is typical of such woodlands but also contains red campion (*Silene dioica*), viper's bugloss (*Echium vulgare*), nipplewort (*Lapsana communis*) and common centaury (*Centaureum erythraea*).

- 8.4.15 Triumph & Foxburrow Plantations CWS (Ref. 1343) is located 620 metres north of the proposed Scheme. This large site (around 50 hectares) site is a mixed broad-leaved woodland with good rides. The woodland canopy is dominated by sweet chestnut, oak and birch with the occasional larch (*Larix* spp.) and pine (*Pinus* spp.). The coppice layer is mostly hazel (*Corylus avellana*) while some of the sweet chestnut coppices may be a century old. The ground flora is a mixture of red campion (*Silene dioica*), herb-Robert (*Geranium robertianum*) wood sage (*Teucrium scorodonia*) and on the open grassy rides marsh cudweed (*Gnaphalium uliginosum*) is found.
- 8.4.16 Walsingham Plantation CWS (Ref. 1351) is located 110 metres from the Proposed Scheme. This small site, just 10 hectares, is a broad-leaved semi-natural woodland, with a canopy dominated by oak, with silver birch, beech, and sycamore also present. The coppice layer is slight and mainly elder (*Sambucus nigra*). The ground flora is composed mostly of bracken (*Pteridium aquilinum*), bramble (*Rubus fruticosus* agg.), ivy (*Hedera helix*) and ground-ivy (*Glechoma hederacea*). Moschatel (*Adoxa moschatellina*), climbing corydalis (*Corydalis claviculata*) and herb-Robert, red campion (*Silene dioica*) and wood avens (*Geum urbanum*) are also found.
- 8.4.17 Marriott's Way CWS (Ref. 2176) is partially beneath the proposed Scheme footprint. It is a linear route, now a permissive footpath, cycleway and equestrian route, following a disused railway from the edge of Norwich City Centre to Aylsham, via Reepham. In total it covers around 69 hectares. Trees and scrub are the dominant vegetation along Marriott's Way, forming an almost continuous corridor as far as Reepham, with a more scattered coverage eastward to Aylsham. Oak and hawthorn occur all the way along the path, with occasional other locally frequent species such as sweet chestnut in the woods at Attlebridge, or alder at Whitwell Common, and other species occurring with varying frequency. Grassland and forbs growing within it form the greatest component of the vegetation. Much of Marriott's Way is on acidic ground, with light, sandy soil but plants also found in neutral and basic soils are also present.
- 8.4.18 Whinney Hills & Common CWS (Ref. 1352) is located 515 metres from the proposed Scheme. This site is a large area of common land. The area now supports mature acid woodland, although patches of heathland do still occur

within the site. On lower marshy ground, older areas of woodland support alder whilst in other areas sweet chestnut coppice occurs. On the higher, dry ground the canopy consists of a mixture of mature and semi-mature trees. Silver birch is most common with frequent oak and rowan. The ground flora is not diverse and both bramble and bracken are common. Heather (*Calluna vulgaris*) is abundant in places as a remnant of the former habitat. In wetter areas the woodland has a different character with a canopy dominated by mature coppiced alder. The centre of the site is derelict sweet chestnut coppice over a poor ground flora with no heather. To the north-east of the site is an area of wet heath with abundant tall heather and dense tussocks of purple moor-grass (*Molinia caerulea*).

8.4.19 Black Park & The Thicket CWS (Ref. 1395) is located 920 metres north of the proposed Scheme. It is a large area (around 32.5 hectares) of oak-dominated acid woodland, with many standard trees and a big area of well-spaced mature trees to the north. The ground flora is varied with a wide range of species. There are numerous small, and several large, ponds in the south-eastern part of the site. Both wet and dry ditches occur around the site, with the wet ditches supporting species such as remote sedge (*Carex remota*), alder, fool's water-cress (*Apium nodiflorum*) and bugle (*Ajuga reptans*). There are a number of old boundary banks within the wood, often with old oak pollards and hazel on them, or old hawthorn hedge. An ancient monument, Castle Hill, is a separate small site to the south.

8.4.20 Horsham Meadows CWS (Ref. 2178) is located 810 metres from the proposed Scheme, and is 8.5 hectares in size. This site consists of three fields of cattle-grazed pasture, over heavily undulating terrain. A small stream runs from west to east. A number of large, shallow hollows, believed to be either fossil pingos or thermokarst hollows, are a significant feature of the site. Many hold water during the winter months, and support a very diverse, often fen-like flora. The grassland surrounding the hollows is generally less diverse, and frequently damp and tussocky. An area of tall reed grading into mature willow scrub and more mature tree cover occupies a narrow block at the north-east corner of the site.

8.4.21 Spixworth Bridge Meadows CWS (Ref. 2205) is located 950 metres north of the proposed Scheme. This is a large area of mixed grassland, some very species-rich. The land is in a valley with Spixworth Beck running through. There are many wet, damp and dry ditches. An area of alder (*Alnus glutinosa*) carr occurs on the northern edge of the site. The two fields at the western end of the site and much of the land north of the beck are ungrazed, unimproved neutral grassland which is long and rank. There is abundant species-rich

marshy grassland in the low-lying parts of the site. The southern boundary of the site has some fine mature oaks, with a varied hedge of hawthorn, hazel, blackthorn, field maple, apple (*Malus domestica*), dog rose (*Rosa canina*) and honeysuckle (*Lonicera periclymenum*), with dog's mercury (*Mercurialis perennis*) growing beneath.

8.4.22 Canham's Hill CWS (Ref. 1335) is located around 600 metres from the proposed Scheme, and is around 7.7 hectares in size. It is comprised of rough unmanaged ground, a mixture of self-seeded mature woodland, some bracken (*Pteridium aquilinum*) and a small open area of unimproved neutral grassland.

8.4.23 Ladies Wood, Church Carr & Springs CWS (Ref. 1393) is located just 20 metres from the proposed Scheme. It is around 14 hectares in size, and includes a variety of aquatic and semi-aquatic habitats. The lakes are generally species poor and fringed by willow (*Salix cinerea*) carr, with a very small number of macrophyte species present. The lake is used by a local angling club, and as such has seen artificial stocking of non-native fish species. The watercourses have been modified in recent seasons, and an otter fence erected to prevent a repeat of the otter predation that caused previous fish stocks to be affected.

8.4.24 There are two areas of marshy grassland and one area of improved grassland. The woodlands are dominated by oak and sweet chestnut, with a fairly diverse understorey. The ground flora is often dominated by dense bracken (*Pteridium aquilinum*) and bramble (*Rubus fruticosus*) although swards of abundant bluebell (*Hyacinthoides non-scripta*) are also evident. An area of lime (*Tilia x vulgaris*) coppice is also present. Part of the site is ancient woodland.

8.4.25 Tollshill Wood CWS (Ref. 2021) is located 490 metres southwest of the proposed Scheme, and covers around 10 hectares. It is an area of ancient, broad-leaved semi-natural woodland, which benefits from ongoing management in terms of coppicing, ride creation and enhancement etc. The canopy is varied in structure and density, and is dominated by sycamore and sweet chestnut, with frequent oak and beech (*Fagus sylvatica*). The ground flora includes areas of dense bluebell (*Hyacinthoides non-scripta*), with the notable wood anemone (*Anemone nemorosa*) also present.

8.4.26 Paynes Yard Wood, The Owlery & March Covert CWS (Ref. 1392) is located 10 metres from the proposed Scheme. The site is around 17 hectares in size. Paine's Yard Wood and The Owlery are varied woodlands of largely native

species and of a varied structure, including abundant deadwood and stored coppice. Mature ash is a dominant species throughout, much of it arising from large coppice stools. Oak and birch are frequent and hazel coppice dominates some areas. The ground flora is dominated by large stands of bluebell in places. A pond occurs on the eastern boundary, and to the north the woodland narrows dramatically, where the woodland follows the parish boundary, which is marked by a bank and impressive oaks, which occur as pollards and coppice stools. A mature hedge also follows the boundary and links the wood with The Owlery.

8.4.27 Whitlingham Marsh CWS (Ref. 2212) is located 400 metres west of the Postwick junction part of the proposed Scheme. This site is an area of inundated swamp, consisting mostly of sedgebeds. The marsh is bisected from north to south by a line of alders and a small pond lies close to the centre of the site. The entire site is dominated by greater pond-sedge (*Carex riparia*), with a greater degree of diversity in the western half than to the east.

8.4.28 Whitlingham Fen CWS (Ref. 279) is located 550 metres west of the Postwick junction part of the proposed Scheme. It is just 6 hectares, and is a linear site running along the eastern side of the Whitlingham sewerage treatment works. It consists largely of fen and wet scrub woodland but also includes a series of open ponds. The area is largely unmanaged. The fen vegetation is dominated by reed sweet-grass (*Glyceria maxima*) or greater pond-sedge (*Carex riparia*). The wet woodland is dominated by mature willow (*Salix* spp.) scrub with occasional hawthorn and elder. The ponds lie towards the centre of the site and have abundant growth of semi-aquatic species. Drier peripheral areas contain great willowherb (*Epilobium hirsutum*) and broad-leaved ragwort (*Senecio fluviatilis*) whilst willow (*Salix* spp.) scrub is a frequent invader of shallow muddy margins.

8.4.29 All of the above County Wildlife Sites are of Medium conservation value.

Roadside Nature Reserves

8.4.30 Fakenham Road RNR is within the footprint of the proposed Scheme. The site is important for hoary mullein (*Verbascum pulverulentum*). It is of Medium conservation value.

Ancient Woodlands

8.4.31 The following thirteen Ancient Woodlands are located within 1 km of the proposed Scheme. Ten of these are Replanted Ancient Woodlands, and three are Ancient Woodlands.

8.4.32 Mileplain Plantation Replanted Ancient Woodland, covering an area of 22.17ha, is located approximately 1.1 km to the north of the proposed Scheme, where it ties in to the existing A1067 Fakenham Road. It is part of a much wider area of woodland that also includes the Deighton Hills and Attlebridge Hills woods, both of which are immediately adjacent to the proposed Scheme.

8.4.33 Primrose Grove Replanted Ancient Woodland is located approximately 1.2 km west of the proposed Scheme, also where it ties in to the existing A1067. It is beyond the River Wensum, and covers an area of 14.79 ha. In addition, Snake Wood, also an Ancient Replanted Woodland, is located approximately 1.1 km metres south of this location. It is 8.62 hectares, on the extreme western edge of Taverham.

8.4.34 The Wilderness Ancient Woodland is approximately 1.6 km north of the Cromer Road junction part of the proposed Scheme. It is just 1.7 hectares in size. Immediately to the north, 1.7 km from the proposed Scheme, is The Wilderness Replanted Ancient Woodland, covering 5.6 hectares.

8.4.35 Northwest of the A1151 Wroxham Road, Church Wood and Ladies Carr, both of which are component parts of the CWS described above, are both Replanted Ancient Woodlands. Church Wood is approximately 500 metres north of the proposed Scheme, and covers an area of 3.62 ha. Ladies Carr is around 50 metres north of the proposed Scheme is 3.432 ha. Church Wood, another block of woodland in the same area, is Ancient Woodland, covering 3.7 ha. It is situated around 260 metres north of the proposed Scheme.

8.4.36 Also in this area, Sprowston Wood Replanted Ancient Woodland is located around 40 metres to the south of the proposed Scheme. It covers an area of 11.19 hectares.

8.4.37 Tollshill Wood Replanted Ancient Woodland is around 520 metres southwest of the proposed Scheme, adjacent to the A1151 Wroxham Road. It covers an area of 9.31 ha.

8.4.38 To the south of the A1151 Wroxham Road, Ortolan's Grove Ancient Woodland is located immediately adjacent to the proposed Scheme. It covers an area of just 0.78 ha.

8.4.39 Bulmer Coppice Replanted Ancient Woodland is located on the Salhouse Road, approximately 800 metres south west of the proposed Scheme. It covers an area of 7.54 ha.

8.4.40 Racecourse Plantation Replanted Ancient Woodland, part of the larger Racecourse Plantation woodland block, is located approximately 1.3 km west of the proposed Scheme. It covers an area of 12.81 ha, and is situated to the immediate north of the Plumstead Road.

8.4.41 All of the above Ancient Woodlands are of Medium conservation value.

Tree Preservation Orders

8.4.42 Broadland District Council has provided details of Tree Preservation Orders (TPO) within 1 km. The only TPO (ref. TPO 1991 No.10) within the Zol surrounds Keepers Cottage along the A1151 Wroxham Road, adjacent to the proposed new junction with the NDR.

8.4.43 The TPO covers four individual trees, oak and one sycamore, a group of four horse chestnut trees and two stands of mixed woodland. Woodland one contains mainly sycamore, ash, oak, birch and sweet chestnut. Woodland two consists mainly of oak, horse chestnut, sycamore and ash. A copy of the order can be found in Volume 2, Chapter 8, Section A.

8.4.44 The Keepers Cottage TPO is considered to be of Low conservation value.

Important Hedgerows under the Hedgerow Regulations 1997

8.4.45 A survey was carried out to identify those hedgerows that are designated as Important under the Hedgerow Regulations 1997, which would be directly affected by the proposed Scheme.

8.4.46 A total of eleven hedgerows are classified as Important and would be directly affected by the proposed Scheme. They are all species rich, containing at least 5 woody species per 30 metres of hedgerow, most commonly hawthorn, blackthorn, field maple, hazel, holly and dog rose. Tree species with the hedgerows typically include oak, ash, birch, hornbeam and sweet chestnut.

8.4.47 The Important hedgerows are detailed in the table below:

Table 8.7 Important Hedgerows to be affected by the proposed Scheme

Number	Location	Length to be removed (m)
1	Runs along the eastern side of Holt Road in Horsford, starting at the crossroads with Church Street and Drayton Lane and running south.	185
2	Runs between arable fields that are located between Holt Road and Drayton Lane to the south of Horsford.	75
3	Runs between arable fields that are located between Holt Road and Drayton Lane to the south of Horsford. Adjoins above hedgerow.	166
4	Runs along the footway/cycleway between West Lane and the A140 in Horsham St Faith.	65
5	Runs along the eastern edge of Old Norwich Road, from Horsham St Faith towards Norwich Airport.	94
6	Runs along the western side of St Faith's Road from the turning onto Quaker Lane in Spixworth.	161
7	Runs along the eastern side of St Faith's Road from the turning onto Quaker Lane in Spixworth.	161
8	Runs along the southern side of Quaker Lane in Spixworth, starting at the turning onto St Faith's Road, running east.	109
9	Runs along the western side of Buxton Road in Spixworth, starting at Quaker Lane and going south.	109
10	Runs along the eastern side of Buxton Road in Spixworth, starting at Arthurton Road and going south.	623
11	Runs along the north-western side of Salhouse Road in New Rackheath, starting at Green Lane East and running southwest.	329

8.4.48 The above Important hedgerows are of Medium conservation value. Full details can be found in the Phase 1 Habitat Survey report (Mott MacDonald, 2013) in Appendix B of this document, and the Hedgerow Survey Report (Mott MacDonald, 2009), in Volume 2, Chapter 8, Section B.

Habitats, Plant Communities and Flora

8.4.49 Plans showing the results of the individual habitat and species surveys are included in the individual Technical Reports in Volume 2, Chapter 8, Sections B to O. Such is the volume and geographical extent of habitat and protected species data that it is not appropriate to produce overarching maps.

Phase 1 Habitat Survey Results

8.4.50 The following sections include brief descriptions of the main habitat types and plant communities present within the Zol of the proposed Scheme. It summarises information from the Extended Phase 1 Habitat Survey, and also includes information from the Detailed Botanical Survey and the Hedgerow Survey reports. Although the latter report has already been referenced above in terms of identifying those Important hedgerows according to the Hedgerows Regulations 1997, the ecological baseline data it contains is pertinent to this section of the baseline description.

8.4.51 Detailed descriptions of the habitats, plant communities and flora, along with target notes (TN) are included in the Extended Phase 1 Habitat Survey (Mott MacDonald, 2012), in Volume 2, Chapter 8, Section B. The Phase 1 habitat maps (also showing locations of target notes) are found in the habitat survey report.

8.4.52 The results of the National Vegetation Classification botanical survey are included in the Detailed Botanical Survey Report in in Volume 2, Chapter 8, Section C. The results of the hedgerow survey are included in the Extended Phase 1 Habitat Survey Report.

Semi-Natural Woodland

8.4.53 A number of blocks of semi- natural woodland are distributed throughout the Zol. In general terms they are typical of woodland of the area, and reflect the neutral and acid soils that underlie the area. Canopies include abundant oak, with frequent ash, sycamore and silver birch, and occasional sweet chestnut,

horse chestnut and various other species. Some woodland blocks include a notable proportion of pine species in the canopy, most often Scot's pine. This is often a reflection of the sandy, acid substrate on which the woodland is growing.

8.4.54 Understoreys vary in quality and species composition, apparently dependent on the degree of management that the woodland receives. They generally contain frequent hazel, hawthorn, elder and field maple competing with younger specimens of the above tree species. In some cases the understorey is virtually absent.

8.4.55 Field layers show similar variability, reflecting both the degree of management and the soil types locally. Those older woodlands that have been a part of the landscape for centuries often have field layers dominated by bluebell and dog's mercury, with numerous other woodland flora species, highlighting an untouched, delicate ecosystem that is dependent on the complex soil structure and a healthy mycorrhizal fungi community. Other areas have a field layer dominated by gorses, where acidic, sandy soils proliferate, whereas other, less well managed field layers are dominated by nettles, bracken, bramble etc.

8.4.56 Many of the woodland blocks in the ZOI are designated as CWS or Ancient Woodland, and hence have already been described. These include Attlebridge Hills, Walsingham Plantation, Sprowston Wood, Ladies Wood, Church Carr & Springs, Ortolan's Grove and Paine's Yard Wood, the Owlery and March Covert. Other notable blocks include Drayton Drewray, Upper Blacksmith's Wood and Heath Wood, which are described below.

8.4.57 Drayton Drewray is a well-established semi-natural woodland which, in the south-eastern corner to be affected by the route, contains abundant Scot's pine, with pockets of mature oak and birch. The understorey contains occasional elder, gorse and non-native species such as rhododendron. Ground flora in this area is poor, largely dominated by bracken and bramble. In the wider area, to the north and west, the woodland is much more diverse and valuable, with much greater species diversity and ecological value. Whinney Hills & Common CWS makes up part of the wider Drayton Drewray woodland area.

8.4.58 Heath Wood shows clear signs of having been a well-established, very old woodland. It is now managed for timber production, so the canopy contains abundant pine (*Pinus*) species, although oak and sweet chestnut are also found occasionally, particularly to the edges. The understorey is,

corresponding with its managed nature, poorly represented, with occasional elder and hazel present. The field layer though is far more representative of an old broadleaved woodland, with abundant bluebell and dog's mercury, and associated woodland herb species.

8.4.59 Woodlands are Habitats of Principle Importance and LBAP Habitats.

Plantation Woodland

8.4.60 Few planted woodlands are located through the Zol. At Beeston Park exotic conifer species have been planted and some of the older woodlands such as Sprowston Wood have also been planted with exotic conifer and poplar species.

8.4.61 Spixworth Belt is a long shelter belt of Scot's pine with a canopy and understorey of frequent oak, elder and ivy, a poor field layer dominated nettle and bramble. A block of hazel coppice is present along the northern boundary.

8.4.62 Parts of Heath Wood, close to Rackheath, are coniferous plantation, although it was previously a semi-mature broadleaved woodland. It contains abundant Scot's pine, with stands of abundant sycamore and birch and occasional other broadleaved species, including an area of mature beech coppice. It has a sparse understorey, bramble and bracken dominated field layer, with bluebell carpets in the central area.

Parkland and Scattered Trees

8.4.63 Two areas of parkland are located within the Zol, Beeston Park and Rackheath Park. Little of the original, historical parkland remains at Beeston, to the immediate south of Beeston Hall, the bulk having been ploughed for arable production. A number of mature parkland trees remain. These are predominantly oak.

8.4.64 Rackheath Park consists mainly of mature parkland trees. However, areas of the original park have been converted to arable production. Very few parkland and scattered trees are located within the footprint of the proposed Scheme. The Phase 1 Habitat Survey maps in Volume 2, Chapter 8, Section B show the extents of the parkland and arable land at Rackheath Park.

8.4.65 Parklands are Habitats of Principle Importance and LBAP Habitats.

Semi-Improved Grassland

8.4.66 Although there are several areas of grassland within the Zol, species rich semi-improved grassland is only recorded at one site, near Gazebo Farm, just northwest of Heath Wood. It has developed from arable reversion 10 - 15 years ago, and contains a mix of Yorkshire-fog (*Holcus lanatus*), creeping bent (*Agrostis stolonifera*), common mouse-ear (*Cerastium fontanum*), creeping buttercup (*Ranunculus repens*), cock's-foot (*Dactylis glomerata*), white clover (*Trifolium repens*), ribwort plantain (*Plantago lanceolata*) and sweet meadow grass (*Anthoxanthum odoratum*). It is heavily rabbit grazed, and contains ruderal species such as bramble and nettles locally.

Improved and Amenity Grassland

8.4.67 Most of the grassland sites are improved grassland mainly dominated by ryegrass. Fields of improved grassland are fairly evenly distributed throughout the Zol.

Arable Land and Arable Field Margins

8.4.68 Arable land dominates the Zol. Intensive farming practices means that the presence of field margins is limited; crop production areas have been maximised at the expense of other, semi-natural habitats, field margins included. No field margins are present between the Airport and Postwick. Those arable field margins that are present are Habitats of Principle Importance and LBAP habitats.

Standing water

8.4.69 Two substantial areas of standing water are present within the Zol, these are the two large lakes that make up Ladies Wood, Church Carr and Springs CWS, as has already been described in Section 8.4 Baseline Conditions – Non Designated Sites. A number of small ponds also exist, some within arable fields and others within woodlands. The largest complex of ponds is at Gazebo Farm, just northwest of Heath Wood. This pond network is described in more detail in the Great Crested Newt survey report in Volume 2, Chapter 8, Section F.

8.4.70 Ponds are Habitat of Principle Importance and a LBAP habitat.

Species-Rich Hedgerows

8.4.71 As a common field boundary, a number of species rich hedgerows, many that contain trees, are present in the Zol, particularly from the airport east to Postwick. The Phase 1 Habitat Survey Report in Volume 2, Chapter 8, Section B, contains more detail.

Species-Poor Hedgerows

8.4.72 Species poor hedgerows are distributed throughout the Zol. Hawthorn is the dominant woody species, with blackthorn, field maple and dog rose also occasionally present.

8.4.73 All hedgerows are Habitats of Principle Importance and LBAP habitats.

8.4.74 All of the above habitats that do not currently benefit from being within a Statutory or Non-Statutory Designated Site are considered to be of Low conservation value.

8.4.75 The table below provides a summary of the habitat types that would be permanently lost to the proposed Scheme:

Table 8.8 Areas of Main Habitats Lost to the Proposed Scheme

Habitat Type	Amount Lost to Proposed Scheme
Semi-Natural Woodland	5.3 Ha
Plantation Woodland	10.4 Ha
Parkland and Scattered Trees	1.8 Ha
Semi-Improved Grassland	25.8 Ha
Improved Grassland	36.0 Ha
Arable	229.9 Ha
Species-Rich Hedgerows	4437 m
Species-Poor Hedgerows	9752 m

Phase 2 (National Vegetation Classification Woodland and Grassland Flora)

8.4.76 Those most valuable and diverse woodlands, semi-improved grasslands and arable field margins within the ZOI were surveyed according to the National Vegetation Classification (NVC) methodology. The results give a more detailed understanding of the flora communities that a simple Phase 1 Habitat Survey provides, and so allow a more detailed, accurate assessment of the potential impacts that the proposed Scheme may have. More detailed descriptions, and plans showing the locations of the surveyed habitats, are included in the Phase 2 Botanical Survey Report in Volume 2, Chapter 8, Section C.

8.4.77 The following NVC woodland classifications were identified:

Table 8.9 NVC Woodland Classifications

NVC Community	NVC Sub-Community	Habitat	Location
W6 <i>Alnus glutinosa- Urtica dioica</i> woodland	W6a typical sub-community	Broadleaved plantation woodland	Strip Plantation, Rackheath
W8 <i>Fraxinus excelsior- Acer campestre- Mercurialis perennis</i> woodland	W8d <i>Hedera helix</i>	Broadleaved plantation woodland	Heath Wood, Rackheath.
W10 <i>Quercus robur- Pteridium aquilinum- Rubus fruticosus</i> woodland	W10a typical sub-community	Semi-natural broad-leaved woodland	Ladies Wood, Beeston St Andrew
W10 <i>Quercus robur- Pteridium aquilinum- Rubus fruticosus</i> woodland	W10a typical sub-community	Semi-natural broad-leaved woodland	Spixworth Plantation
W10 <i>Quercus robur- Pteridium aquilinum- Rubus fruticosus</i> woodland	W10c <i>Hedera helix</i>	Broadleaved plantation woodland	Woodland south of Spixworth Park
W10 <i>Quercus robur- Pteridium aquilinum- Rubus fruticosus</i> woodland	W10a typical sub-community	Mixed plantation woodland	Heath Wood, Rackheath

NVC Community	NVC Sub-Community	Habitat	Location
W10 <i>Quercus robur</i> - <i>Pteridium aquilinum</i> - <i>Rubus fruticosus</i> woodland	W10a typical sub-community	Mixed plantation woodland	Tithe Plantation, south of Spixworth
W10 <i>Quercus robur</i> - <i>Pteridium aquilinum</i> - <i>Rubus fruticosus</i> woodland	W10c <i>Hedera helix</i>	Coniferous plantation	Spixworth Plantation
W16 <i>Quercus spp.</i> - <i>Betula spp.</i> - <i>Deschampsia flexuosa</i> woodland	W16a <i>Quercus robur</i>	Mixed plantation woodland	Dole Plantation, Thorpe Marriot)

8.4.78 Of the areas of semi-improved grassland within the Zol, a small number support a slightly higher number of species but they are not classified as species-rich. Two areas of grassland with slightly higher species richness and occurring under the footprint of the proposed Scheme were surveyed. The area at Brick Yard Farm was dominated by non-native species and may have been sown at some stage. The Fakenham Road Roadside Nature Reserve consists largely of coarse grass species and scattered scrub, but does include hoary mullein (*Verbascum pulverulentum*).

8.4.79 The following NVC grassland classifications were identified:

Table 8.10 NVC Grassland Classifications

NVC Community	NVC Sub-Community	Habitat	Location
MG1 <i>Arrhenatherum elatius</i> grassland	MG1a <i>Festuca rubra</i>	Semi improved neutral grassland	Adjacent to Brick Yard Farm, Reepham Road
MG1 <i>Arrhenatherum elatius</i> grassland	MG1b <i>Urtica dioica</i>	Semi improved neutral grassland (species-poor)	Fakenham Road RNR

8.4.80 Arable fields are the main land use within the survey corridor. These include cereal and non-cereal crops and fields recently seeded with grass. Set-aside field margins are found in a few locations, and they support vegetation resembling semi-improved neutral grassland, with a higher proportion of arable weeds.

8.4.81 Some field margins adjacent to Marriott’s Way, and those to the east of Tithe Plantation and to the north of Beeston Park are frequently disturbed and hence have an open habitat structure with an abundance of arable weeds. These are classified as vegetation of open habitats. The field margins north of Postwick and adjacent to Marriot’s Way are less disturbed and more closely resemble semi-improved neutral grassland.

8.4.82 The following arable field margin NVC classifications were identified:

Table 8.11 NVC Arable Field Margin Classifications

NVC Community	NVC Sub-Community	Habitat	Location
OV9 <i>Matricaria perforata</i> - <i>Stellaria media</i> community	OV9d <i>Bilderdykia convolvulus</i> - <i>Veronica persica</i>	Vegetation of open habitats	Adjacent to Marriot’s Way
OV22 <i>Poa annua</i> - <i>Taraxacum officinale</i> community	OV22c <i>Crepis vesicaria</i> - <i>Epilobium adenocaulon</i>	Vegetation of open habitats	To east of Tithe Plantation, south of Spixworth
OV25 <i>Urtica dioica</i> - <i>Cirsium arvense</i> community	N/A	Vegetation of open habitats	North of Beeston Park and north of Beeston Lane
MG1 <i>Arrhenatherum elatius</i> grassland	MG1a <i>Festuca rubra</i> sub-community	Semi improved neutral grassland	North of Postwick on north side of A47
MG1 <i>Arrhenatherum elatius</i> grassland	N/A	Semi improved neutral grassland	Adjacent to Marriot’s Way

8.4.83 Arable field margins are a priority habitat in the Norfolk LBAP and the (outgoing) UK BAP habitat.

Protected, Notable and Invasive Plant Species

8.4.84 No protected or notable plant species were noted as part of the Phase 1 Habitat Survey.

8.4.85 Four stands of Japanese knotweed were identified within the survey corridor.

- North of Heath Farm, close to the existing Postwick junction;
- Hall Farm, Rackheath;
- Around the pond north of Gazebo Farm, Rackheath; and
- Gazebo Covert, Rackheath.

8.4.86 The stand at Heath Farm has been subject to attempts to eradicate this species, although further efforts are likely to be required in the future.

8.4.87 Rhododendron shrubs are frequent in the understorey of Heath Wood, Rackheath.

8.4.88 Winter heliotrope (*Petasites fragrans*) is dominant on the verge of Middle Road. This species is non-native and invasive, although it is not listed on Schedule 9 of the Wildlife and Countryside Act 1981 (as amended).

Protected Animal Species

Bats

8.4.89 All 18 UK bat species and their roosts are protected under the Wildlife and Countryside Act 1981 and the Conservation of Habitats and Species Regulations 2010. In addition, the barbastelle (*Barbastella barbastellus*), noctule (*Nyctalus noctula*), soprano pipistrelle (*Pipistrellus pygmaeus*) and brown long-eared bat (*Plecotus auritus*) are all Species of Principle Importance and Norfolk BAP species.

8.4.90 Bats are ubiquitous within the Zol. The frequency with which they occur in the Zol and the wider landscape, combined with above levels of protection, means bats have been subject to a high level of survey effort, both temporally and spatially. The history of the proposed Scheme has allowed several

seasons of data to be obtained. Surveys have been updated regularly as it is not permissible to base assessments of impact on data more than 18 months old.

8.4.91 The volume of survey data means that it is not possible, nor appropriate, to include all survey results here; instead, the text below provides a brief overview of results. Full details of all surveys are included Bat Survey Report (Mott MacDonald, 2013), located in Volume 2, Chapter 8, Section E.

8.4.92 A total of ten bat species have been identified within the Zol. These are listed below.

- common pipistrelle (*Pipistrellus pipistrellus*);
- soprano pipistrelle (*Pipistrellus pygmaeus*);
- Nathusius' pipistrelle (*Pipistrellus nathusii*);
- brown long-eared (*Plecotus auritus*);
- Natterer's (*Myotis nattereri*);
- Daubenton's (*Myotis daubentonii*);
- noctule (*Nyctalus noctula*);
- serotine (*Eptesicus serotinus*);
- Leisler's (*Nyctalus leisleri*); and
- barbastelle (*Barbastella barbastellus*)

8.4.93 A number of hibernation roosts were identified, in churches and other buildings within 2km of the proposed Scheme. Evidence of bats was found in eleven of the seventeen churches visited; seven of these are predicted to be of high potential for hibernating bats. The nature of the construction of churches means that actually finding hibernating bats is unlikely; many of the potential roost locations are completely inaccessible. However, hibernating bats were located in one church.

8.4.94 Fourteen other potential hibernation sites were surveyed. Evidence of hibernating bats was found at four of these, whilst evidence of other roost types (maternity roost, feeding perch etc) was found at several others. Note that access to some of these buildings and structures was not possible, for a variety of reasons (derelict, unsafe structures, access denied by landowner,

buildings being demolished etc). One potential hibernation roost, Hall Farm, is located within the footprint of the proposed Scheme. This building is fenced off as is it derelict, so surveys this season were not possible. However, surveys in previous seasons identified hibernating bats. Conditions in the roost remain largely the same, so it is feasible to assume that hibernating bats are still using this location.

8.4.95 Other suitable buildings within 50 m of the proposed Scheme were surveyed during the summer season to identify usage by bats. Of the ninety one buildings surveyed, 11 roosts were confirmed. These included:

- Eight brown long-eared roosts;
- Four common pipistrelle roosts; and,
- Two soprano pipistrelle roosts.

8.4.96 Other bat species were recorded close to the buildings during the dusk and dawn surveys, displaying either foraging or commuting behaviour. These include:

- noctule;
- Leisler's;
- *Myotis* spp.; and,
- barbastelle.

8.4.97 Quaker Farm, to the east of Norwich airport, was subject to particularly high survey effort due to its known value for several species of bats. The numerous survey types here (unmanned automated surveys, manned emergence and re-entry surveys etc) demonstrated that the buildings here (particularly the flint and thatch barn) are used by the following species:

- common pipistrelle;
- soprano pipistrelle;
- barbastelle;
- *Myotis* spp; and
- brown long-eared

8.4.98 A large number of individual trees within 25 m of the proposed Scheme (parkland trees, trees in hedgerows, gardens etc) were climbed to identify the potential for roosting locations and to search for roosting bats. Of the 192 trees climbed, ten were confirmed as roost locations, for pipistrelles, brown long-eared, Natterer's and barbastelle.

8.4.99 Those trees identified as of high potential for bat roosts, but not suitable for climbing, were subject to emergence/re-entry surveys. Of the 67 trees surveyed, roosts were identified at 27. Roosting species included common and soprano pipistrelle, brown long-eared, Natterer's, noctule, barbastelle, serotine and *Myotis* spp.

8.4.100 A total of ten blocks of woodland with 25 m of the proposed Scheme were surveyed. Bat activity was observed in each of them; roosts were confirmed in three. (Note that the survey methodology for woodlands was not specifically aimed at identifying specific roost locations). All species of bat known within the ZOI listed previously were identified during these surveys.

8.4.101 The transect surveys, aimed at quantifying levels of activity in various areas, and allowing comparisons between them, demonstrated high activity in virtually all areas surveyed. The 2009/2010 survey data was not analysed at a species level. Instead it grouped types of bat (big bats – noctule, serotine and Leisler's), *Myotis* spp, with particular attention to barbastelles. Early recordings were analysed, which would indicate potential roosts nearby. (Bat calls picked up a short time after sunset imply that roost site must be nearby as bats would not have had time to travel far. This method of analysis capitalises on the fact that different species of bat are known to emerge a set period after sunset). Activity was picked up in virtually all areas.

8.4.102 The 2012 transect provided additional spatial coverage to the 2009/2010 transects. It recorded six species:

- common pipistrelle;
- soprano pipistrelle;
- Nathusius' pipistrelle;
- *Myotis* species;
- noctule; and,
- serotine.

8.4.103 Transects in 2013 have covered all of the previously completed transects from both 2009/2010 and 2012. All known species within the Zol, as listed at the beginning of this session, were identified during these surveys. Analysis was carried out in a similar way to in 2009/2010, whereby early calls of big bats, *Myotis* spp and barbastelles were identified. As in the previous period, activity was observed in most areas. A number of additional roosts were also identified.

8.4.104 A large number of unmanned static surveys were carried out. These were planned to coincide and reinforce the transects above, by using the same geographical areas and features. The surveys in 2009 identified a number of species, as listed below:

- common pipistrelle;
- soprano pipistrelle;
- Nathusius pipistrelle;
- barbastelle;
- noctule;
- serotine;
- *Myotis* spp; and
- brown long-eared

8.4.105 The bat report includes some detailed analysis of the data, comparing month by month recordings for each of the areas. This has been carried out by group of species, rather than at a species level, with the exception of barbastelles.

8.4.106 Similar to the transect surveys, unmanned static surveys took place in 2010 and 2012 to provide additional spatial coverage of the Zol. Activity by at least nine species was identified:

- barbastelle;
- *Myotis* spp.;
- noctule;
- Leisler's;

- serotine;
- brown long-eared;
- common pipistrelle;
- soprano pipistrelle; and,
- Nathusius' pipistrelle.

8.4.107 Four radio tracking sessions were carried out as part of the detailed survey package for the proposed Scheme. Two sessions were undertaken during the 2009 survey season in June and August. One session was carried out in August 2012, focusing on the eastern end of the Zol. An additional session was undertaken in May 2013, as an update to the 2009 data and to collect additional information for the eastern end of the proposed Scheme.

8.4.108 The radio tracking surveys were carried out to provide a more detailed understanding of bat movements throughout the wider landscape, to allow a more informed, accurate assessment of the impacts on bats that the proposed Scheme would have. Radio tracking focussed on the more sensitive species within the Zol, most notably barbastelles.

8.4.109 Through the radio tracking sessions it has been demonstrated that, within the Zol, Marriott's Way and Middle Lane are very well-used bat routes, particularly for the more sensitive species.

8.4.110 In May 2013, 100 bats were trapped, including common pipistrelle, soprano pipistrelle, barbastelle, brown long-eared, serotine, Natterer's and Daubenton's. Of these, six barbastelles were tagged and radio-tracked. Note that the weather conditions during early part of 2013 were poor.

8.4.111 In August 2012, 75 bats were trapped, including common pipistrelle, soprano pipistrelle, Nathusius' pipistrelle, barbastelle, brown long-eared, serotine, Natterer's and Daubenton's. Three barbastelles were tagged and radio-tracked.

8.4.112 In June 2009, 302 bats were trapped, including barbastelle, Daubenton's, Natterer's, brown long-eared, common pipistrelle, soprano pipistrelle and Nathusius' pipistrelle. A total of 19 of these were tagged and radio-tracked, nine of which were barbastelles.

8.4.113 In August 2009, 230 bats were trapped. Of these, 22 barbastelles were tagged and radio-tracked.

8.4.114 The radio-tracking surveys allowed a greater understanding of bat ranges, and allowed individuals to be caught in various locations and tracked back to roosts elsewhere in the study area, sometimes a distance of several kilometres. Emergence surveys of these confirmed roosts allowed the total number of individuals using these roosts to be quantified.

8.4.115 The surveys have demonstrated that the following features within the Zol are of particular importance to bats:

- Access road between Fakenham Road and the shooting school at Deighton Hills, lined by a hedgerow to the north;
- Marriott's Way;
- Tree line through farmland south of Horsford, west of Drayton Lane;
- Quaker Lane;
- Spixworth Plantation;
- Beeston Estate;
- Accommodation track in Rackheath Estate;
- Newman's Road;
- Double tree line off Toad Lane;
- Middle Road;
- Footpath between Smee Lane and Low Road;
- Smee Lane;
- Hedgerow south of Smee Lane (2nd one south of Smee Lane, running parallel to the road); and,
- Hedgerow east of Broadland Way (running parallel to the road).

8.4.116 In assigning conservation values to bats within and around the Zol, to allow the appropriate level of assessment, it is prudent to consider aspects of bat ecology separately. The following six aspects, each considered to be of Very High conservation value will therefore be assessed:

- Three directly affected roosts in buildings;

- Seven directly affected roosts in trees;
- Indirectly affected roosts;
- Overall barbastelle populations;
- Significant flight paths and other features of importance; and
- Other areas of activity

8.4.117 Detailed bat survey results are available in the Bat Survey Report (Mott MacDonald, 2013), located in Volume 2, Chapter 8, Section D.

Badgers

8.4.118 Badgers and their setts are protected in the UK under the Protection of Badgers Act 1992 against killing/injuring, disturbance to and interference with setts.

8.4.119 A total of seven badger setts were identified within the ZOI. Associated with each sett, various features were identified.

8.4.120 Sett 1 is a complex of five individual setts covering an area of 100m by 75m in the Deighton Hills woodland, and so is not within the footprint of the proposed Scheme. It consists of one main sett, two annexe, one subsidiary and one outlying sett. There are active paths leading from this sett to the pasture land to the south, and badger hairs were found on the fence between the pasture and the shooting club. It is likely that the badgers are using the pasture land for foraging and there are signs of frequent digging in the field boundary. The other setts were primarily disused with more extensive vegetation in the holes and no signs of recent activity; however, in previous visits some of these were well used. An additional outlier was noted during this visit which appeared to have been recently dug. The new outlier sett is located closer to the shooting club entrance approximately 150m from the main sett. It consisted of one entrance with a large freshly dug spoil heap. This sett is considered to be of Medium conservation value.

8.4.121 Sett 2 is located within Drayton Drewray, beyond the footprint of the proposed Scheme. No direct evidence of badgers was found at the sett or in the surrounding woodland. However, the spoil heaps outside the holes were sufficiently large for it to be unlikely to have been dug by anything other than badgers. It is therefore likely that this is a seasonally used outlier sett. The visit to this sett showed no change in activity, with strong evidence that it is

currently being used by rabbits. This sett is considered to be of Low conservation value.

8.4.122 Sett 3 is situated along a hedgerow between two arable fields opposite Quaker Farm on Quaker Lane. The sett is within the footprint of the proposed Scheme and consists of two entrances. Neither entrance showed signs of recent use in 2012. However, there was evidence of active use in both 2007 and 2010. As this sett is unoccupied, it is considered to be of Low conservation value. Should badgers re-occupy it, the assessment will need to be revised.

8.4.123 Sett 4 is situated mid-way along Spixworth Plantation, within the footprint of the proposed Scheme. It consists of a sett with nine entrances along a bund within the plantation. All entrances were filled with leaf litter and vegetation; there was no evidence of recent use by badgers, although they may be seasonally used. The sett was not previously recorded in 2007 or 2010. As this sett is unoccupied, it is considered to be of Low conservation value. Should badgers re-occupy it, the assessment will need to be revised.

8.4.124 Sett 5 is located within Spixworth Woodland, but not within the footprint of the proposed Scheme. Evidence of badger, fox and rabbit was found in the immediate vicinity of the holes at this sett making it difficult to assign a status to them. This sett was not previously recorded in 2007 or 2010. Paths were found that passed three other areas of holes and to the pasture land to the north and west of the woodland. The proposed road would travel through this pastureland. These other areas of holes showed no direct evidence of badgers but as they are on an active badger path the suitable holes were classified as partially active. Two further areas of activity were found as well as several groups of holes that may have been dug by badgers but currently only showed evidence of being inhabited by rabbits or foxes. The two active areas were classified as subsidiary setts. This sett is considered to be of Medium conservation value.

8.4.125 Sett 6 is situated along a hedgerow in farmland to the east of Thorpe End, and is within the footprint of the road. It currently appears to be occupied only by rabbits, although it may be seasonally used by badgers. This sett was not previously recorded in 2007 or 2010. As this sett is unoccupied, it is considered to be of Low conservation value. Should badgers re-occupy it, the assessment will need to be revised.

8.4.126 Sett 7 is located directly beneath the footprint of the proposed road where it crosses Marriott's Way. It consists of a single entrance hole. This sett

was not recorded in any previous surveys but was discovered during other survey work in May 2013. Given the location of the sett within dense brambles and on a steep slope, a detailed assessment of the entrance itself has not been possible. As a result, it is not possible to confirm that this is a badger sett. However, until such confirmation is possible (usually through the clearance of vegetation), it will be assumed that this is a badger sett to ensure appropriate mitigation measures are taken. This sett is considered to be of Medium conservation value.

- 8.4.127 The detailed survey results can be found in the Badger Survey Report (Mott MacDonald, 2013), in Volume 2, Chapter 8, Section E.

Great Crested Newts

- 8.4.128 Great crested newts are protected under the Wildlife and Countryside Act 1981. They are also protected under the Conservation of Habitats and Species Regulations 2010, and are listed under the IUCN Red List, Appendix II of the Bern Convention and Annexes II and IV of the EC Habitats Directive. Great crested newts are also a Species of Principle Importance and a LBAP species.
- 8.4.129 As has been described previously, surveys for many species and habitats have been carried out more than once during the life of the proposed Scheme. Surveys for great crested newts took place in 2012, and were supplemented during 2013 to address some of those ponds that could not be surveyed the previous year, either as they were dry or because access was denied. These surveys served to update those that took place in 2011, 2009 and 2007.
- 8.4.130 Preliminary assessments using Habitat Suitability Index scores (Oldham et al., 2000) were completed for 122 ponds in the Zol over 2012 and 2013. Of these 122 ponds, 65 were identified as suitable habitat for great crested newts.
- 8.4.131 Of the 65 ponds that were initially identified as having potential for great crested newts, a total of 12 ponds were found to support great crested newts.
- 8.4.132 The survey results demonstrate that four meta-populations are located within the Zol. A meta-population is a series of subpopulations that are linked by the dispersal of individuals; great crested newts commonly move between ponds that are within around 250m of each other and usually not further than

1.3km (English Nature, 2001). Information on the four meta-populations is shown in the table below.

Table 8.12 Great Crested Newt Meta-Population Results

Meta-Population Location	No of Ponds	Population Size	Peak Meta-Population Counts
Dog Lane, Horsford	Three (ponds 5, 6 and 7)	Medium	26
Spixworth Road, Horsham St Faith	One (pond 15)	Small	6
Quaker Lane, Spixworth	One (pond 16)	Medium	27
Newman Road, Rackheath	Seven (ponds 37, 42, 44, 47, 48, 41 and 45)	Medium	43

8.4.133 Each of these meta-populations is of Very High conservation value, due to their status as European protected species.

8.4.134 A number of ponds within the Zol were not surveyed during the 2012/2013 seasons, mostly because landowner access was not available. Most of these had been surveyed in previous seasons. Where possible these ponds were visually assessed for their suitability for great crested newts from nearby areas where access was possible, and by using recent aerial photography. This information was combined to formulate suitable mitigation proposals, based on the professional judgement of licensed ecologists, using where necessary the precautionary principle.

8.4.135 Detailed great crested newt survey results can be found in the Great Crested Newt Report (Mott MacDonald, 2013), located in Volume 2, Chapter 8, Section E.

Breeding Birds

8.4.136 All nesting birds are protected in the UK under the Wildlife and Countryside Act 1981 with those species listed on Schedule 1 of the Act being

conferred additional protection from disturbance when breeding. Specific reference has been made in this section to those birds listed on Schedule 1 as well as Red and Amber List 'Birds of Conservation Concern' (Eaton et al 2009), Annex 1 Birds Directive and those listed as Species of Principle Importance and Norfolk BAPs.

8.4.137 Breeding evidence was recorded for a total of 61 species within the Zol of the proposed scheme, of which:

- One species is listed on Schedule 1 – little ringed plover (*Charadrius dubius*);
- 14 species are Species of Principle Importance in England, six of which have Norfolk BAPs;
- 11 species are Red List Birds of Conservation Concern;
- 16 species are Amber List Birds of Conservation Concern; and
- 35 species are Green List Birds of Conservation Concern.

8.4.138 A full species list can be found in the Breeding Bird Survey Report in Volume 2, Chapter 8, Section G.

8.4.139 Blue tit (*Cyanistes caeruleus*), chaffinch (*Fringilla coelebs*), robin (*Erithacus rubecula*), wren (*Troglodytes troglodytes*) and great tit (*Parus major*) were the most numerous species in terms of the maximum number of individuals detected. Chaffinch, wren, robin and skylark (*Alauda arvensis*) were the most numerous species in terms of the maximum number of singing males. A total of 28 species were confirmed breeding with a further three probably breeding and 29 species possibly breeding.

8.4.140 Groups of birds, whose total number exceeds 1% of the total population within a specific geographic scale, i.e. international, national, region, county etc., are considered to be significant at that geographic scale. The following species within the Zol were found to exceed 1% of the median Norfolk population estimate and are therefore considered to be of county value: blackcap (*Sylvia atricapilla*), buzzard (*Buteo buteo*) and goldcrest (*Regulus regulus*). It is likely that the number of buzzard nest locations within the Zol does not exceed to 1% of the median Norfolk population estimate but more likely is that the number of home ranges overlapping the Zol exceeds the 1% threshold.

8.4.141 Little ringed plover (2 birds) were recorded on one visit in apparently suitable breeding habitat at the mineral extraction site immediately north of

Quaker Farm. No further evidence of little ringed plover was recorded at this site and it is considered likely that the birds may have come from larger mineral extraction areas to the north of Church Lane/Spixworth Park. Breeding could be recorded within the Zol in the future given the apparently suitable habitat near Quaker Farm but it is considered to occur incidentally within the Zol at the time of the surveys and does not exceed the 1% of the median Norfolk breeding population estimate.

- 8.4.142 A single singing male yellow wagtail (*Motacilla flava flavissima*) was recorded on a site visit in 2012 (east of Broadland Way) and in 2007 (south of Holt Road). This species is considered to occur incidentally within the Zol and does not exceed the 1% of the median Norfolk breeding population estimate.
- 8.4.143 Turtle dove (*Streptopelia turtur*) was recorded on a site visit in 2007 (south of Holt Road). This species was not recorded in 2012 or 2013 and is considered to occur incidentally within the Zol. Hobby (*Falco subbuteo*) is listed on Schedule 1 of the Wildlife and Countryside Act and was recorded on site visits in 2007 and incidentally in 2013 at a single location close to the proposed route alignment. Hobby was not recorded at this location during surveys in 2012. Given the legal protection from disturbance whilst breeding afforded to this species, this species poses a potential constraint to the programming of construction if confirmed as breeding prior to or during construction.
- 8.4.144 A small colony of sand martin (*Riparia riparia*) was located in mineral workings at Spring Farm, Taverham, The colony consisted of approximately 12 active cavities and is the only sand martin colony located along the proposed scheme route.
- 8.4.145 Utilisation distribution of breeding birds highlighted areas of high intensity bird use for woodland, mature trees in hedgerows and residential areas. Therefore these habitats are likely to constitute good resource areas for breeding birds within the area of the proposed Scheme. Farmland fields dominate the area of the proposed route but the intensity of bird use is generally low.
- 8.4.146 Those bird species listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended), those on the RSPB Red list, and those listed as Species of Principle Importance and/LBAP species are considered as being of High conservation value. Those species listed on the RSPB Amber List are considered as being Medium conservation value.

8.4.147 Those 15 species on Schedule 1 of the Wildlife and Countryside Act 1981, Species of Principle Importance and on the RSPB Red List, and therefore of High conservation value are:

- Bullfinch (*Pyrrhula pyrrhula*)
- Cuckoo (*Cuculus canorus*)
- Dunnock (*Prunella modularis*)
- Grey Partridge (*Perdix perdix*)
- House Sparrow (*Passer domesticus*)
- Linnet (*Carduelis cannabina*)
- Little Ringed Plover (*Charadrius dubius*)
- Marsh Tit (*Poecile palustris*)
- Reed Bunting (*Emberiza schoeniclus*)
- Skylark (*Alauda arvensis*)
- Song Thrush (*Turdus philomelos*)
- Spotted Flycatcher (*Muscicapa striata*)
- Starling (*Sturnus vulgaris*)
- Yellow Wagtail (*Motacilla flava*)
- Yellowhammer (*Emberiza citronella*)

8.4.148 Those 13 species on the RSPB Amber list, and therefore of Medium conservation value, are:

- Green Woodpecker (*Picus viridis*)
- House Martin (*Delichon urbicum*)
- Kestrel (*Falco tinnunculus*)
- Mallard (*Anas platyrhynchos*)
- Meadow Pipit (*Anthus pratensis*)

- Mistle Thrush (*Turdus viscivorus*)
- Sand Martin (*Riparia riparia*)
- Stock Dove (*Columba oenas*)
- Swallow (*Hirundo rustica*)
- Tufted Duck (*Aythya fuligula*)
- Wheatear (*Oenanthe oenanthe*)
- Whitethroat (*Sylvia communis*)
- Willow Warbler (*Phylloscopus trochilus*)

8.4.149 Groups of birds, whose total number exceeds 1% of the total population within a specific geographic scale, i.e. international, national, region, county etc., are considered to be significant at that geographic scale. It is therefore considered that the following species, not included in the lists above, are also of Medium conservation value:

- Blackcap (*Sylvia atricapilla*)
- Goldcrest (*Regulus regulus*)

8.4.150 Detailed breeding birds survey results can be found in the Breeding Bird Report (Mott MacDonald, 2013), in Volume 2, Chapter 8, Section G.

Over-wintering Birds

8.4.151 The Norfolk Bird Atlas provided a primary source of data for the desk-based aspect of the survey. Norfolk bird atlas surveys were carried out between 1999 and 2007 on a tetrad basis (2 x 2 km) with each tetrad visited twice in winter within the same calendar year. Historical data was collected for the wider area in which the proposed Scheme is located.

8.4.152 From the Norfolk Bird Atlas it was determined that a total of 73 species are likely to regularly overwinter within the wider area encompassing the ZOI of the proposed Scheme, of which:

- Two are listed on the EU Wild Birds Directive Annex 1 – golden plover (*Pluvialis apricaria*) and kingfisher (*Alcedo atthis*);
- 16 species are Species of Principle Importance in England, six of which have Norfolk BAPs;

- 15 species are Red List Birds of Conservation Concern;
- 25 species are Amber List Birds of Conservation Concern; and
- 35 species are Green List Birds of Conservation Concern.

8.4.153 It was determined that 15 of the 73 species found were recorded throughout the wider area in which the proposed Scheme is located: blackbird (*Turdus merula*), black-headed gull (*Chroicocephalus ridibundus*), blue tit (*Cyanistes caeruleus*), chaffinch (*Fringilla coelebs*), dunnoek (*Prunella modularis*), fieldfare (*Turdus pilaris*), greenfinch (*Chloris chloris*), great tit (*Parus major*), jay (*Garrulus glandarius*), kestrel (*Falco tinnunculus*), magpie (*Pica pica*), robin (*Erithacus rubecula*), starling (*Sturnus vulgaris*), woodpigeon (*Columba palumbus*) and wren (*Troglodytes troglodytes*).

8.4.154 The total number of species in any one tetrad ranged from 28 to 54 species; across all the sampling areas the average was 40.4 species.

8.4.155 The desk-based assessment was followed up by site surveys, which were undertaken in February 2013 at seven sample sites selected across the proposed route. Sites were selected to be representative of woodland and farmland habitats found across the proposed route. Surveys were conducted based on the British Trust for Ornithology Winter Farmland Bird Survey methodology.

8.4.156 A total of 58 species were recorded overwintering within the ZoI of the proposed Scheme, of which:

- One is listed on the EU Wild Birds Directive Annex 1 (golden plover);
- 12 species are of principle importance in England, six of which have Norfolk BAPs;
- 12 species are Red List Birds of Conservation Concern;
- 15 species are Amber List Birds of Conservation Concern; and
- 30 species are Green List Birds of Conservation Concern.

8.4.157 Nine species were recorded at all sampling sites: blackbird, blue tit, carrion crow (*Corvus corone*), chaffinch (*Fringilla coelebs*), great tit, magpie, robin, woodpigeon and wren. The most frequently observed species were: blue tit (96 observations), great tit (75), chaffinch (72), robin (63) and blackbird (61).

- 8.4.158 Eight species were recorded only once during the sampling surveys: grey heron (*Ardea cinerea*), little owl (*Athene noctua*), lesser redpoll (*Carduelis cabaret*), marsh tit (*Poecile palustris*), nuthatch (*Sitta europaea*), sparrowhawk (*Accipiter nisus*), teal (*Anas crecca*), and tufted duck (*Aythya fuligula*). Limited suitable habitat within the sampling areas is likely to explain the paucity of grey heron, lesser redpoll, marsh tit, nuthatch, teal and tufted duck observations. Bird behaviour is likely to explain the reduced ability to detect little owl (largely nocturnal) and sparrowhawk (relatively large home range).
- 8.4.159 The total number of species in any one sampling area ranged from 24 to 33 species; across all the sampling areas the average was 28.6 species.
- 8.4.160 Utilisation distribution of over-wintering birds highlighted areas of high intensity bird use for woodland, mature trees in hedgerows and residential areas. Therefore these habitats are likely to constitute good resource areas for overwintering birds within the area of the proposed Scheme. Farmland fields dominate the area of the proposed route but the intensity of bird use is generally low but punctuated by clusters of high bird numbers attributed to concentrations of woodpigeon, black-headed gull and common gull (*Larus canus*). Congregations of gull species were related to field ploughing activities at the time of surveying. Other congregatory species, i.e. lapwing (*Vanellus vanellus*) and golden plover, were identified in relatively low numbers at two locations (Horsham St. Faith and near A47 (golden plover only)). The location just north of the A47 with golden plover (8 birds) appears to be a traditionally used site in winter and early spring with birds recorded here on previous surveys in April 2007 (98 birds) and April 2012 (45 birds).
- 8.4.161 Those overwintering bird species listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended), those on the RSPB Red list, and those listed as Species of Principle Importance and/LBAP species are considered as being of High conservation value. Those species listed on the RSPB Amber List are considered as being Medium conservation value.
- 8.4.162 The results of the over-wintering bird surveys can be found in the Over-wintering Bird Survey report (Mott MacDonald, 2013), located in Volume 2, Chapter 8, Section H.

Barn Owl

- 8.4.163 Barn Owls are listed on Schedule 1 of the Wildlife and Countryside Act 1981, meaning it is an offence to intentionally or recklessly cause disturbance at, on or near an 'active' nest. They are also a Norfolk BAP species.
- 8.4.164 The survey results include four aspects: the identification of actual nesting or breeding sites, the identification of potential nesting, roosting or resting sites, and the assessment of habitats in terms of their suitability for utilisation by barn owls for hunting. The latter aspect relates directly to the likelihood of the habitat to support populations of barn owl prey species. Potential accident black-spots were also identified, primarily to inform the proposed mitigation strategy, in an effort to eliminate or reduce potential vehicle collision mortality.
- 8.4.165 Six occupied breeding sites and three roost or rest sites were identified within the Zol. Two of the nest sites were nest boxes that have subsequently fallen into disrepair and are no longer available as suitable nest sites. On the basis of the records collected in this study it is likely that the home ranges of at least six breeding pairs overlap with the Zol. This represents at least 1% of the Norfolk population. The barn owl population within the Zol is therefore of High conservation value.
- 8.4.166 One of the known nesting sites is within the footprint of the proposed Scheme.
- 8.4.167 A total of 256 potential nesting, roosting or resting sites were found along the proposed Scheme. Of these the majority were mature trees covered in ivy and therefore it could not be ascertained whether they had suitable cavities or not. The density of potential nest, roosting and rest sites increases east and south along the route of the proposed road.
- 8.4.168 The corridor of the proposed Scheme is dominated by arable farmland, within which suitable habitat is largely found along the field margins and hedgerows, and as small fragments of fallow or cattle-grazed grassland. The distribution shows six, relatively evenly spaced centres of resource utilisation. The highest known utilisation area is at the River Wensum/Fakenham Road end of the proposed Scheme. The utilisation of much of the proposed Scheme area is moderate with lower utilisation recorded in the areas between Fir Covert Road and Reephams Road, and Thorpe End along Plumstead Road.
- 8.4.169 Detailed results of the barn owl survey can be found in the Barn Owl Survey Report (Mott MacDonald, 2012), located in Volume 2, Chapter 8, Section I.

Aquatic Invertebrates

- 8.4.170 In 2006 and 2007, sampling sites were located at four points around the lake and in two ditches within The Springs CWS. Samples were taken from both the vegetation at the edge of the lake and softer sediments approximately 3m from the shore. In 2013, samples were taken from the same four points around the lake, but from only one of the ditches.
- 8.4.171 Biological water quality ranged from moderate to very good in the lake, with slightly lower scores in the outflow stream and poor scores in the boundary ditch. Scores in 2013 were slightly higher overall than in 2006 and 2007, indicating a slight water quality improvement. Biological water quality information is, however, interpreted here with caution, as many of the standard scoring systems were developed for flowing water. Sweep samples from the lake in all years contained the most diverse macro-invertebrate communities, with a good range of species found. The majority of invertebrate species found are widespread and common in this type of habitat, however a single specimen of Desmoulin's whorl snail (*Vertigo moulinsiana*) was found in September 2006. This species is categorised as rare in the British Red Data Books, is listed on Section 41 of the NERC Act (2006) and is a Norfolk Biodiversity Action Plan Priority Species and is listed on Annex II of the EC Habitats Directive.
- 8.4.172 A specific survey for Desmoulin's whorl snail was subsequently carried out in May 2008. Adults and juveniles were found at locations around The Springs lake and in the wet woodland between the two lakes. A repeat survey for Desmoulin's whorl snail in 2013 found very few individuals present, possibly indicating that there has been a change in ground moisture levels at the site.
- 8.4.173 While the general aquatic invertebrate community is of Low conservation value, the population of Desmoulin's whorl snail is of High conservation value. However, it is considered, because of the diversity and sensitivity of the general aquatic invertebrate population at The Springs, that it is appropriate to consider the whole population, including Desmoulin's whorl snail, through the remainder of the assessment. The aquatic invertebrate population is therefore considered to be of High conservation value.
- 8.4.174 Detailed results of the aquatic invertebrate surveys can be found in the Invertebrate Survey Report (Mott MacDonald, 2013), located in Volume 2, Chapter 8, Section J.

Terrestrial Invertebrates

- 8.4.175 An initial, detailed set of terrestrial invertebrate surveys were carried out by Norfolk Wildlife Services in 2007. These surveys did not reveal the presence of any protected terrestrial invertebrate species within the works corridor of the proposed NDR (Norfolk Wildlife Services, 2008). Therefore, it was not necessary to repeat these surveys. However, it was still important to identify those habitats with the potential to support terrestrial invertebrate assemblages of conservation importance so that they can be mitigated for appropriately.
- 8.4.176 The survey comprised a habitat suitability assessment of the area within the ZOI, considering the potential to support both particularly diverse assemblages (relative to the surrounding habitat) and assemblages that may contain specialised and potentially rare species. The habitats present along the route were surveyed in the field during a walkover of the whole length of the proposed Scheme route by an ecologist using knowledge and experience to identify features of particular importance to terrestrial invertebrates.
- 8.4.177 Seven sites containing habitats of six different types of at least Low Conservation Value for terrestrial invertebrates were identified along the proposed Scheme.
- 8.4.178 The Fakenham Road Roadside Nature Reserve is designated for hoary mullein (*Verbascum pulverulentum*), a Nationally Scarce species that only grows as a native in East Anglia. The majority of the verge consists of a mainly south-facing bank, towards the eastern end of which are some areas of bare earth. Bare earth habitats can have particular value for invertebrates, most notably ground-nesting, solitary bees (e.g. *Andrena* spp.) and wasps. In addition, a number of thermophilic species use bare earth habitats for both foraging and basking, for example, a variety of ground beetles (*Carabidae*), rove beetles (*Staphylinidae*) and centipedes (*Chilopoda*) as well as a number of fly species (particularly *calypterates*) that appear to utilise patches of bare earth as swarm-markers and for lekking activity.
- 8.4.179 Larvae of the mullein moth (*Shargacucullia verbasci*), a relatively common species in the southern half of Britain, were found feeding on the hoary mullein. The Fakenham Road RNR is of Low conservation value for terrestrial invertebrates.
- 8.4.180 The wide road verge on the southern side of Reepham Road, which runs for approximately 1.3km, appears to have been planted relatively recently i.e. within the last five years. Directly adjacent to the road is a strip of

grassland approximately 10m wide. A number of flowering plant species are present, and a large number of pollinating insects (particularly honey bees (*Apis mellifera*) and bumble bees (*Bombus* spp.)) were in evidence at the time of the survey.

- 8.4.181 Within the context of the surrounding arable landscape, where nectaring opportunities are limited, this site offers above average potential for nectar feeding terrestrial invertebrate species. This habitat is assessed as being of Low Conservation Value.
- 8.4.182 An area of habitat at the junction of Holt Road and the A140 at Harts Hill was also assessed. This small site (approximately 1ha) appears to be a Sustainable Drainage System (SuDS) pond and surrounding semi-improved grassland and scrub.
- 8.4.183 The pond has matured and has a well-established reed bed dominated by common reed (*Phragmites australis*) at the western end, which is starting to become overgrown. The water was clear at the time of the visit and there were no signs of eutrophication or pollution. The area immediately around the pond consists of semi-improved grassland. The site slopes up away from the pond resulting in north- and west-facing banks. Beyond this and around the edge of the majority of the site is an area of young plantation woodland. This site has a high level of structural complexity, meaning that the different habitats on the site are non-uniform in their structure giving rise to many different niches and thus maximising the number of opportunities for invertebrates to occupy.
- 8.4.184 This is a varied site containing a number of microhabitats and topographical niches suggesting that there is the potential for a diverse terrestrial invertebrate fauna. Such a site is relatively unusual within the context of the surrounding arable landscape. However, given the limited time that this habitat has existed, this site is assessed as being of Low Conservation Value.
- 8.4.185 Arable field margins adjacent to Marriott's Way and in Beeston Park are both currently unplanted and apparently unmanaged. They contain a range of grass and herb species, and so could become of particular importance to invertebrates, most notably ground beetles and some phytophagous insects. Within the context of the surrounding agricultural landscape, these strips offer a significant increase in botanical diversity relative to the surrounding arable crops and, therefore, increased foraging and

breeding opportunities for terrestrial invertebrates. These arable field margins have been assessed as being of Low Conservation Value.

- 8.4.186 An area of immature plantation woodland at The Springs contains mostly poplars (*Populus* spp.) and goat willow (*Salix capraea*), and there are a number of water features present including a pond and Dobb's Beck. Woodland can be a very important habitat for invertebrates. Some of the most important microhabitats are deadwood features, such as large fallen timbers, dead limbs retained on trees, water-filled rot holes and areas where sap is exuding (sap runs, which can be particularly important for many hoverfly species). Typically, these features develop on old or veteran trees. However, this is immature plantation woodland (most likely less than 30 years old) and it is highly unlikely that the features described above are present here.
- 8.4.187 Surveys carried out in the adjacent Springs CWS in 2007 (Mott MacDonald, 2008) identified a population of Desmoulin's whorl snail (*Vertigo moulinsiana*) around the Springs Lake. Desmoulin's whorl snail is classified as "Rare" in the British Red Data Book (i.e. it is an RDB3 species) and is listed as a priority species under Section 41 of the NERC Act 2006. It is also listed on Annexe II of the EC Habitats Directive and is a priority species on the Norfolk BAP (Norfolk Biodiversity Partnership, 2011).
- 8.4.188 This area of woodland is broadly suitable for Desmoulin's whorl snail and is contiguous with the adjacent CWS where it is known to occur, so its presence cannot be ruled out. However, the immature woodland is sub-optimal habitat for this species and the likelihood of its presence is reduced as a result. The potential presence of Desmoulin's whorl snail means that this area of habitat is of Medium conservation value. Desmoulin's whorl snail is considered more thoroughly in the Aquatic Invertebrates section below.
- 8.4.189 An area of semi-improved grassland at Gazebo Covert has a high level of structural diversity. Additional physical complexity is provided by the topography, and the diversity of habitat types, which include rabbit grazed grassland, ruderal vegetation scrub, woodland edge etc.
- 8.4.190 Such a large and varied patch of contiguous, largely unmanaged, grassland habitat is unusual within the context of the surrounding agricultural landscape. The varied microhabitats present on the site offer the potential for a diverse invertebrate fauna. However, the habitat is of Low conservation value.

8.4.191 Detailed results of the terrestrial invertebrate surveys can be found in the Terrestrial Survey Report (Mott MacDonald, 2013), located in Volume 2, Chapter 8, Section K.

Reptiles

8.4.192 It is an offence under the Wildlife and Countryside Act 1981 to intentionally kill or injure reptiles including grass snake, adder (*Vipera berus*), slow worm (*Anguis fragilis*) and common lizard (*Zootoca vivipara*). All UK reptile species are designated as Species of Principal Importance.

8.4.193 The combined results of the reptile surveys demonstrated that reptiles are absent from many parts of the Zol. In the 2010 survey a total of two grass snakes, three common lizards, one adder and one slow worm were recorded during the survey, spread over four locations. In the 2007 survey six grass snakes were recorded within the survey area, over three locations. These locations overlapped, meaning that in total five locations were identified with reptiles present. The survey results are summarised in the table below:

Table 8.13 Summary of the 2007 and 2010 Reptile Survey Results

Location Number	Location Description	Grass Snake	Adder	Common Lizard	Slow Worm
1	Species-rich hedgerow with trees, northwest of The Springs	1 (2007) 2 (2010)		1 (2010)	
2	Edge of woodland plantation, Sprowston Wood	1 (2007)			
3	Near to broadleaved semi-natural woodland and hedgerow, south of A1151 Wroxham Road	2 (2007)			
4	Edge of Osier Car, broadleaved semi-natural woodland, south of A1151	2 (2007)	1 (2010)		1 (2010)

Location Number	Location Description	Grass Snake	Adder	Common Lizard	Slow Worm
	Wroxham Road				
5	Species-rich hedgerow with trees, close to Heath Wood, Rackheath			2 (2010)	

8.4.194 Locations 2, 3, 4 and 5 represent a cluster of sites in the vicinity of The Springs, corresponding with a watercourse and waterbodies, and with an associated mosaic of habitats, many of which are damp throughout much of the year. These habitats partly influence the pattern of land-use in the vicinity. Both combine to offer the best habitat within the Zol for reptiles, with good connectivity throughout, so the cluster here is not unexpected.

8.4.195 The general absence of reptiles throughout much of the rest of the Zol would be at least partly explained by the land-use, predominantly arable farmland, with interspersed linear features to field boundaries offering the only potential habitat for reptiles, in terms of both shelter and sources of prey.

8.4.196 Historical data also includes a record of an adder within Drayton Drewray, in 2005, which is reinforced by an anecdotal record of an adder in a similar location in 2010.

8.4.197 The reptile populations within the Zol are of Medium conservation value. However, given the sparse, fragmented nature of the reptiles populations it is unlikely that significant effects would be felt, so no further assessment is undertaken.

8.4.198 Detailed reptile survey results can be found in the Reptile Survey Report (Mott MacDonald, 2012), located in Volume 2, Chapter 8, Section L.

Water Vole and Otter

8.4.199 Water voles and their burrows are protected by the Wildlife and Countryside Act 1981. Their breeding and resting places are fully protected from damage, destruction or obstruction; it is also an offence to disturb them in these places. Otters are protected under both the Wildlife and Countryside

Act 1981 and the Conservation of Habitats and Species Regulations 2010. Both species are also designated as Species of Principle Importance and as Norfolk BAP species.

- 8.4.200 The surveys were informed initially by the Phase 1 Habitat survey, which identified likely habitats within the Zol that had the potential to be used by water vole and otters. The Springs CWS was only suitable location.
- 8.4.201 No direct sightings or field signs of either otter or water vole were observed. Norfolk Biodiversity Information Service did not have any records for this site.
- 8.4.202 In recent seasons the Angling club has erected otter fencing around the entire lake at this location, as a result of otter having preyed on the stocked fish populations here. It is likely that this was an isolated event; now fenced off, otters are precluded from entering the site. The lake is at the very top reaches of Dobb's Beck, a tributary of the River Bure some four miles to the North, which becomes a far more regulated, partly culverted ditch upstream of The Springs, with very little suitable habitat for otters. Subsequent surveys for field signs of otters around The Springs have not identified any evidence of their ongoing presence.
- 8.4.203 Otters are thus not likely to be using The Springs currently, and so it is not considered necessary to address these species in the subsequent sections of this report.
- 8.4.204 Detailed water vole and otter survey results can be found in the Water Vole and Otter Survey Report (Mott MacDonald, 2007), located in Volume 2, Chapter 8, Section M.

Brown Hare

- 8.4.205 The field surveys did not identify any brown hares within the Zol. A small number of incidental sightings were recorded by ecologists surveying other protected species in advance of the brown hare report being produced. Conversations with landowners in advance of the brown hare surveys, to arrange access, indicated that populations were very low, in many cases absent from parts of the Zol, with many landowners suggesting that they had not been seen in the vicinity of the proposed Scheme for many years. The brown hare population is therefore considered to be patchy within the Zol, with populations either absent or very low.

8.4.206 The brown hare is subject to some arguably contradictory protection mechanisms. It is a game species, so can be killed during the appropriate season. However it is a Species of Principal Importance and Norfolk BAP species. These non-statutory designations mean that a Low to Medium conservation value is considered appropriate.

8.4.207 Despite the above conservation value, it's very limited population within the Zol means that no significant effects are considered likely within the context of the proposed Scheme. It is therefore not considered necessary to address this species in the subsequent sections of this report.

8.4.208 The detailed results of the brown hare survey can be found in the Brown Hare Survey Report (Mott MacDonald, 2007), located in Volume 2, Chapter 8, Section N.

Other Notable Animal Species

Deer

8.4.209 Deer are not afforded any specific protection in the UK. They were surveyed for two related reasons. Where large populations exist and are likely to cross the proposed Scheme measures can be taken to reduce the chances of deer/vehicles collisions. This would serve to protect deer locally, and would also reduce the likelihood of injuries to motorists, which can be severe.

8.4.210 The deer survey methodology included three main means of identifying deer species, population sizes and distribution through the Zol. The first was entirely desk-based, involving the interrogation of the deer vehicle collisions online database and the Norfolk Biodiversity Information Service. The second involved a landowner questionnaire, asking about species identified, locations and numbers. The third, and perhaps the most valuable, was the series of field surveys.

8.4.211 Desk-based research identified muntjac (*Muntiacus reevesi*), fallow (*Dama dama*), roe (*Capreolus capreolus*) and Chinese water deer (*Hydropotes inermis*) within the search area. The deer vehicle collision database recorded between 11 and 50 collisions between January 2003 and December 2005, although it is recognise that this data is now old, and provides nothing more than an index, with which to compare the area of the proposed Scheme with other areas of the county, or country.

8.4.212 The landowner questionnaires indicated the presence of the above species, as well as red deer (*Cervus elaphus*). Of the 25 responses from

farmers/landowners, two recorded deer on their land most days. Seven recorded deer fairly often, eight saw deer occasionally, and eight stated that they never saw deer on their land.

8.4.213 In terms of species, the most commonly observed was the muntjac, which was recorded in 14 of the 25 responses. Roe was the next most frequent, with 11 positive responses, then fallow with nine. Four responses recorded red deer as being observed, and three recorded Chinese water deer in a cluster between the A1151 Wroxham Road and Spixworth Park. The Springs, the only area of wetland of any note in the study area, is located within this cluster.

8.4.214 Fallow deer were recorded using the majority of the study area, with the exception of the stretch between Postwick and the A1151 Wroxham Road. Roe deer were recorded over almost the whole study area. Red deer were recorded around Deighton Hills, in Beeston Park, on the Trafford Estate and in Rackheath Park.

8.4.215 The field surveys, a combination of actual deer sightings and searches for field signs such as deer slots (footprints), droppings, ring barking of trees etc, demonstrated that there are a number of sensitive locations and commuting routes within the study area that are regularly used by deer, as identified during both the desk and field surveys, which will be bisected by the proposed route. These are highlighted below.

8.4.216 Fallow, Roe and Muntjac regularly commute between Deighton Hills and the Walsingham Plantation.

8.4.217 The southern edge of Drayton Drewray is well used. The predominant species here is likely to be Roe.

8.4.218 The Quaker Farm/Beeston Park area is well-used by Fallow and Roe, with occasional use by Muntjac, Chinese Water Deer and Red Deer. The overall movements appear to be in and east/west orientation, following the woodland belts.

8.4.219 Beeston Park to The Springs. This is most likely to be used by Roe, but Chinese Water Deer and Muntjac may also occasionally use this commuting route.

8.4.220 Movement of deer between Ortolan's Grove and the rest of Rackheath Park, and also to Gazebo Covert, is highly likely, primarily by Roe and Muntjac.

- 8.4.221 Gazebo Covert, Heath Wood and March Covert, which are all different parcels of land within one block of woodland, are inhabited by a moderate-sized population of Roe and Muntjac. Red Deer may also occasionally use this area.
- 8.4.222 The deer populations within the Zol are considered to be of Negligible to Low conservation Value, due to their notable sizes, and the absence of any legal protection.
- 8.4.223 The detailed deer survey results can be found in the Deer Survey Report (Mott MacDonald, 2007), located in Volume 2, Chapter 8, Section O.

Summary of Valued Ecological Resources for Further Consideration

- 8.4.224 As recommended in the current EclA guidance (CIEEM, 2006), the assessment in this ES only considers those ecological receptors which are both of sufficient conservation value and vulnerable to significant impacts arising from the proposed development. These are termed Valued Ecological Receptors.
- 8.4.225 It is generally considered inappropriate to attempt to address all ecological receptors and likely impacts in EIAs; instead, the focus should be on key ecological receptors and ecological features which are covered by the relevant nature conservation and environmental legislation and policies. The EIA Directive and resulting UK Regulations only require the assessment of significant effects.
- 8.4.226 Such is the frequency and distribution of designated and protected habitats in the Zol that few remain unassessed. Only those low value habitats (arable fields, semi-improved grassland, amenity grassland etc) do not undergo assessment in this section.
- 8.4.227 The assessment methodology described in Section 8.2 shows that significant effects (Moderate, Large or Very Large effects, either adverse or beneficial) only occur in relation to those ecological resources valued as having Medium, High or Very High conservation value. Accordingly, only those ecological resources should be considered as Valued Ecological Resources.
- 8.4.228 Those Valued Ecological Receptors considered vulnerable to significant impacts from the proposed Scheme, and therefore requiring further consideration in terms of mitigation and assessment of impacts, are listed below:

8.4.229 Designated Sites:

- Broadland Ramsar site;
- Broadland SPA;
- Broads SAC;
- River Wensum SAC;
- River Wensum SSSI;
- Mid- Yare NNR;
- Attlebridge Hills CWS;
- Marriott's Way CWS;
- Whinney Hills & Common CWS;
- Ladies Wood, Church Carr & Springs CWS and Ancient Woodland;
- Payne's Yard Wood, The Owlery & March Covert CWS;
- Fakenham Road RNR;
- Sprowston Wood Ancient Woodland;
- Ortolan's Grove Ancient Woodland; and
- Important Hedgerows

8.4.230 Species:

- Bats, to include:
 - Directly affected roosts in buildings;
 - Directly affected roosts in trees;
 - Indirectly affected roosts;
 - Significant flight paths and other features of importance; and
 - Other areas of activity;
- Badgers;

- Great Crested Newt meta-populations at Dog Lane, Horsford, Quaker Lane, Spixworth, and Newman's Road, Rackheath;
- Breeding bird species of High and Medium conservation value;
- Overwintering bird species of High and Medium conservation value;
- Barn owls;
- Aquatic Invertebrates, including Desmoulin's whorl snail; and
- Terrestrial Invertebrate habitats of Medium conservation value;

8.4.231 The following habitats, although of Low conservation value, are also considered to be important components of the semi-natural environment within the ZOI, so the effects on these habitats are also assessed:

- Woodlands;
- Parkland;
- Arable field margins; and
- Hedgerows

8.4.232 No habitats other than those included within the above Designated Sites are considered to be Valued Ecological Receptors, which would require further consideration in this chapter.

8.4.233 The following Ecological Resources described within the Baseline Conditions section above, are excluded from further consideration in this Chapter. This is because their conservation value is not sufficiently high, according to those criteria already described, to be considered as Valued Ecological Receptors, or because they are considered unlikely to be significantly impacted by the proposed Scheme.

8.4.234 As these are not required to be assessed, it is therefore not necessary to formulate specific mitigation measures or to assess the impacts on the Ecological Receptors in the subsequent sections of this report. However, generic mitigation associated with the proposed Scheme may serve to benefit the remaining Ecological Receptors, below, in general terms.

8.4.235 Designated Sites:

- River Wensum Pastures CWS;

- Triumph & Foxburrow Plantations CWS;
- Walsingham Plantation CWS;
- Black Park & The Thicket CWS;
- Horsham Meadows CWS;
- Canham's Hill CWS;
- Tollshill Wood CWS;
- Spixworth Bridge Meadows CWS;
- Whitlingham Marsh CWS;
- Whitlingham Fen CWS; and
- Keeper's Cottage TPO

8.4.236 Habitats:

- Those habitats outside of Designated Sites, apart from woodlands, parkland, arable field margins and hedgerows.

8.4.237 Species:

- Great crested newt meta-population at Spixworth Road, Horsham St Faith;
- Fakenham Road RNR, as a potential terrestrial invertebrate habitat;
- Reepham Road verge, as a potential terrestrial invertebrate habitat;
- Junction of Holt Road and the A140 at Harts Hill, as a potential terrestrial invertebrate habitat;
- Arable field margins at Marriott's Way, as a potential terrestrial invertebrate habitat;
- Arable field margins at Beeston Park, as a potential terrestrial invertebrate habitat;
- Semi-improved grassland and Gazebo Covert, as a potential terrestrial invertebrate habitat;
- Reptile populations;

- Brown hare; and
- Deer

8.5 Mitigation

- 8.5.1 The following section describes the general, overarching processes, features and parameters that would be provided as an inherent part of the proposed Scheme. These would not be provided specifically for one species or set of species, however their inclusion would act to provide mitigation for the unavoidable habitat loss, disturbance etc. Where possible, the proposals for the overarching features have been manipulated and refined in order that the benefits can be extended or enhanced, on a species-by-species basis.
- 8.5.2 It should be borne in mind that the proposed Scheme has already been subject to environmental assessment, in a route selection and refinement process. Environmental factors have been considered alongside a multitude of other factors to ensure that the most beneficial, least damaging design has been formulated. This means that the proposed Scheme has been subject to a process whereby as many direct impacts as possible are eliminated, by ensuring that it avoids as many of the ecological and environmental assets as has been practically possible. This has been possible because of the extensive environmental data that was held even at the beginning of the detailed design process.
- 8.5.3 This practice of considering environmental assets during, and not after production of the proposed Scheme design has been an iterative process. It has been sustained through the design stage that has run concurrently with the environmental assessment process, with the embedding of those Environmental Scientists co-ordinating the ES production into the project design team. This supports the contention that it is no longer necessary to assess initial impacts, then consider mitigation, and reassess residual impacts throughout the chapters of this ES; the up-to-date scheme design method has evolved to ensure a collaborative, pro-active process to ensure that environmental issues are identified and addressed as early in the design process as possible.
- 8.5.4 Volume 11 Section 3 Part 4 (Ecology & Nature Conservation) of the Design Manual for Roads and Bridges includes a number of potential impacts that road construction could cause. These include:
- direct loss of wildlife habitats through land-take;

- severance, where a scheme may create a barrier and divide existing habitats or wildlife corridors (eg hedgerows);
- creatures may be killed trying to cross a road which cuts across their traditional territory or foraging routes;
- disruption to the local hydrology;
- polluted run-off from roads can lead to pollution of local watercourses;
- road structures may cause problems for certain birds and mammals;
- effects of road lighting - road lighting can adversely affect invertebrates and disorientate birds;
- air pollutants from road traffic may have effects on local habitats and species;
- spray from road traffic; and
- disturbance during construction.

8.5.5 These have been used as the starting point from which all specific potential impacts have been identified, and for which mitigation measures have been incorporated in the proposed Scheme. Mitigation measures have been formulated with specific input from those specialist ecologists working on the proposed Scheme.

Proposed General Mitigation Measures

8.5.6 The majority of the carriageway within the proposed Scheme will be constructed in cutting or false cutting, meaning that the level of the carriageway will be lower than the existing ground level. The excavated soil will be then used to create earth banks either side of the carriageway. This fundamental aspect of the design has been included to reduce the potential disturbance, in terms of visual intrusion, noise etc, for nearby residents. This screening mechanism would also serve to mitigate the likely disturbance experienced by wildlife in the vicinity.

8.5.7 Further to the above, an extensive landscaping/habitat creation scheme is proposed. This would include areas of woodland, scrub, grassland and hedgerows, as well as ponds and areas of damp grassland associated with the SuDS system, and has been designed to provide enhanced screening for adjacent and nearby properties wherever possible. Again, the screening

would serve to mitigate the likely disturbance on wildlife, as well as human receptors. However, it is acknowledged that the planting would take a number of seasons to become established and function effectively as a screen to reduce visual impact. It is also acknowledged that, as the planting will mostly be broadleaved, the screening capacity during the winter months will be less effective.

8.5.8 Dead wood forms a valuable wildlife habitat. As is becoming common practice, some timber gained from felling trees during habitat clearance would be retained during construction, and incorporated into the new landscaped areas. This would provide many conservation features and boost the associations between the new woodland creation and the invertebrates and fungi that play an essential role in sustaining them.

8.5.9 The habitat creation will also act to mitigate for the loss of habitat. The proposed Scheme is likely to cause severance of habitats, with potential adverse effects on the less mobile, more sensitive species, although the habitat creation would serve to provide connectivity where currently very little exists, for example those areas characterised by large fields of arable monoculture, with few linear boundary habitats. In some locations it has been prudent to propose planting established trees and shrubs, as opposed to whips that would otherwise be ubiquitous, where it is considered to be important to mitigate the impacts on protected species from the earliest opportunity, to provide viable, usable commuting routes for use by protected species as soon as planting occurs.

8.5.10 The total areas/lengths of proposed habitats are shown in the table below:

Table 8.14 Total Areas of Proposed Habitat Creation

Habitat Type	Area to be Created (ha)
Broadleaved Woodland	61.2 ha
Scrub	5.2 ha
Grassland (total)	120.9 ha
Grassland (in infiltration lagoons)	22.0 ha
Lagoons	7.4 ha

Habitat Type	Area to be Created (ha)
Hedgerows	9093 m

8.5.11 The landscaping/habitat creation scheme has been carried out in consultation with ecologists etc from other organisations, responsible for the environmental aspects of adjacent proposed developments. This has included work with Beyond Green, who are proposing a development of 3,525 houses between the current urban fringe and the proposed Scheme, from east of the airport to Beeston Park. A degree of collaboration has taken place with the developers of the airport-related industries on the north-eastern part of the airport, which the proposed Scheme will be located close to. Input was also provided into the Broadland District Council Area Action Plan for its Growth Triangle. The proposed Scheme is a fundamental consideration for this strategy as it runs through a significant portion of the area being considered, and it is inextricably linked with the wider Green Infrastructure and ecological functioning of the area. Intermediary liaison with the County Ecologist has also taken place, who has an active interest in all of the above developments, and other, county-wide ecology issues.

8.5.12 In accordance with the Water Framework Directive and various other related pieces of legislation detailed in Volume 1, Chapter 14, Road Drainage and the Water Environment, the drainage of the proposed Scheme has been designed with SuDS principles as a core parameter. This means that, over the majority of the proposed Scheme, storm water will flow from the carriageway into adjacent swales (wide, shallow depressions in the grassed verges). Water in the swales will then flow to one of the series of drainage lagoons.

8.5.13 Each of the drainage lagoons consist of two parts. The first of the lagoons in each pair would be lined, so will retain water, and will include facilities to allow pollution events to be contained, and the pollutants removed. The second, much larger, unlined lagoon would function as the infiltration area, where storm water will gradually infiltrate into the ground, at a rate similar to the known rate at which infiltration occurs naturally in each locality. The swales themselves will also be unlined, so infiltration to groundwater will also occur from these features.

8.5.14 The pollution and flood prevention mechanisms described above would ensure that changes to the groundwater infiltration rates and locations, and the quality of surface and groundwater, would not be adversely affected. This means that all those ecological features and habitats in the vicinity of the

proposed Scheme that depend on the existing water regime, would be unaffected.

8.5.15 All Construction phase mitigation measures would be included in the Construction Environmental Management Plan (CEMP). This document describes all general mitigation measures and procedures to be followed throughout the Construction phase, at all locations within the proposed Scheme, and so would act to reduce impacts on all Valued Ecological Receptors.

8.5.16 Measures would centre on good construction practice to ensure that disturbance in all its forms were minimised. Effective, well thought-out measures to eliminate potential pollution events would be installed. Refuelling of vehicles and plant would be allowed only in specific areas away from sensitive locations, over bunded trays. Fuel would be stored in double-bunded bowsers and tanks. Spill kits would be readily available at these locations.

8.5.17 Dust suppression measures would be put in place, and Construction phase drainage would be carefully addressed to eliminate the potential for pollution of the rivers, other watercourses and groundwater. Timing of works would be carefully considered, so that disturbance at sensitive times would be avoided as far as possible. Lighting would be directional, with hoods wherever possible, to reduce light spill.

8.5.18 Whilst these measures will be ubiquitous throughout the proposed Scheme, where specific Construction phase mitigation measures would specifically benefit one designated site, habitat or species, this is described in the sections below. Further, specific Construction phase mitigation measures are also described as necessary.

8.5.19 The proposed environmental mitigation measures for the proposed Scheme are shown on drawing numbers MMD-233906-DT-0552-0563 Proposed Mitigation Measures in Volume 1, Appendix 3.

Proposed Site and Species Specific Mitigation Measures

8.5.20 The mitigation measures set out below, particularly those for protected species, are proposed based on the assumption that the current patterns of use and occupation remain the case up to and during construction. On-going monitoring (see the following section) will determine whether this is the case and should changes occur, the mitigation would be adapted to suit. However,

for the purposes of the impact assessment, current known patterns of use and occupation are considered.

Statutory Designated Sites

- 8.5.21 The Broadland Ramsar site, Broadland SPA, the Broads SAC and the Mid-Yare NNR (all coincident in geographical terms) are nearly 2 km from the south-easternmost part of the proposed Scheme at the Postwick junction. All include the River Yare as a main feature in this location, and depend largely on its integrity and favourable condition.
- 8.5.22 In order that the proposed Scheme has no effect on either the quality or quantity of the water in the River Yare, and in accordance with the various pieces of legislation that relate to water quality, flood risk and sustainable drainage, the proposed Scheme has been designed to ensure that all storm water is allowed to attenuate and infiltrate on site. Overland flow would therefore be eliminated from moving from the proposed Scheme into the River Yare, meaning that no impacts on the river's flood regime would be caused by the proposed Scheme. The proposed drainage scheme has been designed to cope with a one in a hundred year storm event.
- 8.5.23 The proposed SuDS drainage system, inputting storm water to groundwater, would ensure that potential pollutants and contaminants – hydrocarbons, heavy metals, de-icing salt – would not enter the River Yare via surface water overland flow during the Operational phase.
- 8.5.24 Another potential source of disturbance on the four above sites is the potential visual impact, particularly in terms of night-time lighting intrusion. Modern street lighting specifications are such that light spill can be minimised, through the appropriate height of lighting columns, the use of directional lamps and hoods, and by the careful specification of the specific lamp types. The lighting scheme at Postwick junction has been designed with input from ecologists and landscape architects to ensure that these mitigation measures are all built into the lighting scheme. No lighting would be installed on the rest of the proposed Scheme.
- 8.5.25 As with the sites described above, potential impacts on the River Wensum SAC and SSSI, located close to the western end of the proposed Scheme, would be mitigated for by ensuring that the quality and quantity of water entering the river, either by overland or groundwater flow, would be of the same quality and quantity as currently occurs. This would be achieved in the same way as with the previous sites, with a drainage system designed to

contain storm water, and to allow infiltration to groundwater. The same pollution control features as above would also be present.

8.5.26 The proposed landscaping scheme is designed to reduce the visual impact on the setting of the River Wensum SAC and SSSI. The notable distances between the proposed Scheme and the Broadland Ramsar, Broadland SPA, Broads SAC and Mid-Yare NNR are too great for landscaping to be considered as a viable mitigation measure.

8.5.27 Construction phase mitigation would be in accordance with those measures already described, and would be employed throughout the Construction phase across the whole site.

8.5.28 The above Ramsar, SPA and SAC designations are considered more fully in the Habitats Regulations Assessment report, as a requirement of the Habitats Regulations 2010. This potentially three-phase document concluded at Stage One of its assessment, that there would be no reasonably foreseeable adverse significant impacts on the conservation status of the Broadland Ramsar, Broadland SPA and Broads SAC. The document is included in Volume 2, Chapter 17, Section A.

8.5.29 It was not possible to scope out potential impacts on the River Wensum SAC at Stage One, due to its proximity to the proposed Scheme and the ease with which it could potentially affect its flow regime and water quality, with adverse significant impacts on the conservation status of its qualifying features. Further, more detailed scientific assessment was therefore carried out at Stage Two. This concluded that no foreseeable significant adverse impacts were likely on the River Wensum. It was therefore not necessary to progress to Stage Three of the assessment.

Non-Statutory Designated Sites

8.5.30 A length of Marriott's Way CWS would be lost to the proposed Scheme. The length of the CWS to be directly affected has been minimised as far as possible, such that the approach ramps to the overbridge would be as steep as design parameters allow. The proposed earth banks, either side of the approach ramps, would be planted with those species currently growing in this location, to replicate the habitats that are to be unavoidably lost. In the wider context, the proposed landscaping scheme would provide connectivity between Marriott's Way and other areas of semi-natural habitat, where currently little exists. Where the proposed Scheme crosses Marriott's Way it is an isolated linear feature in a landscape of arable land and improved

grassland, so connecting it to other areas of habitat, via the landscaping proposed on either side of the proposed carriageway, would be of benefit.

- 8.5.31 During construction, adherence to the CEMP would ensure that no accidental damage to those remaining parts of the CWS would occur.
- 8.5.32 Note that mitigation for Marriott's Way as a permissive footpath, cycle route and equestrian route is discussed in the Effects on All Travellers chapter. Mitigation in terms of the use of Marriott's Way by bats is discussed later in this Chapter.
- 8.5.33 The quality and quantity of water to The Springs CWS (both the waterbodies and the associated surrounding habitats) will be regulated by a different regime than the remainder of the proposed Scheme, as the height of the water table is too high to allow effective infiltration to take place. Instead, a positive drainage system is proposed, whereby storm water will be released, after attenuation to the adjacent watercourse. The attenuation system would ensure no further flashiness of the existing watercourse is caused. It would also incorporate a filtering/treatment process, using an area of newly-created reedbed that would function as a semi-natural facility to achieve this. It is predicted that water quality entering the watercourse here would be of as good, if not better quality, than currently occurs.
- 8.5.34 It would be necessary to mitigate for the potential indirect impacts on those CWSs close to the proposed Scheme. These include Attlebridge Hills CWS, Whinney Hills & Common CWS, and Payne's Yard Wood, The Owlery & March Covert CWS. Disturbance would be minimised by good, effective measures during construction, as have already been described.
- 8.5.35 During the operational phase the landscaping and earth bunding will act to screen the CWSs from the proposed Scheme, to reduce the visual and other impacts on the sites. The landscaping will be designed to marry up with and enhance those already in place within the CWS's.
- 8.5.36 Fakenham Road RNR, which is within the footprint of the proposed Scheme, would be subject to a seed harvesting process at the appropriate time of year, so that seeds of the valuable species here could be stored during construction. The topsoil of the verge would then be carefully stripped and carefully stored away from other areas of topsoil. On completion of construction in this location, it would be returned to site and used to re-build the verge. The harvested seeds would then be replanted, allowing the existing seedbank within the soil to remain loosely in the same location. These two

processes would maximise the chances of the existing valuable flora to re-establish.

8.5.37 No mitigation is proposed for the Important Hedgerows, aside from that already described. The lengths to be removed have been minimised as far as possible. Replacement hedgerows will be planted as part of the proposed landscape scheme. See the Proposed Mitigation Measures drawing number MMD-233906-DT-0552-0563 for more information.

Bats

8.5.38 The mitigation measures that are proposed relate to the maintenance of landscape permeability and functionality for bats. Full information on proposed bat mitigation is given below, and discussed in the bat report in Volume 2, Chapter 8, Section D. The key mitigation measures recommended include:

- Provision of replacement roosts within suitable locations;
- Appropriate working methods and timing for destruction of existing roost sites (i.e. trees and buildings);
- Provision of safe passage for bats across the proposed road route including green bridges, bat gantries, modified accommodation bridges and tunnels/underpasses;
- Provision of dark-flyways to encourage bats to use the safe crossing points; and
- Careful consideration of the proposed Scheme to ensure that no features are included that would require street lighting, which would impact on bat activity.

8.5.39 In addition, an appropriately-designed monitoring programme would be put in place to evaluate the success of the mitigation and determine any long term residual impacts of the proposed scheme. These are detailed in the next sections.

8.5.40 All identified bat roosts to be lost to the development would be replaced with a structure of appropriate size and construction to compensate for the loss of the existing roost. A total of seven tree roosts and three building roosts are currently due to be removed as part of the development. Bat Conservation Trust mitigation guidelines indicate that bat roosts should be provided on a 'like for like' basis; this principle has been adopted throughout the proposed Scheme.

- 8.5.41 All seven confirmed bat roosts in trees and two of the building roosts were identified as summer roosts, therefore removal would take place over the winter months (between November and February). One of the building roosts to be removed by the proposed Scheme was identified as a hibernation site as well as being used for roosting by at least two species of bat during the summer months. The condition of the building (with it being in a derelict state) makes it difficult to exclude the bats under a license. Therefore, the timing for the removal of this roost is more critical and would be confined to March/April or September/October (weather dependent) in order to avoid the main roosting periods.
- 8.5.42 Two new bat houses would be constructed in advance of the loss of the existing roosts in buildings. These would be adjacent to Hall Farm, to mitigate for the loss of this building, and adjacent to Gazebo Farm to mitigate for the loss of the old military building here. The design for the bat houses will be in line with Natural England Mitigation Guidelines and tailored for the specific species known to use the existing roosts. Both bat houses will feature four gable ends as bats are known to prefer entry to buildings via these features. Roof orientations and angles have been designed to maximise thermal properties for bats, and roof voids would be large and free of interruptions, to aid pre-emergence activity for brown long-eared bats, as is their preference when selecting roost sites.
- 8.5.43 The interior of the buildings would include features that bats can roost on and in, and the north-facing wall would include a wider cavity to provide an additional hibernation roost location. The Hall Farm bat house, which is to mitigate for a hibernation roost as well as a maternity roost, would include design features to recreate hibernation conditions, with the required constant temperature and humidity.
- 8.5.44 To mitigate for the loss of the seven known bat roosts in trees, bat boxes will be installed in trees to be retained, close to the existing roosts which will be lost to the development. A minimum of three boxes per tree will be used as a standard for each replacement roost site. These would be of types that would be utilised by those species being displaced.
- 8.5.45 In addition, bat boxes will also be installed in woodland areas to replace trees with features of high bat potential, which will be removed as part of the development. The bat boxes would be placed at varying heights and orientations around the trees to provide a variety of suitable microhabitats for bats at different times of the year, as recommended in the BCT mitigation

guidelines. These locations would be selected in consultation with the project ecologist.

- Drayton Drewray (24 bat boxes);
- Spixworth Plantation (15 bat boxes); and
- Heath Wood (9 bat boxes).

8.5.46 A significant number of large/important maternity roosts of various species are located within close proximity (500 m) of the proposed scheme. However, while most bat species, such as barbastelle, are thought to be particularly sensitive to disturbance, many of the bats recorded in the vicinity of the proposed NDR route already use roosts in close proximity to existing A-roads (although these tend to be unlit and potentially quieter than a major road, such as dual carriage-way). The landscaping scheme has been designed to minimise any potential impact on the identified roosts in the vicinity of these roost locations. No lighting is proposed as part of the proposed Scheme, with the exception of at Postwick junction, which will serve to reduce impacts on general bat activity.

8.5.47 A number of additional buildings and ruins at Gazebo Farm, with suitability for potential use by bats, are also due to be removed as part of the development. These buildings are not considered suitable for emergence/re-entry surveys due to the presence of a high number of potential features and sheltered location, which make visibility and line of sight to the features poor. As such it is recommended that all of the features within such structures are subject to a pre-demolition inspection using an endoscope, to identify bat usage as far as is possible, and is safe.

8.5.48 Severance of flight routes due to the removal of habitats and linear features has the potential to adversely impact on bat populations locally and in the wider landscape. The removal of connectivity throughout their ranges is likely to mean that, for some bat species, use of these routes would no longer be viable. This could result in the severance of foraging areas from roost sites, maternity roosts and areas of summer activity from hibernation roosts etc, with marked adverse impacts on bat populations in the short and longer term.

8.5.49 To mitigate for these potential impacts, a combination of wire bat gantries, modified accommodation bridges and green bridges would be provided, which would promote the continued use of the identified major flight routes that would be severed by the proposed Scheme.

8.5.50 Wire bat gantries would be installed at the following locations:

- Deighton Hills – shooting school access track;
- Tree line south of Horsford;
- Quaker Lane;
- Beeston Estate 1 – Tree line/woodland north east of the Hall buildings;
- Beeston Estate 2 – Farm track off Beeston lane, west of The Springs;
- Double tree line off Toad Lane; and
- Smee Lane

8.5.51 The wire bat gantries have been designed with guidance from national experts in the field of bat ecology. It is acknowledged that basic wire bat gantries across roads are not generally successful, as demonstrated by Berthinussen and Altringham, 2012. However, the type of gantry assessed in this paper was a very basic gantry with little physical substance across the roads. Those gantries that would be installed as part of the proposed Scheme are different, with wire mesh a 'V' shaped profile, across the roads. This design has been formulated with direct guidance from a national bat expert, and is based on specific experience and monitoring of similar structures, which have been proven to be successful.

8.5.52 They have also received input from the Contractors for the proposed Scheme. Attention has been given to the required spans in relation to the carriageway and the adjacent features (swales, earthworks etc), the specific locations and the foundation design. Timing of vegetation clearance and gantry construction has also been carefully considered. This means that permanent gantries would be installed early in the construction process, immediately after vegetation clearance at the bridge locations, negating the requirement for the inclusion of temporary gantries during the construction phase.

8.5.53 Where possible, replanting of hedgerows/treelines leading up to the gantries will also take place at this time, but if not possible, temporary fencing will be using to fill any gaps in the flight route. Temporary fencing should be complemented by artificial or dead foliage to mimic a hedgerow as best as possible; while quick growing vegetation (such as honeysuckle) should be planted in combination with a more traditional hedgerow planting design.

- 8.5.54 Two green bridges (land bridges) would be included as part of the proposed Scheme. This first would be at Marriott's Way, due to its importance as a significant commuting route for local bat populations, including barbastelles. The green bridge would be constructed at this location to ensure continuity of the habitat over the proposed Scheme, along the existing flight path. It would include two hedgerows, one either side of the proposed footway/cycleway/equestrian route. The tall parapets would be solid, to exclude as much light from the headlights of traffic using the NDR beneath as possible.
- 8.5.55 A second green bridge would be constructed at Middle Lane. This route has also been identified as a significant barbastelle commuting route. It is proposed that one hedgerow would be included within this highway bridge, which will also include a two-way carriageway and a footway/cycleway. As above, the tall parapets would be solid, to exclude as much light from the headlights of traffic using the NDR beneath as possible.
- 8.5.56 As with the wire gantries above, detailed consideration has been given to the timing and duration of the proposed construction of these bridges. The main phases of habitat clearance and construction have been programmed such that they take place over winter periods as far as possible to avoid impacts on bats. Where necessary, this has included spreading the construction over two winter periods, such is the required duration of the construction of the bridges.
- 8.5.57 A suitable planting scheme would be provided to complement the proposed bat bridges and ensure continuity of flight routes. Planting on the green bridges and leading up to all of the bat bridges would include semi-established shrubs and trees, to a minimum height of 1.5 m, to provide a tangible habitat/structure along which bats could commute as soon as it is planted. The planting scheme would act to enhance and improve connectivity of the new bat bridges to the wider landscape. This would serve to encourage bats to use the designated crossing points and dissuade them from using areas close to the road where there is an increased risk of collision mortality.
- 8.5.58 Two further highway bridges are proposed, the design of which has been modified to increase the potential for use by bats. The proposed bridge at Buxton Road would include the provision of a dark corridor, created along the proposed footway/cycleway part of the bridge, using solid parapets each side to reduce the intrusion of light from the headlights of cars using the proposed NDR beneath.

- 8.5.59 The proposed bridge at Newman's Road would also be constructed to include tall, solid parapets, either side. The effect in both of these cases would be to create a dark corridor to encourage movement of bats across the proposed Scheme.
- 8.5.60 A bat underpass is proposed for the crossing point in Rackheath Estate. This dual function feature will also serve as a culvert as part of the drainage scheme, to allow surface water in the existing drainage ditch network unimpeded movement, as is currently the case. The underpass will be 2.5 m in width and 2 m in height, catering for the low-flying bat species that are known to use this route.
- 8.5.61 During the Construction phase, the bat mitigation guidelines set out in DMRB Volume 10, Section 1, Part 8 (HA 80/99 Nature Conservation Advice in Relation to Bats) would be strictly adhered to. Any lighting along the route and within site compounds would be bat friendly. The lighting would, wherever possible, be low level and directional, oriented away from areas used by bats. This is especially important near roost areas or important flight routes. The potential use of hoods or cowls would further minimise light spill. These issues are addressed in the CEMP, in Volume 2, Chapter 24, Section A.
- 8.5.62 Details on the above mitigation measures (wire gantry and other bridge designs, bat house layouts and elevations etc.) can be found in the Bat Report, in Volume 2, Chapter 8, Section D.
- 8.5.63 The high levels of bat activity across the proposed Scheme as a whole and in the wider landscape, including the high number of identified roosting sites, significant flight routes and foraging grounds utilised by multiple species, highlight the importance of the NDR route for local bat populations. As a result a European Protected Species (EPS) license from Natural England is being sought to allow derogation from the legislation in relation to adverse effects on sites (roosting, flight routes and feeding grounds) used by bats prior to the commencement of vegetation clearance for the proposed Scheme. This is not being sought within the DCO application; a separate application to Natural England, outside of the DCO process, is being made. Evidence of the submission to Natural England can be found in in Volume 2, Chapter 18, Section A.

Badgers

- 8.5.64 The following mitigation measures are proposed for those active badger setts within the Zol.

8.5.65 As the setts under the footprint will be closed (setts 3, 4, 6 and 7) and the remaining setts are more than 100m away, mitigation during construction will be limited to ensuring as far as possible the safety of any badgers which may stray into the works areas. In most cases permanent badger fencing would be installed in the earliest phases of construction, coincident with the proposed Scheme extents boundary during the early stages of construction. Once in place it would not need to be moved or altered, so it would remain in place through operation as well as during construction.

8.5.66 The following additional mitigation measures would be implemented on site during construction:

- Ensure chemicals are safely stored;
- Open trenches would be covered at the end of each working day, or include a means of escape for any animal falling in (this would be a ramp at 45 degrees every 20m along the trench and can be either dug into the edge or a plank to act as a ramp); and
- Any temporarily exposed open pipe system would be capped in such a way as to prevent badgers gaining access.

8.5.67 Badger activity at Sett 1 primarily takes place to the north and west of the setts. Foraging in the farmland to the south of the sett, towards the proposed Scheme, is recorded, although no evidence of badgers was found in Walsingham Plantation. This spatial pattern of activity means that it is not necessary to construct a tunnel beneath the road. Instead, it is sufficient to install badger fencing along the northern boundary of the proposed Scheme, to ensure the access to the construction area is not likely. The fencing would remain in place during both Construction and Operational phases of the proposed Scheme.

8.5.68 Similarly, at Sett 2, the majority of badger activity, and large areas of prime badger habitat, lie to the north of the proposed Scheme, on the same side as the sett itself. Activity to the south of the proposed Scheme has been recorded, although this habitat is sub-optimal. It is therefore considered that the construction of a tunnel beneath the road is not necessary. As with above, badger fencing would be installed along the northern boundary of the proposed Scheme to preclude their access to the construction zone and carriageway during the construction and operational phases respectively.

8.5.69 At Sett 5, there was no evidence that badgers are regularly crossing the route of the proposed Scheme, although this cannot be ruled out completely. To this

end, badger fencing is proposed to the southern edge of the proposed Scheme during both the construction and operational phases.

- 8.5.70 Sett 7 is within the footprint of the proposed Scheme, and so will be closed. As this sett is an outlier only, its use during winter would be unlikely, so its closure during this period would be proposed. Monitoring of the sett, to ensure that this is the case, is discussed in the next section.
- 8.5.71 During construction, temporary badger fencing would be installed at the edges of the proposed Scheme. On completion of construction, permanent badger fencing will be installed in conjunction with the proposed Green Bridge at Marriott's Way, to ensure that badgers do not stray onto the carriageway here, and to encourage them to use the Green Bridge, thereby ensuring that fragmentation of the home range of the population, does not occur.
- 8.5.72 No mitigation is proposed for the inactive setts. All setts will be monitored to ensure that they do not become active again. See the Monitoring section later in the chapter for details.

Great Crested Newts

- 8.5.73 The ponds used by the Dog Lane, Horsford meta-population are at least 120 metres north of the earthworks for the Bell Farm Lane bridge approach ramps, and at least 290 metres from the carriageway and associated earthworks. The available terrestrial habitat between these ponds and the proposed Scheme is limited to a small number of arable field margins, and there are no ponds suitable for use by newts south of the proposed Scheme, so it is not considered necessary to provide continuity of access to habitats beyond the proposed Scheme in this location.
- 8.5.74 A precautionary approach will be employed whereby newts will be excluded from the footprint of the proposed Scheme by the installation of temporary newt fencing during construction, where it is felt there is a risk of intrusion into the working area. The fencing would therefore be installed around the area of the proposed earthworks for the northern approach ramp, and the track heading north towards Dog Lane. No further fencing is proposed, as other areas will be well beyond 250m, and in sub-optimal (arable) habitat with limited connectivity. It will be installed during the very earliest stages of the construction process. Its installation will be timed in order to eliminate or minimise adverse impacts on newts, and to ensure that no newts are likely to remain within the construction area. The fencing will remain in place throughout the construction phase.

- 8.5.75 On completion of construction, the temporary newt fencing will be removed. This will provide newts with access to the landscaped areas within the proposed Scheme, tying up with the existing field boundaries, and offering linking routes to other areas where currently there is none. The connectivity of habitats should therefore be increased, as should the total area of terrestrial habitat. The landscaped areas will include woodland, scrub and grassland.
- 8.5.76 No permanent newt fencing is proposed as modern, best practice indicates that a road with a greater rate of use than 20 vehicles per hour effectively functions as its own deterrent to movement for newts (and other amphibian and reptiles species). The proposed Scheme would have a volume of traffic that exceeds the above rate by a significant margin, meaning that the risk of mortality of newts is sufficiently low to mean that newt fencing is not necessary.
- 8.5.77 The Quaker Lane, Spixworth meta-population, using pond 16, is 100 metres from the proposed Scheme. As with the Dog Lane, Horsford meta-population, newts will be excluded from the proposed Scheme by the installation of temporary newt fencing, to allow trapping and relocation to take place, ensuring that no newts remain in the construction areas. As with the above, it will be installed during the very earliest stages of the construction process. Its installation will be timed in order to eliminate or minimise adverse impacts on newts, and to ensure that no newts are likely to remain within the construction area. The fencing will remain in place throughout the construction phase.
- 8.5.78 On completion of construction, the temporary newt fencing would be removed. This would allow the newts access to the areas of landscaping in the vicinity, including access to the proposed drainage lagoons, one of which would be lined, and therefore would contain water for periods of time.
- 8.5.79 The Newman Road, Rackheath meta-population will be subject to the loss of one breeding pond, in addition to areas of terrestrial habitat suitable for use by great crested newts. Further to the precautionary exclusion process described for the two above meta-populations, it would be necessary to carry out a trapping and exclusion exercise, to remove newts from these areas in advance of any construction taking place. In advance of this, it will be necessary to create new receptor ponds to which the relocated newts can be relocated.
- 8.5.80 The existing pond has a maximum surface area of around 500 square metres, so it is proposed to provide four new ponds, each of around 250 square metres, in land adjacent to the proposed Scheme, to the immediate southwest

of the pond to be lost. Smaller ponds are known to be more suitable for breeding great crested newts than larger ones; 250 square metres is within the optimum size range, as indicated in the Great Crested Newts Mitigation Guidelines (Natural England, 2001).

- 8.5.81 Two of the proposed ponds would be created in advance of the DCO process being completed, on land within the jurisdiction of Birse/NCC, and would be planted with aquatic and semi-aquatic plant species, such that they would become suitable for newts to breed in. The ponds would be on land currently owned by the construction contractors for the proposed Scheme, to allow them to become established in advance of the trapping and relocation process detailed below. The two remaining ponds would be created during the Construction phase.
- 8.5.82 As previously, newts will be excluded from the proposed Scheme by the installation of temporary newt fencing. As above, the fencing would be installed coincident with the fence-lines demarcating the proposed Scheme extents, on both sides of the proposed Scheme, including the pond to be removed. It would be installed over sufficient length to ensure that newts using other ponds around Newman's Road would not then be able to enter the construction area. It will be installed during the very earliest stages of the construction process. Its installation will be timed in order to eliminate or minimise adverse impacts on newts, and to ensure that no newts are likely to remain within the construction area. This fencing will remain in place throughout the construction phase.
- 8.5.83 Additional lengths of temporary fencing would be installed between those along the proposed Scheme extents to create entirely contained areas or compartments within the area to be lost to the proposed Scheme. These areas would be subject to a trapping and relocating exercise by licensed ecologists to ensure that all newts (and possibly other amphibian species) within these areas are removed and relocated to the newly created habitats described above. This would ensure that the areas of the proposed Scheme, including those areas to be used temporarily, during construction only, will be 'sterile' and no newts would be killed or injured.
- 8.5.84 Once the trapping and relocation exercise had been completed, the temporary fences across the construction area would be removed, but those to the edges would remain in place throughout the construction phase. This would allow the road and associated features to be constructed, whilst at the same time ensuring that no newts would be killed or harmed.

- 8.5.85 All temporary fencing would be removed after construction, allowing access for newts to the newly-created landscaping areas. These areas will tie up with the proposed bat underpass/drainage culvert approximately to the north of this area. Although not specifically for great crested newts, this feature would potentially allow newts safe passage beneath the road, providing continued access to the terrestrial habitat east of the proposed Scheme, and to those drainage lagoons that are to be lined and therefore hold water for sustained periods.
- 8.5.86 As with the previous two meta-populations, no permanent newt fencing is proposed after construction.
- 8.5.87 The grassland habitat around which this meta-population is based, and within which the proposed ponds would be situated, would be managed to benefit great crested newts as far as possible. It is proposed that trees around those ponds within woodland inside the DCO boundary would be trimmed back, to allow more light to the pond and to reduce the seasonal input of leaf litter which currently acts to silt up the ponds and remove oxygen from the water as it rots. Wherever appropriate, silt would be removed from ponds to increase depth and reduce the likelihood of drying out, and aquatic and semi-aquatic plants would be planted to further improve the condition of these ponds for breeding great crested newts. These improvements would be made to those ponds within the DCO boundary, which make up at least half the number of ponds that supports this meta-population.
- 8.5.88 The suitability of the terrestrial habitat within the DCO associated with each of the meta-populations would be bolstered by the inclusion of features such as artificial refugia and hibernacula. These would provide places to shelter during both the active, summer season and the hibernation period. It is also likely they would be used by other species of amphibians, and possibly reptiles.
- 8.5.89 It is acknowledged that there remain a small number of ponds where surveys for great crested newts were not possible. Precautionary mitigation for those ponds has been considered in full in the Great Crested Newt Survey Report. In each case, the ponds were considered to be of sufficient distance from the road, and/or separated by unsuitable terrestrial habitat, that the risk of harming or killing newts was very low. Mitigation to account for these risks around these ponds is therefore not considered necessary.
- 8.5.90 The above work will be subject to a European Protected Species mitigation licence. This is not being sought within the DCO application; a separate application to Natural England, outside of the DCO process, is being made.

Evidence of submission of a draft EPS Licence application having been made to Natural England can be found in Volume 2, Chapter 18, Section A.

Breeding Birds

- 8.5.91 The main mitigation measure for reducing impact on breeding birds is to carry out habitat clearance during the winter months when breeding activity can be ruled out. The early phase of the construction programme has been formulated with this principle at its core.
- 8.5.92 All temporary areas associated with construction, for example access tracks, lay down areas and compounds, would be sited to minimise their impact on breeding birds. Areas of amenity or heavily grazed grassland or arable land have been selected for these temporary areas as far as possible, which would be reinstated after construction. Where this is not possible then alternate areas would be provided to compensate for this loss.
- 8.5.93 During construction, industry best practice guidelines relating to potential disturbance would be followed. These would ensure that light emissions are minimised by reducing construction during the hours of darkness and providing lamps that allow their illumination to be directed away from sensitive areas. Any chemical spills would be cleared quickly and effectively to prevent accidental poisoning of birds and other wildlife, and any dangerous or sharp equipment should be stored safely when not in use. Construction procedures would be subject to national limits for noise and pollution emissions. This would serve to reduce the effects on wildlife locally, as well as the nearby human population.
- 8.5.94 Although noise and light pollution are not considered to significantly impact breeding birds, the bunds and earthworks and subsequent habitat creation would reduce both light and noise pollution to the surrounding habitats. The absence of lighting throughout the proposed Scheme, with the exception of the Postwick junction, will benefit breeding birds in the surrounding landscape. In addition, the road has been designed to use low noise tarmac throughout.
- 8.5.95 The landscaping scheme has been designed with input from the ornithologists involved in the surveys and subsequent reporting and analysis of data. As such, specific habitat types and layouts have been included that would serve to maximise the value of the proposed woodland, scrub, hedgerow and grassland habitats. Detrimental effects would also be avoided as far as possible.

- 8.5.96 Where possible grassland has been proposed behind hedgerows or trees/scrub, which would act as screening and would also mean birds flying over the proposed Scheme would do so at a height that would reduce the risk of vehicle collision mortality. This has been achieved wherever possible, taking into account the needs and requirements of other protected species. The grassland would be allowed to grow to sufficient height that it would provide shelter for abundant small mammals, a potential food source for birds of prey.
- 8.5.97 Screen planting would be planned in conjunction with the recommendations for barn owls (see below). The planting of hedgerows and trees/woodland as well as embankments and noise barriers would encourage birds to fly higher over the carriageway, reducing mortality.
- 8.5.98 The loss of mature trees can have an adverse effect on cavity nesting species. The provision of areas of woodland in the landscaping scheme would ultimately provide potential nesting sites for these species, although the establishment of the woodlands, to the point where this proposition becomes viable, is likely to take many seasons. In acknowledgement of this, nesting boxes will be erected in suitable areas, aimed mostly but not exclusively at cavity nesting species, to be used until such time as the natural alternatives become useable. Details of the specific type and size of bird boxes is provided in the Breeding Bird Survey Report in Volume 2, Chapter 8, Section G.
- 8.5.99 The landscaping proposals for the drainage lagoons along the proposed Scheme would include provision for birds likely to use these areas. An artificial nest bank with a minimum of 50 nest cavities would be created to compensate for the likely loss of a small sand martin colony near Spring Farm, Taverham. This would be incorporated into the drainage lagoon near the Fakenham Road.

Barn Owls

- 8.5.100 The known nesting site that is to be directly affected by the proposed Scheme would need to be removed, by a suitably experienced, licensed ecologist, at a time outside of the nesting season. As already described, habitat clearance would take place outside of the nesting season, in order that no nesting or breeding birds would be affected.
- 8.5.101 Where nesting, roosting and rest sites occur within 150m of construction activities appropriate screening with fine mesh will be installed

under the supervision of a suitably qualified ecologist, to the edge of the proposed Scheme. Where nesting, roosting and resting sites are to be removed during construction these will be capped or blocked under the supervision of a suitably qualified ecologist.

8.5.102 If there is any indication that barn owls are nesting within 150m of construction activities at any time, work would stop within 150m of the site until the matter can be fully investigated and appropriate mitigation measures implemented.

8.5.103 Site compounds would be managed to ensure that potential impacts on barn owls were eliminated or reduced. Measures would be taken to ensure that there was no risk of barn owls drowning in open containers of liquid, as this avoidable mechanism of mortality has been recorded in the past. If pest control were necessary on site, care would be taken to avoid accidental deaths of barn owls through eating poisoned rats and mice. These measures would be included in the Construction Environmental Management Plan.

8.5.104 The proposed Scheme has been designed such that a large part of the route will be in cutting or false cutting. It will include a landscaping scheme that will include the creation of woodland, scrub, hedgerows and grassland on the verges, embankments and other areas. These features of the design are primarily aimed at reducing the visual impact of the proposed Scheme, and also the impacts of noise and vibration for nearby receptors. However, the proposed landforms and planting scheme would also serve to reduce the potential impact on barn owls, which are susceptible to mortality due to vehicle collisions, whereby the proposed embankments and associated landscaping would act as a barrier to low flight across the carriageway, forcing barn owls up and over moving vehicles. Specific attention has been paid to two potential collision blackspots, from Fakenham Road to Fir Covert Road and from Rackheath Park to Wroxham Road, to ensure that the proposed landforms and planting scheme are sufficient to effectively reduce vehicle collision mortality as far as possible.

8.5.105 Ten barn owl boxes would be erected in a series parallel to the proposed route at 2 km intervals, at a distance of at least 1.5 km from the proposed Scheme. The majority of these boxes would be placed on the northern side of the proposed route as the land to the south has a strong urban component and is therefore less suitable for barn owls. Boxes would be installed where there is suitable roosting and foraging habitat.

8.5.106 Norfolk County Council owns, or has rights over, sufficient land in the wider landscape that this would be achieved without the need to depend on private landowners.

Aquatic Invertebrates

8.5.107 The proposed Scheme would not have any direct impacts on the aquatic invertebrates at The Springs. However, it will be necessary to mitigate for potential indirect impacts such as pollutants and silt entering surface and groundwater here, and for potential alterations to the groundwater hydrological regime, that would otherwise affect the availability of suitable semi-aquatic vegetation on which Desmoulin's whorl snail lives.

8.5.108 The following general mitigation measures would be put in place:

8.5.109 Measures to prevent silt run-off from site operations (such as construction of temporary settlement lagoons) should be constructed as early as possible in the works programme;

8.5.110 Spillages of liquid to ground during construction would be mitigated by implementation of an environmental management plan with appropriate refuelling procedures, including an effective spill containment plan, to ensure that it does not enter either the surface or groundwater; and

8.5.111 Groundwater and water table monitoring would take place to ensure that no changes to groundwater levels occur.

8.5.112 These measures would be incorporated into the Construction Environmental Management Plan.

8.5.113 The potential indirect impacts on the aquatic invertebrates at The Springs during the Operational phase are similar to those addressed during the Construction Phase, relating to water quality and quantity. The proposed Scheme has been designed to include a drainage system that caters for very large storm events, to ensure that storm water enters The Springs at approximately the same rate as currently occurs, so no impacts in terms of increased flashiness and the water level regime would occur. At this location, this has been achieved by designing an attenuated positive drainage system rather than using infiltration to dissipate the water created during flood events, as the water table in this location is too high, meaning that that infiltration is not viable.

8.5.114 Incorporated into this design are pollutant containment features. A reedbed filtering/attenuating system is included in the drainage design for this location, which will filter storm water as it moves slowly through this semi-natural feature. This will serve to improve storm water quality before being discharged into the existing watercourse. Mechanisms to contain pollutants from large spills, for example fuel or other substances spilt during a road traffic accident, are also included in the design, to allow discharge of polluted water to watercourses to be contained and removed.

Terrestrial Invertebrates

8.5.115 No specific mitigation measures are proposed in relation to the habitats of above average suitability for invertebrates at the immature plantation woodland at The Springs. However, it will benefit from those mitigation measures aimed at reducing the adverse impacts of other aspects of the proposed Scheme.

8.5.116 The potential invertebrate populations are likely to be susceptible to pollution in its various forms. A decrease in air quality, and an increase in airborne particulates and dust could have adverse impacts on the resilience of the populations. Pollution of surface and ground-water in the vicinity could adversely affect the habitats, and disturbance associated with both the construction and operational phases of the proposed Scheme could also affect the habitats and invertebrates themselves.

8.5.117 There would therefore be secondary mitigating effects for these habitats and potential populations from those in-built mitigation measures of the proposed Scheme envisaged to reduce such effects. Whilst it is hard to mitigate for the potential localised, short term drop in air quality due to the presence of plant machinery during construction, dust production can be greatly reduced by the inclusion of measures such as damping down of the ground before construction takes place whenever necessary. Further detail of such mitigation is given in other assessment chapters of this ES. Such mitigation would be included within and secured through the Construction Environmental Management Plan (CEMP).

8.5.118 Pollution prevention measures during construction would also be included within the CEMP. These are likely to include the availability of spill kits in sensitive areas, strict rules on locations and procedures for refuelling plant and machinery, double-bunded fuel tanks and bowsers etc. Such

measures would greater reduce the risk of pollution events that would adversely affect water quality.

- 8.5.119 Operational phase mitigation to prevent water pollution is centred on the requirement for the design to adhere to the principles of Sustainable Drainage Systems (SuDS) wherever possible. This requirement stems from legislation such as the Water Framework Directive, which itself relates to water quality and quantity (flood risk) and the need for designs to include measures such that neither of these aspects are adversely affected. The surface and ground-water regimes would remain functioning as they currently do, meaning that habitats and dependent species would not be adversely affected in any way.
- 8.5.120 The provision of earth bunds, to reduce the visual impact and noise from the proposed Scheme during its operational phase, would reduce the effects of disturbance on the habitats and potential invertebrate species are minimised as far as possible.
- 8.5.121 Existing and proposed habitats within the DCO boundary, and consequently the terrestrial invertebrates colonising them, would benefit from the careful design of the landscaping scheme that has taken place, and the selection of suitable species mixes. The provision of grassland is particularly important for terrestrial invertebrates.
- 8.5.122 Grassland would include appropriate short sward seed mixtures, to provide food sources for invertebrates and to ensure that vegetation does not grow too high, thereby allowing the warming effect of the sun. Rabbits would be allowed to colonise the verges in order to maintain the short swards and to create areas of bare earth, to benefit invertebrate species. Mowing/cutting would be undertaken after the flowering season and the arisings removed to prevent the accumulation of nutrients and the consequent development of rank grassland.
- 8.5.123 The inherent connectivity of the proposed landscaping would allow invertebrate areas to be connected to the wider landscape to enable dispersal via hedgerows and rough grass margins.

Generic Mitigation for Species and Habitats not considered Valuable Ecological Resources

Habitats

- 8.5.124 The permanent loss of areas of valuable habitat to the proposed Scheme would be mitigated for by the proposed landscaping scheme, which would ensure that similar habitat is provided. The habitats planted would greatly outweigh the habitats lost, in terms of total areas. During the early stages of design a ratio of 3:1 was proposed, although in reality the total areas of habitats created is likely to far exceed this requirement.
- 8.5.125 The temporary loss of habitats, where site compounds, materials storage, batching plants, topsoil storage etc are required, has been minimised by careful design. Wherever possible they would be positioned on arable land, avoiding habitat features of value.
- 8.5.126 The remaining trees and woodland would be protected during construction, with fencing to eliminate impacts within root protection areas, as required by British Standard 5837:2012 Trees in Relationship to Design, Demolition and Construction.

Reptiles

- 8.5.127 It is considered that the reptile populations within the Zol are sufficiently low that individuals could be effectively displaced from the areas where they were recorded, using a precautionary approach. Phased vegetation removal, whereby vegetation is first strimmed to a height of 150mm, and then on subsequent days strimmed to ground level, would be used to displace reptiles, as sufficient habitat would remain beyond the proposed Scheme footprint to allow them to move with no adverse effects. The lack of suitable habitats, and the on-going disturbance associated with the construction of the proposed Scheme should preclude their presence from the site of the proposed Scheme during construction.
- 8.5.128 As with great crested newts above, no fencing is proposed as a road with a greater rate of use than 20 vehicles per hour effectively functions as its own deterrent to movement for amphibian and reptiles species.

Deer

- 8.5.129 The potential risk of deer vehicle collisions with the serious implications in terms of public safety, as well as the health and wellbeing of the deer population has been addressed by a number of measures. The proposed Scheme design includes wide verges and swales along the majority of the proposed route. Further, the landscaping scheme has been designed in such

a way that there is little or no woodland or scrub vegetation adjacent to the road where known crossing points are severed by the proposed Scheme.

8.5.130 These combine to mean that visibility of deer on the carriageway edges for motorists would be good, allowing deer to be identified and their movements predicted, allowing motorists the time to react accordingly, reducing the chances of collisions. It would also allow deer visibility of approaching vehicles, making unpredicted crossings far less likely.

8.5.131 Signing along the carriageway would indicate to motorists that they were entering an area where deer populations are known, providing an early indication as to potential issues.

8.5.132 In addition, it is intended that scaring devices (reflectors) would be installed where known crossing points are severed. These would be mounted on posts, and would reflect approaching car headlights towards the adjacent habitats, creating a dazzling effect that would startle deer and deter them from crossing when vehicles are approaching. This would further reduce the chances of deer vehicles collisions.

Summary of Proposed Mitigation

8.5.133 The mitigation measures described above are summarised in the tables below:

Table 8.15 Summary of General Mitigation Measures

Mitigation Measure	Target	Location	Purpose	Timing
Habitat Clearance during winter season	Birds	Throughout scheme	To ensure that breeding birds are not disturbed. Also benefits other species.	Construction phase
Extensive landscaping scheme	Various	Throughout scheme	To provide replacement and additional habitat, new connectivity, addressing severance etc.	Operational phase
Inclusion of retained deadwood in landscaped areas	Various	Throughout scheme	To provide features of conservation interest, and to boost associations between new planting and invertebrates and fungi that help to sustain them.	Operational phase
Localised provision of more established trees/shrubs	Bats, birds	Throughout scheme	To address severance of existing important flight-lines and commuting routes. To provide higher flight-lines, reducing chance of bat and birds vehicles collision mortality.	Operational phase
Cutting/false cutting	Bats, birds	Throughout scheme	Contributes to providing higher flight lines, reducing chance of bat and birds vehicles collision mortality. Also acts as screening for breeding birds etc in wider landscape.	Operational phase
SuDS Drainage system	Various	Throughout scheme	Maintains existing rate of input to surface and groundwater, eliminating changes in aquatic and semi-	Operational phase

Mitigation Measure	Target	Location	Purpose	Timing
			aquatic habitats. Contains pollution incidents to ensure that surface and groundwater are no affected.	
Prudent siting of site compounds	Various	Throughout scheme	To ensure that no impacts beyond those that are absolutely necessary are caused.	Construction Phase
Construction -Phase pollution prevention	Various	Throughout scheme	To eliminate the risk of pollution to surface and groundwater by silt, hydrocarbons, dust etc, and to reduce light pollution, disturbance etc.	Construction Phase

Table 8.16 Summary of Site and Species Specific Mitigation Measures

Mitigation Measure	Target	Location	Purpose	Timing
Seed harvesting and topsoil storage	Hoary mullein and general sward	Fakenham Road RNR	To allow the re-creation of valuable plant communities currently designated as Roadside Nature Reserve.	Construction phase
Timed removal of roosts	Bats	Various locations	To ensure that roosts are not removed during use by bats. Summer roosts to be removed during winter, for example.	Construction phase
Hand-searches of buildings due for demolition	Bats	Around Gazebo Farm, Rackheath	Although not currently thought to be used as roosts, it would be necessary to ensure that demolition took place with the confidence that no bats were using them.	Construction phase
Absence of Street Lighting (except at Postwick junction)	Bats	Throughout scheme	To reduce impacts on bat activity throughout the proposed Scheme	Operational phase
Green Bridges	Bats	Marriott's Way and Middle Road	To provide continuity of the two most significant flight-lines over the proposed Scheme.	Operational phase
Bat Gantries	Bats	Seven locations throughout scheme	To provide continuity of major flight-lines over the proposed Scheme.	Construction and Operational Phases. (To be installed early

Mitigation Measure	Target	Location	Purpose	Timing
				in construction process).
Modified Highway Bridges to include Dark Corridors	Bats	Buxton Road and Newman's Road bridges	To provide dark corridors within the bridge structure, allowing continuity of movement over the proposed Scheme.	Operational phase
Underpass	Bats	Rackheath Park	To provide continuity of flight-lines for low-flying species, allowing continuity of movement over the proposed Scheme.	Operational phase
Bat houses	Bats	Gazebo Farm and Hall Farm, Rackheath	To mitigate for the loss of two buildings in which bats roost.	Construction and Operational Phases. . (To be installed early in construction process).
Bat boxes	Bats	Drayton Drewray, Spixworth Plantation and Heath Wood	To provide additional roosting locations, mitigating for those that are lost.	Construction and Operational Phases. (To be installed early in construction process).
Sensitive lighting during construction	Bats	Throughout scheme	To reduce or eliminate further impacts on bats during construction.	Construction Phase
Covering open	Badgers	Throughout scheme	To remove potential impacts on badgers during the	Construction Phase

Mitigation Measure	Target	Location	Purpose	Timing
trenches, closing exposed pipework			Construction phase.	
Badger fencing	Badgers	Various locations	To ensure that badgers do not stray onto the construction site and completed proposed Scheme, reducing the chance of vehicle collision mortality.	Construction and Operational Phases
Timed Closure of Outlier Sett	Badgers	Marriott's Way	Closure of small outlier sett will be carried out during winter when not in use.	Construction phase
Four new ponds	Great crested newts	Gazebo Farm	To mitigate for the loss of a GCN breeding pond beneath the footprint of the proposed Scheme.	Construction and Operational Phases. (Two to be installed prior to construction, remaining two early in construction process).
Underpass	Great crested newts	Rackheath Park	Not specifically provided for GCNs but offers the potential for continuity of movement either side of the proposed Scheme.	Operational phase
Temporary newt fencing	Great crested newts	Areas around Dog Lane, Horsford,	To allow the trapping and relocation, and subsequent exclusion of GCNs from the	Construction Phase

Mitigation Measure	Target	Location	Purpose	Timing
		Quaker Farm, Spixworth, and Gazebo Farm, Rackheath	construction site.	
Refugia and Hibernacula	Great crested newts	As above	To provide potential locations for taking refuge and hibernating, to mitigate for the disturbance and loss of habitat caused by the proposed Scheme.	Operational phase
Bird boxes	Breeding birds	Various suitable locations	To provide replacement breeding locations, mitigating for those beneath the footprint of the proposed Scheme.	Construction and Operational Phases
Fine mesh screening to the edge of the Construction site	Barn Owls	Various locations	To reduce the visual intrusion and on-going disturbance to nesting barn owls within 150 metres.	Construction Phase
Barn owl boxes	Barn Owls	Beyond scheme footprint	To provide further nesting opportunities compensating for those lost to the proposed Scheme.	Construction and Operational Phases
Installation of log piles, deadwood, etc	Various	Throughout scheme	To provide habitat for reptiles, small mammals, invertebrates etc, with associated benefits to wider ecosystems.	Operational phase

Mitigation Measure	Target	Location	Purpose	Timing
Reflective deer scarers	Deer	Between sensitive woodland areas	To startle deer when vehicles approach, reducing the chances of deer vehicles collision mortality.	Operational phase

Monitoring

Designated Sites

8.5.134 No specific monitoring is proposed in regard to Designated Sites.

Habitats

8.5.135 It will be necessary to monitor newly created habitats, as part of the initial, two year maintenance period. (After this time maintenance responsibility would revert to Norfolk County Council as the Highway Authority). During this initial maintenance period the health of planted trees and shrubs will be monitored, and any that die during this period would be replaced. Particular attention would be paid to those trees on Marriott's Way and Middle Road Green Bridges, where the soil depth and general conditions will make for challenging growing conditions.

8.5.136 As recommended in the Arboricultural Implications Assessment in Volume 2, Chapter 20, Section A, existing trees would be monitored over a five year period, to ensure the health of those remaining trees, and the health and safety implications of their being located adjacent to the proposed carriageway, footways, cycleways, bridleways etc. This would take into account potential changes in growing conditions that could affect the trees, their health and their stability, which could be affected by slight alterations in groundwater availability, additional wind-loading etc.

Bats

8.5.137 A long term monitoring programme, during and after construction, would be instigated to provide certainty that the mitigation, compensation and enhancement measures put in place for a scheme are functioning effectively, and to allow quick and efficient changes to be made to correct any problems identified through the monitoring.

8.5.138 No clear guidance is available on the level of monitoring that might be appropriate for a road scheme. The Highways Agencies Interim Advice Note 116/08 (Highways Agency, 2008) simply states that monitoring for bats should be appropriate to the level of mitigation provided and should be included within contractual requirements. Where a significant level of mitigation is proposed, as has been put forward for this scheme, monitoring is particularly

important in order to determine the success (or not) of the mitigation put in place. The monitoring methodology would be put together to monitor in and around newly created features (e.g. the bat bridges) and also to monitor against previously identified baseline survey work.

8.5.139 A monitoring programme for bats is provided in the table below.

Table 8.17: Proposed Bat Monitoring for NDR

Activity	Monitoring Period	Months of Checks
Unmanned static monitoring, 12 locations, as during 2013 survey season.	15 years (years 1, 2, 3, 5, 10 and 15).	Late April, June and September each year.
Manned static monitoring of bat bridge and bat tunnel locations, three visits per season.	15 years (years 1, 2, 3, 5, 10 and 15).	Late April, June and September each year.
Survey for dead bats at 10 selected monitoring locations. Early morning twice each year.	15 years (years 1, 3, 5, 10 and 15).	Late April and September each year.
Counts of known roosts within 50 m of the works area: Two dusk surveys per roost.	15 years (years 1, 3, 5, 10 and 15).	May-August inclusive each year (repeat at same time each monitoring visit for each roost)
Monitoring counts of each bat house. Two dusk surveys.	15 years (years 1, 2, 3, 5, 10 and 15).	May-August inclusive each year (repeat at same time each monitoring visit for each roost)
Bat box checks. Twice a year.	15 years (years 1, 3, 5, 10 and 15).	May/June and August/September.
Hibernation surveys of known roosts within 2 km.	15 years (years 1, 3, 5, 10 and 15).	Jan to March.

Activity	Monitoring Period	Months of Checks
Radio-tracking (barbastelles).	7 years (years 1 and 7).	May/June or Aug each year, focussing on same areas identified as important through baseline surveys.

Badgers

8.5.140 Prior to construction, monitoring of all badger setts will be required, to ensure that the assessments of impacts, and mitigation measures, remain appropriate.

8.5.141 Setts 3, 4 and 6 showed no signs of recent activity during the latest survey. Sett 7 did show signs of recent occupancy. As these setts are all within the footprint of the road they will need to be closed prior to construction. If monitoring can demonstrate these setts are not in use, they can be destroyed without a licence from Natural England. If they are re-occupied, a licence will be required. Closure works must normally take place between July and November. However, as setts 3, 6 and 7 are all outlier setts, their use during the winter is unlikely and it may be possible to close them outside of this period if monitoring can confirm lack of winter use.

8.5.142 Occupancy would be determined by daily manual monitoring for at least 21 consecutive days, placing triggers in a position where they would be disturbed if a badger entered or exited the sett, or alternatively with a remote infra-red camera. The latter would have the advantage that it can constantly monitor the site and confirm badger presence (for example, a rabbit may dislodge the sticks in the entrance, giving an inaccurate picture of occupancy).

8.5.143 If during the monitoring any sett is found to be active a licence would be required from Natural England in order to close it. Closures of active setts involve placing one-way wooden gates outside each entrance. These are monitored for 21 days to ensure there is no evidence of re-entry, before the sett is dug out. Licences take up to 30 working days to be processed by Natural England and are not normally issued between December and June when badgers are breeding (although outlier setts can be closed during this period as they are not typically used for over-wintering).

8.5.144 As badgers are a mobile species new setts could be excavated between the survey and the start of works. The proposed Scheme would be resurveyed at least ten to twelve weeks prior to the start of construction to identify any new evidence.

8.5.145 During the operational phase, monitoring would take place for at least five years to assess the effectiveness and condition of the proposed badger fencing, and also the mortality rate of badgers on the new road.

Great Crested Newts

8.5.146 The proximity of the great crested newts meta-populations at Quaker Lane, Spixworth and Newman Road, Rackheath to the proposed Scheme mean that construction phase and post-construction monitoring of the will be required, to ascertain the effectiveness of the proposed mitigation and enhancement measures.

8.5.147 A full population survey of known existing breeding ponds and the four new ponds would be carried out. These surveys will require six visits to each pond on suitable nights (i.e. when the overnight temperature is 5°C or greater and there is no heavy rain) between mid-February and mid-June. The visits should not be on consecutive nights and at least half of them must be carried out in the peak period between mid-April and mid-May. The round of surveys will need to be repeated each year post construction for six years. On completion of the six years of monitoring, a report will be prepared for Natural England as part of the mitigation licence return.

Breeding Birds

8.5.148 A key feature of the mitigation package would be to monitor its success post construction. This monitoring would seek to measure any change in species composition, species number and the number of individuals using the habitats alongside the new road; in particular those habitat areas that will have been created for the use of wildlife. The monitoring programme would involve establishing a baseline data set in the year prior to construction by surveying the route three times between March and June inclusive using a method based used to collect data for this assessment. This would then be repeated each year until five years post construction.

Barn Owls

8.5.149 It would be necessary to monitor the success of the ten barn owl boxes. This would be carried out by a suitably qualified ecologist holding a valid Natural England or British Trust for Ornithology licence to disturb breeding barn owl in Norfolk.

8.5.150 The use of screening as a way to reduce barn owl mortality is fundamental in reducing road casualties and the success of this should be carefully measured. It is also essential that regular maintenance is undertaken on mitigation measures, for example, ensuring the continuity of the screening planting and maintenance of barn owl boxes.

Aquatic Invertebrates

8.5.151 Monitoring of the macro-invertebrate communities should be carried out during and following construction at all sites to establish whether there has been any change from the baseline. This should be carried out at the same time of year as the baseline survey (autumn and spring). Monitoring should be carried out during construction and in years 1, 3 and 5 following construction to assess any operational impacts.

8.5.152 Monitoring of the Desmoulin's whorl snail population should also be undertaken during construction and in years 1, 3 and 5 following construction at the appropriate time of year (mid to late summer).

Terrestrial Invertebrates

8.5.153 No monitoring of the habitats of above average suitability for terrestrial invertebrates is proposed.

8.6 Assessment of Impacts

8.6.1 This section assesses the likely effects of the proposed development based on the successful implementation of the mitigation measures proposed in Section 8.5. Impacts are assessed for the Valuable Ecological Resources listed in Section 8.4.5, during both the Construction phase and the

Operational phase; the latter considers impacts in the Opening Year (Year 1) and in the Design Year (Year 15).

- 8.6.2 Impacts during the Construction phase are those that would occur throughout the two year construction phase, and include the immediate impacts from both the temporary and permanent habitat removal, along with the associated effects this would have. Indirect impacts during construction are also considered; this include the disturbance cause during construction, due to the presence of people, vehicles and plant, the inevitable noise and vibration, localised impacts on air quality due to dust production and pollution, visual impacts on adjacent areas etc.
- 8.6.3 Operational phase impacts are those that occur once the proposed Scheme is opened. The continued absence of habitat lost during the Construction is assessed, against the provision of new habitats within the proposed landscaping scheme, and the return of those areas lost temporarily, for example site compounds, topsoil storage areas, batching plants etc.
- 8.6.4 The indirect effects of the vehicles using the road are also considered. These include disturbance, in terms of noise and vibration, light from vehicles headlights, visual intrusion on adjacent areas etc. As such, it has been necessary to incorporate an in-combination approach to all assessment, such that the potential impacts of disturbance due to, for example alterations in air quality, changes in the noise regime or alterations to surface or groundwater, are included.
- 8.6.5 Cumulative effects are identified and assessed in Volume 1 Chapter 15.

Construction Phase

Statutory Designated Sites

- 8.6.6 No impacts are predicted on Statutory Designated Sites (Broadland Ramsar site, Broadland SPA, The Broads SAC, Mid-Yare NNR, or the River Wensum SAC or SSSI) during the Construction phase of the proposed Scheme. The distance between the Statutory Designated Sites and the proposed Scheme, combined with the mitigation measures to be employed during construction, would ensure that this is the case. As the magnitude of the impact is Neutral, the overall effect would be Neutral. The confidence in these predictions is Certain.
- 8.6.7 No Significant effects are therefore anticipated on any Statutory Designated Sites during the Construction phase of the proposed Scheme.

8.6.8 These conclusions are explored and explained more fully in relation to the SACs, SPAs and Ramsar sites in the NDR Habitat Regulations Assessment report (Mott MacDonald, 2013).

Non-Statutory Designated Sites

8.6.9 No impacts are predicted on the Attlebridge Hills, Whinney Hills & Common, and Payne's Yard Wood, The Owlery & March Covert CWSs; the distances between these sites and the proposed Scheme, and the context of their existing settings are sufficient to ensure this. The magnitude of the impact would be Neutral, with a corresponding Neutral overall effect. The confidence in these predictions is Certain.

8.6.10 Marriott's Way CWS would be directly impacted by the proposed Scheme. Unavoidable loss of habitat would be required to construct the carriageway and associated linear drainage features etc, as well as the proposed overbridge that will ultimately allow the continuation Marriott's Way, both as a habitat and as a footway and cycle and equestrian route. A total length of approximately 300 metres of Marriott's Way would be affected; this length has been greatly reduced during the design process, and represents a small proportion of the total habitat of the CWS, as Marriott's Way continues in a similar form in either direction of the proposed Scheme for several kilometres. The construction of the proposed Scheme, and consequently the loss of habitat would be phased to further minimise the impacts. The magnitude of the impact on this site is predicted to be Minor Negative, leading to a Slight Adverse overall effect during construction.

8.6.11 No impacts are predicted on Ladies Wood, Church Carr & Springs CWS and Ancient Woodland; the site would not be subject to any habitat loss, and the proposed mitigation measures would be sufficient to eliminate any indirect effects. The magnitude of the impact during construction is predicted to be Neutral. The overall effect would therefore also be Neutral.

8.6.12 The confidence in the above predictions is Probable.

8.6.13 Fakenham Road RNR would be directly affected. The whole of this small site would be lost to the proposed Scheme, although the valuable species of flora would have their seeds harvested in advance of construction, and the topsoil, and therefore soil-stored seedbank, would be stored, for reinstatement on the new verge. The magnitude of the impact during construction would be Major Negative as the whole of the site would be removed, giving a Moderate

Adverse overall effect. This would constitute a Significant adverse effect. The confidence in this prediction is Certain.

8.6.14 A part of Ortolan's Grove Ancient Woodland would be permanently lost to the proposed Scheme, meaning that direct adverse impacts are unavoidable. Despite its designation as Ancient Woodland this small site is already fairly degraded. Few mature trees remain in this area, which is now mainly scrub with many self-set young elm trees (*Ulmus* spp), all of which are dead or dying as a result of Dutch elm disease. The most notable, valuable trees are on the south-eastern edge of the wood and comprise of two large, veteran lapsed sweet chestnut (*Castanea sativa*) coppice stools and a small-leaved lime (*Tilia cordata*). The degraded nature of the area means that the ecological integrity of the site, and its status as Ancient Woodland, is already compromised to a major extent.

8.6.15 It is therefore considered that the magnitude of the impact of the proposed Scheme is dissipated by the degradation to the site that has already taken place, as the inherent value of the site has already been greatly reduced. It is therefore considered that, despite its status as Ancient Woodland, the magnitude of impacts on Ortolan's Grove Ancient Woodland is predicted to be Minor Negative. The overall effect would therefore be Slight Adverse. The confidence in this prediction is Probable.

8.6.16 The adverse effect on Ortolan's Grove Ancient Woodland during the Construction phase is therefore not Significant.

8.6.17 Sprowston Wood Replanted Ancient Woodland would not be directly affected. Indirect Construction phase impacts, associated with the disturbance caused by construction vehicles and plant, are likely to be minimal, when considering the distance between the woodland and the proposed works, and when considered in the context of the existing surroundings, adjacent to the A1151 Wroxham Road. The magnitude of these impacts is therefore predicted to be Neutral, with a corresponding Neutral overall effect. The confidence in this prediction is Certain.

8.6.18 The eleven Important Hedgerows would be permanently lost to the proposed Scheme. No Construction phase mitigation is feasible, so the magnitude of the impacts on each of these hedgerows is Major Negative. This means that the overall effect is Moderate Adverse, and is therefore a Significant adverse effect. The confidence in this prediction is Certain.

- 8.6.19 The Construction phase of the proposed Scheme is likely to have direct and indirect effects on three notable areas of woodland, at Drayton Drewray, Spixworth Plantation and Heath Wood. Direct effects would be caused by the unavoidable loss of habitat to the proposed Scheme. Indirect effects are also likely on those remaining adjacent areas of habitat. Severance is likely, whereby one contiguous habitat is split into two or more individual blocks.
- 8.6.20 Associated with this is the introduction of edge effects where currently there are none. Edge effects are the way conditions (daylight, precipitation input, temperature variation, wind loading, disturbance etc) progressively change as you move from the edge to the centre of the woodland (or other habitat). For example, at the edge of the woodland ground flora is likely to be comprised of species that are light tolerant or light-loving. The ground flora species mix is likely to alter away from the edge of the woodland towards the centre, where available light is much less. The ground flora here will contain species tolerant of much darker conditions.
- 8.6.21 The severance and habitat loss that the proposed Scheme will cause will create edge effects where currently there are none; those areas of the interior of the woodlands that would become edge habitats would suffer adverse impacts as those species present may be unable to thrive in the new conditions. The impacts of edge effects are likely to be most marked at Heath Wood and Drayton Drewray; Spixworth Plantation is a long, thin belt of woodland, so there are very few areas that currently do not experience edge effects to some degree already.
- 8.6.22 The Construction phase may also create indirect effects on woodland by the alteration of the groundwater regime, whereby the earthworks may interrupt or reduce groundwater movement, potentially affecting the availability of water for the trees, shrubs and plants.
- 8.6.23 The magnitude of the impacts on the above woodlands are predicted to be Minor to Intermediate Negative This depends on the size and the proportion of the woodland block to be lost to the proposed Scheme, and the integrity and health of the existing habitats. The overall effects in all cases will therefore be Slight Adverse. The confidence in these predictions is Probable.
- 8.6.24 Note that the above assessment of impacts and effects consider just the habitat; assessment of protected and other species likely to be using these habitats are made elsewhere in the section as appropriate.

8.6.25 One small area of parkland would be directly affected by the proposed Scheme, at Beeston Park to the immediate north of Beeston Hall, where habitat loss is inevitable. At this location, the habitat is primarily semi-improved grassland. Few standard trees are present as you would expect in parkland; instead small woodland blocks are present. Some areas of historical parkland are now arable fields.

8.6.26 The magnitude of the impact on parkland habitats is predicted to be Minor Negative, leading to a Slight Adverse overall effect. The confidence in this prediction is Certain.

8.6.27 The consideration of parkland as a landscape feature, as opposed to a habitat or habitats, is given in Volume 1 Chapter 7 Landscape.

Arable Field Margins

8.6.28 A small number of arable field margins would be lost to the proposed Scheme. However, these habitats are ephemeral, becoming established in a very short time. They are also fairly easily replicated; relocation of the topsoil would be likely to include the seedbank, so a very similar sward would be likely to grow soon after relocation. The magnitude of the impact on these habitats is therefore considered to be Neutral, with a corresponding Neutral overall effect. The confidence in this prediction is Certain.

Hedgerows

8.6.29 In common with Important Hedgerows already discussed, unavoidable loss of further hedgerows would occur during the Construction phase of the proposed Scheme. No Construction phase mitigation is feasible, although the lengths of hedgerow to be removed would be minimised as far as possible. In most cases only a section of the hedgerows would be removed, so the magnitude of the impacts on each of these hedgerows is Intermediate Negative, giving a Slight Adverse overall effect. The confidence in this prediction is Probable.

Bats

Directly Affected Roosts in Buildings

8.6.30 The loss of the three buildings used as roosts within the footprint of the proposed Scheme would be mitigated for by the advanced provision of two new bat houses. (One of the existing buildings, although a roost in the past, is

unlikely to be used as anything more than a feeding perch now, as its ongoing dereliction means that conditions are no longer suitable for more permanent, notable roosts. The most recent records of bats using this building are as a feeding perch only). Despite the provision of the bat houses, and the proposed timing of demolition of the existing roosts to minimise impacts, adverse effects would still be likely during the Construction phase.

- 8.6.31 Although the proposed bat houses would be located as close to those buildings to be lost as possible, it is possible that it would take some time for the bats to find and become accustomed to the new buildings. The roosts in the current buildings are likely to have been used for many seasons now, so their use is likely to have become habituated to a certain extent. This may mean that uptake and utilisation of the new roost site is not immediate, and that some of the bats temporarily move to find alternative roost sites in the wider landscape.
- 8.6.32 However, it is not uncommon for bats to use different roosts during and between seasons. Moving between roosts is a known feature of bat activity; this is one of the main reasons why up-to-date survey data is so important in accurately assessing impacts. This means that the impact on the recruitment rate for those bats using these roosts should be limited. Any adverse effects are likely to be temporary, lasting only one or two seasons. The new bat houses, once their usage has become established, would offer more secure, long-lasting roost locations, in which almost all aspects of the design have been formulated expressly to maximise appeal for roosting bats.
- 8.6.33 The loss of habitat during the Construction phase, considered in more detail below, would act to compound the above impacts.
- 8.6.34 During construction, the magnitude of the impacts on bats roosting in directly affected buildings, even with the described mitigation measures in place, is predicted to be Intermediate Negative. This means that the overall effect would be Large Adverse. This is considered to be a Significant adverse effect. The confidence in this prediction is Probable.

Directly Affected Roosts in Trees

- 8.6.35 The loss of seven known bat roosts in trees would have similar adverse impacts on bats as those described above. New potential roost sites would be created by the provision of bat boxes in the vicinity of each existing roost in advance of their loss. As each of the seven known trees with bat roosts are used as summer roosts, they would be removed at a time of year when bats

would not be using them. However, the same temporary effects as above are likely, with a possible slight impact on rates of recruitment over a short period of perhaps a season or two, until such time as new roost sites are identified and habituated.

8.6.36 The loss of habitat during the Construction phase, considered in more detail below, would act to compound the above impacts.

8.6.37 The impact on the bats using those roosts to be lost to the proposed Scheme would be experienced in conjunction with other aspect of the Construction phase, most notably the permanent and temporary loss of habitat locally. The impacts associated with habitat loss are discussed in detail below.

8.6.38 During construction, the magnitude of the impacts on bats roosting in directly affected trees is therefore predicted to be Intermediate Negative. This means that the overall effect would be Large Adverse. This is considered to be Significant. The confidence in this prediction is Probable.

Indirectly Affected Roosts

8.6.39 Those roosts in buildings and trees in areas adjacent to the proposed Scheme should experience limited indirect adverse impacts. The mitigation measures employed during construction, to avoid sensitive times of the year wherever possible, and to minimise indirect effects of disturbance through carefully specified lighting equipment etc, would serve to achieve this. The main effect on bats using indirectly affected roosts would be due to the habitat loss to the proposed Scheme, which is discussed in detail below.

8.6.40 The magnitude of the specific impact on indirectly affected roosts is predicted to be Minor Negative, giving a Slight Adverse overall effect. The confidence in this prediction is Probable.

Significant Flight Paths and Other Features of Importance

8.6.41 The pattern of land use within the Zol is such that a large proportion of the habitats of value to bats are linear features that bisect arable fields and other areas of lower utilisation, as many of the bat species are dependent on using linear features for navigation, shelter and as a source of prey species. This means that the main effect of the extensive habitat loss within the Zol is one of severance of flight paths and commuting routes. Small pockets of wider,

non-linear habitat of value to bats, for example blocks of woodland, are also to be lost.

- 8.6.42 The permanent loss of habitat to the proposed Scheme would affect a large number of significant flight routes, throughout the length of the route. This is by virtue of the size of the proposed Scheme, and the value and volume of the habitats, and hence the size of bat populations, locally. Many of these routes are used in large numbers by several species of bats, including the most sensitive species found within the Zol, the barbastelle. For several of the bat species present within the Zol, the habitat lost, and the linear features severed, would mean that without mitigation, movement through the landscape would be impeded, as they are dependent on the habitat features along which to fly.
- 8.6.43 The most sensitive species are those clutter-dependent, light intolerant species such as barbastelle and brown long-eared bat species, which rely heavily on the shelter of the woodlands, tree canopies and hedgerows, and the physical structure, shelter and darkness that these features provide. These species would experience the most notable impacts. Other species, such as the pipistrelles, also tend to use linear features as commuting and foraging routes, but are more light tolerant, so negotiating gaps in linear features is less problematic. These species would be impacted to a slightly lesser degree. Other species, such as the noctule, are high-flying and light tolerant, so are less dependent on linear features and darkness to be able to move through the landscape. These species would experience the least adverse impacts.
- 8.6.44 The habitat loss may sever roost sites from foraging areas, hibernation roosts from summer roosts, or may sever different parts of the home range of bats, which can cover very large areas. Even in one night some species of bat could easily travel several kilometres.
- 8.6.45 The most important flight path within the Zol is Marriott's Way, by virtue of the frequency of use by bats. All species of bat within the Zol have been recorded using this feature, including individuals from the sizeable barbastelle population known to be centred in habitat several km to the west. Of comparable importance is the flight path along Middle Road, Great Plumstead. The grounds and buildings of Great Plumstead Hall are known to be used by various bat species, and Middle Road is a well-used route for nightly foraging, and for seasonal movement of bats through the wider landscape.

- 8.6.46 The severance of all significant flight paths would be mitigated for by the provision of crossing structures, either a wire gantry, green bridge, tunnel or modified highway bridge structure, as described in the Mitigation section. However, as has been described with the proposed new roosts above, there is likely to be a short term effect on bat movement through the wider landscape even with these features in place, as the process of habituation takes place. The bats would be presented with unfamiliar absences of habitat along which to fly, and unfamiliar structures which would have taken their place. It is likely that use of these significant flight paths would be reduced until the use of these crossing points became the norm.
- 8.6.47 Until habituation takes place, the severance of significant flight paths, and the loss of habitat along which to feed, could result in short term drops in feeding rates. Consequent effects, if the health and physical condition of bats is affected too much, would be a short term drop in breeding success, with an inherent dip in recruitment rates to bat populations locally. This would be likely to last as long as the habituation of new crossing points and flight paths takes, typically one or two seasons.
- 8.6.48 The underpass at Rackheath Park is likely to be the first mitigation structure to be habituated by bats. Structures such as this are known to be readily used, and the underpass would be installed at a level very similar to the existing ground level, and therefore the existing flight level. This, along with the barrier/funnel effect that the proposed Scheme would have on bat flight routes in this location due to its elevation above the existing landscape, mean that the tunnel should be readily accepted and used by bats in this location, with only a short period of habituation required.
- 8.6.49 The wire gantries would be constructed during the first winter of the Construction phase, so there would be no impacts during the summer season. Instead the new crossing points would be in place for when bats emerged from hibernation, so the impact would be between, and not during seasons. The design of gantry, specifically the shape and orientation of the wire mesh between the columns, has been chosen as it is thought to be the most easily adapted to by bats.
- 8.6.50 An advantage of installing the permanent wire gantries during the early stages of the Construction Phase mean that, although habitat loss would be evident, there should be little in the way of features beneath them to act as a source of disturbance during the habituation process. Were the installation of permanent gantries to be delayed until the end of the Construction phase, the habituation process would be impaired by the presence of volumes of traffic

using the road, with the associated noise and lighting from vehicle headlights. Instead, there would be little or no sources of disturbance (noise, light, people) at night during the Construction phase to exacerbate the impacts of the severance of the linear habitats.

8.6.51 The construction of the Green Bridges at Marriott's Way and Middle Road, and the modified highway bridges at Buxton Road and Newman's Road, would take more than twelve months. In the case of Marriott's Way the construction programme is 18 months, although this includes a pause specifically to minimise impacts on bats using this route. However, the duration of the construction of these bridges means that, with the exception of Marriott's Way, at least one full season would pass with severance likely to be unavoidable.

8.6.52 The loss of portions of woodland habitat at Spixworth Plantation and Heath Wood, both of which are known to be of importance for bat populations, is also likely to have adverse impacts on bat populations locally. Spixworth Plantation, a linear woodland belt, would be severed by the proposed Scheme. Extensive habitat recreation would take place to mitigate for the severance, although its viability before becoming established is likely to be limited. The severance of habitat at Heath Wood is to be mitigated for by the provision of a modified highway bridge to provide a dark corridor between the remaining areas. As with previously, there would be a period between the loss of habitat and the provision of the bridge during which connectivity is not provided, and despite sensitive phasing of the works the duration of the construction of this bridge is such that impacts on bats, between their hibernation periods, is likely.

8.6.53 The number and sensitivity of significant flight routes that would be severed, and the number of bats known to be impacted by the severance that the loss of habitat will cause, means that the magnitude of the impacts on bats using these routes, even with the above mitigation, is predicted to be Minor to Intermediate Negative depending on a number of factors including location, species, duration of disturbance, degree of change of habitat etc. The overall effects would therefore be Slight to Large Adverse. These effects are considered to be Significant. The confidence in this prediction is Probable.

Other Areas of Activity

8.6.54 The above assessments deal with the majority of the likely impacts on bats, so few other features require assessment. A notable proportion of the

permanent and temporary areas to be lost to the proposed Scheme are comprised of habitats such as arable fields, amenity and improved grassland, which are of limited value and usage by bats as they offer little in the way of shelter or sources of prey species. Impacts due to the loss of these areas are likely to be limited.

- 8.6.55 The temporary loss of habitat during the Construction phase is likely to have very little additional effect on bat populations with the Zol. All site compounds, topsoil storage areas, batching plants etc have been designed such that only arable and low value grassland would be lost. It would not cause any severance additional to that already considered.
- 8.6.56 The magnitude of the impact due to the loss of these areas during Construction is predicted to be Minor Negative, giving a Slight Adverse overall effect. The confidence in this prediction is Certain.

Badgers

- 8.6.57 Four of the seven identified setts are active; however three of these are outside of the footprint of the proposed Scheme, and so would not be directly impacted. Just one active sett, Sett 7 is within the footprint. However, as an outlier sett it is used only occasionally, and it will be closed when monitoring demonstrates that no badgers occupy it. This means that there would be negligible adverse impacts on badgers due to the closure of setts.
- 8.6.58 Further impacts on the badgers using those occupied setts would be likely due to the required loss of habitat to the proposed Scheme, although in most cases the habitat is generally sub-optimal and not within the likely main territory; the proposed Scheme has been designed in order that optimal habitats are avoided as far as possible. The loss of habitat should be considered in the context of the large sizes of territories. It is acknowledged that Scheme as such as this can influence badger behaviour such that the 30 metres of habitat adjacent to the road becomes less favourable, and therefore less well used, which means an additional impact on the amount of habitat effectively lost to the proposed Scheme.
- 8.6.59 Severance of populations is likely to have only a slight impact on populations. The population at Sett 1 is known not to move far to the south and east of the road, as only a small area of foraging habitat is available in this direction; instead the optimal habitat is away from the road, in the opposite direction. The risk of vehicle collision mortality for this population is addressed as far as

practically possible by the badger fencing, which would prevent them from entering onto the carriageway.

8.6.60 Similarly with Sett 2, the habitats to the south, beyond the proposed Scheme are sub-optimal, whereas the wooded habitats to the north are far more valuable, with much more activity known in this direction. Again, badger fencing would preclude their access to the carriageway, all but eliminating the risk of vehicle collision mortality.

8.6.61 The badgers using Sett 5, a newly discovered sett to the west of the proposed Scheme, are likely to regularly travel to habitats to the east, within and beyond the route. Severance of habitats is therefore likely, although vehicle collision mortality would be eliminated as the badger fencing would prevent access to the carriageway. The area between the woodland and carriageway would include a sizeable area of grassland, scrub and woodland landscaping, and the fence would be positioned towards the carriageway side of this planting, so that as much of the original area would remain as accessible as possible.

8.6.62 The installation of badger fencing, coincident with the proposed Scheme extents, at the earliest stages of construction, means that vehicle collision mortality would be very unlikely.

8.6.63 Considering all of the above, it is predicted that during construction that the magnitude of the impacts on occupied badger setts is likely to be Minor Negative. This means that a Slight Adverse effect is therefore likely. On those unoccupied badger setts the impact would be Neutral, so a Neutral effect is likely. The confidence in these predictions is Probable.

8.6.64 In summary, no Significant effects on badgers are anticipated during the Construction phase.

Great Crested Newts

8.6.65 Each of the three great crested newt meta-populations being considered at this stage is of Very High conservation value due to their European level of protection.

8.6.66 During construction the Dog Lane, Horsford meta-population is likely to be indirectly impacted by a loss of small areas of terrestrial habitat, although these areas will be at least 100 metres from the ponds used, associated with linear features to the edges of large arable fields, with no further breeding ponds in this direction. The duration of the impact is likely to be restricted to one season, and the exclusion will be timed to take place during the seasonal

cycle when impacts can be eliminated or minimised. This means that the magnitude of the impacts is likely to be Neutral. A Neutral effect during construction is therefore predicted. The confidence in this prediction is Probable.

8.6.67 The Quaker Lane, Spixworth meta-population is likely to experience a loss of some terrestrial habitat, as the proposed Scheme is 100 metres from pond 16. The duration of the impact is likely to be restricted to one season, and the exclusion will be timed, as above, to take place when impacts can be minimised. The magnitude of the impacts is likely to be Minor Negative. A Slight Adverse effect is therefore predicted. The confidence in this prediction is Probable.

8.6.68 The Newman's Road, Rackheath meta-population will be directly impacted by the permanent loss of a pond and some terrestrial habitat. Although three new ponds will be provided in advance, and the population subject to a trapping and relocation exercise, timed to be as effective as possible, the disturbance may result in short term reduction in breeding success in those seasons when construction is taking place. However, sufficient other breeding ponds and terrestrial habitats will remain, that the viability of the meta-population is not likely to be jeopardised, so the magnitude of the impacts here is assessed as Minor Negative. The meta-population is therefore likely to experience a Slight Adverse effect. The confidence in this prediction is Probable.

8.6.69 No significant adverse effects on great crested newts are therefore anticipated during construction.

Breeding Birds

8.6.70 There are 15 breeding bird species of High conservation value and 15 species of Medium conservation value within the Zol.

8.6.71 Direct impacts during construction centre on the permanent and temporary loss of habitat to the proposed Scheme. Habitat clearance will avoid the nesting season, so this aspect of the impacts is negated, although there remains the net loss of breeding, foraging and commuting habitats that the proposed Scheme will cause, and the fragmentation that is likely, due to the severance of linear and other habitats.

8.6.72 Arable land makes up a significant proportion of the habitat to be lost to the proposed Scheme. Breeding bird utilisation of arable farmland was relatively diffuse but the spatial scale of the proposed route is taken into context when

considering the overall impacts. Breeding bird habitat utilisation of woodland and hedgerows was comparatively high especially where mature trees were present. Given the high utilisation of woodland locations any impacts here are likely to have a notable effect on the avifauna within the Zol.

- 8.6.73 The loss of woodland, acknowledged as being the most important habitat within the Zol, supporting the largest, most diverse breeding bird populations, has been avoided as far as possible through careful route selection and refinement, although loss of an area of Heath Wood and the corner of Drayton Drewray will occur. In each of these cases, displacement, rather than loss, of breeding birds is likely as sizeable proportions of both woodlands will remain. The loss of these habitats is considered in the context of the wider landscape, however, as it is likely that individual breeding and home ranges of birds are not restricted to the footprint of the proposed Scheme. No slow flowing or standing water habitats will be lost under the footprint of the proposed Scheme.
- 8.6.74 The impacts of severance of habitats is very hard to predict, and is likely to vary species to species. The proposed Scheme footprint is a minimum of approximately 80 metres in width, taking in the carriageways, verges, swales, embankments, footway/cycleways etc. However, the width fluctuates along its length, where drainage lagoons, wider landscaping areas, embankments of bridges, junctions etc are proposed. These additional, adjacent features have generally been designed to avoid linear habitat features as far as possible, minimising the impact of the severance.
- 8.6.75 There is a lack of evidence to suggest roads act as a physical barrier to movement of bird species although there may be behavioural barriers and some avoidance as a result of degraded habitats. In a fragmented landscape behavioural barriers can have greater significance, especially for specialist woodland species such as marsh tit (*Poecile palustris*) where the dispersal behaviour of this species is known to be sensitive to habitat fragmentation resulting in poor settlement beyond the natal wood.
- 8.6.76 The proposed scheme does not fragment likely corridors of movement between significant areas of woodland within the Zol i.e. Attlebridge Hills, Deighton Hills and Drayton Drewray, and Church Wood and Belaugh Broad, Wroxham (outwith the Zol). The adverse effects of the potential to create a barrier to dispersal and interaction between populations are considered only likely to affect the population of marsh tit in The Springs, where the proposed Scheme would create a barrier to movement to the south.

- 8.6.77 Indirect impacts on breeding birds in the Zol centre on the construction noise and increased human presence, which are likely to cause disturbance and displacement of birds. The disturbance effects of lighting and of localised decreases in air quality, primarily associated with dust production, are also likely to contribute to disturbance and displacement, although to a slightly lesser extent. Impacts are likely to take the form of reduced breeding success as a result of nest abandonment, increased predation, changes in nest site selection, reduced density of breeding birds and changes in community structure.
- 8.6.78 Construction activities at many locations within the proposed Scheme are likely to be phased and intermittent, meaning that impacts would be short term only, although some locations, particularly around the proposed bridges, will require longer, more sustained construction activities. With a construction programme of two years, portions of this will be outside the breeding season, so no effects on breeding birds would be felt during these times.
- 8.6.79 Although the effects of artificial light on breeding birds are still poorly understood it has been found to impact on birds in a number of ways. Extending the number of hours available for feeding could be conceived as a positive impact however it could potentially have an adverse impact on prey populations and result in food shortages for the bird species concerned. Further, it has been identified in many bird species that lighting can cause them to come into breeding condition prematurely by creating artificially long days in winter. Early breeding attempts could potentially fail if there is insufficient food to feed young or if weather conditions prove too adverse for young birds to survive. The specific effects on barn owls are considered in the next section.
- 8.6.80 In considering the above, and the status of almost all breeding bird species within the Zol as representing less than 1% of the county breeding population, it is predicted that there would be an Intermediate Negative impact on breeding birds during the Construction phase. This means that, for those species of High conservation value there would be Large Adverse overall effects, and for species of Medium conservation value there would be Moderate Adverse overall effects. The effects during construction on those species of High and Medium conservation value would therefore be Significant. The confidence in these predictions is Probable.

Overwintering Birds

- 8.6.81 Impacts on overwintering birds would be similar to those described above for breeding birds, although the seasonal sensitivity would be lower as no breeding activity would be taking place over winter. The habitat loss and indirect impacts due to disturbance during the Construction phase.
- 8.6.82 It is predicted that there would be a Minor Negative impact on overwintering birds during the Construction phase. This means that, for those species of both High and Medium conservation value there would be Slight Adverse overall effects. No Significant effects are therefore anticipated on overwintering birds during the Construction phase. The confidence in these predictions is Probable.

Barn Owls

- 8.6.83 The barn owl populations identified within the Zol are of High conservation value.
- 8.6.84 Three main adverse impacts are likely during the Construction phase of the proposed Scheme. The first is the loss of one known nesting/breeding site. This is a direct, unavoidable and permanent loss, which is likely to have a displacement effect in terms of the barn owl population within the Zol, and a potential short term reduction in breeding success for the local population, whilst new nesting/breeding sites are identified, and breeding territories re-established.
- 8.6.85 The proposed Scheme will require the loss of areas of habitat over which barn owls currently hunt. Suitable short, semi-improved grassland within the footprint of the proposed Scheme is currently associated with grass verges, arable field margins and some grazed areas. Large portions of the habitats within the footprint are not particularly suitable for hunting over, however, and the ranges of barn owls can be several square kilometres in size in order to include sufficient suitable hunting habitat. The loss of suitable habitat due to the proposed Scheme should therefore represent only a small proportion of the habitat used by those barn owls recorded within the Zol. It is not considered that severance of habitats would result in direct fragmentation of barn owl home ranges, due to the mobility of the species.
- 8.6.86 The construction phase of the proposed Scheme is likely to have another, indirect effect, whereby the likely disturbance may accentuate the above potential decrease in breeding success within the Zol. The presence of construction plant, vehicles and people, and the associated noise, vibration, lighting and other activities is considered likely to deter barn owls from

successfully breeding for several hundred metres either side of the proposed Scheme.

8.6.87 Considering all of the above impacts, it is predicted that the overall magnitude of the impact on barn owls during construction would be Minor Negative, giving a Slight Adverse effect. The confidence in this prediction is Probable.

8.6.88 No significant adverse effects on barn owls are therefore anticipated during construction.

Aquatic Invertebrates

8.6.89 The aquatic invertebrate population at The Springs is of High conservation value.

8.6.90 Aquatic invertebrate populations at The Springs will not be directly impacted by the proposed Scheme, as no habitat will be lost and no changes to the hydrology of the site are predicted. Indirect effects, associated with changes to water quality or quantity, in terms of both surface water and groundwater, will be mitigated for by the effective control of events likely to cause such issues. During construction, there remains the potential for disturbance by construction vehicles, plant and processes, although pollution prevention and control measures would ensure that there would be no foreseeable accidental pollution of surface- and ground-water. Indirect impacts caused by a decrease in air quality remain possible.

8.6.91 The magnitude of impacts on the aquatic invertebrates would be is Minor Negative; this means that there would be a Slight Adverse effect during construction. The confidence in this prediction is Certain. No significant effects on aquatic invertebrates are therefore anticipated during construction.

Terrestrial Invertebrates

8.6.92 The immature woodland plantation at The Springs, as a habitat that offers an above average suitability for terrestrial invertebrates, is of Medium conservation value. During construction, there remains the potential for disturbance by construction vehicles, plant and processes, and for accidental pollution of surface- and ground-water. Indirect impacts caused by a decrease in air quality remain possible. There should be no direct loss of habitat, as the proposed Scheme has been designed to eliminate this potential impact.

8.6.93 It is therefore considered that the magnitude of the impacts on this habitat and its likely population of terrestrial invertebrates is Minor Negative; this means that there would be a Slight Adverse effect during construction. The confidence in this prediction is Certain.

8.6.94 No significant adverse effects on this habitat are therefore anticipated during construction.

Operational Phase

Statutory Designated Sites

8.6.95 No changes to the construction phase impacts are predicted, either at Year 1 or Year 15 of the Operational phase of the proposed Scheme. The magnitude of the impacts on all Designated Sites (Broadland Ramsar site, Broadland SPA, The Broads SAC, the River Wensum SAC and SSSI, and the Mid-Yare NNR) would remain Neutral, with a Neutral overall effect. The confidence in this prediction is Certain.

Non Designated Sites

8.6.96 The direct effect of the habitat loss on Marriott's Way CWS is likely, at Year 1, to have only been partly mitigated by the proposed landscaping and habitat recreation. Whilst the majority of the planting here would be un-established trees and shrubs, linear features of more established planting within the landscaped areas would offer the connectivity required by bats and other protected species even at this early stage.

8.6.97 The indirect impacts during the Operational phase associated with the traffic, namely disturbance through noise and lighting from headlights, and due to the likely decrease in air quality, combined with the above mean that the magnitude of impacts at Year 1 are predicted to remain Minor Negative, with a Slight Adverse overall effect. By Year 15 the habitat is likely to be well established, with connectivity of habitats fully restored and functioning. The maturity of the habitats would act to reduce or eliminate some of the indirect impacts associated with the road described above. It is therefore predicted that at Year 15 the magnitude of the impacts on Marriott's Way would be Neutral, with a corresponding Neutral overall effect. The confidence in these predictions is Probable.

8.6.98 No direct adverse impacts are anticipated on The Springs CWS, as the drainage system of the proposed Scheme will ensure that water quality and quantity entering the watercourse here would remain as is currently the case. Indirect impacts, due to disturbance and a potential decrease in air quality, are likely to be limited given the geographical context of the site, adjacent to the existing A1151 which is already subject to heavy traffic volumes. It is therefore predicted that the magnitude of the impact at Years 1 and 15 would be Neutral, with a corresponding Neutral overall effect. The confidence in this prediction is Probable.

8.6.99 No impacts are predicted on the remaining CWSs during the Operational phase of the proposed Scheme. The magnitude is therefore Neutral, and the overall effect is also Neutral. The confidence in these predictions is Certain.

8.6.100 During the operation of the proposed Scheme the Fakenham Road RNR would begin to re-establish. At Year 1 the habitat is not likely to be to the same quality as existing, so the magnitude of impact would remain Minor Negative, giving a Slight Adverse overall effect. By Year 15 the habitat would be well-established and very similar to existing. The habitat currently exists next to a heavily trafficked road, so re-establishing in similar conditions would not be an issue. The magnitude of impact at Year 15 is therefore predicted to be Neutral, giving a Neutral overall effect. The confidence in these predictions is Probable.

8.6.101 The Operational phase impacts on Ortolan's Grove ancient woodland would be minimal. Indirect impacts on the health of the woodland due to factors such as a slight decrease in air quality in the immediate vicinity, and the altered hydrological and hydrogeological regime, would be of a Minor Negative magnitude, giving a Slight Adverse overall effect. This would be the case at both Year 1 and Year 15. The confidence in this prediction is Probable.

8.6.102 The impacts on Sprowston Wood, being slightly further away, are predicted to be Neutral, with a corresponding Neutral overall effect. Again, this would be the case at Year 1 and Year 15. The confidence in this prediction is Certain.

Woodland

8.6.103 During the Operational phase of the proposed Scheme the impacts on those remaining areas of woodland would be indirect, and likely to act mainly by disturbance. The increase in noise and vibration, whilst unlikely to affect

the habitat itself, is likely to affect the function of the habitat for fauna within it; the effect would be at its most notable close to the carriageway, and would dissipate with distance.

8.6.104 Similarly, a potential drop in air quality is likely to indirectly affect the woodland habitats, increasing stress on trees and shrubs, increasing their susceptibility to disease and generally affecting the health and integrity of the habitat. As above, these impacts would dissipate with distance from the proposed Scheme.

8.6.105 At Year 1 these impacts are likely to be marked. The sudden, indirect effects associated with the volumes of traffic using the proposed Scheme on opening are likely to be an initial cause of stress on the adjacent, remaining woodland habitat. The magnitude of the impact at Year 1 is therefore considered to be Minor Negative, giving a Slight Adverse overall effect. At Year 15, the conditions, and therefore impacts, are likely to remain the same. The confidence in these predictions is Probable.

Parkland

8.6.106 The impacts on the remaining parkland habitats are similar in principle to those described above for woodlands. However, the limited areas of parkland habitat, and the already reduced ecological value, particularly when partially lost to arable and other land-uses, mean that the magnitude of the impacts on parkland habitats are predicted to be Neutral, with a corresponding Neutral overall effect. This would be the case both at Year 1 and Year 15. The confidence in this prediction is Certain.

Arable Field Margins

8.6.107 The ephemeral nature of arable field margins, and the comparatively harsh conditions in which they often exist, mean that those remaining in the vicinity of the proposed Scheme should not experience any tangible impacts. The magnitude of the impacts, and associated overall effect, are therefore predicted to be Neutral, at both Year 1 and Year 15. The confidence in this prediction is Probable.

Hedgerows

8.6.108 In common with woodlands, hedgerows adjacent to, and in the vicinity of, the proposed Scheme, are likely to be indirectly affected by disturbance, potential increases in noise and vibration and slight decreases in air quality locally. The sudden change in air quality and noise at Year 1 is predicted to give rise to Minor Negative magnitude impact, leading to a Slight Adverse overall effect. These impacts are likely to remain the case at Year 15. The confidence in this prediction is Probable.

Bats

Directly Affected Roosts in Buildings and in Trees

8.6.109 At Year 1 those bats that would have been displaced from their roosts will be beginning to habituate themselves with the bat houses and other new roost sites. They are also likely to have returned to other, previously used roost sites and/or discovered new alternatives. It is likely that the habituation process would still be in process, with new/altered routes to and from the new roosts. The degree of impact is likely to be affected by the differing adaptability between those species having been displaced, the amount of associated habitat and number of significant flight paths that were lost during the Construction phase, the amount and location of newly created habitats, flight paths etc.

8.6.110 It is therefore predicted that the magnitude of the impact on the bats using those roosts in buildings or trees that are directly affected by the proposed Scheme at Year 1 would be Minor Negative, giving a Slight Adverse overall effect. The confidence in this prediction is Probable. By Year 15, the use of the new roosts would be well established, with their locations and features part of the ingrained habits and seasonal cycles of the affected bats. The impacts associated with having been displaced from roosts are likely to have been negated, so the magnitude of the impact at this time is predicted to be Neutral. The overall effect would therefore be Neutral. The confidence in this prediction is Probable.

Indirectly Affected Roosts

8.6.111 It is predicted that those indirectly affected roosts, in buildings, structures and trees not directly affected by the proposed Scheme would experience very little in the way of indirect impacts. The nature of the footprint of the proposed Scheme is such that the road itself is only a proportion of the total area, and so those roosts beyond the edge of the footprint of the

proposed Scheme would in some cases be tens of metres further from the new road itself. The habitat creation, and its screening effect, along with the screening of the earthworks along the majority of the route, would mean that at both Year 1 and Year 15, the magnitude of the impact would be Neutral, with a corresponding Neutral overall effect. The confidence in this prediction is Probable.

Significant Flight Paths and Other Features of Importance

8.6.112 As outlined in the prior section on Construction phase impacts, the degree to which impacts are felt is likely to depend on a number of factors.

8.6.113 The flight path along Marriott's Way is the most sensitive within the ZOI, and would also be subject to the most significant physical change, due to the undisturbed nature of the feature currently, and the sheer physical size of the proposed Scheme at this location. At Year 1 the habituation of the proposed green bridge, which will include established planting up all approach ramps, and across the bridge deck itself, is still likely to be in its early stages. This is because of the length of the construction process, with construction at this location not due for completion until towards the end of the overall scheme construction programme.

8.6.114 The indirect impacts due to disturbance, caused by the volume of vehicles using the proposed Scheme, and the inherent noise, vibration and lighting from headlights, although very different to the existing situation, should be of limited impact. The design of the proposed Scheme at Marriott's Way, and the inherent mitigation measures included, should ensure that the bats using the route experience little in the way of indirect impacts due to disturbance.

8.6.115 The risk of vehicle collision mortality at Marriott's Way, as bats would be guided up and over traffic by the solid structure, should be low.

8.6.116 However, the number of bats using this flight path, the frequency of use, the significance in terms of connecting parts of the ranges of bats, the sensitivity of the species using it, and the variation in light tolerance of those species, means that at Year 1 the magnitude of the impacts on this flight route is predicted to remain Intermediate Negative, giving a Large Adverse overall effect. This means that the adverse effect here remains Significant.

8.6.117 By Year 15, the bat populations using this flight route are likely to have become far more habituated to the structure of the bridge, the baseline

disturbance associate with the traffic using the proposed Scheme and the general layout of the area. The landscaping and habitat creation are likely to be well established, both along the existing route of Marriott's Way, including over the bridge itself, and in those areas along the route where currently there is little existing connectivity. This would offer more potential routes through the wider landscape, in addition to or instead of along Marriott's Way.

- 8.6.118 The degree of habituation that would be expected to take place will again depend on the multiple factors already referred to, and the limited understanding as to the success, or otherwise, of structures such as the proposed Marriot's Way overbridge, as very few currently exist in the UK, and so very little scientific data is available on which to base conclusions. (Note that despite the absence of proven success of overbridges in connecting an otherwise severed bat flight route, it is the case that it is the most appropriate mitigation measure to put in place at this location). The magnitude of the impact on this flight route at Year 15 is predicted to be Neutral to Minor Negative, giving a Neutral to Slight Adverse impact at this time. The confidence in this prediction is, however, Uncertain.
- 8.6.119 All the same factors as described above relate to the other sensitive flight routes, to varying degrees. The habituation of the bats to the new crossing features at Year 1 will still be in its early stages, as would the establishment of the associated habitat creation.
- 8.6.120 The degree of indirect disturbance from vehicles using the proposed Scheme will depend on the crossing structure type and the general layout at each crossing location. The underpass, allowing bats to travel beneath the proposed Scheme, would be subject to the lowest levels of disturbance. Those adapted highway bridges, where tall, solid parapets would create dark flyways would also experience limited disturbance. The wire gantries offer less in terms of screening out illumination from vehicle headlights, however these gantries have generally been proposed to mitigation for the impacts on those more light-tolerant bat species.
- 8.6.121 The depth of the road in cutting or false cutting, combined with the proposed habitat planting, which will be planted as established trees and shrubs at certain, sensitive locations, mean that the risk of vehicles collision mortality is low.
- 8.6.122 The slightly reduced sensitivity of the other flight routes, in comparison to Marriott's Way, in terms of volume of bats, diversity of species, importance of the routes within bat ranges etc, mean that at Year 1 the magnitude of the

potential impacts are predicted to have lessened from those during the Construction phase to Neutral to Minor Negative, with Neutral to Slight Adverse overall effects. By Year 15, when habituation and habitat establishment have both taken effect, the magnitude of impacts is predicted to be Neutral, with a corresponding Neutral overall effect. The confidence in this prediction is Probable.

Other Areas of Activity

8.6.123 The vast majority of habitats used by bats have been considered in the above sections, so the assessment of impacts in these sections relates to small components of habitat and bat usage. All the factors described in prior sections remain the case, so other areas of activity would continue to be affected during the Operational Phase.

8.6.124 The magnitude of the impact at Year 1 is therefore likely to remain as during the Construction phase, Minor Negative, giving a Slight Adverse overall effect. The magnitude of the impacts on other areas of bat activity at Year 15 would be Neutral. The overall effect would therefore also be Neutral. The confidence in these predictions is Probable.

Badgers

8.6.125 Impacts on badger populations during the Operational phase would be minimal. The risk of vehicle collision mortality would remain very low, as the badger fencing would remain in place, preventing access to the carriageway.

8.6.126 Those areas of habitat temporarily lost to the proposed Scheme would return to their previous uses, predominantly arable land, partially compensating for the permanent loss of habitat, although this proportion is very small. The landscaping scheme would not, at Year 1, be established so is unlikely to offer much usable habitat. Even at Year 15, when it is likely to have become established, the disturbance from the carriageway and the proximity of most landscaped areas within 30 metres means that use by badgers would be infrequent.

8.6.127 At Year 1 the magnitude of the impacts on those occupied setts is likely to have reduced to become Neutral. This is primarily because of the mobility and flexibility of badgers in determining their home ranges, meaning that the loss of available habitat to the proposed Scheme would have quickly become

accounted and compensated for. This means that the overall effect on badgers at Year 1 would be Neutral.

8.6.128 The impact and overall effect at Year 15 are both likely to remain Neutral.

Great Crested Newts

8.6.129 The Dog Lane, Horsford meta-population would benefit from the slight increase in terrestrial habitat that the landscaping scheme would provide, although this is around 100 metres from the breeding ponds, and connected only by a small number of linear terrestrial habitat features. As with for most other valued ecological resources, at Year 1 the habitat would be too young to be of any viable use as it would be unlikely to provide sufficient shelter from predators to be used by the newts. The magnitude of the impact on this meta-population is therefore predicted to be Neutral, with a corresponding Neutral overall effect.

8.6.130 By Year 15 the habitat will have become well-established, as viable terrestrial habitat for great crested newts. Overall there should be a net gain in terrestrial habitat accessible to this meta-population, including the grassed and wooded banks to the northern approach ramps to the Bell Farm track bridge, as well as linear habitats along the proposed Scheme, which would provide connectivity to habitats to the east and west that currently are not easily accessed for newts. However, the connectivity from the breeding ponds would remain via the above linear terrestrial habitat features, which means that its potential utilisation would be limited. The magnitude of the impact, and the overall effect, would therefore remain Neutral at Year 15. The confidence in the above predictions is Probable.

8.6.131 Quaker Lane, Spixworth great crested newt meta-population would benefit from additional terrestrial habitat close to the breeding pond, which would serve to replace the habitats lost to severance due to the proposed Scheme. The provision of the drainage lagoon, in which breeding could potentially occur, would also be of potential benefit. However at Year 1 neither of these habitats is likely to be established, so the magnitude of the impact at Year 1 is predicted to be Neutral, giving a Neutral overall effect.

8.6.132 As with the above meta-populations, by Year 15 the terrestrial habitats would be well-established, offering foraging and sheltering opportunities, and connectivity to blocks of existing habitat. These impacts would be Neutral,

giving a Neutral overall effect. The confidence in the above predictions is Probable.

8.6.133 The great crested newt meta-population at Newman's Road, Rackheath would benefit from the provision of four ponds of optimal size for breeding, to replace the pond to be lost, and the provision of some replacement habitat. At Year 1 those newly created habitats would not yet be established and viable, although the sizeable areas of existing terrestrial habitat that would remain in place within the footprint of the wider proposed Scheme are still likely to be utilised. The new ponds, having been constructed before or in the early stages of the Construction phase, would be approaching an acceptable degree of establishment, offering a viable breeding habitat for the newts. It is therefore predicted that at Year 1 the magnitude of the impact on the Newman Road meta-population would be Neutral, giving a Neutral overall effect. The establishment and on-going management of the extensive areas of terrestrial habitat, and the continued maturing of the four ponds here would remain the case at Year 15, so a continued Neutral impacts is predicted, with a corresponding Neutral overall effect. The confidence in the above predictions is Probable.

8.6.134 No significant adverse effects on great crested newts are therefore anticipated during operation.

Breeding Birds

8.6.135 Throughout the operational phase of the proposed Scheme there are likely to be a number of impacts on breeding birds within the Zol. All of the impacts detailed below are predicted to be applicable to both Year 1 and Year 15.

8.6.136 The proposed road has the potential to cause disturbance and displacement from road traffic noise. The mechanism with which noise initiates a response in birds is not always clear, although there is evidence to suggest that there is a correlation between adverse behavioural and physiological effects in birds and road traffic noise. Scientific studies clearly indicate that maximum disturbance zones either side of the road for species assemblages in woodland could be between 100 and 300 metres, depending on traffic volumes. In open agricultural land these distances could be between 190 and 500 metres. It is likely that the proposed Scheme would therefore affect breeding density and bird presence over the above described distances.

- 8.6.137 Part of the disturbance mechanism relates to the disruption of acoustic communication, specifically the ability for one bird to hear another singing, a vital part of the establishment and maintenance of breeding territories, and of attracting a breeding partner. The reduced ability for singing males to attract females has been recorded for some species. In other species it is known that males in noisier environments sing at higher sound levels than males in quieter territories, with a resultant indirect increase in the rate of detection by predators.
- 8.6.138 It is also likely that the presence of people using the footways and cycleways, running loosely parallel to the carriageway, will have a partial deterrent effect on breeding birds in the adjacent habitats, giving an additional source of disturbance.
- 8.6.139 The proposed Scheme would have potential impacts associated with the risk of vehicle collision mortality, which would remove adults from breeding populations and contribute to a decline in the number of new birds recruited into the population by reducing the number of fledglings per breeding attempt. The design of the proposed Scheme, whereby large proportions are in cutting or false cutting, would serve to reduce this risk, although it would not be completely removed. Some stretches of the road would not be in cutting. Accident black spots are most likely to be where there is a relative change in elevation along the route i.e. between Fakenham Road and Fir Covert Road, and between Rackheath Park and the Wroxham Road.
- 8.6.140 The proposed Scheme would not include any street lighting, with the exception of the Postwick junction, which would be lit. Therefore, over the majority of the proposed Scheme the lighting impacts are likely to arise only from the headlights of vehicles using the road during the hours of darkness. At the Postwick junction due to the lighting, and to a far less extent on the rest of the proposed Scheme due to car headlights, the same impacts are likely during operation as during construction, namely disruption to feeding time during the day, with a disruption to the predator-prey equilibrium, premature breeding resulting in failed broods due to lack of food etc.
- 8.6.141 There would be limited indirect impacts on breeding bird populations through contamination of surface water in the wider landscape, via the presence of organic and inorganic materials from traffic. The drainage system has been designed to contain all storm water, allowing it to infiltrate into the substrate, rather than allowing it to flow into watercourses. The exception to this is around The Springs, where the topography and high water table do not permit infiltration to take place at a sufficiently high rate to satisfy system

requirements. In this location, outfall to the watercourse will be via filtration devices, to ensure that entry of contaminants to the water system is eliminated. Each drainage lagoon will include pollution control measures so that, should a spillage occur, it can easily and quickly be contained and removed.

- 8.6.142 Studies on diffuse source (traffic exhaust) pollution have found direct impacts on birds; however the level of the problem from traffic exhaust emissions in the UK is not well documented. It is likely that the alterations in air quality locally would have negligible effect on its own but is likely to contribute to the overall effect, in combination with the other indirect impacts already considered.
- 8.6.143 There is the potential for indirect impacts on breeding bird populations from the effects of heat radiation from road surfaces on birds. The use of roads to regulate body temperature by species of other taxa, e.g. reptiles and invertebrates, could lead to an indirect effect on birds as a result of the availability of carrion should the food species be killed by passing vehicles. The risk of impacts associated with heat radiation is considered to be very low.
- 8.6.144 The return of the habitats temporarily lost to the proposed Scheme will have a limited impact. The areas are comparatively small, in the context of the whole scheme, and the land will predominantly be returned to arable, which is of low utilisation by breeding birds.
- 8.6.145 The primary difference in the impacts on breeding birds between Year 1 and Year 15 relates to the establishment of the proposed landscaping scheme. At Year 1 the extensive landscaping/habitat creation scheme would not be established, with the exception of some of the grassland habitats that could be planted during early stages of the construction, as it would take a far shorter time for planted grassland to begin to become viable than woodland, scrub and hedgerows. The provision of larger trees and shrubs, which are planted to provide routes along which bats could fly from the earliest stages of the proposed Scheme, would also still only provide areas of partially established habitat.
- 8.6.146 This means that the benefits that these habitats would offer – providing potential new foraging and nesting opportunities, providing linear features to allow connectivity between existing habitats, encouraging birds to fly sufficiently high as to avoid vehicle collision mortality, and screening existing habitats adjacent to the proposed Scheme – would not yet be provided.

8.6.147 In considering the above, and the status of almost all breeding bird species within the ZOI as representing less than 1% of the county breeding population, it is therefore predicted that at Year 1 the impact on breeding birds would be of Minor Negative magnitude. The overall effect on breeding bird species of both High and Medium conservation value is therefore Slight Adverse. The confidence of this prediction is Probable.

8.6.148 By Year 15, most habitats will be approaching semi-maturity. The ongoing disturbance affecting those habitats close to the road is likely to preclude nesting and breeding activity to a notable degree, although those larger blocks of habitat that stretch back from the road, such that the disturbance is less marked, may offer viable nesting and breeding habitats.

8.6.149 Even those habitats not suitable for breeding will, by Year 15, offer a degree of screening, such that the disturbance and displacement would be less marked than at Year 1. The noise and light disturbance would be baffled and damped, allowing the species displaced from affected adjacent habitat to regain some of the habitat lost as an indirect result of the proposed Scheme. It is unlikely that full use of those habitats indirectly affected would be regained, however.

8.6.150 The risk of vehicle collision mortality would remain, although the establishment and growth of the landscaping would mean that the heights at which birds crossed the proposed Scheme would be higher than at Year 1. The frequency of mortalities is therefore likely to be less at Year 15 than at Year 1.

8.6.151 At Year 15, it is predicted that the impact on breeding birds would be Neutral. The overall effect on breeding bird species of both High and Medium conservation value is therefore Neutral. The confidence in these predictions is generally Probable, although some aspects remain Uncertain due to the timescales being considered.

Overwintering Birds

8.6.152 During the Operational phase, overwintering birds would be likely to experience the same direct and indirect impacts as breeding birds, described previously. At Year 1 the proposed landscaping/habitat recreation would not be established, so would offer only a partial benefit in terms of viable habitat or screening. This means that at Year 1 the impact on overwintering birds would be of Minor Negative magnitude. The overall effect on bird species of

both High and Medium conservation value is therefore Slight Adverse. The confidence of this prediction is Probable.

8.6.153 By Year 15 the habitats in the landscaping scheme would be well established, serving to mitigate for the losses during the Construction phase, and acting as screening, to reduce the visual disturbance. It is acknowledged that the screening capability of the landscaping over winter would be reduced, as the trees and shrubs, mostly deciduous, would lose their leaves during the time when overwintering birds would be affected.

8.6.154 Despite this, at Year 15, it is predicted that the impact on overwintering birds would be Neutral. The overall effect on overwintering bird species of both High and Medium conservation value is therefore Neutral. The confidence in these predictions is generally Probable.

Barn Owls

8.6.155 During the Operational phase of the proposed Scheme, the main potential direct impacts are associated with the risk of vehicle collision mortality. Although the proposed Scheme is designed to include cutting and/or earth banks, which would serve to reduce the risk of vehicle collisions by forcing the barn owls to fly over the majority of the traffic, the proposed planting which would reinforce this effect and force barn owls higher than the topography of the proposed Scheme on its own, would not have become established at Year 1, so this would not yet effectively be in place.

8.6.156 Indirect effects would also be likely, as major roads are known to have adverse effects on nesting density throughout the landscape due to the degree of disturbance, in terms of noise and lighting from vehicle headlights. This disturbance, combined with the loss of foraging habitat described in the Construction phase impacts, is likely to cause a slight decrease in barn owl populations within the ZoI. It is therefore predicted that the magnitude of the impact on barn owls within the ZoI would be Minor Negative, giving a Slight Adverse effect. The confidence in this prediction is Probable.

8.6.157 By Year 15, the landscaping would have become well-established. The likely height of the proposed planting at Year 15 means that barn owls would be forced to cross the proposed Scheme sufficiently high that the risk of vehicle collision mortality would be far less than at Year 1.

8.6.158 Further, there would be a marked increase in habitat suitable for hunting over. Although portions of this habitat would, in many cases be close

to the carriageway, reducing their beneficial effect, many of these would be some distance from the carriageway, for example those grassland habitats associated with the many drainage lagoons etc. The combined effect of these two above aspects mean that at Year 15 the magnitude of the impacts would have reduced to Neutral. This means that the overall effect would be Neutral. The confidence in this prediction is probable.

8.6.159 No significant adverse effects on barn owls are therefore anticipated during operation.

Aquatic Invertebrates

8.6.160 During the Operational Phase, there are not likely to be any differences in the impacts on aquatic invertebrates at The Springs, or the magnitudes of the impacts, between Year 1 and Year 15.

8.6.161 The inherent features of the drainage system for the proposed Scheme would all but eliminate changes to the hydrological and hydrogeological nature of The Springs, as storm water would be captured and attenuated, being released back into the watercourse at a rate equivalent to current scenarios. The quality of storm water would be addressed, such that water entering The Springs would be of equal, if not better, quality than is currently the case. There would also be the benefit that water from the existing Wroxham Road layout that currently drains into the watercourse untreated and unattenuated would also be included in the new system, and therefore subject to a higher level of treatment, and attenuated to reduce flashiness and therefore benefit the flood regime locally.

8.6.162 All of the above means that the habitats in which the aquatic invertebrates live, and the aquatic invertebrates themselves, would all be subject to an impact of Neutral magnitude during the Operational Phase, and therefore the overall effect would also be Neutral. The confidence in these predictions are Probable.

8.6.163 No significant adverse effects on aquatic Invertebrates are therefore anticipated.

Terrestrial Invertebrates

8.6.164 At Year 1, the immature woodland plantation at The Springs, as a habitat that offers an above average suitability for terrestrial invertebrates is

not likely to experience any direct adverse impacts. No further habitat loss is predicted, and changes in the surface and groundwater regime are unlikely, due to the overarching requirements on the proposed Scheme to provide a sustainable drainage system, which would mimic the existing localised water movement regime.

8.6.165 In this locality extensive areas of woodland and scrub are proposed, which would greatly increase the area of this habitat type. As with for other species already described above, the habitat is not likely to be viable at Year 1, so the magnitude of the impact at this time is predicted to be Neutral, giving a Neutral effect. It is acknowledged that a localised drop in air quality is likely, due to the volume of vehicles using the proposed Scheme, although the magnitude of this indirect impact is not likely to be sufficient to affect the results of this assessment.

8.6.166 By Year 15, the habitats would have become well-established in the landscape, and will have bedded in with the similar existing, surrounding habitats, providing much larger areas than currently exist, with a good level of connectivity to those existing habitats. This would afford terrestrial invertebrates a greater area in which to shelter and would mean that the potential populations would be less susceptible to localised variations than currently. This means that the magnitude of the impact at Year 15 is likely to be Positive. A Moderate Beneficial effect is therefore predicted. This would be a Significant positive effect. As with above, this is despite the potential adverse effect of a decrease in air quality locally, the impact of which is considered not to be of a sufficient magnitude to detract from this overall beneficial effect.

8.6.167 The confidence in these predictions is Probable.

8.6.168 No significant adverse effects on this habitat are therefore anticipated at Year 1, although by Year 15 there is predicted to be a Significant positive effect.

Assessment of Tolerances

8.6.169 The DCO for the proposed Scheme will have a set of tolerances inbuilt, which will provide a limit of variation in terms of vertical alignment that the finished Scheme will be required to fit within. These are to take account of the potential issues that may arise during the Construction phase, whereby the final height of various aspects of the proposed Scheme – carriageway and/or embankment heights, for example – may vary from those initially proposed.

8.6.170 Full descriptions of the tolerances are included in Volume 1, Chapter 2, The Scheme.

8.6.171 The tolerances, or variations within the constructed Scheme, will all be accommodated within the proposed DCO boundary. Any small scale, localised variations will be accommodated within the footprint, so would not require the loss of additional habitat loss. The minimal scope for variation means that no further impacts would be created; the impacts and the Significant effects already identified would not be affected by the very small scale variations that would be possible within the DCO boundary.

Assessment of Utilities Diversions

8.6.172 The suite of diversions to utilities – electricity, gas, water, sewerage, telephone and other communications – that would be required to facilitate the construction of the proposed Scheme, have also been considered in terms of the their impacts on Valued Ecological Receptors.

8.6.173 With the exception of the alterations to the high pressure gas main at the western end of the proposed Scheme, close to the junction with the existing Fakenham Road, it is predicted that all utilities diversions could take place with no Significant adverse impacts on Valued Ecological Receptors. The diversions would be very localised, over comparatively short distances, and with a degree of flexibility in terms of routing to avoid specific features of localised value, for example trees and, water courses.

8.6.174 The high pressure gas main diversion is sufficiently sizeable to have been included in the footprint of the proposed Scheme, so its impacts have already been assessed in this chapter.

Climate Change

8.6.175 The design life of the proposed Scheme means it is also necessary to consider the potential impacts of climate change on the Valued Ecological Receptors in the ZoI, and whether the proposed Scheme will have any influence on the resilience, or otherwise to the effects of climate change.

8.6.176 As indicated in the NDR Climate Change Risk Assessment report, the local climate is predicted to change in a number of ways:

- the annual mean temperature is predicted to increase;

- the annual mean daily maximum temperature is predicted to increase;
- the annual mean daily minimum temperature is predicted to increase; and
- the annual total precipitation is predicted to decrease;

8.6.177 The general increase in temperatures and the decrease in precipitation are likely to impact on semi-natural habitats.

8.6.178 Increases in daily and longer term temperatures are likely to alter the micro-climates that habitats create. The presence of trees and shrubs in hedgerows, tree belts and woodlands create shelter and shade, offer lower temperatures within woodland centres and reduce the impact of strong winds. The individual ecosystems within these blocks of habitats will have evolved and arrived at an approximate equilibrium according to the local conditions. Whilst climate change is likely to affect these habitats and alter these equilibria, the proposed Scheme, which would require the loss of parts of these habitats, would be likely to further reduce their resilience by creating a sudden change in conditions, rather than allow them to change slowly and progressively in reaction to the slowly altering local climate. Any short term, significant changes to habitats as a result of the scheme are expected to affect the vulnerability of the environment and its capacity to adapt to climate risks.

8.6.179 The establishment of new habitats, and therefore the take-up of mechanisms to address many instances of severance, is not likely to be affected by climate change. The length of time for habitats to establish to a point at which they become viable is far shorter than those timescales over which tangible, noticeable changes in the local climate are likely to occur. This means that the proposed Scheme is not likely to exacerbate any effects on indirectly affected habitats, or species affected by severance, to a greater extent than is likely to otherwise take place. The inclusion of the landscaping and habitat creation mean that the implications for habitats and species within and using the Zol due to climate change should remain unaffected to any great degree.

8.6.180 The reduction on water availability is likely to stress the habitats, and a gradual change in species composition is likely, from the current composition to one for tolerant of drier, more desiccated conditions. However, the proposed Scheme would not act to exacerbate the change in water availability or distribution locally. A drainage system based on infiltration to groundwater at rates comparable to those occurring naturally means that input to groundwater should remain unaffected.

8.6.181 The proposed Scheme design has also identified the routes of surface water and stormwater flows, and includes culverts and pipes, such that these flows should, in most instances, remain unimpeded. The proposed Scheme would therefore be unlikely to influence the changes to surface and groundwater availability that climate change is likely to have.

8.7 Conclusions

8.7.1 During the Construction phase, the proposed Scheme is predicted to have Significant adverse effects on:

- Fakenham Road RNR;
- Important Hedgerows (under the Hedgerow Regulations 1997);
- Bats, or more specifically directly affected roosts in buildings, directly affected roosts in trees and significant flight paths and areas of activity;
- Breeding bird species of both High and Medium conservation value;

8.7.2 A full summary of the predicted magnitude impacts and overall effects on all Valued Ecological Receptors during the Construction phase of the proposed Scheme is given in the table below:

Summary of Construction Phase Effects

Table 8.18: Summary of Construction Phase Effects on Valued Ecological Receptors

Valued Ecological Receptor	Conservation Value	Magnitude of Impact	Overall effect	Confidence
Statutory Designated Sites				
Broadland Ramsar Site	Very High	Neutral	Neutral	Certain
Broadland SPA	Very High	Neutral	Neutral	Certain
Broads SAC	Very High	Neutral	Neutral	Certain
River Wensum SAC	Very High	Neutral	Neutral	Certain
River Wensum SSSI	High	Neutral	Neutral	Certain

Valued Ecological Receptor	Conservation Value	Magnitude of Impact	Overall effect	Confidence
Mid-Yare NNR	High	Neutral	Neutral	Certain
Non-Statutory Designated Sites				
Attlebridge Hills CWS	Medium	Neutral	Neutral	Certain
Marriott's Way CWS	Medium	Minor Negative	Slight Adverse	Probable
Whinney Hills & Common CWS	Medium	Neutral	Neutral	Certain
Ladies Wood, Church Carr & Springs CWS and Ancient Woodland	Medium	Neutral	Neutral	Probable
Payne's Yard Wood, The Owlery & March Covert CWS	Medium	Neutral	Neutral	Certain
Fakenham Road RNR	Medium	Major Negative	Moderate Adverse	Certain
Ortolan's Grove Ancient Woodland	Medium	Minor Negative	Slight Adverse	Probable
Spowston Wood Ancient Woodland	Medium	Neutral	Neutral	Certain
Important Hedgerows	Medium	Major Negative	Moderate Adverse	Certain
Habitats				
Woodland	Low	Minor to Intermediate Negative	Slight Adverse	Probable
Parkland	Low	Minor Negative	Slight Adverse	Certain
Arable Field Margins	Low	Neutral	Neutral	Certain

Valued Ecological Receptor	Conservation Value	Magnitude of Impact	Overall effect	Confidence
Hedgerows	Low	Intermediate Negative	Slight Adverse	Probable
Species				
Bats				
Directly affected roosts in buildings	Very High	Intermediate Negative	Large Adverse	Probable
Directly affected roosts in trees;	Very High	Intermediate Negative	Large Adverse	Probable
Indirectly affected roosts;	Very High	Minor Negative	Slight Adverse	Probable
Significant flight paths and areas of activity	Very High	Minor to Intermediate Negative	Slight to Large Adverse	Probable
Marriott's Way	Very High	Intermediate Negative	Large Adverse	Probable
Other areas of activity	Very High	Minor Negative	Slight Adverse	Certain
Badgers				
Occupied setts	Medium	Minor Negative	Slight Adverse	Probable
Unoccupied setts	Low	Neutral	Neutral	Certain
Great Crested Newts				
Dog Lane, Horsford meta-population	Very High	Neutral	Neutral	Probable
Quaker Lane, Spixworth meta-population	Very High	Minor Negative	Slight Adverse	Probable

Valued Ecological Receptor	Conservation Value	Magnitude of Impact	Overall effect	Confidence
Newman's Road, Rackheath meta-population	Very High	Minor Negative	Slight Adverse	Probable
Breeding Birds				
Species of High conservation value	High	Intermediate Negative	Large Adverse	Probable
Species of Medium conservation value	Medium	Intermediate Negative	Moderate Adverse	Probable
Overwintering Birds				
Species of High conservation value	High	Minor Negative	Slight Adverse	Probable
Species of Medium conservation value	Medium	Minor Negative	Slight Adverse	Probable
Barn Owls	High	Minor Negative	Slight Adverse	Probable
Aquatic Invertebrates	High	Minor Negative	Slight Adverse	Probable
Terrestrial Invertebrate Habitat at the Springs	Medium	Minor Negative	Slight Adverse	Certain

Summary of Operational Phase Effects

8.7.3 During the Operational phase of the proposed Scheme, Significant adverse effects are predicted to remain in place only for the bats using the significant flight paths along Marriott's Way, at Year 1 only. By year 15 the effects on this flight route would no longer be Significant. No other Significant adverse effects are predicted during the Construction phase.

8.7.4 Significant beneficial effects are predicted on terrestrial invertebrate habitats at the Springs.

8.7.5 A full summary of the predicted magnitude impacts and overall effects on all Valued Ecological Receptors during the Operational phase of the proposed Scheme is given in Table 8.19 below. Note that predictions apply to both Year 1 (Opening Year) and Year 15 (Design Year) unless indicated otherwise.

Table 8.19: Summary of Operational Phase Effects on Valued Ecological Receptors

Valued Ecological Receptor	Conservation Value	Magnitude of Impact	Overall effect	Confidence
Statutory Designated Sites				
Broadland Ramsar Site	Very High	Neutral	Neutral	Certain
Broadland SPA	Very High	Neutral	Neutral	Certain
Broads SAC	Very High	Neutral	Neutral	Certain
River Wensum SAC	Very High	Neutral	Neutral	Certain
River Wensum SSSI	High	Neutral	Neutral	Certain
Mid-Yare NNR	High	Neutral	Neutral	Certain
Non-Statutory Designated Sites				
Attlebridge Hills CWS	Medium	Neutral	Neutral	Certain
Marriott's Way CWS	Medium	Minor Negative (Y1) Neutral (Y15)	Slight Adverse (Y1) Neutral (Y15)	Probable
Whinney Hills & Common CWS	Medium	Neutral	Neutral	Certain
Ladies Wood, Church Carr & Springs CWS;	Medium	Neutral	Neutral	Probable
Payne's Yard Wood, The Owlery & March Covert CWS	Medium	Neutral	Neutral	Certain

Valued Ecological Receptor	Conservation Value	Magnitude of Impact	Overall effect	Confidence
Fakenham Road RNR	Low	Minor Negative (Y1) Neutral (Y15)	Slight Adverse (Y1) Neutral (Y15)	Probable
Ortolan's Grove Ancient Woodland	Medium	Minor Negative	Slight Adverse	Probable
Spowston Wood Ancient Woodland	Medium	Neutral	Neutral	Certain
Important Hedgerows	N/A	N/A	N/A	N/A
Habitats				
Woodland	Low	Minor Negative	Slight Adverse	Probable
Parkland	Low	Neutral	Neutral	Certain
Arable Field Margins	Low	Neutral	Neutral	Probable
Hedgerows	Low	Minor Negative	Slight Adverse	Probable
Species				
Bats				
Directly affected roosts in buildings	Very High	Minor Negative (Y1) Neutral (Y15)	Slight Adverse (Y1) Neutral (Y15)	Probable
Directly affected roosts in trees;	Very High	Minor Negative (Y1) Neutral (Y15)	Slight Adverse (Y1) Neutral (Y15)	Probable
Indirectly affected roosts;	Very High	Neutral	Neutral	Probable
Significant flight paths	Very High	Neutral to Minor	Neutral to Slight	Probable

Valued Ecological Receptor	Conservation Value	Magnitude of Impact	Overall effect	Confidence
and areas of activity		Negative	Adverse	
Marriott's Way	Very High	Intermediate Negative (Y1) Neutral to Minor Negative (Y15)	Large Adverse (Y1) Neutral to Slight Adverse (Y15)	Uncertain
Other areas of activity	Very High	Minor Negative (Y1) Neutral (Y15)	Slight Adverse (Y1) Neutral (Y15)	Probable
Badgers				
Occupied setts	Medium	Neutral	Neutral	Certain
Unoccupied setts	Low	Neutral	Neutral	Certain
Great Crested Newts				
Dog Lane, Horsford meta-population	Very High	Neutral	Neutral	Probable
Quaker Lane, Spixworth meta-population	Very High	Neutral	Neutral	Probable
Newman's Road, Rackheath meta-population	Very High	Neutral	Neutral	Probable
Breeding Birds				
Species of High conservation value	High	Minor Negative (Y1)	Slight Adverse (Y1)	Probable

Valued Ecological Receptor	Conservation Value	Magnitude of Impact	Overall effect	Confidence
		Neutral (Y15)	Neutral (Y15)	
Species of Medium conservation value	Medium	Minor Negative (Y1) Neutral (Y15)	Slight Adverse (Y1) Neutral (Y15)	Probable
Overwintering Birds				
Species of High conservation value	High	Minor Negative (Y1) Neutral (Y15)	Slight Adverse (Y1) Neutral (Y15)	Probable
Species of Medium conservation value	Medium	Minor Negative (Y1) Neutral (Y15)	Slight Adverse (Y1) Neutral (Y15)	Probable
Barn Owls	High	Minor Negative (Y1) Neutral (Y15)	Slight Adverse (Y1) Neutral (Y15)	Probable
Aquatic Invertebrates	High	Neutral	Neutral	Probable
Terrestrial Invertebrate Habitat at the Springs	Medium	Neutral (Y1) Positive (Y15)	Neutral (Y1) Moderate Beneficial (Y15)	Probable

8.8

8.8.1 Main body text (heading 3)

9. Geology and Soils

9.1 Introduction

- 9.1.1 The soils and geology of an area play an important part in determining the environmental character, including influencing the landform and vegetation present, as well as the types of horticultural and agricultural practices that the area can support.
- 9.1.2 The development of the Norwich Northern Distributor Road (NDR) has the potential to impact on local geology and soils and constraints could also be imposed on the construction of the Scheme as a result of the existing ground conditions. This chapter describes the assessment of geology and soils, including contaminated land and unstable land which may impact, or be impacted by the NDR, both for the construction phase and the subsequent operational phase. It provides an overview of the baseline, geological and soil conditions in the area, the potential presence of land and groundwater conditions, Sites of Special Scientific Interest (SSSIs) and assessment of potential impacts of the Scheme relating to geology and soils.
- 9.1.3 Impacts on geology and soils may be adverse or beneficial; the assessment methodology used in this Chapter has been designed to identify both and subsequently seek appropriate mitigation measures to avoid or reduce significant adverse impacts.
- 9.1.4 Impacts on groundwater have been discussed in greater detail in Chapter 14: Road Drainage and Water Environment. Impacts on agricultural soils are covered in more detail in Chapter 13: Community and Private Assets: Impacts on Agriculture.
- 9.1.5 Geological and geomorphological features considered to be of national importance are designated Sites of Special Scientific Interest (SSSIs). They have some legal protection under the Wildlife and Countryside Act (1981) against operations which might damage their interest. Other sites of geological importance may be designated as Regionally Important Geological Sites (RIGS). RIGS are any geological or geomorphological sites, excluding SSSIs that have an educational, research, historical or aesthetic importance.
- 9.1.6 For ease of reference the NDR has been split into chainage (distance from the start of the Scheme at its junction with the A1067 in metres) sections as indicated on the NDR Engineering Layout and Profile Drawings R1C096-R1-

4003E to R1C096-R1-4014E located in the Contaminated Land Desk Study and Preliminary Interpretative Report (Report no. 233906/BSE/BNI/001/P3) presented in volume

9.2 Methodology

- 9.2.1 This section describes the methodology which has been used in the assessment of geology and soils, including contaminated land, which may impact, or be impacted, by the construction and operation of NDR.
- 9.2.2 The assessment has been carried out in accordance with the Highways Agency Design Manual for Roads and Bridges (DMRB) Volume 11.3.11 on Geology and Soils.
- 9.2.3 This assessment has consolidated information on nationally and locally important geological sites and map information on the agricultural quality of land. The potential for contaminated land along the route has also been reviewed. There is also an opportunity for environmental gain through remediation where proposed works impinge on contaminated land.
- 9.2.4 The study area is limited to 250m either side of the route as it is highly unlikely that geology or soils features further away will be impacted by construction or operation of the Scheme.

Consultation

- 9.2.5 A Scoping Report was submitted to the Secretary of State (SoS) on 22 February 2013 by Norfolk County Council under Regulation 8 of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2009 in order to request a Scoping Opinion for the proposed NDR Scheme. Impact on soils or contaminated land during operation of the Scheme had been identified to be scoped out in the Scoping Report. The Scoping Opinion states:
- 9.2.6 “Impacts on soils or contaminated land during operation of the Scheme have also been identified to be scoped out in the Scoping report, given a low likelihood of significant effects following mitigation proposals. The SoS does not consider that enough information has been provided at this stage in order for this aspect to be scoped out and that it should therefore be considered within the EIA”.

Site survey

9.2.7 A site walkover was undertaken Mott MacDonald in July 2012, a summary of the findings is included within Mott MacDonald Desk Study.

Ground Investigations

9.2.8 A number of ground investigations have been carried out by Norfolk Partnership Laboratory for various schemes relating to NDR which were completed between January 2006 and September 2008 as presented in the Norfolk County Council, Site Investigation, Norwich Northern Distribution Route, Factual Report, PTPK1000, June 2008 and Norfolk County Council, Site Investigation, Norwich Northern Distribution Route, Supplementary Factual Report, PTPK1000, June 2009.

9.2.9 A ground investigation was undertaken by Norfolk Partnership Laboratories between August and October 2007 for the Broadland Gate development at Postwick. This is situated at the eastern end of the Scheme in November 2008, which was reported in the Mott MacDonald report 233894/ENV/01/B.

9.2.10 A supplementary ground investigation was undertaken by Norfolk Partnership Laboratory between May 2009 and October 2009. The ground investigation is presented within Norfolk County Council, Site Investigation, Postwick Interchange, Supplementary Factual Report, PK5072P1, December 2009.

Desk study and Preliminary Interpretative Report

9.2.11 A Contaminated Land Desk Study and Preliminary Interpretative Report were developed by Mott MacDonald in November 2013. This presented a summary of the ground conditions encountered and findings of the contamination testing carried out during the historical ground investigations outlined above.

Assessment criteria

9.2.12 The assessment approach for geology and soils follows the guidance presented in the Highways Agency Design Manual for Roads and Bridges (DMRB) Volume 11 Section 2 Part 5 HA (205/08) (Assessment and Management of Environmental Effects). With regards to contaminated land, sensitivity categories were derived based on standards and targets set by government authorities such as Natural England (NE), the Environment Agency (EA) and advisory bodies, such as the Construction Industry Research and Information Association (CIRIA).

9.2.13 The sensitivity of geological receptors is determined according to the methodology shown in Table 9.1.

Table 9.1 Scale for evaluating the Sensitivity of Receptors

Value (sensitivity)	Criteria	Typical Examples
Very High	Very high importance and rarity, international scale and very limited potential for substitution.	<p>Geology: World Heritage Sites.</p> <p>Soils: Agricultural land of Grade 1 quality.</p> <p>Controlled Water: Groundwater vulnerability is classified as high; Principal aquifer providing a regionally important resource or supporting site protected under wildlife legislation; or SPZ I.</p>
		<p>Future site users: Very sensitive land uses proposed such as residential housing with gardens, allotments.</p> <p>Built Environment :Sites of international Importance, World Heritage Sites.</p>
High	High importance and rarity, national scale, and limited potential for substitution	<p>Geology: Site protected under EU or UK wildlife legislation (SAC, SPA, SSSI, Ramsar site).</p> <p>Soils: Agricultural land of Grade 2 quality.</p> <p>Controlled Water: Groundwater vulnerability is classified as high; Principal aquifer providing locally important resource or supporting river ecosystem; SPZ II.</p>
		<p>Future site users: Sensitive land uses proposed such as schools, residential housing without gardens, open spaces.</p> <p>Built Environment :Listed buildings, Scheduled Monuments.</p>
Medium	Attribute has a medium quality and	<p>Geology: Regionally Important Geological Sites (RIGS).</p>

Value (sensitivity)	Criteria	Typical Examples
	rarity on local scale	<p>Soils: Agricultural land of Grade 3 quality.</p> <p>Controlled Water: Moderate classification of groundwater vulnerability; Secondary aquifer providing water for agricultural or industrial use with limited connection to surface water; SPZ III.</p>
		<p>Future site users: Moderately sensitive land uses such as commercial developments and open spaces.</p> <p>Built Environment : Sites with local interest for education or cultural appreciation.</p>
Low	Attribute has a low quality and rarity on local scale	<p>Geology: Rock exposures.</p> <p>Soils: Agricultural land of Grade 4&5 quality.</p> <p>Controlled Water: Deep Secondary aquifer with poor water quality not providing baseflow to rivers; Aquifer not used for water supplies (public or private).</p>
		<p>Future Site Users: Low sensitivity land use such as Industrial Sites, highways and rail .</p> <p>Built Environment : Infrastructure (e.g. Roads, railways, tramways).</p>
Negligible	Very low importance and rarity, local scale.	<p>Geology: No rock exposures.</p> <p>Soils: Urban classified soils.</p> <p>Controlled Water: Non-aquifer.</p>
		<p>Future Site Users: No sensitive land use proposed.</p>

9.2.14 Magnitude is determined by the predicted deviation from the baseline conditions and the scale of impact. Quantifiable assessment of magnitude has been undertaken where possible. In cases where only qualitative impact assessment is possible, magnitude has been defined as fully as possible. The methodology for determining the magnitude of an impact is shown in Table 9.2.

Table 9.2 Scale for Magnitude with Respect to Impacts on Geological/Soil Receptors

Magnitude	Description
Major	<p>Change in favourable condition status of geological SSSI;</p> <p>Generation of large volume of hazardous materials for disposal off site;</p> <p>Permanent impact on geological conditions;</p> <p>Physical removal or degradation (including loss of structure and contamination) of a large area of soil;</p> <p>Previous or on-going activities on or near to a site where severe harm to a defined receptor is very likely;</p> <p>Site investigation data indicating contamination on many sites impacted by current or former uses. Quantitative or qualitative risk assessment data estimating a significant likelihood of adverse impacts from exposure to pollutants in the environment; and</p> <p>Loss of special characteristics of a water resource. Change in GQA grade, pollution of potable source, severe flood risk, loss of fisheries. Any pollution inside Zone 1 or a groundwater protection zone of special interest.</p>
Moderate	<p>Generation of hazardous and non-hazardous materials for disposal off site;</p> <p>Temporary impact on geological conditions; and physical removal or degradation (including loss of structure and contamination) of a moderate area of soil.</p> <p>Previous or on-going activity where harm to a defined receptor is possible but severe harm is unlikely;</p>

Magnitude	Description
	<p>Site investigation data indicating moderate contamination. Quantitative or qualitative risk assessment data estimating medium risk of adverse impacts from exposure to pollutants in the environment; and</p> <p>Impact on water resources. Reduction in the production of fisheries, moderate changes insufficient to reduce water quality.</p>
Minor	<p>Generation of inert and non-hazardous waste materials which may be suitable for re-use on site;</p> <p>No permanent impact on geological conditions;</p> <p>Physical removal or degradation (including loss of structure and contamination) of a minor area of soil.</p> <p>Greenfield site or previous on-going activities where harm to a defined receptor is unlikely;</p> <p>Site investigation data indicating significant contamination is unlikely. Quantitative or qualitative risk assessment data estimating low likelihood of adverse impacts from exposure to pollutants in the environment; and</p> <p>Minor impact insufficient to impact on the use or characteristics of the water resource.</p>
Negligible	<p>Physical removal or degradation (including loss of structure and contamination) of a very minor area of soil; and</p> <p>Minimal impact on geological conditions.</p>
No change	<p>No loss or alteration of characteristics, features or elements; no observable impact in either direction.</p>

9.2.15 The likely severity of the impacts was assessed using the matrix in Table 9.3 in conjunction with professional judgement to consider site specific factors that may be of relevance.

Table 9.3 Severity of impact with regards to geology and soil receptors

Magnitude of Potential Impact	Value (importance) of attribute				
	Very high	High	Medium	Low	Negligible
Major	Very large	Large / Very large	Moderate / Large	Slight / Moderate	Slight
Moderate	Large / Very Large	Large / Moderate	Moderate	Slight	Neutral/ Slight
Minor	Moderate / Large	Slight / Moderate	Slight	Neutral/ Slight	Neutral/ Slight
Negligible	Slight	Slight	Neutral/ Slight	Neutral/ Slight	Neutral
No Change	Neutral	Neutral	Neutral	Neutral	Neutral

9.2.16 The significance of impact is predicted with reference to Table 2.2 in DMRB [8] as provided below in Table 9.4.

Table 9.4 Significance criteria for geology, soils and land contamination

Significance category	Description and examples		Significance
Neutral	-	Minimal impact on geological condition, minor loss of urban soils; and No discernible negative impact with regards to contaminated land.	Not Significant
Slight	Adverse	Changes to Made Ground deposits only, moderate/ major loss/ degradation of Grade 4 or 5 soils. minor or moderate	

Significance category	Description and examples		Significance
		<p>loss/ degradation of Grade 3 soils</p> <p>Easily preventable, non-permanent health impacts on humans;</p> <p>Minor low-level and localised contamination of on-site soils; and</p> <p>Easily repairable damage to buildings / infrastructure.</p>	
	Beneficial	<p>Remediation of localised low levels of contamination;</p> <p>Remediation of non-sensitive water resource contamination; and</p> <p>Minimal improvements to overall soil and water quality.</p>	
Moderate	Adverse	<p>Superficial disturbance to near surface deposits,</p> <p>Changes in geomorphology, large loss/ degradation of Grade 3 soils, minor loss/ degradation of Grade 1 or 2 soils.</p> <p>Sterilisation of low quality mineral resources.</p> <p>Easily preventable, permanent health impacts on humans;</p> <p>Pollution of non-sensitive water resource or Low long term risk of pollution to sensitive water resource; and</p> <p>Localised damage to buildings/ infrastructure (on or off site).</p>	
	Beneficial	Remediation of localised moderate levels	

Significance category	Description and examples		Significance
		of contamination; Remediation of moderate, localised sensitive water resource contamination; and Re-use of excavated soils on-site to avoid disposal to landfill.	
Large	Adverse	Substantial changes due to cuttings, moderate/ large loss/ Degradation of Grade 2 soils or moderate loss/ degradation of Grade 1 soils. Sterilisation of high quality mineral resource Medium / long-term (chronic) risk to human health; Medium long-term risk of pollution of sensitive water resources; Significant damage to buildings / infrastructure (on or off site); and Contamination of offsite soils.	Significant
	Beneficial	Remediation of localised high levels of contamination; Remediation of significant, localised sensitive water resource contamination; and Re-use of moderate quantities of excavated soils on-site to avoid disposal to landfill	
Very Large	Adverse	Loss of exposed designated geological feature or large loss/ degradation of	

Significance category	Description and examples		Significance
		Grade 1 soils. Short-term (acute) risk to human health; Short- term risk of pollution of sensitive water resources; Catastrophic damage to buildings / infrastructure; and Generation of significant quantities of waste sediment or soils for landfill	
	Beneficial	Remediation of significant, widespread elevated levels of soil contamination; Remediation of significant, widespread sensitive water resource contamination; and Re-use of significant quantities of excavated soils on-site to avoid disposal to landfill	

9.3 Context

Technical

- 9.3.1 The construction phase of the proposed Scheme has the potential to result in changes to the volume and quality of the soils in the study area from activities such as heavy machinery movements, excavations, re-profiling and piling.
- 9.3.2 Where there are major earthworks to be carried out, a cut and fill balance will be aimed for, as detailed in the Materials section of this report (Chapter 10). However surplus soils may be suitable for re-use elsewhere on the Scheme provided they meet defined criteria.
- 9.3.3 Construction may also disturb contaminated land, especially during ground works; this is more likely in areas which have historic industrial land use. However, remediation of any contaminated materials identified as part of the construction process may provide an overall benefit to the Scheme. During

construction, implementation of appropriate site management practices will control accidental spills and leakages of hazardous materials which could result in local contamination of soils with potential adverse implications for groundwater.

Regulatory and Policy Context

Relevant legislation

9.3.4 The main legislative framework regarding geology and soils (including contaminated land) is set by the following Acts and Regulations:

- Agriculture Act 1986;
- Construction (Design and Management Regulations) 2007;
- Contaminated Land (England) (Amendment) Regulations 2012;
- Control of Pollution (Oil Storage) (England) Regulations 2001;
- Control of Substances Hazardous to Human Health 2002 (as amended);
- Environmental Damage and Liability (Prevention and Remediation) Regulations 2009;
- Environmental Permitting Regulations (England and Wales) 2010;
- Environmental Protection Act 1990 (as amended by the Environment Act 1995);
- Environmental Protection (Duty of Care) Regulations 1991 (as amended 2003);
- Landfill Directive 1999/31/EC 1999;
- Hazardous Waste (England and Wales) Regulations 2005;
- Landfill (England and Wales) Regulations 2002;
- Town and Country Planning Act 1990;
- Water Act 2003;
- Water Resources Act 1991 (WRA 1991) and Amendment 2009; and

- Wildlife and Countryside Act 1981 and (Amendment) Act 1985 (as amended by the Countryside and Rights of Way Act 2000).
- 9.3.5 The Wildlife and Countryside Act 1981 (as amended) provides statutory protection of SSSIs in England, some of which are of geological importance. Special Protection Areas (SPAs) and Ramsar Sites, as well as Limestone pavements, are also protected under this act. Environmentally Sensitive Areas (ESAs) are agricultural areas benefiting from special protection. The importance of nature conservation, including areas with geological features, is also emphasised in the Environmental Protection Act 1990 (as amended).
- 9.3.6 The prevention of pollution is regulated by several pieces of legislation including the Environmental Permitting Regulations 2010, which regulates pollution control by requiring permits for emissions to, for example, air and water.
- 9.3.7 The statutory process for dealing with contaminated land in England and Wales is set out in Part IIA of the Environmental Protection Act 1990 (EPA 1990) (as amended by the Environment Act 1995 and the Water Act 2003). Part IIA sets in place a regime whereby contaminated land can be identified, a decision made as to how the land will be remediated and where responsibility for this will fall. The primary legislation is supported by a number of secondary legislative instruments including the Contaminated Land (England) (Amendment) Regulations 2012.
- 9.3.8 The need to consider contaminated land issues during the planning process is set out in the Town and Country Planning Act 1990 (Section 215). This Act gives the Local Authorities the ability to require developers to investigate contamination and, if necessary, remediate the land.
- 9.3.9 There are also a number of waste related regulations which serve to protect soils from contamination by waste management, such as the Hazardous Waste (England and Wales) Regulations 2005 (as amended by Hazardous Waste (England and Wales) Regulations 2009), Environmental Protection (Duty of care) Regulations 1991, Waste Management Licensing Regulations 1994 (as amended by Waste Management Licensing Regulations 1997), Landfill Directive 1999, Landfill Tax (Contaminated land) Order 1996 and Landfill (England and Wales) Regulations 2002 (as amended by The Landfill (England and Wales) Regulations 2004 and 2005).
- 9.3.10 Under the Control of Substances Hazardous to Health Regulations 2002 (COSHH) and the Construction and Design Management (CDM) Regulations 1994, where a developer knows or suspects the presence of contaminated

soil, provision will be made to ensure that risks to the public and site workers are minimised.

National planning policy

9.3.11 As the majority of sites impacted by historic contamination are not classed as “Contaminated Land” under Part IIA of the EPA, the remediation of any contamination present is generally managed by the planning regime. The National Planning Policy Framework (Department for Communities and Local Government) March 2012 provides guidance on contaminated land and protection from a planning perspective.

Local planning policy

9.3.12 Norwich City Council adopted the Joint Core Strategy (JCS) for Broadland, Norwich and South Norfolk in March 2011 and as submitted for examination in February 2013 . The plan forms part of the emerging Local Development Framework (LDF) for Norfolk. It contains strategic policies covering the period 2008-26 and replaces relevant parts of the City of Norwich Replacement Local Plan (RLP).

9.3.13 The JCS has to comply with national planning policies and demonstrate how required growth can be delivered. At the time of its adoption the JCS is required to be in conformity with the East of England Plan now revoked (EEP). However, the JCS is supported by an evidence base that demonstrates that it remains valid and its policies do not rely on the East of England Plan.

9.3.14 The Norfolk Minerals and Waste Development Framework, 2010-2026 [9], requires no allocation of chalk as it is considered to be abundant in Norfolk relative to demand. However, sands and gravels require a minimum total of 2.05million tonnes of sand and gravel aggregates to be allocated to the East of England from 2010 to 2026. The Core Strategy and supporting documents have been developed to ensure mineral extraction and associated development and waste management is done in a sustainable manner, for example the use of aggregate material from within the Scheme footprint for construction.

Area-Wide policies include:

9.3.15 Section 5.4 of Policy 1 of the Joint Core Strategy: Addressing climate change and protecting environmental assets. The area has a wealth of environmental assets ranging from international and national status, to those of local importance. These must be safeguarded and enhanced for the benefit of current and future generations. These assets include biodiversity (wildlife and habitats), built heritage and the wider historic environment, ancient monuments and archaeological assets, geodiversity (geological features), landscape and historic landscape character; as well as more general aspects such as the countryside and rural character, the setting of Norwich, towns and villages and the Broads. Assets of local importance, such as County Wildlife Sites are valuable in their own right, and in combination provide an important resource.

9.4 Baseline

Spatial scope

9.4.1 The proposed Scheme starts approximately 1km to the north-west of the village of Taverham, situated around 10km north-west of Norwich city centre, on the A1067 Fakenham Road (approximate National Grid Reference TG 147 154). The NDR continues broadly eastwards to the north of Norwich, before heading south to meet the existing A47 at Postwick and Broadland Park Business Development, which is located roughly 7km east of Norwich city centre at National Grid Reference TG 292 085.

9.4.2 The spatial scope was defined by the initial baseline desk study[1] which sought to identify these locations of likely geotechnical risk and contamination sources and where pathways and pollutant linkages could result from construction activities. In addition, the desk study identified where the geological conditions may impact on the Scheme.

Temporal scope

9.4.3 The baseline scenario considers the sub-surface conditions on site as they exist at the time of writing in 2013 and the current impacts on any particular resources or receptors. Assessment of the construction period considers the impacts and associated impacts of construction on areas of potentially contaminated land or geological resources within the spatial scope of the proposed Scheme and associated works, including the remediation of any contamination, if required.

9.4.4 The operational scenario considers the impact that any residual contamination could have on the general environment surrounding the proposed Scheme

and an assessment of the risks of ground pollution as a result of the operation of the proposed Scheme, and identification of mitigation measures to address these risks.

Data sources

9.4.5 Information has been gathered from the following sources for the identification and assessment of impacts on geology and soils:

- Norfolk County Council, Site Investigation, Norwich Northern Distribution Route, Factual Report, PTPK1000, June 2008.
- Norfolk County Council, Site Investigation, Norwich Northern Distribution Route, Supplementary Factual Report, PTPK1000, June 2009.
- Envirocheck Report Order Number 37669135_1_1 and historical maps from Landmark Information Group, obtained in February 2012.
- Norfolk Heritage Explorer archaeological search from <http://www.heritage.norfolk.gov.uk> accessed 7th May 2012.
- 1:50,000 Landranger Series, North East Norfolk, Sheet 133.
- 1:50,000 Landranger Series, Norwich and the Broads, Sheet 134.
- 1:25,000 Explorer Series, Norwich – Wymondham, Attleborough and Watton, Sheet 237.
- 1:25,000 Explorer Series, Dereham and Aylsham, Sheet 238.
- 1:25,000 Explorer Series, The Broads, Outdoor Leisure Map 40.
- Sheet 161, Norwich, Solid and Drift Edition, Geological Survey of Great Britain (England and Wales), 1975.
- Sheet 162, Great Yarmouth, Quaternary and Pre-Quaternary Geology, Geological Survey of Great Britain (England and Wales), 1991.
- Sheet 147, Aylsham, Quaternary and Pre-Quaternary Geology, Geological Survey of Great Britain (England and Wales), Digital map.
- Sheet TG 20 NE, Kirby Bedon, Trowse, Field Sheet, Geological Survey of Great Britain (England and Wales), 1976.

- Sheet TG 21 SE, Rackheath, Gt and Lt Plumstead, Field Sheet, Geological Survey of Great Britain (England and Wales), 1976.
- Associated Geological memoir for Sheet 161 is also available, by Cox, F C, Gallois, R W, and Wood C.J. (1989), Geology of the country around Norwich.
- Associated Geological memoir for Sheet 162 is by Arthurton R S, et al, Geology of the country around Great Yarmouth (1994).
- Mott MacDonald, Norwich Northern Distributor Road, Environment Statement, Water Quality & Drainage Chapter, Volume 1 and 2, December 2008.
- Mott MacDonald, Norwich Northern Distributor Road, Environment Statement, Cultural Heritage, Volume 1 and 2, December 2008.
- Mott MacDonald, Norwich Northern Distributor Road, Ground Investigation Report, Rev F, September 2009.
- 6 Alpha Associates Preliminary Unexploded Ordnance (UXO) Risk Assessment, 21st May 2012, Project Number P2886.
- 6 Alpha Associates Preliminary Unexploded Ordnance (UXO) Risk Assessment, 24th August 2012, Project Number P2981.
- Mott MacDonald Phase 1 Geo-environmental Risk Assessment Broadland Gate Business Park, Norwich, November 2008.

Sensitive receptors

9.4.6 The following sensitive receptors which may be impacted by the construction and operation of the proposed Scheme have been identified in Table 9.5.

Table 9.5 Summary of Sensitive Receptors

Receptor	Description
Controlled waters, including the underlying aquifers	<p>Source Protection Zones around groundwater abstraction wells.</p> <p>Horizontal and vertical migration of contaminants through potentially permeable soils and variably permeable geological formations could lead to pollution of controlled waters from current and historic polluting activities, such as the use of pesticides and herbicides in farming.</p> <p>Surface runoff on hard standing sections of the route may also lead to contamination of surface waters.</p>
The Broads	Ecology and landscape sensitivity
Human Health, including construction workers and final end users	Human uptake pathways, airborne construction gas and vertical and lateral migration of volatile vapours and ground gas could cause harm to human health.
Fauna and flora	Root uptake of contaminants from current and historic polluting activities.
Buildings, structures and utilities	Chemical agents destructive to concrete may be found in natural materials and Made Ground.
Regionally important geology and soils	Cutting through important geological strata, excavation or sterilisation of valuable geological assets (mineral resources).

Source: Contaminated Land Desk Study and Preliminary Interpretative Report, Mott MacDonald, 2013 (Report no. 233906/BSE/BNI/001/P3)

9.4.7 A Phase 1 Contaminated Land Desk Study and Preliminary Interpretative Report was prepared in November 2013. Hazard plans and conceptual models were produced for the NDR and are presented as an appendix to the Contaminated Land Desk Study presented in Volume 2 and are summarised in Table 9.6 below.

Table 9.6 Hazard Plans and Conceptual Models

Chainage	Hazard plan reference	Conceptual model reference
0.00-3300.00	MMD-233906-DT-0050	MMD-233906-DT-0056
3300.00- 6800.00	MMD-233906-DT-0051	MMD-233906-DT-0056
6800.00-10900.00	MMD-233906-DT-0052	MMD-233906-DT-0057
10900.00-14600.00	MMD-233906-DT-0053	MMD-233906-DT-0057
14600.00-17800.00	MMD-233906-DT-0054	MMD-233906-DT-0058
17800.00-19500.00	MMD-233906-DT-0055	MMD-233906-DT-0058

9.4.8 Environmental hazards identified on the plans include

- Licenced Waste Management facilities;
- Pollution incidents and historical land use that could be considered contaminated;
- Discharge consents;
- Water abstractions; and
- Potentially contaminated land sites.

Geomorphology and Topography

9.4.9 The topography along the proposed Scheme consists of a gently undulating agricultural landscape. The topography at the start of the route at the existing

A1067 Fakenham Road is approximately 20m AOD gently rising and falling between approximately 30m and 20m AOD along the NDR and then gently sloping down to approximately 10m AOD at the end of the proposed Scheme at the A1042 road.

Regional Geology

- 9.4.10 The Norwich area is underlain by Cretaceous Upper Chalk, between approximately 19.50m and 33.50m below ground level. These beds are mostly covered by Pleistocene and Recent deposits which lie non-conformably on the Chalk surface. The Chalk generally outcrops in the river valleys.
- 9.4.11 The oldest Pleistocene formation is Crag, extensive to the east but gradually disappearing to the west of Costessey. Crag comprises interbedded sands and gravels with occasional lenticular clays. To the north of the River Wensum, the Crag is overlain by Brickearth (Corton Formation Till), Boulder Clay comprising glacial deposits of intercalated, mainly un-bedded clays and loamy sands.
- 9.4.12 Glacial Sands and Gravels overlie the Crag to the north and south of the River Wensum. These comprise fluvial gravels, incorporating quartz, white quartzite and volcanic pebbles. Valley Gravels occur sporadically, with recent alluvium, mainly silty or fine sand, occupying the valley centres and the recent river terraces.
- 9.4.13 No known mines are located within the area of the proposed Scheme; numerous flint mines are located outside this area in and around Norwich, but are highly unlikely to impact on any construction processes.

Regional Soils

- 9.4.14 Based on the maps published by the National Soil Resources Institute[10], the route of the proposed Scheme is predominantly over:
- Freely draining slightly acid sandy soils with low fertility;
 - Naturally wet very acid sandy and loamy soils with very low fertility;
 - Naturally wet very acid sandy and loamy soils with low to high fertility;

- Slowly permeable seasonally wet acid loamy and clayey soils with low fertility; and
- Freely draining slightly acid loamy soils – low fertility.

9.4.15 An agricultural soil survey was carried out to determine the quality of the soil according to the Agricultural Land Classification of England and Wales (Ministry of Agriculture, Fisheries and Food 1988)[11]. The survey can be found in Chapter 13. Land along the route of the NDR has been predominantly classed as Grades 2 and 3a and b.

9.4.16 Topsoil encountered is anticipated to be <1.45m thickness.

9.4.17 The National Soil Resources Institute indicates that the soils present at the site are vulnerable to leaching of nitrate and pesticides to groundwater.

Regionally Environmentally Sensitive Sites

9.4.18 There are no designated sites relating to geological interests beneath or in the vicinity of the proposed Scheme.

9.4.19 The Broads within the surrounding areas of the proposed Scheme have been classified as an Environmentally Sensitive Area and along with the River Wensum have been classified as Sites of Special Scientific Interest and Special Areas of Conservation. These Environmentally Sensitive Sites have been discussed further in Volume 2, Chapter 8: Ecology.

Chainage Specific Baseline Conditions

9.4.20 Table 9.7 below presents a summary of the findings of the Desk Study and Preliminary Interpretative Report split by chainage.

Table 9.7: Summary of Baseline Conditions by Chainage

Chainage	Geology & Soils		Hydrology and Hydrogeology (Groundwater and surface water are covered in more detail in Chapter 14: Road Drainage and Water Environment)	Historic land use	Contamination and waste	Pollution incidents	Environmentally sensitive sites
	Strata	Max thickness (m)					
0.00-3300.00	Topsoil Cover Silt Glacial Sand and Gravel Corton Formation Till Crag Upper Chalk (Ch0.00-Ch1300.00: no drift deposits) No Graded agricultural land is present along this section of the Scheme	1.2 0.7 11.0 8.2 2.9 Not proven	Bedrock classified as Principal Aquifer. Drift deposits designated as Secondary A Aquifer (Ch1500.00-3300.00) Source Protection Zone 3: Ch2300.00-3000.00(4) Large pond 200m north of Ch1300.00. River Wensum ~200-250m south of the Scheme.	1882-1886: the Scheme generally surrounded by open land, woodland and marsh; East Midlands Railway the Scheme at Ch2400.00; Marl pit adjacent to the Scheme at Ch750.00 1965-1971: Poultry houses at Ch750.00; Poultry Farm 200m south of Ch1600.00; railway no longer present. 2006: Poultry houses no longer present; abattoir located 480m north of Ch2600.00	Historical landfill/ registered landfill site north of Ch750.00 Licensed waste management facilities: 270m north and northwest of Ch700.00; 463m west and 473m west of Ch1200.00 Historic poultry houses; Ch750.00 Undated aircraft: Ch900.00 Biogas facilities: 500m north of Ch1700.00; 480m north of Ch2600.00 Disused railway: Ch2400.00 Abattoir: 480m north of Ch2600.00	NGR 614100, 315700: Category 3, Minor Incident	Broads are an Environmentally Sensitive Area River Wensum at NGR 614549 315079 and NGR 614488 315152 classified as Site of Special Scientific Interest and Special Area of Conservation
3300.00-6800.00	Topsoil Cover Silt Glacial Sand and Gravel Corton Formation Till Crag Upper Chalk No Graded agricultural	0.4 1.0 6.9 9.0 9.0 Not proven	Bedrock classified as a Principal Aquifer. Drift deposits classified as Secondary A Aquifer (Ch3300.00-6600.00) and Unproductive Strata (Ch6600.00-6800.00). Ch6400.00-6600.00 crosses SPZ3.	1882-1886: Agricultural land. 1885: Buggs Grave at Ch5400.00; farm 250m south of Ch6400.00. 1971-1979: allotment gardens 600m north of Ch5400.00 2000: Farm adjacent to Ch3600.00	Licensed waste management facility: 240m south from Ch4400.00 Historical landfill 500m south of Ch5300.00 Allotment gardens 500m north of Ch5400.00	None recorded	Broads are an Environmentally Sensitive Area River Wensum at NGR 618791 312723 is classified as Site of Special Scientific Interest and Special Area

Chainage	Geology & Soils		Hydrology and Hydrogeology (Groundwater and surface water are covered in more detail in Chapter 14: Road Drainage and Water Environment)	Historic land use	Contamination and waste	Pollution incidents	Environmentally sensitive sites
	Strata	Max thickness (m)					
6800.00-10900.00 Cromer Road – Buxton Road	land is present along this section of the Scheme		Pond on the Scheme at Ch6800.00.				of Conservation
	Topsoil	1.2	Bedrock classified as Principal Aquifer.	1882: Agricultural land.	Allotment gardens 400m north of Ch8000.00	None recorded	Broads are an Environmentally Sensitive Area.
	Cover Silt	1.0	Drift deposits designated as Unproductive Strata	1885: Farm adjacent to the Scheme at Ch10100.00	Norwich airport Ch7100.00-9800.00		
	Glacial Sand and Gravel	3.6	(Ch6800.00-7300.00, Ch7700.00-8500.00, Ch9800.00-10300.00, Ch10500.00-10700.00) and Secondary A	1966: Norwich Airport constructed.	Aviation Museum, Ch7600.00		
	Corton Formation Till	4.25	Aquifer (Ch7300.00-7700.00, Ch9400.00- 9600.00, Ch10300.00- 10500.00) and Secondary B Aquifer (Ch8500.00- 9400.00, Ch9600.00- 9800.00).	1971: A140 constructed running north of the Scheme (Ch6800.00); farm 300m north of Ch7700.00	Farms: Ch7700.00, 10100.00		
	Crags	9.0	Pond in Quaker Farm adjacent to the Scheme at Ch10100.00	1971-1979: Allotment gardens 400m north of Ch8000.00			
	Upper Chalk	Not proven		2000: Farm at Ch7700.00 no longer present.			
	Grade 2 agricultural land approximately 75m north of the proposed Scheme from Ch10200.00 to 10500.00						
	Grade 1, 2 and 3 agricultural land present approximately 375m north of the Scheme from Ch10500.00 to 10750.00						
10900.00-14600.00 Buxton Road-300m east	Topsoil	0.5	Bedrock classified as a Principal Aquifer.	1882: Farm 300m southeast of Ch11700.00; agricultural land	Dairy Farm, Ch13200.00	NGR 626700, 314200: Category 3, Minor Incident.	Broads are an Environmentally Sensitive Area.
	Cover Silt	1.2	Drift deposits classified as Secondary A Aquifer (Ch11800.00-12100.00,	1950-1951: sewage works adjacent to The Springs,	Sewage works, Ch13700.00		Area along the Scheme is within
	Alluvium	1.0					

Chainage	Geology & Soils		Hydrology and Hydrogeology (Groundwater and surface water are covered in more detail in Chapter 14: Road Drainage and Water Environment)	Historic land use	Contamination and waste	Pollution incidents	Environmentally sensitive sites
	Strata	Max thickness (m)					
Wroxham Road	Corton Formation Till Crag Upper Chalk (No drift deposits Ch10900.00-11100.0, Ch12400.00-14200.00, 14300.00-14600.00) Grade 3 agricultural land present approximately 225m north of the Scheme at Ch11000.00 to 12100.00	2.6 8.6 Not proven	11400.00-14600.00), Unproductive Strata (Ch11100.00-11800.00, Ch11400.00-14600.00), Secondary B Aquifer (Ch12000.00-12600.00) Ch11300.00-14600.00: SPZ3; 172m northeast of Ch13800.00: SPZ2. The Springs are located 250m north of Ch13700.00-14000.00; stream flows through the Scheme at Ch14200.00	Ch13700.00. 2000: reservoir approximately 450m south of Ch10600.00.		NGR 626600, 314400: Category 3, Minor Incident.	a Nitrate Vulnerable Zone
14600.00-17800.00 300m east of Wroxham Road-200m west of Middle Road	Topsoil Cover Silt Glacial Sand and Gravel Corton Formation Sand Corton Formation Till Crag Grade 3 agricultural land present approximately 250m northeast of the proposed Scheme from Ch15700.00 to	0.8 0.3 5.4 12.0 7.0 12.0	Bedrock classified as Principal Aquifer. Drift deposits classified as Secondary A Aquifer (Ch14600.00-14800.00, Ch15000.00-16600.00) and Unproductive Strata (Ch14800.00-15000.00, Ch16600.00-17800.00) SPZ3: Ch14600.00-16300.00, Ch16600.00-17800.00 Pond 200m west of Ch15400.00	1887: Gravel pit 100m northeast of Ch15800.0; sand pit approximately 80m northwest of Ch116100.00; GER East Norfolk Line crosses at Ch17000.00 1908: sand pit no longer present. 1919: four tanks approximately 250m east of Ch17300.00 1957: airfield 500m northeast of Ch15300.00 1967: poultry houses, 475m northeast of Ch15300.00; tanks no longer present; farm on proposed	Rackheath Industrial Estate, Ch15300.00 Old airfield, 500m northeast of Ch15300.00 Old Gravel Pits and Sand Pits potentially infilled with Made Ground (50m northwest from Ch15300.00, 100m northeast of Ch15800.00 Licensed Waste Management Facility (landfill boundary) 500m southwest from Ch15900.00. Poultry buildings (between 1967 and 1989) approximately 475m	None recorded.	The Scheme is within a Nitrate Vulnerable Zone.

Chainage	Geology & Soils		Hydrology and Hydrogeology (Groundwater and surface water are covered in more detail in Chapter 14: Road Drainage and Water Environment)	Historic land use	Contamination and waste	Pollution incidents	Environmentally sensitive sites
	Strata	Max thickness (m)					
	16500.00. Grade 2 agricultural land present adjacent and underlying the site from Ch15000.00 to 16500.00.			Scheme at Ch15700.00 1989: poultry houses no longer present 1994: gravel pit no longer present; pumping station 200m east of Ch17000.00 2000: gas compound on the Scheme at Ch16900.00, allotment gardens 250m east of Ch15000.00	northeast from Ch15300.00.		
17800.00-19500.00 200m west of Middle Road-Peachman Way	Topsoil Made Ground Cover Silt Glacial Sand and Gravel Corton Formation Sand Corton Formation Till There is Grade 3 agricultural land 350m west of the Scheme from Ch18000.00 to 19500.00 Grade 2 agricultural land is present 450m west of the Scheme from Ch19000.00 to 19500.00	0.5 0.5 0.85 0.85 3.0 7.05	Bedrock classified as Principal Aquifer. Drift deposits classified as Unproductive Strata. Within SPZ3.	1887: agricultural land; gravel pit 150m west of Ch18400.00; GER East Norfolk Line 500m west of Ch18400.00. 1971-1975: Plant nursery 250m west of Ch18700.00 2006: Industrial Estate 250m west of Ch19500.00.	Licensed waste management facility 500m southwest from Ch15900.00. Old gravel pits (150m west of Ch18400.00 and 150m east of Ch19500.00) potentially infilled with Made Ground. Industrial estate 250m west of Ch19500.00	NGR 628300 308200: Pollution Incident to Controlled Waters	Broads are an Environmentally Sensitive Area.

Chainage	Geology & Soils		Hydrology and Hydrogeology (Groundwater and surface water are covered in more detail in Chapter 14: Road Drainage and Water Environment)	Historic land use	Contamination and waste	Pollution incidents	Environmentally sensitive sites
	Strata	Max thickness (m)					
19500.00-20403.16 Peachman Way- end of NDR Scheme	Topsoil Made Ground Cover Silt Glacial Sand and Gravel Lowestoft Till Corton Formation Till Drift deposits are not present from Ch19750.00-20403.16 Grade 3 agricultural land is present approximately 350m west of the site from Ch19500.00 to the end of the Scheme	1.2 0.8 1.65 1.9 9.2 6.5	Bedrock classified as Principal Aquifer. Drift deposits from Ch19500.00-19750.00 are classified as a Secondary A Aquifer. This section of the Scheme is within a SPZ3. 223m west of the end of the Scheme the area is classified as a SPZ2. From Ch19700-20403.16 the Scheme is within a SPZ1 due to a new abstraction point at Brundall Low Road and Church Road, Postwick. Pond located approximately 270m south of Ch19700.00.	1888: Agricultural land; farm present in centre of site; Great Eastern Railway 200m to south; gravel pit to the east of the site. 1929: tank to the east of the site. 1985-195: A47 constructed along southern site boundary.	Licensed waste facility approximately 61m southwest from the end of the Scheme. Registered landfills: 75m southwest from the end of the Scheme; 247m southwest from the end of the Scheme.	NGR 628300 308200: Category 3, Minor Incident NGR 628400 308100: Category 3, Minor Incident	Broads are an Environmentally Sensitive Area. NGR 628171 308187 is a National Park.

Source: Contaminated Land Desk Study and Preliminary Interpretative Report, 2013 (Report no. 233906/BSE/BN/001/P3)[2]

Summary of Contamination Testing

9.4.21 Chemical analysis of soil and groundwater samples was undertaken during the 2006-2009 ground investigations. A preliminary assessment of the test results is presented in the Desk Study and Preliminary Interpretative Report, as summary of which is presented below.

Human Health

9.4.22 Chemical analysis of soil and groundwater samples was undertaken during the 2006-2009 ground investigations. A preliminary assessment of the test results is presented in the Desk Study and Preliminary Interpretative Report, as summary of which is presented below

9.4.23 Table 9.8 below presents a summary of those contaminants which exceeded the Generic Assessment Criteria for Industrial / Commercial Land Use. Further discussion of the results is presented in the Desk Study and Preliminary Interpretative Report.

Table 9.8 Soil Contamination Testing Summary by Chainage

Chainage	No of Samples Tested	Contaminants exceeding the Generic Assessment Criteria for Industrial / Commercial Land Use
0.00-3300.00	2	None
3300.00-6800.00	1	None
6800.00-10900.00	27	Naphthalene, Benz(a)anthracene, Chrysene, Benzo(b)fluoranthene, Benzo(a)pyrene, Indeno(123cd)pyrene, Dibenzo(ah)anthracene
10900.00-14600.00	No tests	-
14600.00-17800.00	3	None
17800.00-19500.00	6	None

19500.00-20403.16	No tests	-
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Groundwater

9.4.24 Concentrations of contaminants in groundwater were compared to a variety of assessment criteria. Non-hazardous pollutants (e.g. boron, chloride, chromium, copper, nickel, lead, vanadium, zinc, sulphate, phenol, cyanide, magnesium and nitrate) can be discharged to groundwater under a permit, but must not cause pollution. The concentration level which is considered to cause pollution depends on the use of the receptor. For surface water receptors, a non-hazardous pollutant is considered to be non-compliant if the concentration exceeds the Environmental Quality Standard (EQS), while for groundwater the Drinking Water Standard (DWS) is used. For the NDR scheme the most sensitive receptors are considered to be the underlying Secondary A and Principal aquifers and therefore the DWS were used.

9.4.25 Hazardous substances (e.g. arsenic, cadmium, mercury, selenium, Polycyclic Aromatic Hydrocarbons (PAHs), benzene, toluene, ethylbenzene and xylene (BTEX)) are considered to be non-compliant if a concentration is found exceeding the EA's Minimum Reporting Value (MRV) or, where there is no published MRV the laboratory Method Detection Limit (MDL), is found in groundwater.

9.4.26 Table 9.9 summarises exceedences of non-hazardous and hazardous substances by chainage. Further, more detailed discussion of the results is presented in the Desk Study and Preliminary Interpretative Report.

Table 9.9: Contamination Testing Summary by Chainage

Chainage	No of Samples Tested	Exceedence of Non-hazardous substances above DWS	Exceedence of Hazardous Substances above the MRV / MDL
0.00-3300.00	41	Copper, Chromium, BOD, COD, Nitrate as NO ₃ , Ammoniacal Nitrogen	Fluorene
3300.00-6800.00	No tests	-	-

Chainage	No of Samples Tested	Exceedence of Non-hazardous substances above DWS	Exceedence of Hazardous Substances above the MRV / MDL
6800.00-10900.00	7	Chromium, BOD, COD,	Acenaphthylene, Acenaphthene, Fluorene, Phenanthrene, Anthracene, Fluoranthene, Pyrene, Benz(a)anthracene, Chrysene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Indeno(123cd)pyrene, Dibenzo(ah)anthracene, Benzo(ghi)perylene, PAH total 16
10900.00-14600.00	69	Chromium BOD, COD, Nitrate as NO ₃ , Ammoniacal Nitrogen,	Acenaphthylene, Acenaphthene, Fluorene, Phenanthrene, Anthracene, Fluoranthene, Pyrene, Benz(a)anthracene, Chrysene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Indeno(123cd)pyrene , Benzo(ghi)perylene, PAH total 16
14600.00-17800.00	146	Chromium, Nickel, Zinc, BOD, COD, Nitrate as NO ₃ , Ammoniacal Nitrogen,	Cadmium, Naphthalene, Acenaphthene, Flourene, Phenanthrene, Anthracene, Fluoranthene, Pyrene, Benz(a)anthracene, Chrysene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Indeno(123cd)pyrene ,

Chainage	No of Samples Tested	Exceedence of Non-hazardous substances above DWS	Exceedence of Hazardous Substances above the MRV / MDL
			Benzo(ghi)perylene, PAH total 16
17800.00-19500.00	2	Chromium, Nitrate as NO ₃ ,	Acenaphthene, Flourene Phenanthrene, Fluoranthene, Pyrene, Benzo(a)pyrene, PAH 16 total
19500.00-20403.16	12	Chromium, BOD, COD, Nitrate as NO ₃ ,	Anthracene

Source: Contaminated Land Desk Study and Preliminary Interpretative Report, 2013 (Report no. 233906/BSE/BNI/001/P3).

9.4.27 Soil and groundwater samples taken between Ch6800.00-10900.00 indicated elevated concentrations of PAHs exceeding human health assessment criteria and above the Minimum Reporting Values for groundwater. This is likely to be due to the presence of the Norwich Airport, associated training facilities airfield in this section of the Scheme.

9.4.28 Groundwater contamination has been identified as the result of leaching from the Attlebridge Landfill and Rackheath Landfill which were outside of the scope of the ground investigations reported in the Desk Study and Preliminary Interpretative Report. This is discussed in more detail in Chapter 14: Road Drainage and Water Environment.

Additional survey work to be carried out

9.4.29 The Scoping Opinion received from the SoS[3] indicated that there was not enough information to scope out the impacts of the Scheme. Therefore, given the limited nature of previous investigations it is recommended that additional ground investigation and contamination testing is carried out in order to comprehensively assess the potential risks to receptors from the proposed NDR Scheme. The contamination testing will be targeted at specific areas long the NDR route, taking into account where large structures are to be located, where earthworks are anticipated and where active sources of contamination are present beneath or adjacent to the Scheme.

9.5 Mitigation and Impacts

9.5.1 The following section describes the anticipated activities to be undertaken during the construction and operational phases of the NDR Scheme. Mitigation measures to be implemented are discussed and impacts predicted to occur as a result of the Scheme and post-mitigation are then outlined.

9.5.2 A additional ground investigation will need to take into account the NDR Engineering Layout and Profile Drawings R1C096-R1-4003E to R1C096-R1-4014E for both geotechnical and contamination assessment purposes. Following the interpretation of the ground investigation data, design specific mitigation measures can be defined.

Do Something Scenario

9.5.3 The Do-Something scenario considers the impact of developing the NDR on geology and soils.

Works Impacting on Geology and Soils

Construction Phase

9.5.4 The proposed Scheme may include a range of construction activities across different sections of the NDR. The main construction activities include:

- Shallow excavation works – areas where shallow excavation works will be undertaken will result in the permanent removal of made ground and soils;
- Earthworks – where major earthworks are required a cut and fill balance will be aimed for, however surplus soils may be suitable for re-use elsewhere on the Scheme depending on testing of the soils and providing the results fall within defined acceptability criteria;
- Potential piling and rock cuttings – permanent removal of rock;
- Potential retaining walls – permanent removal of soils and rock; and
- General Construction works – movement of materials, storage of hazardous chemicals leading to secondary impacts on soils and groundwater.

Operational Phase

- 9.5.5 Once the construction phase is complete, reinstatement and landscaping will be carried out in accordance with the Landscaping Chapter mitigation.
- 9.5.6 Table 9.10 summarises the features at each section of the Scheme and considers the potential receptors to the construction works

Table 9.10: Proposed construction works along the NDR

Feature	Chainage	Locations of feature	Drawing	Description	Receptor
Roundabout	0.00-3300.00	Fakenham Road Ch510	4003E-4005E	Excavations and construction of new roundabouts, including appropriate foundations.	Soils Groundwater Surface water Construction workers General public Fauna and flora
		Fir Covert Road Ch1750			
	3300.00-6800.00	Drayton Lane Ch5330	4005E-4007E		
		Holton Road/ Drayton Lane Ch0			
	6800.00-10900.00	Airport Ch9120	4007E-4009E		
		North Walsham Road Ch12100			
	10900.00-14600.00	Wroxham Road Ch14240	4009E-4011E		
	14600.00-17800.00	Salhouse Road Ch16100	4011E-4013E		
		Plumstead Road North Ch210			
	17800.00-19500.00	Business Park Ch19500	4013E-4014E		
Broadland Gate, south of Ch19500					
19500.00-20403.16	Postwick North East Ch20100	4014E			
Balancing pond	0.00-3300.00	1. Ch600	4003E-4005E	Excavations/ use of existing lakes to provide balancing ponds as part of the drainage system to control flooding.	Soils Groundwater Surface water Construction workers General public Fauna and flora
		1A. Ch600			
		2. Ch1600			
	3300.00-6800.00	5. Ch4750	4005E-4007E		
		6. Reepham Road Ch1000			
	6800.00-10900.00	6A. Holt Road Ch90	4007E-4009E		
		12. Ch8900			
		13. Ch9750			
		3. Ch2800			
		4. Ch3200			
		8. Ch6750			
		8A. Ch6750			
		9. Cromer Road Ch0			
	13A. Ch9800				
	Postwick North West, north of Ch20403				

Feature	Chainage	Locations of feature	Drawing	Description	Receptor
Cut (thickness)	10900.00-14600.00	14. Ch11000	4009E- 4011E	The undulating nature of the landscape along the Scheme requires the creation of several cuttings and embankments to maintain an acceptable vertical alignment.	Soils Groundwater Surface water Construction workers General public Fauna and flora
		14A. Ch11000			
		16. Ch12750			
		17. Ch13300	4011E- 4013E		
		19. Ch16200			
		20. Ch16300	4013E- 4014E		
		23. Ch18200			
		24. Ch18750	4014E		
		27. Ch19750			
		28. Ch20200	4003E- 4005E		
Ch-50 to 0: 0.4m					
3300.00-6800.00	6800.00-10900.00	Ch3925 to 4400: 0.4 to 2.0m	4005E- 4007E	The undulating nature of the landscape along the Scheme requires the creation of several cuttings and embankments to maintain an acceptable vertical alignment.	Soils Groundwater Surface water Construction workers General public Fauna and flora
		4400 to 4550: 0.25 to 2m			
		7220 to 7500: 0.4 to 0.9m	4007E- 4009E		
		7600-8000: 0.1 to 2.4m			
		8000 to 8300: 0.2 to 1.4m	4009E- 4011E		
		10050 to 11510: 0.1 to 3.3m			
		12190 to 12500: 0.2 to 0.6	4009E- 4011E		
		12625 to 13260: 0.52 to 2.3			
		13370 to 13540: 1.5 to 2.1	4009E- 4011E		
		14280 to 14750: 0.5 to 0.7			

Feature	Chainage	Locations of feature	Drawing	Description	Receptor
Fill (thickness)	14600.00-17800.00	2.4			
		14925 to 15200: 0.9 to 6.6	4011E-4013E	16310 to 16440: 0.4 to 0.6m	
		15200 to 16100: 0.4 to 4.9		17350 to 17870: 0.2 to 1.6	
	17800.00-19500.00	18325 to 18750: 0.2 to 0.8m	4013E-4014E	18800 to 19525: 0.05 to 1.5	
		19730 to 20050: 0.2 to 1.9	4014E		
	0.00-3300.00	475 to 800: 0.5 to 1.2m	4003E-4005E	1510 to 1675: 0.5 to 0.6	
		800 to 860: 0.1 to 0.6m		2910 to 3925: 0.3 to 2.1	Soils Groundwater Surface water Construction workers General public Fauna and flora
		925 to 1220: 0.25 to 2.2m			
	3300.00-6800.00	None	4005E-4007E		
	6800.00-10900.00	7080 to 7220: 0.6 to 2.1	4007E-4009E	9660 to 9800: 0.2 to 1.8	
		8300 to 8520: 0.4 to 1.2		9800 to 10050: 1.3 to 1.4	
		9100 to 9275: 0.2 to 0.6			
10900.00-14600.00	11510 to 11600: 0.7 to 1.1	4009E-4011E	13260 to 13370: 1.1 to 2.3		
	11600 to 12290: 0.1 to 1.2		13540 to 13680: 0.6 to 2.1		
	12500 to 12625: 0.3 to 0.6		14160 to 14280: 0.17 to 1.1		
	14750 to 14925: 0.5 to 1.2	4011E-4013E	16440 to 17360: 0.5 to 8.5m		
17800.00-19500.00	17875 to 18325: 0.15 to 1m	4013E-4014E			

Feature	Chainage	Locations of feature		Drawing	Description	Receptor
Temporary topsoil storage	19500.00-20403.16	19525 to 19730: 0.5 to 1.2m	20050 to 20403: 0.4 to 7.9m	4014E	Storage of material excavated during construction works for potential re-use on the site if it meets validation criteria.	Soils Groundwater Surface Water Fauna and flora
	0.00-3300.00	Ch400	Ch2800	4003E- 4005E		
		Ch1500	Ch3100			
		Ch2300	Ch3200			
	3300.00-6800.00	Ch5250	Ch9800	4005E- 4007E		
		Ch6250	Ch10800			
	6800.00-10900.00	Ch7200	Ch9200	4007E- 4009E		
	10900.00-14600.00	Ch11300	Ch13500	4009E- 4011E		
		Ch12300				
	14600.00-17800.00	Ch14900	Ch16750	4011E- 4013E		
	Ch15800	Ch17250				
	Ch16250					
	17800.00-19500.00	Ch18300	Ch19100	4013E- 4014E	Development of bridges along the Scheme , including appropriate foundations. The majority of the project is classed as a Geotechnical Category 2 under Eurocode 7, which is defined as using conventional types of structures and foundations. Piling works may be required and retaining walls.	Soils Groundwater Surface Water Geology Construction workers
Bridge	19500.00-20403.16	None		4014E		
	0.00-3300.00	Marriots Way Overbridge Ch2390		4003E- 4005E		
	3300.00-6800.00	Bell Farm Overbridge Ch3980	Cromer Road Ch6800	4005E- 4007E		
	6800.00-10900.00	None		4007E- 4009E		
	10900.00-14600.00	Buxton Road Ch10940		4009E- 4011E		

Feature	Chainage	Locations of feature	Drawing	Description	Receptor
Site compound	14600.00-17800.00	Newman Track Ch15500 NDR Bridge (Over Railway Line) Ch16920	4011E- 4013E	Secure storage for excavated materials, machinery, equipment and vehicles.	General public Fauna and flora
	17800.00-19500.00	Middle Road Overbridge Ch18060	4013E- 4014E		
	19500.00-20403.16	New Postwick Bridge Ch20150	4014E		
	0.00-3300.00	Bridge Compound 2500	4003E- 4005E		
	3300.00-6800.00	Compound Ch4100	4005E- 4007E		
	6800.00-10900.00	Site compound with temporary mitigation measures Ch5250	4007E- 4009E		
		Main Site Compound Ch7200-7700			
	10900.00-14600.00	Bridge Compound Ch11250	4009E- 4011E		
	14600.00-17800.00	Site compound with temporary mitigation measures Ch11750 to 12200			
	17800.00-19500.00	Bridge Compound Ch18300	4011E- 4013E		
Proposed culvert	19500.00-20403.16	Site Compound Ch16450-17000	4013E- 4014E	To convey highways drainage under the NDR a number of culverts will be developed.	Soils Groundwater Surface water Fauna and flora
	0.00-3300.00	Bridge Compound Ch18300	4014E		
	3300.00-6800.00	Postwick Site Compound south west of Ch20403	4003E- 4005E		
	6800.00-10900.00	None	4005E- 4007E		
	None	Ch7200	4007E-		Soils Groundwater Surface water Geology

Feature	Chainage	Locations of feature	Drawing	Description	Receptor
Ditch		Ch10700	4009E	Development of drainage ditches adjacent to the Scheme.	Construction workers
	10900.00-14600.00	Ch11650	4009E-4011E		General public
		Ch12200	Ch13700		Fauna and flora
		Ch12520			
	14600.00-17800.00	Ch14800	4011E-4013E		
		Ch16700	Ch17520		
	17800.00-19500.00	Ch18150	4013E-4014E		
		Ch18700			
	19500.00-20403.16	None	4014E		
	0.00-3300.00	Ch150-2400	4003E-4005E		
Traffic diversion	3300.00-6800.00	Ch3250-3900	4005E-4007E	Development of 10m wide strips to allow traffic diversions	Soils
		Ch4000-5000	Ch6750-7500		Groundwater
	6800.00-10900.00	Ch6800-8400	Ch85950-10700		Surface water
	10900.00-14600.00	Ch11000-12200	Ch12700-14800		Construction workers
		Buxton Road Ch-10to130; Ch420-600			General public
	14600.00-17800.00	Plumstead Road	Ch16500-18400		Fauna and flora
	17800.00-19500.00	Ch18700-19500	4013E-4014E		
	19500.00-20403.16	None	4014E		
	0.00-3300.00	None	4003E-4005E		

Feature	Chainage	Locations of feature	Drawing	Description	Receptor
	3300.00-6800.00	Ch-159-100 Ch600 Ch1750 Ch2800	4005E- 4007E	Ch5400 Holt Road Drayton Lane	Groundwater Surface water Construction workers General public Fauna and flora
	6800.00-10900.00	Cromer Road	4007E- 4009E		
	10900.00-14600.00	Buxton Road Walsham Road	4009E- 4011E	Wroxham Road	
	14600.00-17800.00	Salhouse Road	4011E- 4013E	Plumstead Road	
	17800.00-19500.00	None	4013E- 4014E		
	19500.00-20403.16	None	4014E		

Construction Phase Mitigation

9.5.7 During the construction phase, mitigation measures will be implemented by the Contractor through a Construction Environmental Management Plan (CEMP).

Protection of Soil Structure and Quality

9.5.8 Chapter 10 (Materials) discusses the potential impacts of the Scheme on materials and introduces mitigation measures to be put in place with regards to materials. The Materials chapter incorporates a cut and fill balance to reduce the amount of soil permanently removed from the site.

9.5.9 Soils and rock will be permanently removed in areas where excavations are proposed. Where appropriate, any excavated material will be reused on site if acceptable. Where temporary works are proposed for the construction of the proposed Scheme, soils will also be stripped and then reinstated upon completion of the construction period.

9.5.10 Soils will be stripped, handled, stored and reinstated using best practice procedures, in accordance with appropriate guidelines, such as DEFRA's 2009 'Code of Practice for the Sustainable Use of Soils on Construction Sites'. Best practice procedures include topsoil and subsoil stripping, stockpiling and placing.

9.5.11 To minimise impacts on soil structure and quality, the topsoil will be sequentially stripped from the working areas. Topsoil and subsoil will be stockpiled separately so that they can be replaced in the same sequential layers, in-keeping with the existing soil profile. Soil stockpiles will be clearly defined. Tracked equipment will be used where possible, and traffic will be confined to designated routes to minimise compaction.

9.5.12 Other possible mitigation measures may include, but not be limited to, the use of a proprietary geotextile membrane to protect the existing ground condition, a layer of inert crushed granular material on the membrane to form temporary running surfaces for construction plant and reinforcement of access tracks.

Prevention of Contamination

9.5.13 Hazardous substances, including contaminated land, fuels, chemicals, waste and construction material, will be stored, handled, transported and disposed of in accordance with relevant legislation and best practice guidance for

mitigation of spillages and leaks. Measures to be applied include the appropriate use of storage containers, labelling of containers, the secure storage of containers and regular checks for leaks. The stockpiling of contaminated land will be avoided as far as possible. Where stockpiling is necessary, the contaminated material will be segregated and stockpiled on appropriately contained hardstanding and covered to prevent spreading.

9.5.14 Procedures will be put in place should contaminated land be encountered including contact details of the relevant consultees and regulators. Should any unexpected contamination be encountered during the construction works, all works will cease whilst an assessment of the level and extent of contamination is undertaken. In all cases where contamination is identified, risk assessment will be undertaken to determine if remediation is required. Any clean-up will be conducted as part of the construction works. Guidance regarding the correct procedure for storage, handling and disposal of contaminated soils will be detailed in the CEMP.

9.5.15 Emergency procedures will be in place to respond to potential accidental spillages and leaks. Particular consideration will be given to works around and displacement of the buried utilities.

9.5.16 Construction workers will be provided with appropriate personal protective equipment and direct contact with soil will be limited.

Dust Suppression

9.5.17 Dust will be suppressed using best practice methods to prevent spread of potentially contaminated windblown material. Dust suppression measures will include wheel washing for vehicles leaving the site and re-vegetation of earthworks and exposed areas. Further detail regarding dust suppressing measures can be found in the Air Quality Section of this report (Chapter 4).

Management of Waste

9.5.18 A Site Waste Management Plan (SWMP) has been developed for this Scheme and will be incorporated within the CEMP (Volume 2, Chapter 19: CEMP + SWMP). This document outlines the procedures for storage and disposal of waste, including hazardous and potentially contaminated wastes, to ensure appropriate disposal and minimal associated environmental impacts. For further information refer to the Materials section of this report (Chapter 10).

Deep Intrusive Works

9.5.19 Where piling or penetrative ground improvement is required through contaminated ground, especially in the vicinity of source protection zones, works will be carried out in accordance with the EA “Piling into contaminated sites” guidance and “Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination: Guidance on Pollution Prevention” and a Foundation Works Risk Assessment will be undertaken.

Operational Phase Mitigation

Drainage

9.5.20 There is potential for contamination issues due to runoff from roads. This is addressed in Chapter 14: Road Drainage and Water Environment.

Assessment of effects – Do Something Scenario

9.5.21 The following sections provide details of the impacts predicted to occur during both construction and operational phases as a result of the NDR Scheme following implementation of the mitigation measures. A comparison has been carried out between the impacts to geology and soils due to the Scheme and a “Do Minimum” scenario where the NDR is not developed.

9.5.22 Table 9.11 summarises appropriate mitigation measures for the Scheme and anticipated impacts following the implementation of mitigation.

Table 9.11: Assessment of Effect after mitigation- Do-Something scenario

Project Phase	Receptor	Summary of impact:	Mitigation	When impact is encountered			Compliance mechanism	Action by	Sensitivity of receptor	Magnitude	Effect				
				Construction period	Opening year (2017)	Design year (2032)									
Construction	Soils	Permanent removal of soils where excavation works are carried out during earthworks and foundation construction.	The Materials section of this report (Chapter 10) incorporates a cut and fill balance to reduce the amount of material permanently removed from the area of the Scheme.	✓	x	x	Cut and fill balance, Materials chapter 10 of this report.	Designer	Medium-High	Minor	Slight- Moderate Adverse				
		Potential for excess material to be generated which could be suitable for re-use elsewhere.		✓	x	x						Designer	Medium-High	Minor	Slight- Moderate Beneficial
		Soil deterioration and consolidation may occur due to poor storage and handling or due to vehicle movements during construction and due to loading by the NDR.		✓	✓	x									
		Works will be undertaken in accordance with appropriate guidelines such as DEFRA's 2009 Code of Practice for the Sustainable Use of Soils on Construction Sites. Stripping of soils for temporary works, storage of materials and reinstatement upon completion using best practice procedures. Sequential stripping of topsoil and separate stockpiling of topsoil and subsoil. Stockpiles will be clearly defined. Tracked equipment will be used where possible, and traffic will be confined to				DEFRA 2009 Code of Practice for Sustainable Use of Soils on Construction Sites									

Operation	Controlled Waters	contaminated land be encountered including suitable management/ remediation.	✓	✓	*	DEFRA 2009 Code of Practice for Sustainable Use of Soils on Construction Sites	Contractor	Low	Minor	Slight Adverse
		Tracked equipment will be used where possible, and traffic will be confined to designated routes to minimise compaction	✓	✓	*	Materials chapter, cut and fill balance	Designer	Low	Minor	Slight Adverse
		Consolidation of soils due to construction work may hinder vegetation growth due to reduction of pore spaces containing oxygen.								
		Removal of topsoil in construction could impact on flora and fauna.	✓	✓	*					
		The Materials section of this report discusses mitigation measures to protect materials in the area of the Scheme. A cut and fill balance has been developed to ensure as much material as possible that is removed from the area of the Scheme is re-used in the Scheme.								
		The Ecology chapter of this report describes the re-use of excavated soil to create earth banks; this will mitigate the likely disturbance experienced by wildlife.								
		Contamination issues relating to surface water runoff from roads has been adequately addressed in the Road Drainage and the Water Environment Chapter XX and are therefore not reproduced here.								

9.5.23 The impacts of the Scheme have been considered during construction works, at Opening Year (2017) and at Design Year (2032).

9.5.24 The main impacts associated with the construction period are considered to include loss and deterioration of soils and geology due to construction works, contamination of water bodies, soils and flora and fauna through accidental spills or leakages and mobilisation of contaminants, contamination of the Principal Aquifer due to piling works and impact on human health due to uptake of contaminated materials.

9.5.25 The proposed works are not within any Environmentally Sensitive Areas, Sites of Special Scientific Interest or Special Areas of Conservation (the Broads are between 185m southwest and 215m northeast of the Scheme and the River Wensum is 219m southwest). Therefore there is not considered to be any risk to designated sites.

9.5.26 A new abstraction point has been installed at Brundall Low Road and Church Road. Therefore the Postwick Hub now falls within a Source Protection Zone 1. There is potential for construction work to impact on this protected zone, in particular due to piling works within the zone. The two main potential impacts on the SPZ are:

- Increase in turbidity, potentially leading to a deterioration of the supplies water quality; and
- Creation of new pathways between areas of contamination and the water table, potentially contaminating the supply.

9.5.27 An assessment of the impacts at Opening Year (2017) indicates that there may be continued deterioration and consolidation of the soils occurring due to loading of the ground by the NDR. Some of the soils are anticipated to consolidate slowly in response to loading due to low permeability. This may cause an indirect impact to flora and fauna. Vegetation often struggles to grow in consolidated soils due to the lack of pore spaces containing oxygen. Impacts to fauna and flora are further discussed in the Ecology chapter of this report.

9.5.28 In assessment of operation impacts of the Scheme, a contamination risk to controlled waters was determined due to runoff from roads. However, this has been adequately discussed in the Road Drainage and Water Environment Chapter of this report and is not covered here. There are therefore not anticipated to be any impacts to geology and soils at Design year (2032)

9.5.29 The significance of cumulative effects on a single receptor has also been considered. No significant cumulative effects were determined.

Alterations to the Scheme

9.5.30 The Scheme will potentially alter in elevation by a small amount. It is not anticipated that this will alter the assessment of Significant Effects relating to geology and soils.

Do-Minimum Scenario

9.5.31 The Do-Minimum scenario considers the impacts on the geology and soils if the NDR was not to be developed.

Activities Impacting on Geology and Soils

9.5.32 In the absence of the Scheme, the land is being used predominantly for agricultural activity; there is also some residential and commercial land use.

9.5.33 Due to the use of land for agricultural activity, there is currently likely to be disturbance of soils and there is potential for contamination of soils, flora and fauna, and controlled water bodies. Human uptake of contaminated material is currently a potential risk due to the nature of agricultural work.

9.5.34 The main impacts currently on geology and soils are anticipated to be disturbance and potential contamination of soils, controlled waters and fauna and flora due to farming activities and a risk to human health due to the nature of work carried out on site leading to exposure to potentially contaminated soils. It is anticipated that the current land use has little/ no impact on geology and there will be no risk to construction workers if the Scheme is not to be developed.

9.5.35 A significant effect was determined for groundwater due to potential contamination of the Principal Aquifer underlying the site by fertilisers, pesticides and other hazardous materials used for farming activities.

9.5.36 The assessment of impacts was carried out for the “period of construction” (when the NDR was being developed if it was going ahead), 2017 and 2032. Assuming that the land use remains the same for this period, the impacts on the geology and soils are anticipated to remain the same for the period until 2032.

Table 9.12: Assessment of Effect- Do Minimum Scenario

Receptor	Summary of impact:	When impact will be encountered			Sensitivity of receptor	Magnitude	Effect
		Baseline	2017	2032			
Soils	Disturbance of soils through farming activities. Soil deterioration and consolidation may occur.	✓	✓	✓	Medium-High	Moderate	Moderate Adverse
	Potential contamination of soils through use and accidental spills/ leaks of pesticides, fertilisers and other hazardous materials during farming activities.	✓	✓	✓	Medium- High	Moderate	Moderate Adverse
Geology	No impact on geology is anticipated as farming activities are generally limited to soils impacts.	✓	✓	✓	Low	No change	Neutral
Controlled waters	Potential for contamination of controlled waters due to use or accidental spills/leaks of fertilisers, pesticides and other hazardous materials during farming activities.	✓	✓	✓	High	Moderate	Large Adverse
Construction workers	No impact anticipated on construction workers.	✓	✓	✓	Negligible	No change	Neutral
General public	Risk to human health through uptake of contaminated materials. In particular farmers are at risk due to their greater exposure to potentially contaminated materials during farming activities.	✓	✓	✓	High	Minor	Slight Adverse
Fauna and flora	Potential impact on fauna and flora due to use or accidental spills/leaks of fertilisers, pesticides and other hazardous materials during farming activities.	✓	✓	✓	Medium	Minor	Slight Adverse

9.6 Climate Change

- 9.6.1 Table 9.13 considers the potential impacts of climate change on the identified receptors and considers mitigation measures that could be implemented into the design and construction of the Scheme to reduce the significance of effects relating to geology and soils. The impact of climate change on the Scheme itself, with respect to geology and soils, is also summarised.

Table 9.13: Impact of climate change on geology and soils and appropriate mitigation measures

Receptor	Impact relating to climate change	Mitigation measures to be implemented
Soils	<p>Drought conditions could lead to soil heave or subsidence affecting geomorphology.</p> <p>Weakening or wash out of soils in heavy rain may lead to landslides and undercutting</p>	Implementation of soil reinforcement structures and robust structural design to limit impacts to maintenance requirements.
Geology	<p>Drought conditions could lead to subsidence, impacting on geomorphology.</p> <p>Gravel and sands are classed as “water compatible” in PPS25: Development and Flood Risk, therefore the risk to underlying geology is not considered high.</p>	Design of the Scheme will account, and be able to cope with, any future anticipated subsidence.
Controlled waters	<p>Droughts or heavy precipitation can open pathways for contamination, increasing the risk of contamination to controlled waters.</p> <p>A rising groundwater table could bring the groundwater in closer proximity to shallow contamination following heavy rains.</p>	<p>Remediation of local contamination within the construction of the Scheme.</p> <p>No piling or intrusive works to be carried out during heavy rainfall/ drought.</p>
Human health	Changes in climate may alter the groundwater level, increasing/ decreasing the probability of human exposure to contaminated materials. For example, during construction works contaminated	Works not to be carried out in extremes of weather.

Receptor	Impact relating to climate change	Mitigation measures to be implemented
	water is more likely to be encountered if the groundwater is shallower.	
Fauna and flora	If groundwater levels rise due to heavy rainfall, contamination may occur at shallower levels and be taken up by roots of plants that would otherwise not have been exposed to contamination.	Remediation of local contamination within the construction of the Scheme. Hardy species to be incorporated in landscape design.
The Scheme	<p>Alteration of groundwater levels may lead to it being necessary to change the design and construction of works.</p> <p>If groundwater levels were to rise, contaminants within groundwater could provide a risk to structures.</p> <p>Climate impacts have the potential to increase the risk of contamination, for example a rising groundwater level may lead to increased mobilisation of contaminants. This will have financial implications due to the need for remediation of greater quantities of material.</p> <p>The integrity of the Scheme could be compromised due to potential for subsidence, landslides, earthwork failures and undercutting of materials supporting the Scheme infrastructure.</p>	<p>Material selection and design standards will consider the capacity to respond to the risks presented by climate variability. The Materials section (Chapter 10) of this report discusses the necessary adaptation of materials to climate change in more detail.</p> <p>Flexibility in response, for example allowing within the budget for necessary treatment of unexpected ground conditions/ the need to change the design to ensure that the Scheme is built to a standard best able to cope with climate change.</p>

- 9.6.2 The main impact identified is alteration to the groundwater table due to changes in weather conditions. This has been identified to increase contamination risk and risk to the integrity of structures.
- 9.6.3 Incorporation of mitigation measures into the design and construction of the NDR could increase the resilience and adaptability of the Scheme to climate change.

9.7 Conclusions

Do Something Scenario

Significant Effects

Construction Phase

- 9.7.1 It is considered that, with appropriate implementation of the incorporated mitigation measures identified above, there will be no significant effects relating to geology and soils during the construction phase of the proposed Scheme.
- 9.7.2 The impacts of the Scheme are anticipated to be predominantly limited to the period of construction, with the exception of potential longer term consolidation occurring due to loading of soils. This may indirectly impact on fauna and flora.
- 9.7.3 By the Design Year, 2032, no impacts on geology and soils are anticipated.
- 9.7.4 Any potential alteration to the elevation of the Scheme is not anticipated to change the assessment of significant effects relating to geology and soils.

Operational Phase

- 9.7.5 There are considered to be no impacts during the operational phase of the Scheme (with the exception of some accident scenarios which are outside the scope of this EIA).

Cumulative Effects

- 9.7.6 No significant cumulative effects have been determined for the Scheme.

Summary of Predicted impacts

- 9.7.7 See Table 9.14 below.

Table 9.14: Summary of predicted impacts - Do Something Scenario

Project Phase	Receptor	Summary of impact:	Effect	Significance of Effect
Construction	Soils	Permanent removal of soils where excavation works are carried out during earthworks and foundation construction.	Slight-Moderate Adverse	Not Significant
		Potential for excess material to be generated which could be suitable for re-use elsewhere.	Slight-Moderate Beneficial	Not Significant
		Soil deterioration and consolidation may occur due to poor storage and handling or due to vehicle movements during construction and due to loading by the NDR.	Moderate Adverse	Not Significant
		Construction is likely to involve digging new trenches for utilities and potentially diverting existing utilities which will result in the temporary loss of soil and may impact on soil structure.	Slight Adverse	Not Significant
		Potential opportunity for remediation of contaminated soils	Moderate Beneficial	Not Significant
		Potential contamination of soils through contaminant mobilisation during excavations or accidental spills and leakages of hazardous substances.	Slight Adverse	Not Significant

Project Phase	Receptor	Summary of impact:	Effect	Significance of Effect
	Geology	Potential for permanent removal of rock forming deep piles or where retaining walls are to be constructed, for example the new overbridge at Postwick and Rackheath Road and Rail Bridge.	Slight Adverse	Not Significant
	Surface water	There is potential for contaminants to mobilise and sediments to reach surface water receptors.	Slight Adverse	Not Significant
	Groundwater	Piling through soils into the Principal Aquifer or Source Protection Zone 1 at the new overbridge at Postwick may promote migration of any potentially contaminated groundwater.	Moderate to Large Adverse	Not Significant
		Accidental spills or leakages of hazardous substances and migration into underlying groundwater.	Slight Adverse	Not Significant
		Removal of topsoil can decrease retardation of contaminants, increasing the risk of contaminants leaching into groundwater.	Moderate Adverse	Not Significant
		Mobilisation of contaminants in the vicinity of Norwich airport (Ch6800.00-10900.00)	Moderate Adverse	Not Significant
		Construction workers	Harm to human health by ingestion/ inhalation/ dermal contact with contaminated soils, asphyxiation or explosion due to hazardous	Slight Adverse

Project Phase	Receptor	Summary of impact:	Effect	Significance of Effect
		gases from contaminated land during construction activities.		
	General public	Harm to human health by ingestion/ inhalation/ dermal contact with contaminated soils.	Slight Adverse	Not Significant
	Fauna and flora	Harm to fauna and flora by contaminants mobilised during excavations or through accidental spills/ leakages of hazardous materials.	Slight Adverse	Not Significant
		Consolidation of soils due to construction work may hinder vegetation growth due to reduction of pore spaces containing oxygen.	Slight Adverse	Not Significant
Operation		Removal of topsoil in construction could impact on flora and fauna.	Slight Adverse	Not Significant
	Controlled waters	Contamination issues relating to surface water runoff are adequately discussed in Road Drainage and the Water Environment Chapter 14.		

Do Minimum scenario

9.7.8 The impacts on geology and soils are anticipated to remain the same until 2032, assuming that the land use remains the same.

Significant Effects

9.7.9 A significant effect on groundwater was identified due to the potential for contamination of the Principal Aquifer underlying the site by hazardous materials used in farming activities.

Cumulative Effects

9.7.10 No significant cumulative effects were identified for the Do Minimum Scenario

Summary of predicted impacts

9.7.11 See Table 9.15 below.

Table 9.15: Summary of predicted impacts - Do Minimum Scenario

Receptor	Summary of impact:	Effect	Significance of Effect
Soils	Disturbance of soils through farming activities. Soil deterioration and consolidation may occur.	Moderate Adverse	Not Significant
	Potential contamination of soils through use and accidental spills/leaks of pesticides, fertilisers and other hazardous materials during farming activities.	Moderate Adverse	Not Significant
Geology	No impact on geology is anticipated as farming activities are generally limited to soils.	Neutral	Not Significant
Controlled waters	Potential for contamination of controlled waters due to use or accidental spills/leaks of fertilisers, pesticides and other hazardous materials during farming activities.	Large Adverse	Significant
Construction workers	No impact anticipated on construction workers	Neutral	Not Significant
General public	Risk to human health through uptake of contaminated materials. In particular farmers are at risk due to their greater exposure to potentially contaminated materials during farming activities.	Slight Adverse	Not Significant

Receptor	Summary of impact:	Effect	Significance of Effect
Fauna and flora	Potential impact on fauna and flora due to use or accidental spills/leaks of fertilisers, pesticides and other hazardous materials during farming activities.	Slight Adverse	Not Significant

Climate Change

9.7.12 Climate change impacts relating to geology and soils have been assessed for this Scheme. The main impact identified is alteration to the groundwater table due to changes in weather conditions. A rising groundwater table could affect the stability of the ground conditions, impacting on construction works and design. It could also allow for greater contaminant migration and could bring contaminants closer to the surface, causing a risk to concrete structures, human health, fauna and flora. In addition climate change could lead to subsidence of soils or soil heave and undercutting.

9.7.13 Mitigation measures will be incorporated into the design of the Scheme in order to increase the resilience and adaptability of the NDR to climate change.

Compliance with Planning Policy

9.7.14 The proposed Scheme will be implemented in accordance with National Planning Policy Framework 2012. The proposed Scheme will also be implemented in accordance with the corresponding policies ENV4 and WM7 and local policies within Norwich City Council adopted the Joint Core Strategy (JCS) for Broadland,

9.7.15 Where construction does interact with soils the 'Code of Practice for the Sustainable Use of soils on Construction Sites' (DEFRA, 2009) will be followed.

9.7.16 Contaminated land assessments will be undertaken or have already been undertaken as part of the planning for the proposed Scheme, in accordance with UK legislation and best practice UK guidance including CLR11 and CIRIA C552.

10. Materials

10.1 Introduction

10.1.1 In this chapter the term materials is used to describe all minerals and recycled products used by the construction industry for road making and bridge building. The largest component of construction minerals and the most voluminous materials extracted from the UK landmass are ‘aggregates’ – a term used to describe granular or particulate material which is suitable for use on its own, or with a binder such as cement, lime or bitumen (in construction). Aggregates are used in concrete, mortar, roadstone or asphalt (drainage courses), or for constructional fill and railway ballast. The two principal types of natural aggregate are crushed rock (limestone, igneous rock and sandstone) and sand and gravel. In addition to land-won sand and gravel, significant quantities are produced by marine dredging. Recycled materials used in road building are typically recycled concrete aggregate, asphalt, and light-weight fill materials such as shredded tires and glass.

10.1.2 For material resource use, the potential environmental effects are associated with the extraction and transport of primary raw materials, the manufacture of products, and their subsequent transport to and use on construction sites. Projects, such as the NDR, consume large quantities of materials and hence may have permanent and direct effects on the environment. For example, effects may occur as a result of the depletion of natural resources and the embodied energy associated with the manufacture and transport of materials.

10.1.3 However some impacts occur off site and may possibly occur outside the UK. They include the depletion of non-renewable resources and the production of waste at the point of extraction and during manufacturing. It is outside the scope of this assessment to assess the environmental impacts associated with the extraction of raw materials and the manufacture of products. This chapter concentrates on the assessment of the impacts and effects that will occur as a result of the use of primary, secondary and recycled raw materials and manufactured construction products on the NDR.

10.1.4 For surplus materials and waste, the potential environmental effects are associated with the production, movement, transport, processing, and disposal of arisings from the NDR. Major new road construction projects or large-scale maintenance schemes might result in large quantities of surplus materials and waste leading to effects on the available waste management infrastructure. The basis of any assessment of the effects of waste will be to

identify the quantities and type of waste firstly, and then try to establish the impacts.

10.1.5 The use of materials including the management of waste may also give rise to other impacts, which might include, for example, detrimental impacts on air quality and increased noise; these aspects will be covered, if appropriate by the other assessments included in the ES.

10.2 Study Area

10.2.1 The study area comprises the NDR scheme boundary but will also take into account locations of waste management facilities that can be utilised by the project within Norfolk. Many materials will originate on-site such as excavated soil and rock; these are included within the scheme boundary. Other material resources will be sourced from off-site, their environmental impact will also be taken into account.

10.3 Methodology

Overall Methodology

10.3.1 The assessment process is aligned with the assessment levels in DMRB Volume 11 Section 2, Part 1, and Chapter 2: Project Development and Environmental Impact Assessment Levels:

10.3.2 The objective of the Detailed Assessment is to gain an in-depth appreciation of the environmental consequences of the project (both adverse and beneficial) to inform project decisions on whether the project proceeds in its proposed design, taking account of the key issues. The guidance in this Standard is not prescriptive or exhaustive in order to provide a flexible approach enabling those undertaking the assessment to tailor their approach to the specific characteristics of each project.

10.3.3 For the purposes of assessing the effects associated with materials use and waste the Detailed Assessment is a quantitative exercise which should aim to identify and quantify the following:

- The types and quantities of materials required for the project;
- The cut and fill balance;
- The types and quantities of forecast waste arisings from the project, including the identification of any forecast hazardous wastes;
- Surplus materials and waste falling under regulatory controls;

- Waste that requires storage on site prior to re-use, recycling or disposal;
- Waste to be pre-treated on site for re-use within the project;
- Wastes requiring treatment and/or disposal off site;
- The impacts that will arise from the issues identified in relation to materials and waste;
- A conclusion about the magnitude and nature of the impacts; and
- The identification of measures to mitigate the identified impacts.

10.3.4 There are no specific significance criteria used in the DMRB for assessment of materials and waste. The sensitivity of a receptor is dependent on the capacity of the local environment to provide the required materials and deal with the waste produced.

10.3.5 This assessment will identify whether the impacts are positive/negative, permanent/temporary and direct/indirect. Permanent impacts are likely to be significant in terms of their effect and so projects should aim to identify these. Equally it is clear that identifying quantities of materials to be used and waste forecast to be produce provides the basis for an assessment of the magnitude of change.

10.3.6 Calculations of waste arisings undertaken (for instance for the earth works balance) will be developed further by the construction contractor. At this time additional material requirements or waste streams may be identified. Conversely further waste management or resource efficiency measures may be identified. Nonetheless, the assessment in this chapter does provide sufficient information to determine the magnitude of impacts from materials use and waste generated, to determine effects at a County level.

10.4 Regulatory / Policy Framework Context

Planning and Legislative

10.4.1 An assessment has been undertaken of how the use of materials conforms to the high level policy and strategy targets influencing materials resource use.

10.4.2 The impacts of the waste forecast to be generated has been assessed in the context of the impacts on the waste management infrastructure (the receptor with regards to waste) and the legislation, policy and strategy targets influencing waste management.

National Planning Policy Framework (NPPF)

10.4.3 The National Planning Policy Framework sets out the Government's planning policies for England and how these are expected to be applied. It sets out the Government's requirements for the planning system only to the extent that it is relevant, proportionate and necessary to do so. It provides a framework within which local people and their accountable councils can produce their own distinctive local and neighbourhood plans, which reflect the needs and priorities of their communities.

10.4.4 This Framework does not contain specific policies for nationally significant infrastructure projects for which particular considerations apply. These are determined in accordance with the decision-making framework set out in the Planning Act 2008 and relevant national policy statements for major infrastructure, as well as any other matters that are considered both important and relevant (which may include the National Planning Policy Framework). National policy statements form part of the overall framework of national planning policy, and are a material consideration in decisions on planning applications.

10.4.5 NPPF Section 13 Facilitating the sustainable use of minerals: "Minerals are essential to support sustainable economic growth and our quality of life. It is therefore important that there is a sufficient supply of material to provide the infrastructure, buildings, energy and goods that the country needs. However, since minerals are a finite natural resource, and can only be worked where they are found, it is important to make best use of them to secure their long-term conservation."

Design Manual for Roads and Bridges

10.4.6 Design Manual for Roads and Bridges DMRB Volume 7 Design and Maintenance, Part 2 (HD 35/04) considers the conservation and use of secondary and recycled materials. Table 2.1 in this section summarises the permitted uses of secondary aggregates in the Specification for Highway Works. All the types of recycled and secondary aggregates that can be used in earthworks are listed.

10.4.7 In addition to the DMRB, Interim Advice Notes (IANs) are issued by the HA for specific guidance. IAN 73/06 (Revision1 2009) Design Guidance for Road Pavement Foundations gives one of the main objectives of design as the facilitation of the efficient use of a wide range of resources, incorporating natural, secondary and recycled materials as both binders and aggregates.

Other relevant IANs include the HA's carbon accounting framework (IAN114) and the HA's Environmental Information Systems (EnvIS) (IAN84). The quantities and nature of materials used and waste generated in earthworks are required for reporting under these IANs.

Local Policy

10.4.8 Norfolk Minerals and Waste Development Framework: Core Strategy and Minerals and Waste Management Policies Development Plan Document 2010-2026: Core Strategy Policy CS17 states that *“The County Council will promote the use of secondary and recycled aggregates in all developments and encourages all local authorities within Norfolk to require, as part of their own Local Development Frameworks, the use of recycled and secondary aggregates in development (where practicable). Applicants will be required to demonstrate the consideration of the use, where practicable, of secondary and recycled aggregates. Although a ‘target’ figure cannot be set for the production of secondary and recycled aggregates, the County Council will aim to achieve a year-on-year increase in the percentage of inert and construction and demolition waste managed in Norfolk that is recycled, starting with the baseline of 70%.”*

10.4.9 The scheme should aim to follow the Minerals and Waste Development Framework, which aims to promote the efficient consumption of minerals and the hierarchical approach to safeguarding and sustainable use of mineral resources, through re-use, recycling and secondary aggregates. Policy options for waste are recommended to include waste minimisation, re-use, recycling and recovery of resources.

Technical

10.4.10 The construction value for the NDR exceeds the £300,000 threshold in England, over which a Site Waste Management Plan (SWMP) is required (IAN 153/11). The SWMP is used to ensure that the waste management provisions are adequate for the construction activities planned and that wastes produced from the scheme are dealt with in an appropriate manner, following the waste hierarchy. The SWMP produced for this scheme can be found in Volume 2, Chapter 19: CEMP + SWMP, it is the responsibility of the client and principal contractor to review the SWMP at regular intervals so that it remains aligned with the progress of the project. The SWMP should outline

all waste types that are predicted to arise from the scheme and identify the methods of treatment, recovery or disposal.

10.5 Baseline

Minerals

10.5.1 Norfolk has significant permitted reserves of sand and gravel natural aggregates, estimated at 2.6million tonnes in 2001 (BGS). Norfolk's Minerals Site Specific Allocations Local Plan identified twenty-nine sites across the County, allocated for the abstraction of sand and gravel, silica sand and carstone, these are Norfolk's. However, Norfolk's demand for mineral resources is increasing, with the need for sand and gravel to the end of 2026 being calculated at 2.05 million tonnes (mt), currently there are twenty-six sand and gravel sites allocated in Norfolk, with their reserves standing at 27,591,000 tonnes. The demand for sand and gravel in the region amounts to 2.57 million tonnes per annum (mtpa) although, by contrast, the rolling average 10 years' sales are at 1.99 mtpa. Three sites have been allocated that have the potential to yield a total of approximately 6.4 million tonnes of silica sand. This figure is likely to fall with allocation of two of the sites coming into question. Norfolk represents 10% of the UK's total output. Norfolk's third resource, Carstone, has a current landbank reserve of approximately 8.6 years, another abstraction site is currently waiting to be added to this and has the potential to add a further seven years to this estimate.

10.5.2 The Scheme is located over areas of sand and gravels, it is therefore anticipated that much of the aggregate material required for construction will be taken from within the Scheme footprint. The overall earthworks strategy has been based on a cut to fill balance with excavated material from the cuttings, structures, balancing ponds and other drainage operations being utilised to satisfy all of the fill areas, bunds, landscape areas and also provide the aggregate for the CBGM A sub-base. Where possible the requirement to import Type 1 sub-base will be substituted by utilising crushed concrete or road planings from the works or other local contracts.

Waste

10.5.3 The policy document for waste in Europe, The Revised Waste Framework Directive (EU 2008), sets a target for recycling/reuse of 70% for construction, demolition and excavation wastes by 2020. This is enforced at a national level within The Waste (England and Wales) Regulations 2011.

- 10.5.4 Since the banning of co-disposal of hazardous waste in landfills in July 2004, Norfolk does not landfill any hazardous waste, with the exception of asbestos in Attlebridge landfill. This means that Norfolk exports its hazardous waste to other counties, in 2007 figures show that of 95,000 tonnes produced 60,000 tonnes were exported.
- 10.5.5 In 2008/2009 the Annual Monitoring Report figures show that Norfolk had five non-hazardous landfills, receiving over 482,000 tonnes of waste and had a permitted void space capacity of approximately 8.5 million m³.
- 10.5.6 The main waste type that is assumed to be associated with the scheme is Inert Waste, currently recycling levels of inert waste are high. The NDR project supports the Revised Waste Framework Directives and aims to use a cut to fill balance for material. Only two inert only landfills in Norfolk accepted waste in 2008/9, totalling 42,000 tonnes. Norfolk also uses inert waste to restore quarries and closed non-hazardous landfills (168,000 tonnes), whilst 31,000 tonnes of inert waste was disposed of too non-hazardous landfill sites. Between 2004 and 2007 approximately 60% of waste was recycled, 10% was used for engineering purposes on landfills and 25% for backfilling/restoring quarries, the remaining 5% went to landfill.
- 10.5.7 If materials are available but immediate usage is not possible then they will be stored at the main compound at Norwich Airport. The intention is to, whenever possible, deposit excavated material in its final location, in many cases temporary soil storage will have to be used, the locations of these sites are displayed on the plan drawings.

10.6 Mitigation

- 10.6.1 To limit the potential impacts upon resources in the region and increase the projects resource efficiency with regards to materials and waste have been considered. Approaches to mitigation are recommended for the scheme (table 1.3). It is important to note that the validity of the assessment forecasts are dependent on proper management of impacts and effects. Which is why projects should only include mitigation they know they can deliver and subsequently manage to fulfil their purpose. Assessments should describe how this process will be implemented.
- 10.6.2 The current project design aims to reduce the waste produced by maximising the use of materials available within the Schemes footprint, such as a cut and fill policy for soil, sands and gravels.

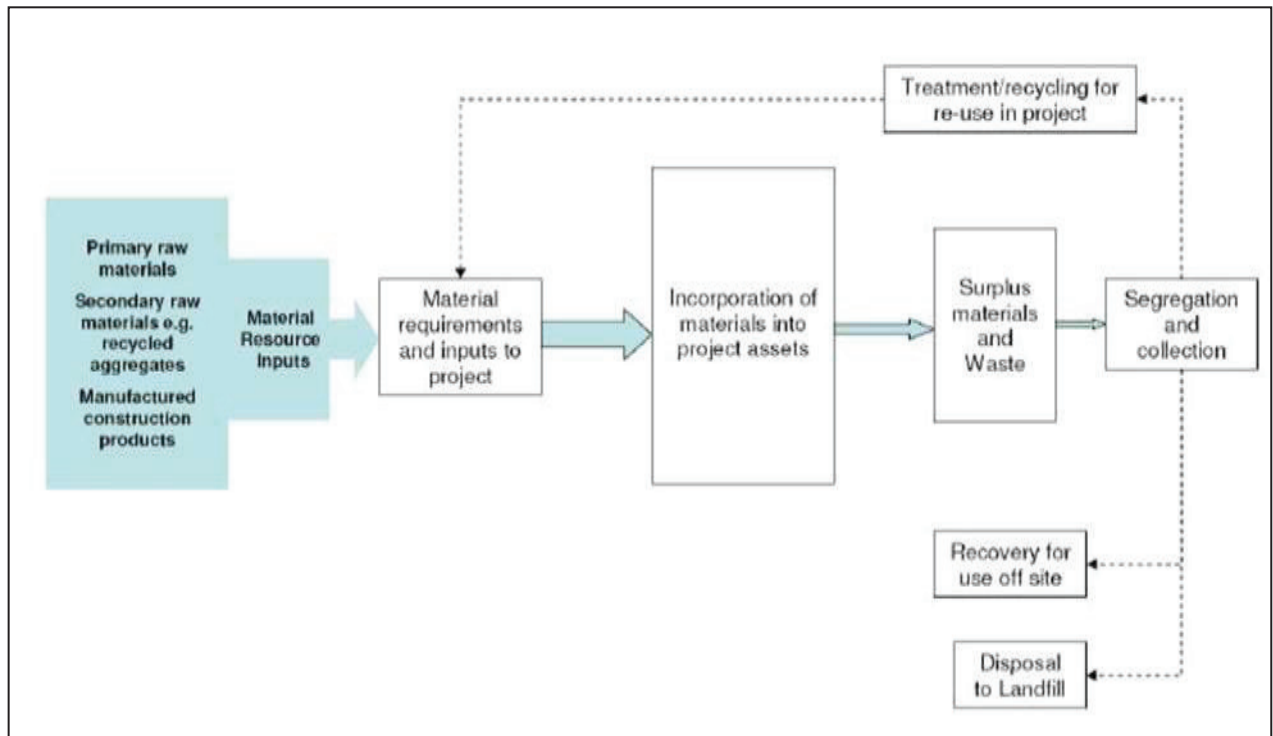
10.6.3 A preliminary draft Site Waste Management Plan (SWMP) has been prepared for the scheme and is included in Volume II. The agreement of, and compliance with the SWMP will be secured by requirements in the Development Consent Order (DCO). The SWMP aims to ensure that the waste produced in the construction phase, and other phases of the project is dealt with in accordance with the Duty of Care Provisions under the EPA and the duty of care provisions, the Waste Strategy (2007) and principles outlined within the Waste Hierarchy. The mitigation measures discussed in this chapter are incorporated into the SWMP. The contractor uses a WRAP system to achieve efficiency in waste management.

10.7 Assessment of Impacts

10.7.1 The potential environmental effects are associated with the extraction and transport of primary materials, the manufacturing and transportation of products. Many material resources will originate on site, with the overall aim being a cut to fill balance. Other materials will be purchased as construction products and others will originate off site from decommissioned sites.

10.7.2 Waste will arise as a result of the Scheme, due to a surplus of materials from excavation and materials brought to site but not used for the original purpose e.g. damages, off-cuts and surplus. The environmental implications of waste are associated with production, movement, transport, processing and disposal. Figure 10.1 illustrates how materials and waste are used in the process.

Figure 10.1: Project Material Flow Diagram (Source: IAN 153/11)



Construction

Materials Required

10.7.3 Estimated resource use during construction is shown in Table 10.1. This table is open to alterations from the construction contractor. Quantities are likely to change during the schemes construction as alterations are made. The percentage values in the recycled/reused and Recyclable on Decommission columns are only indicative of the likely percentages and should not be taken as confirmed. Cells are left blank if the material’s recyclable capability is unknown. This table can be updated when the scheme progresses and materials are purchased.

Waste Arisings

10.7.4 Information on the likely waste arising is presented in Table 10.1. Quantities of waste material are based on the current cut and fill calculations; these quantities are subject to change during the scheme construction and should therefore be considered as estimates.

Table 10.1 Summary of anticipated waste arisings (Table B within IAN 153/11)

Waste arisings from the project	Quantity	Unit	Additional information on waste arisings
Excavation			
Topsoil	502297	m ³	Retained on site for reuse
Win CBGM A Agg	67212	m ³	Retained on site for reuse
Class 1	629676	m ³	Retained on site for reuse
Class 2	390909	m ³	Retained on site for reuse
Class 4	350786	m ³	Retained on site for reuse
Acceptable	1371371	m ³	Retained on site for reuse
Excavation of class U1B	2000	m ³	Disposal
Excavation of class U2	500	m ³	Disposal
Ground Preparation and Cultivation			
Vegetation clearance	1421926	m ²	Disposal to landfill or green waste
Re-depositing in Scheme			
General	705273	m ³	-
Landscaping	748764	m ³	-
Fill	1454037	m ³	-
Resoil	360518	m ³	-
Disposal			
Excess Soil Material	8099	m ³	Disposal to selected landfill
Vegetation Disposal	1421926	m ²	Recycle or dispose to landfill or green waste
Excavation of unacceptable material (Japanese	1000	m ³	Treat on site over a number of years and then bury within the

Knotweed)			scheme boundary.
Class U1B Material	2000	m ³	Dispose to approved landfill site.
Class U2 Material	500	m ³	When toxic or other hazardous waste material is to be removed, the regulations covering excavation, transportation and deposition into a registered tip are closely governed. The local Environmental Health Officer (EHO) must be contacted and consulted regarding the treatment of any toxic waste material located within or affected by the scheme.
Site Accommodation – municipal waste	TBC		Recycle or to landfill

Climate Change Risk Assessment

10.7.5 Materials have the potential to be influence by climate change, therefore it is imperative that careful material selection should take place. Materials will be fit for purpose but also robust and resilient to a changing climate. The main risk highlighted by the NDR CCRA road surfaces should be resilient to extreme temperatures, with future risk to operation of the NDR likely to increase due to heatwaves.

10.7.6 Other material considerations are earthworks; ensuring their capability to endure weakening or washing out due to high rainfall events. Drainage systems have been designed to minimise the potential of flooding on the scheme.

10.7.7 The transportation of materials for construction and waste will give rise to carbon emissions therefore the Scheme will minimise the transportation of minerals through the cut fill balance.

Operation

10.7.8 Currently no alterations to the scheme are expected after the commencement of operation. If during the operation of the scheme material adjustments are made then the SWMP should be adjusted accordingly.

Maintenance

10.7.9 Currently there are limited maintenance plans for the scheme. Some considerations have been made to the maintenance of scheme ecology. These considerations are summarised in table 10.2:

Table 10.2: Planned maintenance for the NDR

Planned Maintenance	Quantity	Sum
Maintenance of Established Trees and Shrubs		
Pruning shrubs and climbers	12	Sum
Thinning and coppicing	12	Sum
Tree surgery	12	Sum
Control of Rabbits and Deer		
Rabbit / deer control within the highway boundary	12	Item
Management of Established Waterbodies		
Inspection of existing waterbodies and removal of debris / silt where required	1	Sum
Maintenance Period (Assumed 5 years)		
Grass cutting	851881	m ²
Inspection of waterbodies (swales/ditches/lagoons/containment lagoons) and removal of debris / silt where required	1	Sum
Maintenance of wildflower areas	272109	m ²
Total weed control if required	1061643	m ²

Hedge cutting	13696	m
Maintenance of trees	68939	Nr

10.7.10 Maintenance activities identified in table 10.4 will produce waste, for example grass cutting. The waste anticipated from these activities can either be recycled or disposed of in green waste landfills.

10.7.11 Maintenance of constructed elements within the scheme e.g. road surface, bridges, landscaping, should try and use materials already present in the scheme.

Significant Effects:

10.7.12 Volume2, Chapter 2: Materials, Section A shows the estimated materials that will be required for the project from the BOQ. The main materials required are for use in the schemes earthworks and surfacing. This is where the scheme aims to fulfil its cut and fill proposal. With a total of 1,873,668m³ of topsoil, CBGM A. aggregate and other acceptable materials being excavated, with 1,814,555m³ of this material being reused within the scheme. Leaving 10,599m³ of material left for disposal.

10.7.13 The main requirement from the supplier will be for; concrete 8,283.1m³ and precast concrete items such as; kerbs and drainage channels. A total of 1,736,622m² of sub-base and bitumen macadam will also be required for the surfacing of the schemes main carriageway. This will be provided by the schemes provider Tarmac.

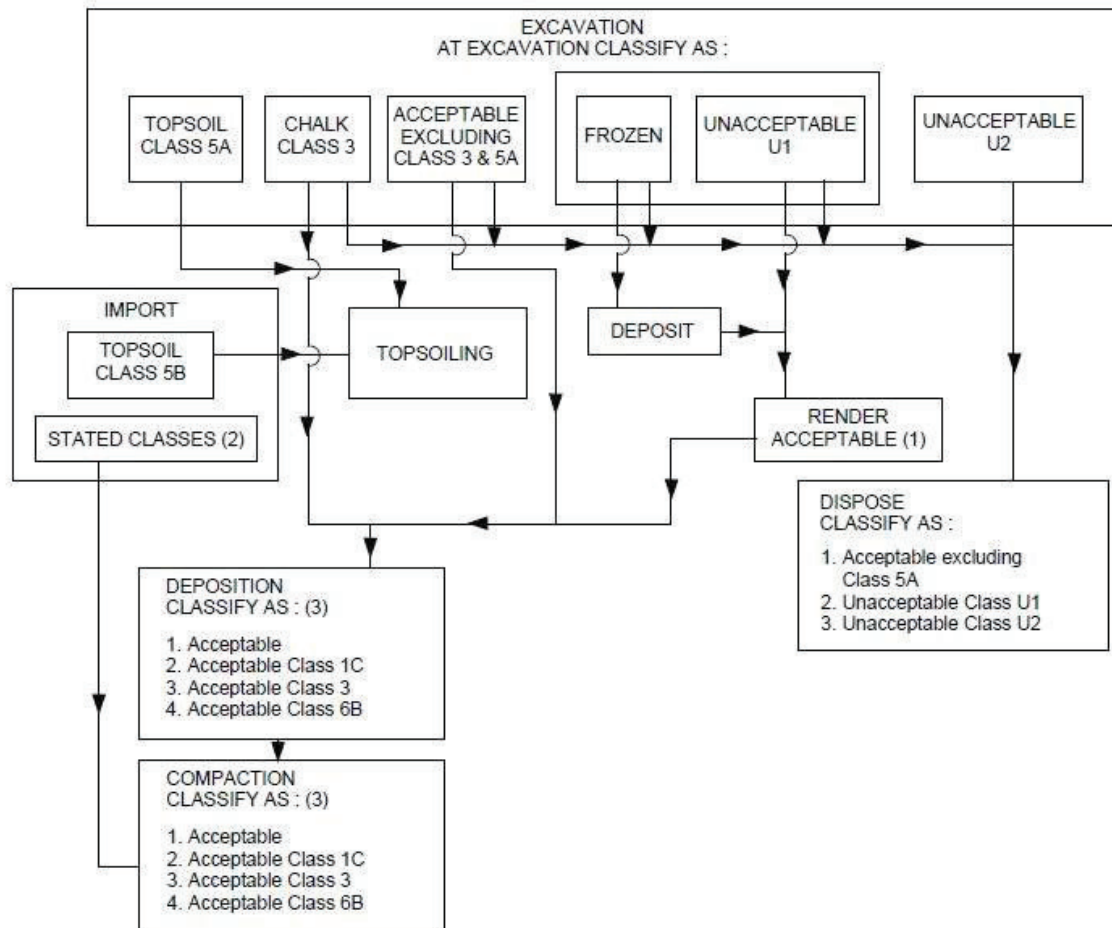
10.7.14 Many other materials will be required for the scheme. These new/virgin materials, for example; fencing, drainage, road signs/markings, waterproofing, vehicle parapets and ecological installations, will be required to have a recycled element and/or a recyclable potential upon decommission.

10.7.15 The majority of waste will either be retained for reuse on site (Table 10.1), and the amount of material taken off site is therefore minimised. This will be achieved by ensuring that topsoil and geological arisings from excavations will be reinstated for both use as aggregate and embankments/earthworks. There are three main site compounds for the scheme; these will have adequate space for storage of materials on site. Each bridge construction will also have a small storage site available during the construction process. It is not anticipated that any further storage will be

required. Earthworks and materials used during the construction process will be available when required to limit stockpiling of resources, which would lead to increased waste. Tarmac, the schemes provider, will supply materials when required via haulage.

- 10.7.16 The majority of waste that will go to landfill comprises 2,500m³ of unacceptable material; classes U1 and U2. The excavation and disposal classification outlined by the Highways Agency is displayed in figure 10.2. The volume of soil values are currently just estimates as the Agricultural land survey land classification map (Volume II) classifies the soils within the scheme to be either Grade 2 or Grade 3a and b and Grade 3; very good quality – moderate quality agricultural land. Therefore unacceptable materials are not anticipated. Other wastes that could go to landfill (table 10.2) should be quantified throughout the construction process. Japanese Knotweed will be treated on site and then subsequently buried within the scheme boundary. The project SWMP (attached in Volume II) will also be further developed by the construction contractor. There will therefore be opportunities throughout the project to improve the amount of reused or recycled materials and waste generated. Table 10.2 sets out the main impacts arising from waste and materials, it also outlines the mitigation that can be applied through the project and how measures will be implemented.

Figure 10.2: Excavation of soil classifications for Highway Works (Source: Chapter 3: Specification and Method of Measurement for Highway Works. Volume 4, Section 1, part 1 HA 44/91)



NOTES :

- (1) If the Contractor opts to render unacceptable material acceptable for use in the Works, then he will be paid as though he had disposed and then imported the class of material he rendered acceptable. If the contract requires material to be so treated then payment will be at rates in the BoQ.
- (2) For Import, only Stated Classes have to be classified (Group I, Feature 2)
- (3) Deposition and Compaction of Class 1C and 6B materials shall be measured separately only where Class 1C or 6B material as such is specifically stated by the Contract to be required to be placed and compacted in a particular location.

Table 10.3 Detailed Assessment and Mitigation Measures Reporting Matrix (Tables C and D within IAN 153/11)

Potential impacts associated with material resources/ waste arisings	Description for the impact	Description of mitigation measures	How the measures will be implemented, measured and monitored
Use of imported aggregates from quarry	Minor adverse. Indirect, permanent impact.	Quarry materials are only to be used as a back-up if site won materials are not adequate. Therefore effective use of excavated site materials is essential	The material management plan for the site will be updated throughout the construction process, allowing for improved estimates for the cut and fill balance.
Re-use of imported materials from decommissioned site	Minor positive. Indirect/direct permanent impact.	Avoid damage of materials when decommissioning and transporting to the scheme, will maximise their usability. Use materials instead of new materials	Assess the potential of materials on the planned decommissioning site, gaining an effective grasp on the quantities available will reduce the need for new materials and wastage of them.
Use of new/virgin materials e.g. signs, fencing, drainage etc.	Minor adverse. Indirect, permanent impact.	The recycled content in the new material should be maximised. Materials should be ordered for when they are required; this will reduce stockpiling and reduce excess materials that will increase wastage. Where possible materials should be sourced as locally as	Supply and procurement documentation. CEEQUAL assessment if being used. Site best practise in accordance with CEMP.

Potential impacts associated with material resources/ waste arisings	Description for the impact	Description of mitigation measures	How the measures will be implemented, measured and monitored
		possible to reduce the transport distance.	
Re-use of waste materials on site including topsoil, subsoil and aggregates.	Minor positive. Direct permanent impact.	Segregation of waste materials and correct storage to avoid damage.	Use of CEMP to set out correct storage methods.
Recycling of materials off-site including; concrete, planings and green waste.	Minor positive. Indirect, permanent impact.	Segregation of waste materials in the storage sites to maximise the opportunities for recycling any waste material. This can be helped by storing materials with best practise to avoid damage.	Monitor waste off-site using the SWMP. Identify appropriate waste and recycling sites to streamline recycling and disposal efficiency.
Landfill of waste including; unsuitable soils, damaged or unused new materials e.g. concrete.	Minor adverse. Indirect, permanent impact.	Waste to landfill should be minimised through waste management (described above). When required the landfills chosen should be in close proximity to the scheme to reduce the transport distance of waste.	Waste should be constantly monitored using the SWMP. CEEQUAL could be used or targets set for construction.

10.8 Conclusion

- 10.8.1 The NDR scheme has the potential to use large amounts of raw materials and generate quantities of waste. This consumption of material resources and the management of waste, results in environmental impacts that need to be managed and mitigated.
- 10.8.2 The bulk of the material requirements in the scheme are for the earthworks. It is currently estimated that 1,814,555m³ of soil, sub-soil, sub base and granular capping material is needed for the scheme; this is less than the estimated excavations of 1,873,668m³. Therefore it is currently expected that the scheme will work on a cut and fill basis. The significance of the effect is assessed as minor positive.
- 10.8.3 A considerable quantity of raw/virgin materials will be required, predominantly for surfacing, including 8,283m³ of concrete and precast concrete items such as; kerbs and drainage channels, and 1,736,622m² of sub-base and bitumen macadam. These will be provided by the schemes provider, Tarmac. The significance of the effect is assessed as minor adverse.
- 10.8.4 However, some materials, including concrete and bitumen macadam, are to be sourced from a decommissioned site, this will reduce the reliance on raw materials. The significance of this effect is assessed as minor positive.
- 10.8.5 Other materials will be used for new signage, fences and barriers. These will have a smaller recycled component and will have to be sourced off site from a supplier. The significance of this is considered to be minor adverse.
- 10.8.6 It is currently predicted that 10,599m³ of excavated material will be disposed of in landfill, the majority of which is excess soil material. If this can be used on other schemes then it will be. Unacceptable or excess material must go to landfill. An estimated 1,421,926m² of vegetation is to be removed during the schemes construction, the percentage of this recycled will be maximised, the remaining waste will be disposed of in green waste sites.
- 10.8.7 The NDR scheme is in the early stages of resource use and estimation of waste generated. There will be opportunities throughout the planning and construction processes to improve the results of this assessment and reduce the waste produced. This assessment is based on current information and only confirmed practices have been taken into account.
- 10.8.8 The detailed impact assessment anticipates that as a result of the materials used and the waste produced from the scheme that there will only be no

significant effects as a result of the Scheme. Mitigation measures suggested to reduce the impact of the scheme include; maximisation of usage of materials won from the schemes footprint, maximisation of recycled content of virgin materials sourced for the scheme and segregation of waste to maximise the recycling of materials, source materials from as close as possible to the scheme to reduce transport distance and select landfills in close proximity to the scheme to reduce waste haulage distance. This can be achieved through a constantly evolving Materials Management plan and Site Waste Management Plan. CEEQUAL scheme could be engaged for the project to set targets for construction.

11. Noise and Vibration

11.1 Introduction

11.1.1 The proposed route of the NDR will reduce the volume of through traffic in and around Norwich city centre but will introduce traffic into a relatively quiet rural corridor to the north and east of the city. This is likely to result in positive noise impacts in the former area but negative impacts in the latter - the purpose of this Chapter of the ES is to quantify and assess any such effects and to assess whether there are any likely significant environmental noise impacts.

11.1.2 Two phases of the development are considered: temporary impacts resulting from the construction activities and permanent impacts due to noise and vibration from road traffic using the NDR and the local highway network. This chapter sets out the following in relation to the assessment of noise effects:

- Methodology;
- Policy;
- Mitigation;
- Assessment; and
- Identification of any significant effects.

11.2 Methodology

Overview

11.2.1 An environmental impact assessment of the impact of noise and vibration requires a comparison of the predicted impacts of noise resulting from the proposed Scheme with the pre-existing (baseline) levels. The predicted increases/decreases (impacts) and the resulting effects on people and resources are then quantified (resulting in an assessment) which enables likely significant adverse impacts of the Scheme to be identified and reduced or eliminated where possible, and the design of additional mitigation measures where appropriate.

Scope of Assessment

Spatial Scope

11.2.2 The study area and hence spatial scope can be expressed in terms of both temporary and permanent impacts (detailed below). For the baseline noise survey, the broad study area includes the area surrounding the extents of the on-line route of the Scheme, as shown on the General Arrangement plans in the ES (Volume 1, Appendix 1).

11.2.3 In general, for the spatial scope of the survey, monitoring positions were selected to represent residential receptors and primarily front-line properties facing existing roads or the proposed NDR route. This is discussed in more detail in ensuing sections.

Temporary Impacts

11.2.4 In terms of construction noise, the extent of the assessment is limited to areas where the calculated total noise (construction noise plus baseline noise) exceeds the baseline noise level by 5 dB or more, subject to threshold values of 65 dB(A) for daytime (weekdays 07:00 – 19:00; Saturdays 07:00 – 13:00), 55 dB(A) for evenings and weekends (weekdays 19:00 – 23:00; Saturdays 13:00 – 23:00; Sundays 07:00 – 23:00), and 45 dB(A) for night periods (23:00 – 07:00). This is largely restricted to the proposed Scheme envelope, although could extend along elements of the existing road network, depending on haul routes and the quantity of construction-related traffic.

Operational Impacts

11.2.5 The Design Manual for Roads and Bridges (DMRB) Volume 11 Section 3 Part 7 HD213/11 Noise and Vibration (2011) describes a methodology for the assessment of road projects in the UK. The methodology requires that the study area is identified as an area within 1km of the physical works associated with the Scheme. Within this study area, road traffic noise predictions are performed at any sensitive receptor within 600m of a road where there is the possibility of a change of 1 dB LA10,18hr upon Scheme opening, or 3 dB LA10,18hr in the long term.

11.2.6 For potential effects due to road traffic noise outside of the 1km area, the methodology requires that sensitive receptors are identified adjacent to roads where the change in received road traffic noise level would, as a result of the proposed Scheme, increase or decrease by at least 1 dB LA10,18hr on opening or 3 dB in the long term. Consequently, the spatial extents of the assessment extend beyond the physical works associated with the Scheme.

Temporal Scope

Temporary Impacts

11.2.7 The baseline for noise and vibration with respect to temporary impacts during construction is represented by the conditions immediately prior to construction of the Scheme. However, measurements made to describe the baseline are required for the purposes of the present assessment. Comprehensive baseline noise measurements were carried out during September and October 2006 and in March, October and November 2008. In order to ensure a robust baseline for the construction year, further measurements were carried out in June and September 2013. The description of the baseline refers to the results of all of these measurements in order to indicate variations that occur over the day, week and throughout the year, especially with the season. Construction of the Scheme is due to begin in January 2015 with completion of construction works in October 2017. The assessment of noise and vibration impacts during construction applies to all the periods (time of day, days of the week etc.) that works are expected to take place.

Operational Impacts

11.2.8 The assessment of operational noise and vibration impacts considers the conditions in the year of Scheme opening and in the Scheme design year. The assessment methodology described in DMRB HD213/11 includes an estimation of nuisance. This is based on a 'steady-state' relationship between noise exposure and noise nuisance 15 years after Scheme opening, which is assumed here as the Scheme design year. In the case of the NDR the opening year is 2017 and the Scheme design year is 2032.

Sensitive Receptors

11.2.9 Key sensitive receptors were identified by site walkovers, OS mapping and aerial photography. Examples of sensitive receptors include dwellings, schools, hospitals, community facilities and designated areas such as Sites of Special Scientific Interest (SSSIs).

11.3 Methodology

Consultation

11.3.1 The Secretary of State's response to the Scoping Report notes the following:

- The methodology should be agreed with the Environment Agency;

- Noise and vibration along access routes during construction should be considered;
- Information on the types of vehicles and plant used during construction should be identified;
- Operational noise sources should be identified and assessed; and
- Consideration should be given to non-designated features which may be sensitive to noise and vibration.

11.3.2 With respect to the second point above, the Environment Agency has been consulted and had no comment to make.

11.3.3 Norwich City Council identified that cumulative effects should include development within Norwich Airport and the effect of aircraft noise.

11.3.4 South Norfolk Council noted that the impact on local residents would need to be considered carefully.

11.3.5 No comments from other Local Authorities have been received.

Desk Study

11.3.6 DMRB HD213/11 provides guidance on three levels of noise and vibration assessment: Scoping, Simple and Detailed. As an aid to deciding the relevant level of assessment a flowchart is provided in Annex 1 of HD213/11.

11.3.7 It was considered that a 'Detailed Assessment' would be appropriate as:

- There are changes to infrastructure that may cause a change in noise level;
- There are sensitive receptors within 1km that may be subject to change in noise level; and
- It is evident that the project will result in changes greater than the threshold levels stated within HD213/11.

11.3.8 Desk-based studies and site walkovers prior to baseline surveys and assessment have been carried out to inform the assessment process. The main sources of information that are relevant to the assessment of potential noise and vibration effects of the proposed Scheme include:

- Review of the proposed Scheme drawings and information;

- Review of previous work that has been undertaken. This included previous iterations of the Environmental Statement and noise input to the Major Scheme Business Case (MSBC);
- Forecasted traffic flows;
- Ordnance Survey mapping; and
- Consultation with Norfolk County Council (NCC).

Site Survey

11.3.9 Following guidance within DMRB HD213/11 that a 'Detailed Assessment' 'should include a noise measurement survey if not already undertaken' (i.e. at earlier stages of the DMRB assessment), a noise measurement survey was undertaken. Baseline noise measurements were conducted during September and October 2006 and in March, October and November 2008. In order to ensure a robust baseline for the construction year, further measurements were carried out in June and September 2013.

11.3.10 Guidance on undertaking noise measurements is given in Annex 7 of DMRB HD213/11. The description of the baseline is presented in Section 10.4.

11.3.11 Ground-borne vibration may arise due to certain types of construction activities and due to road traffic where there are irregularities in the carriageway surface. A baseline survey of ground-borne vibration was not considered necessary because:

- The assessment of construction-generated vibration and any consideration of mitigation is not affected by the exposure of receptors to existing sources of vibration; and
- Vibration generated by irregularities in the road surface of the Scheme is unlikely to be of significant magnitude as it would be newly-surfaced, and any subsequent irregularities in the surface could be rectified by maintenance of the carriageway surface (see DMRB HD213/11 clause A5.26).

Assessment Methodology

Approach

11.3.12 For the purposes of this Chapter of the ES, 'impact' is defined as a physical change to the baseline environment resulting from the proposed Scheme. For example, an impact can be an increase in the level of road traffic noise due to an expected increase in traffic volumes. The consequence of the change to the baseline environment on any environmental receptor is defined as the 'effect'. For example, the impact of an increased level of road traffic noise may produce the effect of increased disturbance in the community.

11.3.13 The significance of effects due to noise and vibration is a function of the magnitude of impact and the sensitivity of the receptor.

11.3.14 The assessment of the effects on receptors arising from changes to levels of noise or vibration comprises the following elements:

- Identification of potential sources and prediction of noise and vibration impacts likely to be received at nearby sensitive receptors, including dwellings;
- Comparison of the predicted impacts with the baseline conditions;
- Evaluation of the receptor sensitivity and the significance of effects; and
- The consideration of noise mitigation measures incorporated within the design and an assessment of any residual effects.

Evaluation of Effects

Construction Effects

Construction Noise

11.3.15 British Standard (BS) 5228 'Code of construction practice for noise and vibration control on construction and open sites – Part 1: Noise' (2009) provides a methodology for calculating noise levels generated by fixed and mobile plant used for a range of typical construction operations. The Standard set out in BS 5228 includes a database of equivalent continuous noise levels (LAeq dB) at a reference distance of 10m and a simple noise propagation model that can be used to make allowances for source-receiver distances, ground properties, utilisation time etc.

11.3.16 The Standard does not define strict criteria to determine the significance of noise impacts, although examples of how limits of acceptability have been applied historically and some examples of assessing significance

are presented. 'Example Method 2 – 5dB(A) change' (Annex E 'Significance of Noise Effects' Section E.3.3) has been adopted for the assessment of effects at residential receptors as the approach considers the expected changes in ambient noise levels and better reflects conventional EIA methodologies compared with the use of fixed/absolute noise limits.

11.3.17 Example Method 2 deems noise levels generated by construction activities to be significant if the total noise (pre-construction baseline noise plus construction noise) exceeds the pre-construction baseline noise by 5 dB or more, subject to lower cut-off values of 65 dB LAeq (daytime), 55 dB LAeq (evening) and 45 dB LAeq (night-time) from construction noise alone; and a duration of one month or more, unless works of a shorter duration are likely to result in significant impact.

11.3.18 The day-time period is defined as 07:00 to 19:00; the evening period as 19:00 to 23:00 and the night-time period as 23:00 to 07:00.

11.3.19 BS 5228 – 1:2009 does not define what might constitute a significant noise impact from works of shorter duration, however the Standard does provide an example of criteria for the significance of noise effects which might be used to determine whether a Scheme for installation of noise insulation or temporary rehousing of occupants is appropriate. This example cites the occurrence of the trigger noise levels reproduced below in Table 11.1 subject to the following conditions:

- Predicted noise level exceeds the noise trigger level in Table 11.3;
- The total noise (baseline plus construction noise) is 5 dB above the existing baseline noise level (from Example Method 2 above); and
- The noise level exceeds the trigger level for ten or more days of working in any fifteen or for a total of days exceeding 40 in any 6 month period.

Table 11.1: Examples of time periods, averaging times and noise levels associated with the determination of eligibility for noise insulation.

Time	Relevant time period	Averaging time, T	Noise insulation trigger level dB $L_{Aeq,T}$
Monday to Friday	07:00 – 08:00	1h	70
	08:00 – 18:00	10h	75
	18:00 – 19:00	1h	70
	19:00 – 22:00	3h	65
	22:00 – 07:00	1h	55
Saturday	07:00 – 08:00	1h	70
	08:00 – 13:00	5h	75
	13:00 – 14:00	1h	70
	14:00 – 22:00	3h	65
	22:00 – 07:00	1h	55
Sunday and Public Holidays	07:00 – 21:00	1h	65
	21:00 – 07:00	1h	55

11.3.20 Where construction involves large scale and long-term earth-moving activities which are more akin to surface mineral extraction than to conventional construction activity, BS 8233 *'Sound Insulation and Noise Reduction for Buildings'* states that advice within ODPM document *'Minerals policy statement 2 Controlling and mitigating the environmental effects of mineral extraction in England, 2005'* (MPS2) should be taken into account. MPS2 has been superseded, in relation to mineral extraction, by the NPPF and its Technical Guidance, which cites similar noise advice to MPS2. MPS2 is therefore referred to in this document, given its focus is activities that would typically occur in road construction, and as MPS2 is in turn referred to within the current version of BS 5228 – 1:2009.

11.3.21 It is assumed that the majority of construction work will be undertaken during the daytime. Noise increases of 5 dB or more above existing baseline are deemed to be significant subject to a lower cut-off value for the construction noise component alone of 65 dB LAeq,T during the day-time, and a duration of one month or more, unless works of a shorter duration are likely to result in significant impact.

11.3.22 Based upon the guidance in MPS2 (and the National Planning Policy Framework), BS 5228 – 1:2009 suggests a limit of 55 dB LAeq,1h for day-time construction of earthworks, but only where these works are likely to occur for a period in excess of 6 months.

Construction Vibration

11.3.23 In general, vibration arising from construction activities is ground-borne and, for example in the case of typical earthworks schemes, may be generated by operations such as ground compaction, piling and the movement of vehicles over irregular surfaces. The Transport Research Laboratory (TRL) has published the results of a series of measurements of vibration levels at distances from a range of construction works. Although the ground conditions in the area of the source and receiver position and of the intervening ground are not specified in that report, the data is considered to be adequate for the purpose of providing an indication of potential magnitudes of impact for this assessment. The data is reproduced in Table 11.2 with vibration levels expressed as peak particle velocity (PPV). PPV is defined as the instantaneous maximum velocity reached by a vibrating element as it oscillates about its rest position and can be used in the assessment of vibration impacts with respect to disturbance and building damage.

Table 11.2: Estimated peak particle velocities at distances between construction plant and vibration measurement positions

Construction plant	Distance between construction site and vibration measurement position in m	Peak particle velocity at measurement position in mm/s
General construction traffic including haul routes	1	0.60
	2	0.24
	4	0.14
	6	0.10
	≥8	<0.10
Heavy lorry on poor road surface	1	2.20
	2	0.80
	4	0.24
	6	0.16
	8	0.10
	≥10	<0.10

11.3.24 BS 5228 ‘Code of construction practice for noise and vibration control on construction and open sites – Part 2: Vibration’ (2009) provides guidance on the effect of vibration and the likelihood they will cause complaint and cosmetic damage to buildings. BS 5228 – 2:2009 does not indicate whether particular vibrations are significant. The standard states:

11.3.25 “Vibrations above these levels [0.14mm/s to 0.3mm/s] can disturb, startle, cause annoyance or interfere with work activities. At higher levels they can be described as unpleasant or even painful. In residential accommodation, vibrations can promote anxiety.”.

11.3.26 In addition BS 5228 – 2:2009 provides the following guidance on effects:

- At a vibration level of 0.14mm/s vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction;
- At a vibration level of 0.3mm/s vibration might be just perceptible in residential environments;
- At a vibration level of 1.0mm/s “It is likely that vibration of this level in residential environments will cause complaint, but can be tolerated if prior warning and explanation has been given to residents”; and
- At a vibration level

11.3.27 Generally, vibration from construction activities will be temporary and intermittent in nature. On this basis, in this assessment a PPV of 1.0 mm/s or more, lasting for a minimum of one hour during the normal hours of working, is considered to have a major adverse impact and deemed to produce a significant adverse effect in terms of annoyance to the occupiers of affected buildings. Lower vibration magnitudes would have progressively less significant effects. Table 11.3 presents the criteria adopted within this assessment for receptors having high environmental sensitivity. It should be noted that moderate and major impacts are considered to be significant.

Table 11.3: Criteria for the assessment of the significance of transient vibration effects for receptors having high environmental sensitivity.

		Continuous peak particle velocity (1 hour minimum) [mm/s]	Magnitude of impact	Significance of effect
Sensitivity	High	0	None	Neutral
		>0 and <0.14	Negligible adverse	Slight adverse
		≥0.14 and <0.3	Minor adverse	Slight or moderate adverse
		≥0.3 and <1.0	Moderate adverse	Moderate or Large adverse
		≥1.0	Major adverse	Large or Very Large adverse

11.3.28 To put the values in Table 11.3 into context, the BS 7385 ‘Evaluation and measurement for vibration in buildings Part 2: Guide to damage levels from ground-borne vibration’ (1993) provides guidance on the levels of vibration that would be necessary to cause structural damage to different types of buildings. BS 7385 – 2:1993 indicates that:

- In industrial and heavy commercial buildings, continuous PPVs of more than about 25 mm/s would be required to cause structural damage; and
- In residential buildings and light commercial buildings, continuous PPVs of more than about 7 mm/s would be required to cause structural damage.

Operational Effects

Day-time Road Traffic Noise Impacts

11.3.29 DMRB HD213/11 describes the impacts of road traffic noise in terms of the noise descriptors conventionally used for assessing the impact of road traffic in the UK, i.e. the statistical noise level LA10,18 hr over an 18-hour period between 06:00 and 24:00 (the traffic noise index). The Calculation of Road Traffic Noise (CRTN) methodology was followed in the traffic noise

calculations below, which have provided input to the DMRB assessment carried out in this chapter.

11.3.30 In order to predict the level of road traffic noise from the road network, traffic data has been provided in terms of 18-hour Annual Average Weekday Traffic (AAWT) flow between the hours of 06:00 to 24:00, along with average vehicle speed and percentage heavy vehicles.

11.3.31 Calculations of the road traffic noise level have been carried out for four scenarios:

- Do Minimum option in the baseline year;
- Do Minimum option in the future assessment year;
- Do Something option in the baseline year; and
- Do Something option in the future assessment year.

11.3.32 In the above scenarios, 'Do Minimum' means traffic growth with committed development only. 'Do Something' means committed growth with the NDR. More specific details are contained within the Transport Assessment Summary in the ES Volume 2, Chapter 2).

11.3.33 In accordance with HD213/11 the assessment of road traffic noise impacts requires the following comparisons:

- The **short-term change** in road traffic noise upon proposed Scheme opening (Do Minimum option in the baseline year vs. Do Something option in the baseline year).
- The **long-term change** in road traffic noise assuming the proposed Scheme is built (Do Minimum option in the baseline year vs. Do Something option in the future assessment year); and,
- The **long-term change** in road traffic noise assuming the proposed Scheme is not built (Do Minimum option in the baseline year vs. Do Minimum option in the future assessment year).

11.3.34 DMRB HD213/11 states that "in terms of road traffic noise, a methodology has not yet been developed to assign significance according to both the value of a resource and the magnitude of the impact." (paragraph 3.36). For this reason the magnitude of the road traffic noise impact is reported rather than the significance of the impact. However, environmental assessment regulations do require the reporting of any significant effects, and

DMRB does provide guidance on significance for other environmental disciplines, based upon sensitivity of receptor and magnitude of impacts, as have been outlined in preceding and following text.

11.3.35 For short-term changes in road traffic noise the smallest change in road traffic noise level that is considered perceptible is 1 dB LA10,18hr. In the long-term a 3 dB LA10,18hr change in road traffic noise is considered to the smallest perceptible change. For this reason the magnitude of short-term and long-term impacts are expressed differently as shown in Table 11.4 below.

Table 11.4: Magnitude of impact due to changes in road traffic noise in the short-term and long-term

Noise change dB L _{A10,18h}	Magnitude of impact for a short-term change in road traffic noise	Magnitude of impact for a long-term change in road traffic noise
≤ -10	Major beneficial	Major beneficial
> -10 and ≤ -5		Moderate beneficial
> -5 and ≤ -3	Moderate beneficial	Minor beneficial
> -3 and ≤ -1	Minor beneficial	Negligible beneficial
> -1 and ≤ -0.1	Negligible beneficial	
0	No change	No change
≥ 0.1 and < +1	Negligible adverse	Negligible adverse
≥ 1 and < +3	Minor adverse	
≥ 3 and < +5	Moderate adverse	Minor adverse
≥ +5 and < +10	Major adverse	Moderate adverse
≥ +10		Major adverse

Night-time Road Traffic Noise Impacts

11.3.36 In addition to the day-time impact of the proposed Scheme, it is recognised within DMRB HD213/11 that there is potential for a road scheme

to result in increased levels of road traffic noise during the night-time. Whilst traffic levels during the night-time are generally lower than during the day-time, there is still a potential impact due to the heightened sensitivity of receptors during the night. The World Health Organization (WHO) Night Noise Guidelines for Europe propose an Interim Target Level of 55 dB $L_{night, outside}$ and the assessment in this chapter considers where the proposed Scheme would result in night-time levels above this target.

11.3.37 Predictions of night-time noise level, expressed in terms of dB $L_{night, outside}$, have been carried out following the method within the TRL report ‘*Converting the UK traffic noise index $L_{A10, 18hr}$ to EU noise indices for noise mapping*’. Receptors have been identified where:

- The introduction of the proposed Scheme could result in a receptor being exposed to night-time road traffic noise levels above the Interim Target level, where current exposure is below this level; and
- A receptor already exposed to night-time road traffic levels in excess of the Interim Target Level and where exposure is predicted to increase.

Airborne Vibration Impacts Due to Road Traffic

11.3.38 Vibration due to road traffic may occur in two forms: ground-borne and airborne.

11.3.39 Ground-borne vibration may be generated by the dynamic interaction of vehicle wheels on road surface irregularities and may be transmitted to adjacent buildings (generally at low frequencies, typically 8 to 20 Hz). The level of vibration is a complex function of road surface profile, vehicle speed, weight and suspension characteristics, pavement construction, underlying geology etc. and there exists no simple model for predicting such impacts. With reference to DMRB HD213/11 clause A5.26, it is expected that newly constructed carriageways are unlikely to generate significant levels of such vibration as they may be assumed to be free of irregularities. Therefore this impact has not been considered further.

11.3.40 Airborne-induced vibration may be generated by high levels of low-frequency noise (20 – 100 Hz) from vehicle exhausts, which can induce vibration in nearby building elements. This may be perceptible and/or in turn generate noise at different frequencies (window-rattle etc.). DMRB HD213/11 clauses A1.33 and A6.21 present a methodology to assess airborne vibration nuisance at dwellings within 40m of the carriageway. This is based on the

same approach for the assessment of nuisance associated with airborne noise but the percentages of people annoyed are reduced by 10%.

Effects on Fauna

11.3.41 DMRB HD213/11 acknowledges the potential for traffic noise to affect animal behaviour, particularly breeding behaviour and predator-prey interactions. DMRB also cites research indicating that the “effects of traffic noise show an increasing impact with increasing noise levels above about 45 dB LAeq for a range of woodland, marsh and grassland species in certain circumstances”. Predicted noise contours indicate that the 45 dB LAeq impact threshold would be exceeded in areas close to the road. Based on the limited guidance within DMRB HD213/11, it is therefore likely that some impact on fauna would result.

Sensitivity of Receptors

11.3.42 Noise affects people in a number of different ways. This may include factors such as annoyance and sleep disturbance, enjoyment of quiet spaces, ability to communicate with others, ability to concentrate at home or at work, participation in social and community activities. As a consequence it is not appropriate to consider a single criterion when assessing the value of an existing noise environment.

11.3.43 Table 11.5 sets out criteria used in this assessment to determine the sensitivity of a receptor. It should be noted that, generally, the variation in the sensitivity of receptors in terms of noise impact is taken into account by applying different scales to classify magnitude of impact (e.g. by using different scales for daytime and night-time) rather than by varying the assignment of sensitivity to specific types of receptors.

Table 11.5: Criteria to define the sensitivity of receptors (Source:Based on CIRIA C693 Noise and Vibration from Road and Rail (13))

Sensitivity	Description	Examples of receptors
High	Receptors where occupants or activities are particularly susceptible to noise	Residential Quiet outdoor areas used for recreation Conference facilities Auditoria/studios Schools in daytime Hospitals/residential care homes Religious institutions e.g. churches or mosques
Medium	Receptors moderately sensitive to noise, where it may cause some distraction or disturbance	Offices Restaurants Sports grounds where spectator noise is not a normal part of the event and where quiet conditions are necessary (e.g. golf or tennis)
Low	Receptors where distraction or disturbance from noise is minimal	Residences and other buildings not occupied during working hours Factories and working environments with existing high noise levels Sports grounds where spectator noise is a normal part of the event

11.3.44 The majority of the receptors that are expected to be affected by noise and vibration impacts arising due to the proposed Scheme would be dwellings. Therefore, the tables below that set out scales for magnitude of impact apply to receptors having high sensitivity.

Significance

11.3.45 The significance of the effect of any noise and vibration impacts is determined as a function of the sensitivity of the receptor and the magnitude of the impact to which it is exposed. Using the definition of receptor sensitivity and the magnitudes of impact (defined below), significance of any effects are identified using the matrix presented in Table 11.6.

Table 11.6: Matrix for determining significance of effect

	Sensitivity of receptor		
Magnitude of impact (beneficial or adverse)	Low	Medium	High
Major	Slight or Moderate	Moderate or Large	Large or Very Large
Moderate	Slight	Moderate	Moderate or Large
Minor	Neutral or Slight	Slight	Slight or Moderate
Negligible	Neutral or Slight	Neutral or Slight	Slight
No impact	Neutral	Neutral	Neutral

11.3.46 Effects are considered to be significant when identified as likely to have a Moderate, Large or Very large effect.

11.4 Context

Technical

Scheme Design

11.4.1 The Scheme details are based on the General Arrangement in the ES (Volume 1. Appendix 1) the General Arrangement of the Scheme design.

Road Traffic Flows

11.4.2 The assessment below uses traffic parameters provided by Mott MacDonald, which were derived using the software Simulation and Assignment of Traffic to Urban Road Networks (SATURN). The sources of assumptions and limitations of the traffic data are described within the Transport Assessment DCO document 5.5 Ref (10).

Construction Activities

11.4.3 Information on construction activities at this stage of a project is given in the Birse Civils document 'Norwich Northern Distributor Road (NDR) Construction Methodology' and is limited to a high-level description of construction sequences and provisional inventory of likely plant to be used. Limited noise data is available on plant used for earthworks. Therefore, the prediction of potential noise impacts arising from construction activities is carried out with reference noise levels for plant items given in Annex C of BS 5228 – 1:2009 where information is not otherwise available from the Contractor. Assumptions on the utilisation of plant and plan distance between sources and receptors are stated below.

11.4.4 With regards to road traffic associated with construction, the Construction Methodology states that:

11.4.5 “During peak periods it is envisaged that there will be up to 75 deliveries per day predominantly in 20 tonne eight wheeled wagons. This of course is in addition to staff and workforce transport. We will endeavour to restrict any deliveries until after 07:00.”

11.4.6 It is not possible to make a meaningful, quantitative assessment of potential noise impacts attributable to construction traffic using the available information without additional details on the routing and timing of movements etc. However, the management of potential noise and vibration from traffic during construction will be addressed as part of the Section 61 process.

Planning and Legislative

National Planning Policy Framework

11.4.7 The NPPF came into force in March 2012 and forms the main national planning policy document within England. The NPPF replaced Planning Policy 24 (PPG24) 'Planning and Noise'.

11.4.8 Paragraph 123 of the NPPF states that:

11.4.9 "Planning policies and decisions should aim to:

- avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development [Note that the NPPF provides a footnote referencing the Noise Policy Statement – this document is discussed in the following section];
- mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions;
- recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established; and
- identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason."

11.4.10 The NPPF does not refer directly to vibration, other than in the context of mineral extraction in paragraph 144.

11.4.11 In considering decision making, paragraph 186 of the NPPF states that:

11.4.12 "Local planning authorities should approach decision-taking in a positive way to foster the delivery of sustainable development. The relationship between decision-taking and plan-making should be seamless, translating plans into high quality development on the ground."

The Noise Policy Statement for England

11.4.13 The Noise Policy Statement for England (NPSE) was issued by DEFRA in 2010. Its purpose is to promote "good health and a good quality of life through the effective management of noise within the context of

Government policy on sustainable development.” The Noise Policy Aims of the NPSE are to:

- “avoid significant adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development;
- mitigate and minimise adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development; and,
- where possible, contribute to the improvement of health and quality of life through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.” (paragraph 1.7).

11.4.14 These aims are required to be interpreted having regard to the guiding principles of sustainable development, set out at paragraph 1.8 of the NPSE. Paragraph 2.18 explains what is meant by this:

11.4.15 “There is a need to integrate consideration of the economic and social benefit of the activity or policy under examination with proper consideration of the adverse environmental effects, including the impact of noise on health and quality of life. This should avoid noise being treated in isolation in any particular situation, i.e. not focussing solely on the noise impact without taking into account other related factors.”

11.4.16 The NPSE refers to established concepts from toxicology that are currently being applied to noise impacts:

- NOEL – No Observed Effect Level: this is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.
- LOAEL – Lowest Observed Adverse Effect Level: this is the level above which adverse effects on health and quality of life can be detected.
- SOAEL – Significant Observed Adverse Effect Level: this is the level above which significant adverse effects on health and quality of life occur

11.4.17 The NPSE states that noise levels above the SOAEL should be avoided, while also taking into account the guiding principles on sustainable development (paragraph 2.23). If noise levels fall between the LOAEL and SOAEL, the NPSE requires that all reasonable steps should be taken to

minimise and mitigate adverse effects, again taking into account the guiding principles of sustainable development (paragraph 2.24). The NPSE makes it clear that this does not mean that such adverse effects cannot occur (paragraph 2.24).

- 11.4.18 In paragraph 2.22, the NPSE states that: “it is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times... However, not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available”.

The Land Compensation Act 1973 Part 1

- 11.4.19 The Land Compensation Act 1973 Part 1 includes provision for compensation for loss in property value resulting from physical agents, including noise and vibration, resulting from the use of public works, such as new or improved roads.

The Noise Insulation Regulations 1975 (amended 1988)

- 11.4.20 The Noise Insulation Regulations 1975 (amended 1988) were made under Part 2 of the Land Compensation Act for the obligatory and discretionary provision of noise mitigation measures for dwellings adjacent to new highways.

Sections 60 and 61 of the Control of Pollution Act 1974 and the Environmental Protection Act 1990

- 11.4.21 Local Authorities have other statutory controls on noise and vibration. Sections 60 and 61 of the Control of Pollution Act 1974 concern impacts relating to construction sites; and the Environmental Protection Act 1990 places a duty on local authorities to serve abatement notices where noise from premises, vehicles and machinery are judged to constitute a statutory nuisance. Compliance with these controls is required, although the requirements fall outside the planning system.

BS 5228 'Code of practice for noise and vibration control on construction and open sites – Part 1: Noise', British Standards Institution, 2009.

11.4.22 BS 5228 – 1:2009 provides a methodology for calculating noise levels generated by fixed and mobile plant used for a range of typical construction operations. The standard includes a database of equivalent continuous noise levels (LAeq dB) at a reference distance of 10m and a simple noise propagation model that can be used to make allowances for source-receiver distances, ground properties, utilisation time etc.

BS 5228 'Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration'

11.4.23 BS 5228 – 2:2009 provides guidance on the effect of vibration and the likelihood they will cause complaint and cosmetic damage to buildings.

World Health Organization Night Noise Guidelines for Europe 2009

11.4.24 These guidelines reviewed available evidence of health effects of night-time noise across Europe, and derived health-based guideline values. The guidelines recommended an interim target of 55 dB LNight, outside to protect the public. This target value is an annual average LAeq,8h dB from 23:00 to 07:00.

11.5 Baseline

General Observations

11.4.1 The proposed route passes through a primarily rural area which may be described as generally tranquil except for local areas close to the airport and the major roads leading into the city. There are no major industrial noise sources in the area.

11.4.2 General descriptions are given below along with indicative traffic flows expressed as 2-way Annual Average Daily Traffic (AADT) flows.

A1067 Attlebridge to A140 Cromer Road

11.5.1 This section of the proposed route is primarily rural, but affected locally by noise from road traffic, particularly that using:

- A1067 Fakenham Road (9,100 AADT 2012);

- B1149 Holt Road (9,900 AADT 2012); and
- A140 Cromer Road (11,700 AADT 2012)

11.5.2 Norwich Airport is also a significant source at the east end of this section. Daytime noise levels varied between 40 and 60 dB LAeq.

A140 Cromer Road to A1151 Wroxham Road

11.5.3 This section of the proposed route is primarily rural, but affected locally by noise from road traffic, particularly that using:

- A140 Cromer Road (11,700 AADT 2012);
- B1150 North Walsham Road (10,600 AADT 2012); and
- A1151 Wroxham Road (11,800 AADT 2012).

11.5.4 This area is also affected by noise from aircraft using Norwich Airport and the associated engine test facilities. Between these areas, daytime levels fall to about 45 dB LAeq in the quietest parts.

A1151 Wroxham Road to the A47

11.5.5 This section of the proposed route is primarily rural but affected locally by noise from road traffic, particularly that using:

- A1151 (11,700 AADT 2012) at the north end; and
- A47 (37,200 AADT 2012).

11.5.6 Between these areas, levels fall to about 40 dB LAeq in the quietest parts.

11.5.7 Noise from the trains on the Norwich to Cromer Railway is also a feature of the noise climate on the east side of Thorpe End and Rackheath.

Survey Results

11.5.8 Measurements were made at the sites shown in drawings MMD-233906-DT-0861 to MMD-233906-DT-0865 [Volume 1A, Figure 10.2] on various occasions between September 2006 and September 2013. The measurement results are summarised in the Table 11.7 to Table 11.11.

11.5.9 The following acoustic parameters are presented in the tables:

- LAeq dB(A) The A-weighted equivalent continuous noise level in decibels;
- LA10 dB(A) The A-weighted noise level exceeded for 10% of the measurement interval and represents the highest noise levels measured during the interval. It is often used to describe contributors such as passing road traffic; and
- LA90 dB(A) The A-weighted noise level exceeded for 90% of the measurement interval and represents the lowest noise levels measured during the interval. It is often used to describe background noise level.

11.5.10 A review of Table 2 of The Statistical Release for the DfT's Transport Statistics Great Britain indicates that traffic flows have not increased significantly (> 25%) over the period during which the various baseline noise surveys were undertaken. This would indicate that in areas where traffic noise predominates, ambient noise levels would not have changed significantly over the period of the noise surveys.

11.5.11 A review of Table 2 of The Statistical Release for the DfT's Transport Statistics Great Britain indicates that traffic flows have not increased significantly (> 25%) over the period during which the various baseline noise surveys were undertaken. This would indicate that in areas where traffic noise predominates, ambient noise levels would not have changed significantly over the period of the noise surveys.

Table 11.7: Summary of short-term baseline noise measurements (free-field) shown in drawing MMD-233906-DT-0861 (1 of 5)

Location	Date	Start time	L _{A10} dB(A)	L _{A90} dB(A)	L _{Aeq} dB(A)
D1	29/08/2007	11:00	47.5	41.5	45.8
D1	21/10/2008	10:00	61.3	51.0	58.2
D1	11/09/2013	12:12	51.0	44.0	48.8
D2	29/08/2007	11:50	54.5	44.5	52.3
D2	21/10/2008	10:25	58.1	46.6	53.4
D2	11/09/2013	13:05	64.0	47.0	59.8
D3	29/08/2007	12:25	49.0	42.5	48.1
D3	21/10/2008	11:00	60.1	46.8	49.9
D3	11/09/2013	13:35	61.0	49.0	47.9
D4	29/08/2007	13:15	43.0	31.5	40.3
D4	21/10/2008	11:30	55.9	45.9	52.3
D4	11/09/2013	14:07	50.0	38.0	54.3
D5	29/08/2007	13:53	41.0	34.5	39.5
D5	21/10/2008	11:55	47.7	41.2	45.3
D5	12/09/2013	15:37	-	38.0	46.3
D5	12/09/2013	15:55	46.2	31.8	43.0
D6	29/08/2007	14:30	54.5	42.0	51.3
D6	21/10/2008	12:17	48.5	40.5	46.3
D6	11/09/2013	15:08	56.0	48.0	52.6
D7	29/08/2007	14:50	60.5	45.0	57.0
D7	21/10/2008	12:40	60.6	46.0	57.3

Location	Date	Start time	L_{A10} dB(A)	L_{A90} dB(A)	L_{Aeq} dB(A)
D7	11/09/2013	14:51	64.0	47.0	60.4
D9	30/08/2007	10:55	47.0	38.9	43.7
D9	21/10/2008	15:14	42.7	39.1	41.3
D9	12/09/2013	14:40	49.9	33.2	52.2
AMS1	05/03/2008	11:51	64.0	48.0	59.7
AMS1	21/10/2008	13:05	59.9	47.1	56.0
AMS1	12/09/2013	15:20	68.4	48.9	63.8
AMS2	05/03/2008	12:20	57.0	48.0	56.7
AMS2	11/09/2013	14:30	62.5	37.7	63.8
AMS2	13/09/2013	16:42	-	53.0	61.8
AMS3	05/03/2008	12:57	52.0	42.0	49.6
AMS3	21/10/2008	13:30	43.4	37.2	40.7
AMS3	03/06/2013	17:14	54.7	47.4	55.3

Table 11.8: Summary of short-term baseline noise measurements (free-field) shown in drawing MMD-233906-DT-0862 (2 of 5)

Location	Date	Start time	L _{A10} dB(A)	L _{A90} dB(A)	L _{Aeq} dB(A)
D8	29/08/2007	15:25	59.5	41.5	55.3
D8	21/10/2008	13:55	57.5	48.3	54.4
D8	12/09/2013	13:35	66.9	37.0	66.9
D10	30/08/2007	11:35	45.2	37.7	42.5
D10	21/10/2008	14:48	42.6	37.4	40.2
D10	23/10/2008	12:04	53.4	45.6	50.0
D10	12/09/2013	13:05	47.0	32.0	47.3
D11	30/08/2007	12:20	48.9	38.8	45.5
D11	21/10/2008	14:21	56.1	48.4	53.5
D11	12/09/2013	12:25	57.0	35.0	55.8
D12	30/08/2007	12:50	50.3	45.5	48.7
D12	21/10/2008	16:06	51.8	47.9	50.2
D12	04/06/2013	11:11	56.4	46.0	54.3
D12	12/09/2013	15:19	49.0	35.0	47.8
D13	30/08/2007	13:25	44.0	38.5	42.1
D13	21/10/2008	16:28	45.4	41.7	43.8
D13	13/11/2008	14:40	54.5	42.5	52.3
D13	04/06/2013	10:46	56.2	44.0	53.7
D13	12/09/2013	15:51	46.0	35.0	53.0
AMS4	05/03/2008	13:36	64.0	53.0	60.7
AMS4	21/10/2008	16:42	58.7	50.5	55.8

Location	Date	Start time	L _{A10} dB(A)	L _{A90} dB(A)	L _{Aeq} dB(A)
AMS4	03/06/2013	16:43	53.5	48.0	51.8
AMS4	12/09/2013	14:55	68.0	46.0	62.8

Table 11.9: Summary of Short-term Baseline Noise Measurements (Free field) (3 of 5)

Location	Date	Start time	L _{A10} dB(A)	L _{A90} dB(A)	L _{Aeq} dB(A)
D14	30/08/2007	14:25	44.6	34.7	40.8
D15	30/08/2007	15:10	47.3	40.4	44.9
D16	30/08/2007	15:50	57.7	46.2	54.5
AMS5	05/03/2008	14:33	56.0	44.0	56.4
AMS6	05/03/2008	15:19	51.0	44.0	49.7
AMS5	21/10/2008	16:57	50.9	43.2	48.3
D14	22/10/2008	10:38	47.6	41.7	45.3
D15	22/10/2008	10:57	56.2	46.5	52.8
D16	22/10/2008	11:17	65.4	44.1	60.0
AMS6	22/10/2008	11:39	47.6	41.7	45.2
D14	23/10/2008	11:36	52.6	45.4	49.6
D16	13/11/2008	14:10	47.5	37.0	44.3
D15	13/11/2008	15:15	50.5	38.5	48.8
D14	13/11/2008	15:45	50.0	38.5	50.0
AMS5	03/06/2013	15:04	48.9	33.2	47.5
D14	03/06/2013	15:41	57.7	38.1	57.6
D15	03/06/2013	15:59	50.7	36.3	52.2
AMS6	12/09/2013	11:05	61.0	38.0	58.9
D16	12/09/2013	11:40	59.0	40.0	56.5

Table 11.10: Summary of Short-term Baseline Noise Measurements (Free field) (4 of 5)

Location	Date	Start time	L _{A10} dB(A)	L _{A90} dB(A)	L _{Aeq} dB(A)
M5	27/09/2006	14:25	46.0	38.5	43.5
M5	10/10/2006	13:30	44.0	34.0	71.6
M5	22/10/2008	15:06	49.7	44.3	47.6
M5	23/10/2008	10:41	50.1	42.8	59.4
M5	13/11/2008	09:00	42.5	34.5	40.0
M5	11/09/2013	15:45	47.8	41.7	45.4
M6	27/09/2006	15:17	63.0	44.5	59.4
M6	22/10/2008	14:40	52.2	41.6	51.7
M6	12/11/2008	14:35	63.3	37.5	58.9
M6	11/09/2013	16:15	76.3	46.3	71.6
M7	27/09/2006	15:50	45.5	36.0	44.9
M7	22/10/2008	14:15	45.1	38.8	42.7
M7	13/11/2008	09:36	39.0	35.0	37.3
M7	04/06/2013	09:47	52.9	45.2	50.2
M8	27/09/2006	16:45	44.5	40.0	44.2
M8	31/08/2007	11:05	48.5	43.3	48.0
M8	04/06/2013	09:23	48.1	39.8	45.3
M8/D19	22/10/2008	13:50	47.1	42.1	45.1
AMS7	23/10/2008	11:09	51.7	47.4	49.8
AMS7	05/03/2008	16:15	55.0	47.0	53.7
AMS7	22/10/2008	13:26	49.4	45.1	47.6

Location	Date	Start time	L_{A10} dB(A)	L_{A90} dB(A)	L_{Aeq} dB(A)
AMS7	03/06/2013	14:18	66.0	49.0	62.2
AMS201	18/08/2008	13:35	52.9	45.1	50.1
AMS201	22/10/2008	12:02	42.6	38.6	41.1
D17	31/08/2007	10:15	58.7	48.6	56.0
D17	22/10/2008	12:27	69.2	50.4	64.9
D17	12/11/2008	15:00	70.0	47.5	65.1
D17	12/09/2013	9:35	62.0	49.0	58.9
D18	31/08/2007	10:35	75.4	54.4	71.3
D18	22/10/2008	12:45	72.2	48.7	68.0
D18	12/11/2008	15:25	62.5	47.0	58.8
D18	12/09/2013	9:10	76.0	52.0	71.5
D20	31/08/2007	11:40	66.1	53.0	62.6
D20	22/10/2008	13:08	62.4	49.0	58.8
D20	12/11/2008	16:05	61.5	45.5	58.1
D20	11/09/2013	16:45	70.5	52.7	67.4

Table 11.11: Summary of Short-term Baseline Noise Measurements (Free field) (5 of 5)

Location	Date	Start time	L _{A10} dB(A)	L _{A90} dB(A)	L _{Aeq} dB(A)
M1	27/09/2006	09:20	55.0	51.0	50.0
M3	27/09/2006	12:45	46.5	40.5	44.5
M4	27/09/2006	13:10	52.5	39.0	49.3
M2	10/10/2006	11:35	52.0	43.0	69.2
M4	10/10/2006	12:45	48.5	35.0	65.1
AMS8	06/03/2008	08:56	54.0	47.0	50.9
AMS9	06/03/2008	09:22	50.0	46.0	48.5
A2	18/08/2008	14:57	63.6	58.9	61.7
A3	18/08/2008	15:17	55.2	51.6	53.7
AMS204	18/08/2008	15:57	53.6	46.8	50.9
M4	22/10/2008	15:30	53.3	43.8	50.0
M3	22/10/2008	15:45	51.1	39.9	47.3
AMS204	22/10/2008	16:06	50.1	42.2	46.8
M2	22/10/2008	16:36	49.9	46.2	48.3
A3	22/10/2008	16:55	52.6	49.4	51.2
A2	22/10/2008	17:13	57.9	54.5	56.8
M1	23/10/2008	09:55	58.6	54.5	56.9
A1	23/10/2008	10:21	67.3	61.5	65.1
M2	12/11/2008	13:15	46.5	39.0	44.6
M3	12/11/2008	14:05	51.2	38.5	52.2
M4	13/11/2008	12:45	46.5	35.0	41.2

Location	Date	Start time	L_{A10} dB(A)	L_{A90} dB(A)	L_{Aeq} dB(A)
M3	04/06/2013	08:48	50.9	43.8	48.5
AMS9	04/06/2013	12:11	46.8	39.0	44.7
M1	11/09/2013	11:10	62.1	57.0	60.1
A1	11/09/2013	11:35	56.0	52.1	54.5
A2	11/09/2013	12:25	49.0	45.3	47.5
A2	13/09/2013	10:30	56.7	51.6	54.6
A3	11/09/2013	12:50	46.3	40.5	43.9
A3	11/09/2013	12:50	46.4	43.9	45.8
M2	11/09/2013	13:10	51.9	42.0	49.3
M2	13/09/2013	11:15	-	42.6	44.8
M4	11/09/2013	15:15	62.3	46.9	58.0
AMS8	13/09/2013	9:45	51.3	42.3	48.1

11.6 Mitigation

Traffic Noise

Primary Measures: Reduction at Source

11.6.1 A thin surface course (TSC) will be applied to the new carriageways along the length of the NDR Scheme. This material reduces the generation of tyre noise relative to that for hot-rolled asphalt (HRA), but has little effect on engine/transmission/exhaust noise. The beneficial effect from TSC increases with traffic speed, but reduces with time and wear.

11.6.2 DMRB HD213/11 clause A4.29 advises a correction of -3.5 dB where speeds are greater than 75 km/h, and this has been applied in the assessment where appropriate.

Secondary Measures: Barriers and Bunds

11.6.3 A number of bunds, false cuttings and barriers have been included in the Scheme design (Volume 1. Appendix 1), which reduce noise impacts and which are summarised in the Table 11.12.

Table 11.12: Summary of noise mitigation measures

	Chainage (approx)	Length (approx)
South (city) side	m	m
Bund	1250-2200	950
Bund	2500-2900	400
Bund	3000-3250	250
2m barrier fence	3250-3450	200
Bund	3450-4100	650
Bund	5400-6500	1100
Bund	8450-8900	450
Bund	10400-10900	500

	Chainage (approx)	Length (approx)
Bund	12350-13700	1350
Bund	17250-17500	250
Bund	17700-19000	1300
North side		
Bund	1000-1150	150
Bund	1350-1700	350
Bund	4000-6500	2500
Bund	7900-12100	4200
Bund	13850-14150	300
Bund	14850-15100	250
Bund	15750-16100	350
Bund	16250-16900	650
Bund	17000-17150	150
Bund	17700-19000	1300
Total		17600

11.6.4 The performance of a bund or noise barrier varies with height, distance from the carriageway edge and distance to the receptor. The screening effect of these measures has been included in the traffic noise prediction model.

Sound Insulation

11.6.5 Any dwellings at which the predicted traffic noise is found to satisfy the criteria for sound insulation measures in accordance with the Noise Insulation

Regulations 1975 (i.e. a design year level > 68 dB and an increase of at least 1 dB etc.) will be offered either sound insulation measures or a grant instead. Eligible dwellings are required to be shown on a map or list produced by the Highway Authority, and made available for public inspection no later than six months after the opening of the NDR. It is likely that very few properties would qualify for insulation – calculations for this assessment indicate 2 properties would qualify.

Construction Noise

- 11.6.6 Noise from construction operations is generally regarded as acceptable at sensitive receptors, provided that it is restricted to reasonable times and kept to a minimum.
- 11.6.7 Limits for normal working hours and levels of noise at nearby properties will be agreed in advance with the Local Authority and incorporated into the contract specification for the Scheme. The contract will also include a clause requiring that the best practicable means for noise control (BPM) be applied at all times.
- 11.6.8 These would include the selection of the most appropriate method and plant for the job, adequate maintenance of plant, optimum siting of stationary plant, local screening and the education of the workforce. Restrictions may also be placed on the off-site haul routes and early/late delivery times. Potentially affected residents would be kept informed in advance of the works and a telephone complaint hotline be provided.
- 11.6.9 Where the existing noise from traffic or other sources exceeds these levels, the total noise may be permitted to exceed the background by up to 3 dB. A relaxation of these limits may be permitted in exceptional circumstances.
- 11.6.10 Incorporated mitigation related to construction noise and vibration is documented within the Construction Methodology which will be implemented alongside the Construction Environmental Management Plan (CEMP) throughout the construction period. The Construction Methodology identifies a series of measures to reduce the environmental effects during the construction period and covers environmental and safety aspects affecting the interests of residents, businesses, all road users and the general public in the vicinity of the works.
- 11.6.11 The effects of potential noise and vibration impacts on affected communities can also be mitigated by effective communication between the

Promoter, contractors and the public. The Construction Methodology describes specific measures for the management of community relations that contractors must apply including the establishing of local liaison groups, information and complaints hotline, information centre and website, weekly newsletter. Specific provisions for the notification of affected residents ahead of noisy works and the arrangements for the investigation and remediation of noise issues that may arise during construction are also required.

- 11.6.12 Where potentially significant construction noise and vibration effects have been predicted, the Contractor will be required to minimise the impacts to levels lower than those classed as significant impacts. Amongst others, this may include the erection of temporary noise barriers around working areas or alternative methods of working. The Contractor will additionally be required to seek prior consent under Section 61 of the Control of Pollution Act 1974 for its works in advance of commencing works, which will require 'best practicable means' to be adopted at all times.

Climate Change

- 11.6.13 Climate change may have direct and indirect influences on noise within the study area. For example, increases in ambient temperatures would have a direct influence on the mechanism of sound propagation because it results in a reduction in the attenuation of sound due to air absorption, as well as other factors such as temperature inversions. Climate change also influences trends in rainfall with a gradual change emerging of drier summers and winters with increased rainfall. The presence of moisture on the carriageway surface results in a significant increase in noise from road traffic.
- 11.6.14 Notwithstanding the above, the influence of climate change on the magnitudes of noise impact is gradual and is not expected to have any significant influence on the results of the assessment of potential effects of the Scheme in terms of noise and vibration.

11.7 Assessment of Effects

Construction

Predicted Noise and Vibration Effects During Construction

- 11.7.1 An inventory of construction plant which is likely to be deployed for various construction activities along the NDR route has been provided by BIRSE Civils, along with limited information on emitted noise levels from some plant and a preliminary construction programme. Each activity has been provided

with a percentage operating time for any given hour of construction activity. In the absence of detailed contractor's information at this stage in the project, professional judgement has been used in the assignment of this percentage. The assumed operating times should be regarded as conservative. Where plant noise levels have not been provided, reference noise from Annex C of BS 5228-1:2009 have been assigned to the plant. This inventory, broken down by construction activity, is reproduced in.

Table 11.13: Construction plant information used for assessment of construction noise. Construction activity

	Item of plant	Number of plant items operating concurrently	Noise level at 10 m (dBA)	BS 5228 – 1:2009 reference	% on-time
Earthworks	Volvo A30 Dumptruck	2	70 at 8m	NA	25
	Cat D6 Dozer	1	90 at 8m	NA	50
	Cat CP76 Roller	1	91 at 8m	NA	25
Drainage	15 Tonne Excavator	1	73	C2. 24	50
	4 Tonne Dumper	1	56	C4. 08	25
	Bomag 120 Roller	1	67	C5. 27	25
	Hiab lorry	1	77	C4. 53	25
Surfacing	Master Paver	1	77	C5. 31	50
	Bomag 161 Roller	1	75	C5. 20	25
	Bomag 138 Roller	1	77	C5. 26	25
	8 Tonne Dead Wight Roller	1	75	C5. 20	25
	Tack Coat Sprayer	1	-	-	25
Structures	NCK 40 tonne Crawler Crane	1	67	C4. 46	25
	40 Tonne Mobile Crane	1	68	C4. 47	25
	Hiab lorry	1	77	C4. 53	25

	Item of plant	Number of plant items operating concurrently	Noise level at 10 m (dBA)	BS 5228 – 1:2009 reference	% on-time
	Telehandler Forklift	1	71	C2.35	25
	Vibrodisplacement and compaction of stone columns (Rackheath Only)	1	80	C3.27	50
	Construction flight auger piling – cast in situ	1	80	C3.22	80

11.7.2 Noise levels from construction activities have been predicted at the façades of representative sensitive receptors along the NDR route, as set out below. The predicted construction noise level, combined with the measured baseline level representative of the receptor, provides the overall noise level at the receptor during construction. The increase in noise level above the existing baseline due to construction has been determined.

11.7.3 Predictions have been carried out for standard working hours of Monday to Friday 07:00 – 19:00 and Saturday 09:00 – 13:00.

11.7.4 Due to the generally rural nature of the terrain, soft-ground conditions are assumed between the construction noise source and the receptor. As a worst case, no screening effect is assumed for intervening structures such as garden fences and walls. The baseline measurement selected for calculations is generally the lowest $L_{Aeq,T}$ recorded during standard working hours and is corrected to a façade level if the measurement was carried out in free field.

11.7.5 Table 11.14, Table 11.15 and Table 11.17 below present the predicted noise levels at representative receptors. It is important to note that whilst the construction works may take several months, the duration over which noise will be produced in the vicinity of any given receptor will be for shorter periods. Work generating peak levels of noise will be carried out intermittently over this time and will not be constant for these periods. While the details of localised construction durations will be determined by the Contractor, reference to the

preliminary construction programme indicates that for any given section of the route, works will be complete during a three year period. During this time, however, individual phases of the work will progress along the route and most individual receptors will be subject to elevated noise levels for relatively short durations.

11.7.6 The transient nature of construction works, in conjunction with the construction phase mitigation measures described above, will ensure that residual effects of construction noise are not significant. Of particular importance is the requirement for the Contractor to seek prior consent for works under Section 61 of the Control of Pollution Act 1974 where construction noise is predicted to be 65 dB or greater and an increase in noise level of 5 dB or more over baseline is predicted for works with a duration of over one month. This ensures that best practicable means will be employed to limit noise effects from construction activities. The detailed assessment of construction noise below predicts where noise increases for the various construction activities will exceed this threshold and would therefore trigger the Section 61 process.

Whole route linear works

11.7.7 The main works which will take place throughout the length of the route will comprise drainage, earthworks, and new carriageway construction. For the purpose of this assessment the various linear works have been broken down into the following categories based upon advice from the Contractor regarding activities that are likely to occur simultaneously at any given location:

- Earthworks and Drainage
- Carriageway Paving

11.7.8 Details of the construction activities occurring within these categories are presented in above. As these work categories are likely to follow on from one another during the construction process, a noise prediction has been carried out for each category at a series of representative receptors along the route.

11.7.9 Table 11.14 and Table 11.15 present the predicted construction noise level at the facades of a representative sample of sensitive receptors along the route along with the relevant baseline noise measurement, corrected to façade level. The tables also show the predicted increase in noise level above baseline due to the combined baseline and construction noise level. **Shaded**

cells of the tables indicate where predicted construction noise levels exceed 65 dB(A).

11.7.10 For the purposes of these predictions the construction noise source location is assumed to be the centre-line of the NDR route.

Table 11.14: Predicted increase in façade noise levels due to construction noise at representative sensitive receptors L_{Aeq} , 07:00 – 19:00 hours during normal working hours due to earthworks and drainage.

Receptor	Distance to works (m)	Measured baseline noise level (dBA)	Predicted construction noise level (dBA)	Predicted increase in noise level above baseline with construction (dB)
Peacehaven	184	49	60	11
Deighton Hills (Shooting School)	138	49	63	14
Heathwood	256	49	57	9
Two Hoots	180	55	61	7
Spring Farm	340	55	54	3
Fir Covert	198	55	59	5
Residence Fir Covert Road (N of High Breck)	139	55	63	9
Breck Farm Bungalow	467	43	52	10
The Warren	141	43	63	20
538 Felsham Way	714	43	46	5
14 Coopers Close	433	54	51	2
14 Jordan Close	281	60	56	1
Bell Farm	253	41	57	16
18 St Margarets	415	54	51	2

Receptor	Distance to works (m)	Measured baseline noise level (dBA)	Predicted construction noise level (dBA)	Predicted increase in noise level above baseline with construction (dB)
Close				
Nature Farm	227	60	58	2
Old Manor Barn	334	44	54	10
New Dawn	560	43	48	6
The Lindens	245	43	57	14
The Homestead	65	58	72	14
Claydon Cottage	578	49	48	3
Home Farm	436	49	51	4
New Holme Farm	92	55	68	13
1 Sparrow Cottage	279	55	56	4
Hartshill Cottage	203	55	59	5
Manor Farm Bungalow	231	55	58	5
West Farm	176	55	61	7
19 Blind Lane	559	52	48	1
158 Old Norwich Road	179	45	61	16
Control Tower	90	45	68	23
Airport Training Centre	90	45	68	23

Receptor	Distance to works (m)	Measured baseline noise level (dBA)	Predicted construction noise level (dBA)	Predicted increase in noise level above baseline with construction (dB)
Quaker Farm	154	51	62	11
Quaker Cottages	104	51	66	15
318 Buxton Road	151	47	62	15
181 Arthurton Road	346	48	53	6
91 Arthurton Road	440	44	51	8
The Bungalow	419	48	51	5
2 Redhall New Cottages	379	48	52	5
34 Arthurton Road	440	48	51	5
North Park Cottage	133	48	64	16
Park Farm	372	48	53	6
Oak Lodge	289	48	55	8
Hill Farm Lodge	149	59	63	5
Oakwood House	111	62	66	5
Grange Lodge	143	62	63	4
The Last Resort	582	61	48	0
Rackheath Village Hall	459	53	50	2

Receptor	Distance to works (m)	Measured baseline noise level (dBA)	Predicted construction noise level (dBA)	Predicted increase in noise level above baseline with construction (dB)
27 Sir Edward Stracey Road	222	47	58	11
Gazebo Farm	157	40	62	22
34 Green Lane W	340	55	54	3
7 Green Lane W	361	55	53	2
51 Broad Lane	407	55	52	2
33 Padgate	220	43	58	15
Railway Crossing	87	44	68	24
Thorpe End Village Hall	488	44	50	7
43 Woodland Drive	482	50	50	3
Edgefield House	435	50	51	4
Oaks Farm	126	50	64	14
Red House	145	54	63	10
laurel Farm Cottages	240	54	57	5
Apple Tree Farm	169	48	61	13
2 Church Road	280	57	50	1
Cicero Bungalow	135	68	64	1
Grange Bungalow	437	68	51	0

Table 11.15: Predicted worst case increase in façade noise levels due to noise from road paving at representative sensitive receptors LAeq,07:00 – 19:00 hours during normal working hours

Receptor	Distance to works (m)	Measured baseline noise level LAeq,T (dB)	Predicted construction noise level LAeq,T (dB)	Predicted increase in façade noise level LAeq,T (dB)
Peacehaven	184	49	51	4
Deighton Hills (Shooting School)	138	49	55	7
Heathwood	256	49	48	3
Two Hoots	180	55	52	2
Spring Farm	340	55	45	0
Fir Covert	198	55	51	1
Residence Fir Covert Road (N of High Breck)	139	55	54	3
Breck Farm Bungalow	467	43	43	3
The Warren	141	43	54	11
538 Felsham Way	714	43	37	1
14 Coopers Close	433	54	42	0
14 Jordan Close	281	60	47	0
Bell Farm	253	41	48	8

Receptor	Distance to works (m)	Measured baseline noise level $L_{Aeq,T}$ (dB)	Predicted construction noise level $L_{Aeq,T}$ (dB)	Predicted increase in façade noise level $L_{Aeq,T}$ (dB)
18 St Margrets Close	415	54	43	0
Nature Farm	227	60	49	0
Old Manor Barn	334	44	45	4
New Dawn	560	43	39	1
The Lindens	245	43	48	6
The Homestead	65	58	63	6
Claydon Cottage	578	49	39	0
Home Farm	436	49	42	1
New Holme Farm	92	55	59	5
1 Sparrow Cottage	279	55	47	1
Hartshill Cottage	203	55	50	1
Manor Farm Bungalow	231	55	49	1
West Farm	176	55	52	2
19 Blind Lane	559	52	39	0
158 Old Norwich Road	179	45	52	8

Receptor	Distance to works (m)	Measured baseline noise level $L_{Aeq,T}$ (dB)	Predicted construction noise level $L_{Aeq,T}$ (dB)	Predicted increase in façade noise level $L_{Aeq,T}$ (dB)
Control Tower	90	45	59	14
Airport Training Centre	90	45	59	14
Quaker Farm	154	51	53	4
Quaker Cottages	104	51	58	8
318 Buxton Road	151	47	54	8
181 Arthurton Road	346	48	45	2
91 Arthurton Road	440	44	42	2
The Bungalow	419	48	42	1
2 Redhall New Cottages	379	48	44	1
34 Arthurton Road	440	48	42	1
North Park Cottage	133	48	55	8
Park Farm	372	48	44	1
Oak Lodge	289	48	47	3
Hill Farm Lodge	149	59	54	1
Oakwood	111	62	57	1

Receptor	Distance to works (m)	Measured baseline noise level $L_{Aeq,T}$ (dB)	Predicted construction noise level $L_{Aeq,T}$ (dB)	Predicted increase in façade noise level $L_{Aeq,T}$ (dB)
House				
Grange Lodge	143	62	54	1
The Last Resort	582	61	39	0
Rackheath Village Hall	459	53	41	0
27 Sir Edward Stracey Road	222	47	49	4
Gazebo Farm	157	40	53	13
34 Green Lane W	340	55	45	0
7 Green Lane W	361	55	44	0
51 Broad Lane	407	55	43	0
33 Padgate	220	43	49	7
Railway Crossing	87	44	60	16
Thorpe End Village Hall	488	44	41	2
43 Woodland Drive	482	50	41	1
Edgefield House	435	50	40	0
Oaks Farm	126	50	56	7

Receptor	Distance to works (m)	Measured baseline noise level $L_{Aeq,T}$ (dB)	Predicted construction noise level $L_{Aeq,T}$ (dB)	Predicted increase in façade noise level $L_{Aeq,T}$ (dB)
Red House	145	54	54	3
laurel Farm Cottages	240	54	49	1
Apple Tree Farm	169	48	52	5
2 Church Road	280	57	47	0
Cicero Bungalow	135	68	55	0
Grange Bungalow	437	68	42	0

11.7.11 Noise increases of 5 dB or more above existing baseline are deemed to be significant subject to a lower cut-off value for the construction noise component alone of 65 dB $L_{Aeq,T}$ during the day-time, and a duration of one month or more, unless works of a shorter duration are likely to result in significant impact.

11.7.12 For the majority of receptors for works along the length of the route, the predicted noise level from construction alone is not predicted to reach 65 dB(A).

11.7.13 During earthworks and drainage work, the noise level from construction alone is predicted to exceed 65 dB(A) and the overall noise level is predicted to increase by 5 dB or more for a limited number of representative receptors close to the route.

11.7.14 Noise levels are predicted to reach 68 dB(A) at New Holme Farm which is situated very close to the route at the junction with Cromer Road. Due to the close approach of the main carriageway works to the farm, which is also relatively close to roundabout and bridgeworks and will have a works compound located nearby, additional mitigation in the form of temporary noise

barriers or earth bunds will be required to control noise impact. The details of these measures will be agreed with the Local Authority as part of the Section 61 consent process for this site.

- 11.7.15 Noise levels at the Airport Control Tower and Airport Training Centre are predicted to exceed 68 dB(A). These receptors lie along the section of the route between Cromer Roundabout and the Airport Roundabout. The draft construction programme indicates that the earthworks and drainage works along this section of the route will last for 54 days and 80 days respectively. As these works will progress along the route, it is unlikely that either of these receptors will experience high noise levels from these activities for durations of over a month. It should also be noted that these receptors are not residential and that the Control Tower in particular has been subject to a separate assessment of construction noise impact. The conclusions of that report will be taken into account when agreeing mitigation measures with the Local Authority as part of the Section 61 consent process for this site.
- 11.7.16 Quaker Cottages and Oakwood House are sufficiently close to the works for construction noise to exceed 65 dB(A) with an increase in overall noise level of 5 dB or more above baseline. The draft construction programme indicates that drainage and earthworks on the adjacent sections of road may exceed one month, however it is unlikely that these works at the closest approach to the receptors will reach this duration. Additional mitigation in the form of temporary noise barriers will be agreed with the Local Authority as part of the Section 61 consent process for this site.
- 11.7.17 Railway Crossing is predicted to be subject to construction noise levels from earthworks and drainage of 68 dB(A), with an increase above baseline level of 24 dB(A). The dwelling is located at the site of the proposed road and rail bridges near Rackheath and will be close to earthworks which are scheduled to last for a period in excess of 6 months. As such the more stringent noise limit of 55 dB LAeq,1h recommended by MPS2 is applicable here and will be taken into considered during the process of agreeing details of the Section 61 consent process with the Local Authority. Additional mitigation in the form of temporary noise barriers or earth bunds will be required to control noise impact.
- 11.7.18 During carriageway paving work, the noise level from construction alone is not predicted to exceed 65 dB(A) at any of the receptors assessed.

Bridge Construction Sites

11.7.19 There are 8 new bridges to construct on the NDR Scheme. The bridge locations are listed in Table 11.16 along with the form that the bridge will take. The bridges at Rackheath have been regarded as a single construction for the purpose of this assessment. The bridgeworks at Rackheath, Newman Road and Middle Road will include Continuous Flight Auger (CFA) piling. Vibrated stone columns may be incorporated on the approach embankments at Rackheath. These piling operations have been taken into account in the prediction of construction noise for receptors close to these sites.

Table 11.16: Summary of bridges on the proposed NDR route

Bridge	Bridge Form
Marriott's Way	Two span precast concrete deck with reinforced earth abutments
Bell Farm	Two span precast concrete deck with reinforced earth abutments
Cromer Road	Two span precast concrete deck with reinforced earth abutments
Buxton Road	Two span precast concrete deck with reinforced earth abutments
Newman Road	Two span precast concrete deck with reinforced earth abutments
Rackheath Rail	Three span composite deck with steel beams with in-situ concrete abutments
Rackheath Road	Single span precast concrete deck with reinforced earth abutments
Middle Road	Two span precast concrete deck with reinforced earth abutments

11.7.20 Table 11.17 presents the construction noise level at the facades of a representative sample of sensitive receptors located close to bridge works, with the relevant baseline noise level and predicted increase in noise level above baseline with construction.

11.7.21 For the purposes of these predictions, as a worst case, the construction noise source location is assumed to be the closest approach of the bridgeworks to the receptor.

Table 11.17: Predicted worst case increase in façade noise levels due to noise from bridge works at representative sensitive receptors LAeq,07:00 – 19:00 hours during normal working hours

Receptor	Distance to works (m)	Measured baseline noise level LAeq,T (dB)	Predicted construction noise level LAeq,T (dB)	Predicted increase in façade noise level LAeq,T (dB)
Marriott's Way Bridge				
Fir Covert	484	55	35	0
The Warren	227	51	43	1
Laburnum	277	51	41	0
Park Farm Bungalow	342	43	39	1
Bell Farm Bridge				
Bell Farm Barn	54	41	59	18
Bell Farm	176	41	46	6
Nature Farm	293	60	40	0
18 St Margarets Close	252	57	42	0
Cromer Road Bridge				
Harts Hill Farm	147	55	48	1
Harts Hill Cottages	165	55	46	1
Harts Hill Cottages	107	55	51	1
Manor Farm Bungalow	222	55	43	0

Receptor	Distance to works (m)	Measured baseline noise level $L_{Aeq,T}$ (dB)	Predicted construction noise level $L_{Aeq,T}$ (dB)	Predicted increase in façade noise level $L_{Aeq,T}$ (dB)
New Holme farm	68	55	56	4
Buxton Road Bridge				
179 Buxton Road	52	48	59	11
318 Buxton Road	34	47	64	17
Newman Road Bridge				
Gazebo Farm	45	40	68	28
March Farm	128	40	57	17
The Fold	197	40	52	12
5 Newman Road	70	40	63	23
10 Longs Crescent	87	40	61	21
117 Green Lane West	101	40	59	19
Rackheath Bridges				
Dairy Farm	208	44	53	10
Railway Crossing	75	44	64	20
Village Hall	436	44	45	4
Greenacre	317	44	49	6

Receptor	Distance to works (m)	Measured baseline noise level $L_{Aeq,T}$ (dB)	Predicted construction noise level $L_{Aeq,T}$ (dB)	Predicted increase in façade noise level $L_{Aeq,T}$ (dB)
Middle Road Bridge				
Oaks farm	50	54	67	13
Beechcroft	41	54	69	15
Oak House	63	54	64	10
Land farm Cottages	256	54	55	1

11.7.22 During structural bridgeworks, the noise level from construction alone is predicted to exceed 65dB at Gazebo Farm close to Newman Road bridge and at Oaks Farm and Beechcroft close to Middle Road bridge. The elevated levels are largely related to piling activities which are predicted to last more than one month at each site. Additional mitigation in the form of temporary noise barriers or earth bunds will be required to control noise impact. The details of these measures will be agreed with the Local Authority as part of the Section 61 consent process for these sites.

Effects of Construction Traffic

11.7.23 With the exception of roads required for direct site access which are identified in the Construction Methodology, and peak daily flows, the details of construction traffic routes and construction traffic frequency have not been determined at this stage. It has not therefore been possible to carry out a quantitative prediction of associated noise and vibration impacts from construction traffic.

11.7.24 It is unlikely that construction traffic will increase overall traffic flows on public highways by 20% or more, which would result in a perceptible increase in traffic noise levels. However, it is conceivable that the community response to noise from construction traffic could be adversely affected by noise from a small number of movements occurring in close proximity to sensitive receptors especially if movements occur at sensitive times of the day.

Therefore, it is important that measures are put in place to minimise potential adverse effects including:

- Direct traffic accessing the site along less exposed routes and limit times vehicles can access to avoid sensitive times of the day;
- Manage deliveries to prevent queuing of site traffic at access points and the need for vehicles to reverse;
- Avoid unnecessary revving of engines and reducing speed of vehicle movement to avoid body slap from empty vehicles, designing and maintaining access routes to minimise noise; and
- Avoid the need for vehicles to reverse and use adjustable or directional audible vehicle-reversing alarms or use white noise alarms.

11.7.25 A more comprehensive review will be included within a separate assessment of construction traffic impacts when the relevant information is available in order to inform the Section 61 consent process undertaken with the Local Authority.

Effects of Temporary Construction Compounds

11.7.26 Construction compounds will be used at a number of locations along the route for storage of plant, equipment and materials as well as for temporary administrative facilities and parking for construction personnel. Locations for compounds are identified in the Construction Methodology and are summarised in Table 11.18.

Table 11.18: Locations of proposed site compounds

Compound Location	Description
Airport Land north of the NDR	Main site compound incorporating welfare facilities and adequate parking for both staff and operatives' accommodation for travelling staff, offices, plant storage and maintenance compound and a recycling yard.
Gazebo Farm	Administrative office
Drayton Lane, Buxton Road, Plumstead Road	office, parking, plant storage facilities and sub-base batching plant
Bridge sites	Small compounds with welfare facilities, parking and material storage.

11.7.27 Detailed information has not been defined for the compounds at this stage, so quantitative prediction of likely noise impacts has not been carried out. Such a level of information is not anticipated to be available until the detailed design stage of the Scheme. It is likely that equipment such as heavy vehicles, cranes and forklift trucks will access the compounds, which will generate noise on an intermittent basis. Compounds with welfare facilities may require the use of a generator. There is the potential for sensitive receptors located nearby to experience noise impacts.

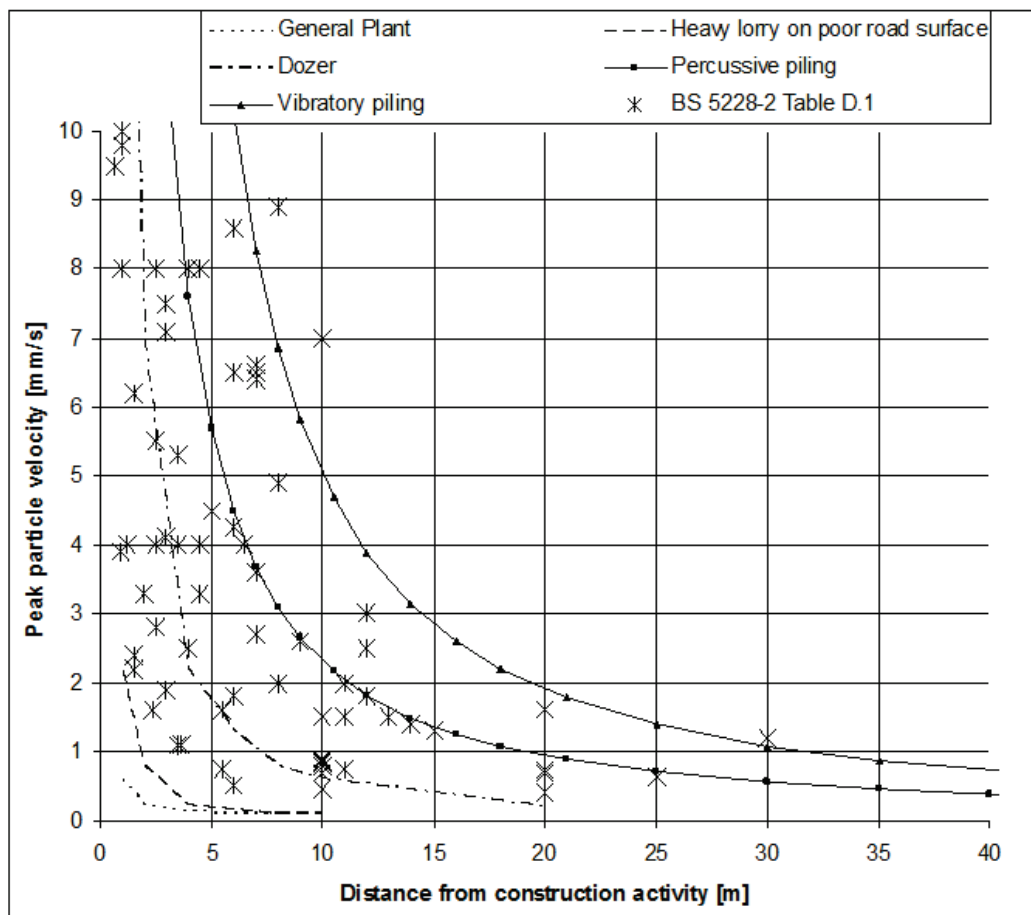
11.7.28 Each of these sites will be assessed in more detail and discussed as part of the Section 61 process with the Local Authority as and when further details become available. Likely noise mitigation will include:

- Acoustic enclosure of external plant;
- Temporary noise barriers where there are sensitive receptors close by;
- Restrictions on delivery times; and
- Appropriate location of ingress and egress point.

Effects of Construction Vibration

11.7.29 BS 5228 – Part 2: Vibration (2009) provides empirical relationships between various construction operations and vibration levels. Some of these values and those from the TRL Report 53 have been plotted – see Figure 10.1.

Figure 10.1: Vibration levels for construction plant using data in BS 5228 and TRL Report 53



11.7.30 From the above figure it can be seen that with the exception of vibratory and percussive piling, other activities attenuate rapidly with distance.

11.7.31 With respect to vibration impacts for the general construction plant and traffic which will be used for the majority of works along the NDR route, reference to Table 11.2 and Table 11.3 shows that peak particle velocities

(PPV) deemed to have a moderate adverse impact on sensitive receptors (PPV 0.3 – 1.0 mm/s) are unlikely to occur at distances from works of greater than 2m and PPVs deemed to have a minor adverse impact (0.14 to 0.3 mm/s) are unlikely to occur at distances from works of greater than 8m.

- 11.7.32 All sensitive receptors are located more than 8m from the works. It should be noted that any vibration impacts from NDR construction would be transient and unlikely to last for 1 hour or more, further reducing the likelihood of significant adverse effects. Construction vibration is likely to be at least an order of magnitude lower than the PPVs needed to cause cosmetic damage to properties.

Summary of Construction Noise and Vibration Impacts

- 11.7.33 The potential for significant construction noise effects has been identified at a number of receptor locations along the route where the predicted noise levels from construction of earthworks and drainage exceed 65 dB(A) during normal construction hours (07:00 – 19:00) and the predicted increase of the overall noise level with construction is 5 dB or more above the measured baseline noise. In these cases as the basis of incorporated mitigation, the Contractor will be required to seek prior consent under Section 61 of the Control of Pollution Act 1974 in advance of commencing works, which will require 'best practicable means'. Measures will include erection of temporary noise barriers, selection of quieter plant options, alternative methods of working or avoiding times when works would be most disruptive to the receptor.
- 11.7.34 For receptors such as Railway Crossing (residence) located close to the site of the proposed road and rail bridges near Rackheath, where earthworks are scheduled to last for a period of over six months, the more stringent noise limit of 55 dB LAeq,1h recommended by MPS2 may be applicable and should be taken into consideration during the process of agreeing details of the Section 61 consent process with the Local Authority.
- 11.7.35 No significant noise impacts or effects are predicted from carriageway paving or structural bridge construction.
- 11.7.36 No significant vibration impacts are anticipated from construction works.

Operation

Airborne Noise from Road Traffic

- 11.7.37 The results of the traffic noise calculations at potentially affected dwellings are presented in accordance with the DMRB HD 213/11 procedure in the following tables. Calculation results presented represent noise changes at the worst-affected façade of each property, at a height equivalent to first floor level. Property counts have been refined to include dwelling numbers within each housing block indicated on Ordnance Survey mapping
- 11.7.38 The results for noise impacts at dwellings within 600m of affected routes within 1km of the proposed Scheme, and adjacent to affected routes beyond 1km are presented in the Assessment Summary Tables in Table 11.19, Table 11.20 and Table 11.21. In terms of night time impacts, traffic noise impacts are only assessed in the long-term.
- 11.7.39 The result for change in nuisance from noise is given in Assessment Summary Table 11.22 and Table 11.23.
- 11.7.40 The impacts are illustrated graphically in the form of contours of traffic noise in the opening year and contours of difference with respect to the baseline on opening in MMD-233906-DT-0919 – MMD-233906-DT-0936 Volume 2, Chapter 11 Section B.
- 11.7.41 With reference to Table 11.6 (Matrix for determining significance of effect) and Table 11.4 (Magnitude of impact due to changes in road traffic noise in the short-term and long term) the results may be viewed in terms of significance. Effects are considered significant where the magnitude of noise impacts are expected to be Moderate, Large or Very Large.
- 11.7.42 From Table 11.19 below, significant effects occur where adverse or beneficial impacts exceed 3dB. This is a lower threshold than that applicable to subsequent tables, reflecting the fact that short-term impacts have a greater impact than when considered over a longer period. From Figure 1A.10.3 series: DM2017-DS2017 Difference Contours the distribution of noise changes can be seen and the observations in the following paragraphs noted.
- 11.7.43 Of the 2658 dwellings which would experience significant adverse effects, the majority are in New Rackheath (441); Old Catton (188); Spixworth (669); Thorpe Marriott (240); and Thorpe End (322). Major adverse effects would occur at the periphery of the aforementioned locations. There are corresponding significant adverse effects at 24 other sensitive receptors (i.e.

non-residential). In total 84% of dwellings where significant adverse effects are predicted are located within the calculation area.

11.7.44 Some 718 dwellings would experience significant beneficial effects. In general, the majority of dwellings where these effects occur (98% of all dwellings with a significant beneficial effect) are adjacent to existing roads outside the main calculation area (600m from affected routes within the 1km corridor) where traffic flows are forecast to reduce. Locations within the calculation area where traffic flows and hence noise levels reduce can be seen in DM2017-DS2017 Difference Contours, for example at locations near A1067 Fakenham Road, Fir Covert Road, Reepham Road etc.

Table 11.19: Short term change in noise levels, Do Minimum 2017 - Do Something 2017

Project/Option: NDR			
Short term change in noise levels (DM 2017 - Scenario/Comparison: DS2017)			
		Daytime	
Change in noise level		Number of dwellings	Number of other sensitive receptors
Increase in noise level, $L_{A10,18hr}$	0.1 - 0.9	1579	29
	1.0 - 2.9	3248	45
	3 - 4.9	1807	12
	5+	851	12
No change	0	738	13
Decrease in noise level, $L_{A10,18hr}$	0.1 - 0.9	672	18
	1.0 - 2.9	3976	47
	3 - 4.9	423	10
	5+	295	5

11.7.45 With respect to Table 11.20 below, significant effects occur where adverse or beneficial impacts exceed 5dB. From Figure 1A.10.3 series: DM2017-DS2032 Difference the distribution of noise changes can be seen and the observations in the following paragraphs noted .

- 11.7.46 Of the 1984 dwellings which would experience significant adverse effects, the majority are in Horsham St. Faith (63); New Rackheath (432); Old Catton (70); Spixworth (497); Thorpe Marriott (58); and Thorpe End (258). There are corresponding significant effects at 14 other sensitive receptors (i.e. non-residential). In total 81% of dwellings where significant adverse effects are predicted are located within the calculation area.
- 11.7.47 Some 494 dwellings would experience significant beneficial effects. In general, the majority of dwellings where these effects occur (99% of all dwellings with a significant beneficial effect) are adjacent to existing roads outside the main calculation area (600m from affected routes within a 1km corridor) where traffic flows are forecast to reduce. Locations within the calculation area where traffic flows and hence noise levels reduce can be seen in DM2017-DS2017 Difference Contours, for example at locations near A1067 Fakenham Road, Fir Covert Road, Reepham Road etc.
- 11.7.48 Considering night-time noise, a total of 422 additional residential properties would receive noise levels in excess of the World Health Organization's Interim Target level of 55 dB(A).

Table 11.20: Long term change in noise levels, Do Minimum 2017 - Do Something 2032

Project/Option: NDR				
Scenario/Comparison: Long term change in noise levels (DM 2017 – DS 2032)				
		Daytime		Night-time
Change in noise level		Number of dwellings	Number of other sensitive receptors	Number of dwellings
Increase in noise level, L _{A10,18hr}	0.1 - 2.9	3766	64	125
	3 - 4.9	2828	24	291
	5 - 9.9	1911	21	4
	10+	73	4	2
No change	0	46	0	0
Decrease in noise level, L _{A10,18hr}	0.1 - 2.9	3924	52	0
	3 - 4.9	547	12	0
	5 - 9.9	223	9	0
	10+	271	5	0

11.7.49 With respect to Table 11.21 below, long term effects arising from the Do Minimum case would cause significant adverse effects at 187 residential properties, and significant beneficial effects at 53 residential properties. There are corresponding significant effects at two other sensitive receptors (i.e. non-residential). Impacts associated with the Do Minimum case would clearly be associated predominantly with changes on the existing road network.

11.7.50 Considering night-time noise, the World Health Organisation’s Interim Target level of 55 dB would be exceeded at an additional 473 residential properties.

Table 11.21: Long term change in noise levels, Do Minimum 2017 - Do Minimum 2032

Project/Option: NDR				
Scenario/Comparison: Long term change in noise levels (DM 2017 – DM 2032)				
		Daytime		Night-time
Change in Noise Level		Number of dwellings	Number of other sensitive receptors	Number of dwellings
Increase in noise level, L _{A10,18hr}	0.1 - 2.9	11465	163	296
	3 - 4.9	807	8	176
	5 - 9.9	173	0	1
	10+	14	2	0
No change	0	211	4	0
Decrease in noise level, L _{A10,18hr}	0.1 - 2.9	866	14	0
	3 - 4.9	0	0	0
	5 - 9.9	0	0	0
	10+	53	0	0

11.7.51 HD213/11 clause A1.27 includes an assessment of nuisance and provides a relationship for noise level against change in people bothered very much, or quite a lot by noise. The relationship differs depending on whether short term or long term changes are considered, the former giving rise to greater changes in nuisance. Thus short term changes in noise, as would be experienced on scheme opening, generally determine reported nuisance increases. For assessment the worst-case change is considered and results are shown in Table 11.22 below. DMRB advises caution in interpretation of results as surveys underpinning the relationship between noise and nuisance were conducted at locations within 18m of the carriageway edge, at noise exposure levels of 65 – 78dB and noise changes of up to 10dB. It should also be borne in mind that results represent change in percentage of people bothered very much, or quite a lot by noise. Thus total numbers are in effect a percentage of a percentage as the degree of nuisance felt towards traffic noise varies amongst the population.

Table 11.22: Summary of nuisance calculations for road traffic noise

Project/Option:		NDR	
Scenario/Comparison:			
		Do-Minimum	Do-Something
Change in nuisance level		Number of dwellings	Number of dwellings
Increase in nuisance level	<10%	481	135
	10<20%	0	1076
	20<30%	0	2807
	30<40%	0	2063
	>40%	0	164
No change	0%	6444	647
Decrease in nuisance level	<10%	3	34
	10<20%	0	2
	20<30%	0	0
	30<40%	0	0
	>40%	0	0

Airborne Vibration from Road Traffic

11.7.52 The results of the airborne noise calculations are used to compare the estimate percentages of people annoyed in the Scheme design year with and without the Scheme. Table 11.23 presents the results within the calculation area of 1km. Figures in brackets indicate dwellings within 40m of the NDR which is the cut-off distance recommended within HD 213/11. The remainder of dwellings are associated with traffic changes on the existing road network,

but within the calculation area. There are 7 residential receptors within 40m of the proposed NDR. The results show that without the Scheme, 2 dwellings are expected to experience an increase in airborne vibration whereas there will be no change at the other 5 dwellings. With the Scheme in place, the assessment shows an increase of up to 10% in the number of people annoyed at 4 dwellings, an increase of between 10% and 20% at one dwelling and between 20 and 30% at one dwelling. One dwelling will experience no change.

Table 11.23: Summary of nuisance calculations for airborne vibration from road traffic

Project/Option:		NDR	
Scenario/Comparison:			
		Do-Minimum	Do-Something
Change in nuisance level		Number of dwellings	Number of dwellings
Increase in nuisance level	<10%	73 (2)	114 (4)
	10<20%	0	2 (1)
	20<30%	0	1 (1)
	30<40%	0	0
	>40%	0	0
No change	0%	1497 (5)	1439 (1)
Decrease in nuisance level	<10%	3	17
	10<20%	0	0
	20<30%	0	0
	30<40%	0	0
	>40%	0	0

Summary of Predicted Noise and Vibration Effects

Vibration

11.7.53 Newly constructed carriageways are unlikely to generate significant levels of such vibration as they may be assumed to be free of irregularities. Therefore any impact due to ground-borne vibration has been assumed to be negligible and was not considered further.

11.7.54 The assessment of potential effects due to airborne vibration has considered all residential receptors within the study area and those within 40 metres of the Scheme (which includes seven dwellings in total).

Noise

11.7.55 Table 11.24 and Table 11.25 below summarise effects at residential dwellings and non-residential receptors. These figures include those dwellings outside the 1km study area, adjacent to the existing road network. At these locations, changes in noise levels are primarily determined by changes in traffic flows and speed.

11.7.56 From the tables below it may be observed that significant adverse effects reduce with time, between opening and design year, and significant beneficial effects increase over the same time. This is likely to be a consequence of the adjustment in significance threshold between long term and short term effects to take into account different perceptions of noise change. The least amount of significant effects are observed in the Do Minimum case.

11.7.57 Calculations have indicated that two properties would qualify for noise insulation under the Noise Insulation Regulations. Predicted noise levels for the majority of properties in the vicinity of the Scheme are therefore less than 67.5dB, since, in order to qualify, calculated noise levels in the design year have to be at least 67.5dB, have an increase of 1dB from the new scheme and be within 300m of the new scheme.

Table 11.24: Significance of effects at residential receptors

	Adverse	Beneficial
Effect in Opening year (with Scheme)		
Slight	4827	4648
Significant	2658	718
Effect with scheme in the Long Term (Do Scheme)		
Slight	6594	4471
Significant	1984	494
Effect without scheme in the Long Term (Do Minimum)		
Slight	12272	866
Significant	187	53

Table 11.25: Significance of effects at non-residential receptors

	Adverse	Beneficial
Effect in Opening Year (with Scheme)		
Slight	74	65
Significant	24	15
Effect with scheme in the Long Term (Do Scheme)		
Slight	88	64
Significant	25	14
Effect without scheme in the Long Term (Do Minimum)		
Slight	171	14
Significant	2	0

11.8 Conclusions

11.8.1 A noise and vibration assessment has been undertaken to establish significant effects associated with construction and operation of the proposed NDR.

11.8.2 Two phases of the development have been considered: temporary impacts resulting from the construction activities and permanent impacts due to noise and vibration from road traffic using the NDR and the local highway network.

11.8.3 Methodology adopted for traffic noise and vibration was the Highways Agency's Design Manual for Roads and Bridges, and for construction noise and vibration the methodology was BS 5228 'Code of practice for noise and

vibration control on construction and open sites'. In both cases, the approach was:

- Identification of potential sources and prediction of noise and vibration impacts likely to be received at nearby sensitive receptors including dwellings;
- Comparison of the predicted impacts with the baseline conditions;
- Evaluation of the receptor sensitivity and the significance of effects; and
- The consideration of noise mitigation measures incorporated within the design and an assessment of any residual effects.

11.8.4 Prior to assessment baseline noise monitoring was undertaken across the area.

11.8.5 Mitigation measures incorporated into the Scheme include a thin surface course for the proposed NDR, three lengths of acoustic barrier and extensive bunding and false cuttings. Temporary barriers will be required during construction at some locations.

11.8.6 Both short term and long term effects have been predicted across the Scheme associated with operational noise. No significant effects are expected due to airborne vibration arising from road traffic.

11.8.7 Construction noise has been predicted to generate temporary significant effects at some locations. Further construction noise calculations will be carried out as sufficient construction-related information becomes available. This will be required as the Contractor will apply for Section 61 consent under the Control of Pollution Act 1974.

11.8.8 Calculations for this assessment indicate 2 properties would qualify for insulation under the Noise Insulation Regulations.

Table 11.26 provides a summary of the significant operational noise effects.

	Residential receptors			Non-residential receptors	
	Adverse	Beneficial		Adverse	Beneficial
Effect in Opening Year (with Scheme)	2658	718		24	15
Effect with scheme in the Long Term (Do Scheme)	1984	494		25	14
Effect without scheme in the Long Term (Do Minimum)	187	53		2	0

11.9 References

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24. DfT 13 December 2012 “Transport Statistics Great Britain – Statistical Release”
25. Construction Environmental Management Plan
26. Noise Contours - MMD-233906-DT-0919 – MMD-233906-DT-0936 Volume 2, Chapter 11 Section B

12. Effects On All Travellers

12.1 Introduction

12.1.1 Effects on All Travellers is identified as a DMRB Topic within Interim Advice Note 125/09 Supplementary guidance for users of DMRB Volume 11 'Environmental Assessment'. However, the guidance contained within DMRB Volume 11, Section 3 has not yet been updated. As a result, the Effects on All Travellers assessment incorporates two of the "old" DMRB Topics. These are:

- Volume 11, Section 3, Part 8: Pedestrians, Cyclists, Equestrians and Community Effects; and,
- Volume 11, Section 3, Part 9: Vehicle Travellers.

12.1.2 Following the guidance contained within these two DMRB chapters, the overall approach for the assessment of Effects on All Travellers will consider the following:

- The impact of the NDR on vehicle travellers that are not included in the cost-benefit economic analysis as quantifiable effects. The two impacts considered in the assessment are changes in the view from the road for drivers and passengers, and driver stress.
- The impact of the NDR for Non-Motorised Users (NMUs) as a result of changes to the network of Public Rights of Way (PRoW) and minor roads. NMUs include pedestrians, equestrians and cyclists, as well as users with mobility issues. The assessment considers changes in journey length and times, the provision of amenities such as PRoW, and connectivity between communities and community facilities (community severance) as a result of the Scheme and associated traffic changes on affected routes.

12.1.3 A separate Transport Assessment Report (DCO Document 5.5) document has been prepared and will be submitted as part of the DCO Application for the proposed Scheme.

12.1.4 A brief discussion of the potential impacts that may result for All Travellers due to Climate Change has also been included within this assessment.
Methodology

12.1.5 DMRB does not provide guidance for the Effects on All Traveller's topic, as it has only recently been introduced to the EIA process. Therefore the assessment of impacts of the proposed NDR on all travellers has been carried

out using professional judgement, drawing on older guidance for superseded topics in DMRB. Pending publication of new DMRB guidance, there is no agreed method of measuring the value or sensitivity of effects on all travellers, and there is no agreed scale against which they can be measured. The assessment makes use of the established significance criteria presented within DMRB Volume 11, Section 2, Part 5, as well as that contained within DMRB Volume 11, Section 3, Parts 8 and 9 (where relevant). By applying this criteria, the significance of the effect is formulated as a function of the receptor or resource environmental value (or sensitivity) and the magnitude of project impact (change). The following significance categories have been used for motorised and non-motorised users:

- Large Beneficial;
- Moderate Beneficial;
- Slight Beneficial;
- Neutral;
- Slight Adverse;
- Moderate Adverse; and,
- Large Adverse.

Motorised Users

12.1.6 The assessment of impacts of the proposed Scheme on motorised users has been carried out using professional judgement and drawing on guidance contained within DMRB Volume 11, Section 3, Part 9: Vehicle Travellers. This guidance document considers changes in the view from the road for drivers and passengers, and driver stress (including delay and road safety).

Views from the Road

12.1.7 The view from the road is assessed by considering wide differences between, landscape character and quality and especially good or bad potential views along the route. It is defined in DMRB as the extent to which travellers, including drivers, are exposed to the different types of scenery through which a route passes.

12.1.8 There are four categories which should be used in assessing travellers' ability to see the surrounding landscape:

- No view – road in deep cutting or contained by bunds, environmental barriers or structures;
- Restricted view – frequent cuttings or structures;
- Intermittent view – road generally at ground level but with barriers at intervals; and,
- Open view – view extending over many miles, or only restricted by existing landscape features.

12.1.9 The assessment of views from the road draws primarily on the landscape and visual impact assessment that has been undertaken for the Scheme (refer to Volume 2, Chapter 7: Landscape). It considers the predicted changes in the quality of views that travellers would experience during construction, and after the opening of the new road, taking account of travellers who transfer to the new road and those that continue to use the local road network.

12.1.10 The nature and extent of future views have been assessed for the Scheme when operational, and has been assessed for both the first year after opening (2017) and at a 15 year period following completion of the Scheme (2032) to take account of the establishment of the soft landscape mitigation measures. The assessment of future views is consistent with the Zone of Visual Influence (ZVI) of the Scheme, which is identified as part of the visual impact assessment described in Chapter 7: Landscape. The ZVI is the approximate area from within which views of the NDR (i.e. the road and its associated infrastructure, and traffic upon it) would be possible, and is shown in Volume 2, Chapter 7, Drawings MMD-233906-DT-0953 to MMD-233906-DT-0955. Routes that would be affected by the proposals are identified within this zone, and are therefore assessed as part of the Views from the Road assessment. The assessment of the view from vehicles is based upon a 120 degrees arc of view which approximates to the view that a traveller can generally appreciate whilst seated in a vehicle. Whilst in reality the situation is more complex, particularly for passengers who may have a wider range of view such as users of Public Transport (coaches and buses), this approach recognises that travellers tend to appreciate their surroundings in a general sense rather than focusing in detail upon any one feature or direction. The assessment will include a consideration of the changes in traffic levels on affected routes.

Significance Criteria

12.1.11 Significance criteria for the effects of the NDR on Views from Affected routes (within the ZVI), and the proposed NDR alignment, have been established with reference to Chapter 7: Landscape. This indicates that with regards to visual sensitivity and motorised users, the users of main roads (e.g. trunk roads) or passengers in public transport on main arterial routes, are considered to be of low sensitivity with regards to visual impacts. Users of scenic roads or designated tourist routes are considered to be of Moderate sensitivity. Vehicle travellers are not considered to be of High sensitivity in any situation since the focus of a vehicle traveller’s attention and the enjoyment of their experience is unlikely to be wholly dependent on the surrounding landscape.

12.1.12 The magnitude of change is determined by the above mentioned categories of no view, restricted view, intermittent view and open view. These categories have been considered in relation to the descriptors given within Table 7.5 of Chapter 7, with the following classification described in Table 12.1:

Table 12.1 View from the Road – Magnitude of Effects

Magnitude	Description
Major	No view - the Scheme or a part of it, would become the dominant feature or focal point of the view from the road.
Moderate	Restricted view - the Scheme or a part of it, would form a noticeable feature or element of the view which is readily apparent to the motorised user.
Minor	Intermittent view - the project, or a part of it, would be perceptible but not alter the overall balance of features and elements that comprise the existing view for motorised users.
Negligible	Open view - only a very small part of the project would be discernible, or it is at such a distance that it would form a barely noticeable feature or element of the view.
No change	No part of the project, or work or activity associated with it, is discernible for motorised users.

12.1.13 In determining the significance of effects, the sensitivity of potential visual receptors (i.e. motorised users/ viewers) within the ZVI is combined with the magnitude of change. The following table represents this combination using descriptors for significance categories, and has been adapted from Table 7.5 of Chapter 7 to be applicable for motorised users of affected routes and the proposed NDR only. Note that for motorised users, receptors are not considered to be of High sensitivity.

Table 12.2 View from the Road: Typical Descriptors of the Significance of Effect Categories

Significance	Typical Descriptors of Effect
Large Beneficial	The project would lead to the creation of an open view and a major improvement for a highly sensitive receptor.
Moderate Beneficial	The project would lead to the creation of an open view or obvious improvement for a moderately sensitive receptor.
Slight Beneficial	The project would lead to the creation of an open view or obvious improvement for a receptor of low sensitivity, or the creation of an intermittent view and obvious improvement for a moderately sensitive receptor.
Neutral	No perceptible change in the view for all receptors.
Slight Adverse	The project would create an intermittent view or obvious deterioration for a receptor of moderate sensitivity, or restricted view for a receptor of low sensitivity.
Moderate Adverse	The project would create an intermittent view or obvious deterioration for a receptor of high sensitivity, or a restricted view and obvious deterioration for a moderately sensitive receptor, or no view for a receptor of low sensitivity.
Large Adverse	The project would cause major deterioration/ loss of view for a highly sensitive receptor.

Driver Stress (including road safety)

- 12.1.14 The introduction of the proposed Scheme would alter the number of vehicles and pattern of traffic movements on the local road network, which could influence Driver Stress through road safety impacts (including fear and intimidation), and changes in traffic flows and congestion (which would influence driver delay and stress). Driver Stress is defined for the purposes of the environmental assessment as the adverse mental and physiological effects experienced by a driver traversing a road network. Factors influencing the level of stress include road layout and geometry, junction frequency, and speed and flow per lane. Taken together, these factors can induce in drivers the feelings of discomfort, annoyance, frustration or fear culminating in physical and emotional tension that detracts from the value and safety of a journey.
- 12.1.15 DMRB considers that driver stress has three components, which are frustration, fear of potential accidents and uncertainty relating to the route being followed. Frustration is caused by a driver's inability to drive at a speed consistent with his or her own wishes in relation to the general standard of the road. It increases as speed falls in relation to roadworks, or to difficulties in overtaking slower moving traffic. Congestion can lead to frustration by creating a situation in which the driver does not feel in control.
- 12.1.16 The main factors leading to fear are presence of other vehicles, inadequate sight distances and the likelihood of pedestrians, particularly children, stepping into the road. Other factors include inadequate lighting, narrow roads, roadworks and poorly maintained road surfaces. Fear is highest when speeds, flows and the proportion of heavy goods vehicles (HGVs) are all high.
- 12.1.17 Route uncertainty is caused primarily by signing that is inadequate for the individual's purposes. It will not normally be possible to assess the size of this factor unless a consensus has already appeared on the adequacy of existing signing practice at a specific site. Good design and layout of signs can go a long way towards eliminating this cause of stress from new road schemes.
- 12.1.18 The study area and affected routes for Driver Stress and Safety/Accidents is illustrated on Drawing MMD-233906-DT-0795 (Volume 2, Chapter 12: Effects on All Travellers, Section A). This is consistent with the study area that is included within the Transport Assessment for the Scheme. It includes all routes that intersect with the proposed NDR, and local routes

within the wider study area, to include routes between local communities and routes within Norwich centre which would be affected by the proposed Scheme.

Significance Criteria

12.1.19 DMRB Volume 11, Section 3, Part 9 states that available research evidence does not permit the use of finely graded assessment of driver stress, and therefore a three point descriptive scale (Low, Moderate or High) should be used. It is useful to consider how the operation of the existing and new routes and associated changes in traffic flows and accident rates can influence vehicle travellers in terms of driver stress. As a result, the criteria included within the Institution of Highways and Transportation Guidelines for Traffic Impact Assessment and the Institute of Environmental Assessment (now Institute of Environmental Management and Assessment), Guidelines for the Assessment of Road Traffic can be applied to determine the magnitude of potential safety impacts. This would be as a result of traffic changes between the Do Minimum (Design Year (2032); no NDR), and Do Something (Design Year (2032); with NDR) on affected routes.

12.1.20 Table 12.3 below illustrates the magnitude of these changes which will be applied to affected routes.

Table 12.3 Impact magnitude

Magnitude	Percentage Flow Change*
Negligible	None
Slight	Up to +/- 5% flow change
Moderate	+/- 5 –10% flow change
Major	>10% flow change
Note: These criteria apply to changes in total flows. * Flow changes are changes in 2-way 24 Hour Annual Average Daily Flows (AADT) for all vehicles	

12.1.21 The significance of impacts is determined based on the magnitude of impacts as illustrated above, and a degree of professional judgement. For traffic flow changes, the percentage change is formed from a change in Annual Average Daily Traffic (AADT), as this represents the Total Flow changes for Affected Routes. Table 12.4 provides the definitions:

Table 12.4 Significance of impact for Vehicle Travellers (Driver Stress)

Significance	Definition
Large Beneficial	<p>Elements of the highway network where congestion is relieved by the magnitude of impact predicted.</p> <p>Major positive changes in total traffic flow on parts of the network with a poor accident record.</p> <p>Moderate or major change to total flows at locations and at times when there are a high number of vulnerable road users (cyclists, pedestrians, equestrians) at several locations on the route, or in the vicinity of hospitals or schools combined.</p>
Moderate Beneficial	<p>Moderate total flow changes on parts of the network with a poor accident record.</p> <p>Moderate or major total flow changes in locations with some vulnerable road users, or that are near schools or hospitals, or have direct residential frontages.</p>
Slight Beneficial	<p>The network operates within capacity and flow changes on the network are slight.</p> <p>Slight total flow changes on parts of the network with a poor accident record.</p> <p>Slight total flow changes in locations with some vulnerable road users, or that are near schools or hospitals, or have direct residential frontages.</p>
Neutral	<p>No or negligible changes to traffic flows.</p> <p>Low vulnerable road user activity, with no large settlements or sensitive receptors on route</p>

	<p>Accident rates are at or below average.</p> <p>No changes to local infrastructure or services.</p>
Slight Adverse	<p>The network operates within capacity and flow changes on the network are slight.</p> <p>Slight total flow changes on parts of the network with a poor accident record.</p> <p>Slight total flow changes in locations with some vulnerable road users, or that are near schools or hospitals, or have direct residential frontages.</p>
Moderate Adverse	<p>Isolated parts of the highway network taken over operational capacity for periods of the day.</p> <p>Moderate total flow changes on parts of the network with a poor accident record.</p> <p>Moderate or major total flow changes in locations with some vulnerable road users, or that are near schools or hospitals, or have direct residential frontages.</p>
Large Adverse	<p>Elements of the highway network taken over operational capacity by the magnitude of impact predicted.</p> <p>Major changes in total traffic flow on parts of the network with a poor accident record.</p> <p>Moderate or major change to total flows at locations and at times when there are a high number of vulnerable road users (cyclists, pedestrians, equestrians) at several locations on the route, or in the vicinity of hospitals or schools combined with a lack of footways or large sections of road with direct residential frontages.</p>

Non-Motorised Users

12.1.22 The assessment of impacts of the proposed Scheme on non-motorised users (NMUs) has been carried out using professional judgement and guidance contained within DMRB Volume 11, Section 3, Part 8:

- 12.1.23 Pedestrians, Cyclists, Equestrians and Community Effects. This guidance document considers changes in journey length, changes in amenity and community severance. This chapter, therefore, examines the NDR's impact on communities and their journeys as pedestrians, cyclists and equestrians on the local network. This includes communities which although not lying immediately adjacent to the proposed road are within the extents of the Study Area, as defined within the TA and applied to the Driver Stress element of this chapter (Volume 2, Chapter 12: Effects on All Travellers, Section A)).
- 12.1.24 Following the traffic flow analysis and the determination of the impact magnitude for affected communities and key routes in terms of highway operation/ traffic flow changes, a review of the study area has been undertaken to determine the impact magnitude in terms of NMUs. It examines the likely detriment or improvement to amenity, such as the provision of new NMU routes, and the likely effect of temporary closures and diversions during the NDR's construction, such as changes to journey length. It assesses what effect the NDR will have on community connectivity and existing journeys; whether the amenity value of these journeys will be increased, diminished or people deterred from making them.

Significance Criteria

- 12.1.25 A beneficial impact is defined as the enhancement of a NMU recreational or utility experience due to the implementation of the proposed NDR, such as through reduced community severance, improved access or improved amenity. A neutral impact is defined as a negligible change in the NMUs experience as a result of changes implemented or caused by the Scheme. A neutral impact may also result where beneficial and adverse impacts are considered to balance. An adverse impact is defined as the degradation of the NMU experience as a result of the NDR. Examples of this may include an increase in community severance as a result of increased traffic or physical barriers, an increase in journey time or a reduction in amenity, such as the removal of dedicated footpaths and cycleways. These broad categories are described in more detail in Table 12.5 below:

Table 12.5 Significance criteria for NMUs

Significance	Typical examples
Large Beneficial	<p>Total removal or major reductions in traffic, where NMUs are present.</p> <p>Substantially improve NMU network through the provision of new amenities for pedestrians, equestrians and cyclists where none existed previously.</p>
Moderate Beneficial	<p>Moderate reductions in traffic, where NMUs are present.</p> <p>Improve existing NMU network through the provision of new amenities for pedestrians, equestrians and cyclists where few or none existed previously.</p>
Slight Beneficial	<p>Slight reduction in traffic, where NMUs are present.</p> <p>Improve existing NMU network through the upgrading of existing amenities or provision of new amenities for pedestrians, equestrians and cyclists where some already exist.</p>
Neutral	<p>Negligible or no change to traffic flow where NMUs are present.</p> <p>Negligible changes for recreational or utility users or where beneficial and adverse impacts balance.</p>
Slight Adverse	<p>Slight increase in traffic where NMUs are present and where improvements to the pedestrian / cycle facilities are not provided.</p> <p>Close a PRoW or desire line, thus increasing journey times for users.</p>
Moderate Adverse	<p>Moderate or major increase in traffic, where NMUs are present and where improvements to the pedestrian / cycle facilities are not provided.</p> <p>Close a well-used PRoW with links to community facilities.</p>
Large Adverse	<p>Moderate or major increase in traffic, where NMUs are present and where pedestrian / cycle facilities are</p>

	<p>degraded.</p> <p>Close a network of PRow with highly convenient crossing points.</p> <p>Increase journey times for NMUs between facilities by closing amenities or increasing traffic/ introducing traffic.</p>
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12.2 Context

Technical

12.2.1 The information used in this chapter was obtained through a desk-based study and surveys of non-motorised traffic. Key sources of information for the desk-based study included the online version of the Definitive Map of PRow, planning policy documents, relevant ordnance survey maps, and the results of the public consultation undertaken between 2006 and 2008. In addition, the report takes into account work carried out to date with respect to NMU's, primarily as a result of the severance of existing routes to adjacent communities, and of the suggested mitigation measures following sensitivity testing and significant consultation with user groups, Broadland District Council and Norfolk County Council Environment Team. It draws on the information contained within the NDR NMU Context Report and NMU Audit that was completed in March 2013. Finally, the assessment of construction stage impacts draws upon information contained within the Construction Methodology document, prepared by Birse Civils (April 2013; refer to Volume 2, Chapter 24: CEMP), as well as Schedule 8 of the Construction Methodology which was updated by Birse in November 2013. Schedule 8 details the Contractor's access requirements from public roads during construction, and has been re-produced within (Volume 2, Chapter 12: Effects on All Travellers, Section B).

Scoping and Consultation

12.2.2 Between 2006 – 2008 all the parishes directly affected by the Scheme were invited to a scoping workshop and asked to identify possible severance problems that may be caused by the construction of the NDR. The following relevant issues were raised:

- Impact on buses including school buses;

- Impact on journeys to and from schools; and,
- Severance between villages (in particular between Drayton and Horsford).

12.2.3 The Scheme alignment and associated mitigation for impacts upon All Travellers has been revised since this date to take account of many of the concerns raised by the parishes. Further consultation has subsequently been undertaken for the current Scheme design and as part of the Environmental Impact Assessment process for the DCO Application. The Environmental Scoping Report was submitted by Norfolk County Council to the Secretary of State for Transport (SoS) in February 2013 in order to request a scoping opinion for the proposed NDR. So as to inform the Scoping Opinion, the SoS has a duty under Regulation 8(6) of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2009 (SI 2263) (as amended) (the EIA Regulations) to consult widely. Consequently, all parishes were given the opportunity to pass comment on the proposed content and structure and potential impacts of the proposed NDR prior to the formation of a Scoping opinion and the submission of this ES.

12.2.4 12.2.4 The Scoping Opinion identifies effects on the local road network as one of the main potential concerns. The comments raised by Norfolk County Council, South Norfolk Council, Salhouse Parish Council, Rackheath Parish Council, Ringland Parish Council, and Frettenham Parish Council in respect to impacts upon the local road network have been considered within this Chapter; refer to the Scoping Opinion within Volume 1, Appendix 5 of this ES for further details. As requested within the Scoping Opinion, the potential impacts on the local road network, both adverse and beneficial, have been fully assessed within this Chapter, as well as the recommendation to take account of the location of footpaths, cycleways, and any PRow including bridleways and byways.

Limitations

12.2.5 This chapter draws on a separate 'Non-Motorised Users Context Report' prepared for the Scheme, which presents the baseline information in more detail. Surveys of pedestrian, equestrian and cyclist traffic for roads that would intersect the NDR were undertaken in April 2013. However, to date, surveys of Non-Motorised Users (NMUs) of Public Rights of Way (PRow) such as bridleways and footpaths within the vicinity of the Scheme have not been undertaken.

12.2.6 Construction stage traffic movement assumptions have been based on the Construction Methodology document, prepared by Birse Civils (April 2013), as well as the Schedule 8 document prepared by Birse in November 2013 (Volume 2, Chapter 12: Effects on All Travellers, Section B). However, this document and Schedule does not include the likely level of construction traffic for each of those roads identified, and whether the presence of construction plant is likely to be during peak hours, which could impact upon vehicle travellers and NMU journeys. Consequently, no quantifiable assessment of construction traffic movement has been undertaken, and the construction stage impacts upon Driver Stress are qualitative. The document does state that during peak periods it is envisaged that there will be up to 75 deliveries per day predominantly in 20 tonne eight wheeled wagons. This is in addition to staff and workforce transport.

12.2.7 Finally, the Traffic Model for the proposed Scheme includes a number of confirmed developments for the Norwich area for which new roads are proposed. These developments do not form the baseline for the Effects on All Travellers assessment, as they have not yet been built out. However, the inclusion of these developments does mean that some traffic increases or decreases for certain roads may not be fully attributed to the proposed NDR. Consequently, for some locations where impacts have been identified as a result of changes to traffic flows for Driver Stress and for NMUs, the impact (beneficial or adverse) may not be entirely as a result of the proposed NDR.

Planning and Legislative

National Planning Policy

12.2.8 On the 27th March 2012 national planning guidance in the form of topic-based PPGs and PPSs was superseded by the National Planning Policy Framework (NPPF). The NPPF contains topic-based advice to help achieve sustainable development. The paragraphs relevant to this topic fall within core planning principles, promoting sustainable transport and healthy communities and Plan-making. The NPPF provides advice on how the Scheme can be considered in relation to sustainable development, including:

- Supporting the transition to a low carbon future, and consideration of whether the opportunities for sustainable transport modes have been taken up.
- Protecting and exploiting opportunities for the use of sustainable modes for the movement of goods or people, including the protection and enhancement of PRoW and access. The Scheme should consider pedestrian and cycle

movements, access to high quality public transport, creation of safe crossing points and the needs of people with disabilities.

- A Scheme that reflects the vision and aspirations of local communities.

Local Planning Policy

Norfolk 3rd Transport Plan 2011 – 2026

12.2.9 NCC's Third Transport Plan "Connecting Norfolk" describes the county's strategy and policy framework for delivery up to 2026. It is used as a guide for transport investment when determining planning or delivery decisions. It reflects the views of local people and stakeholders and identifies six priorities for transportation:

- Maintaining and managing the highway network;
- Delivering sustainable growth;
- Enhancing strategic connections;
- Reducing emissions;
- Improving road safety; and,
- Improving accessibility.

The Norfolk Rights of Way Improvement Plan 2007-2017

12.2.10 The Norfolk Rights of Way Improvement Plan sets out NCC's aspirations for improving the network of PRow. The Plan provides an assessment of the needs of the county's residents and visitors, and of Norfolk's existing local rights of way network. The objectives of the Plan are to:

- Develop a well signed, maintained and easily accessible network.
- Develop and maintain an integrated network that provides for the requirements of all users.
- Improve promotion, understanding and use of the network.
- Encourage community involvement in improving and maintaining local rights of way.

- Develop a safe network of local rights of way.
- Prepare and make publicly available an up to date digitised Definitive Map.
- Protect and enhance biodiversity associated with the network of public rights of way.

12.2.11 In autumn 2010 Norfolk County Council initiated “The Big Conversation” with the public to decide what the spending priorities should be. Following, this NCC agreed that the Public Rights of Way Service would focus on its statutory duties to maintain paths. Furthermore, a network of these paths would be created to support Norfolk’s leisure/tourism economy and would be known as “Norfolk Trails”. Policy guiding this Service is contained in the Norfolk Rights of Way Improvement Plan 2007-2017, which sets out Norfolk County Council’s goal, aims and objectives to improve its network of local rights of way.

Transport for Norwich Consultation Document 2009

12.2.12 The Transport Strategy has been designed to help deliver growth within the Norwich area. It intends to improve walking and cycling facilities as part of an appropriately designed wider transport infrastructure, and to promote sustainable transport choices, reduce congestion and improve air quality. The strategy has already delivered key improvements such as Norwich Bus Station, St Augustine’s Gyratory and the network of Park and Ride facilities.

The Joint Core Strategy Submission Document February 2013

12.2.13 The Joint Core Strategy for Broadland, Norwich and South Norfolk was adopted in March 2011. Following a legal challenge, parts of the text, and some associated maps and diagrams, were remitted by High Court Order and taken back to the Regulation 19: Publication of a Local Plan Stage, to be treated as not having been subject to examination and adoption. The remainder of the Joint Core Strategy remains adopted.

12.2.14 Further work has been carried out to address the High Court ruling and an updated version of the JCS was submitted for Examination in Public (February 2013). The examination closed on Thursday 25th July 2013, and on Monday 9th September the Councils published a number of Main Modifications to the Joint Core Strategy. The six week consultation period for

this closed on Monday 21st October, and on 13th November 2013 the Planning Inspector issued his final report. The report concludes that, subject to a number of Main Modifications, the Joint Core Strategy for Broadland, Norwich and South Norfolk, the Broadland part of the Norwich Policy Area Local Plan is sound and is an appropriate basis for the future planning of the area. The Inspector's report and the Main Modifications Appendix are available to view at <http://www.gndp.org.uk/our-work/joint-core-strategy/> and it is expected that councillors will consider formal adoption by their individual local authorities early in 2014.

- 12.2.15 The adopted Joint Cores Strategy (March 2011) refers to the construction of the NDR, and specifically states that the NDR will provide improved access to the north of the city, to enhance the living conditions for those residents who live in the northern suburbs and to enable improvements to be made to buses, cycling and walking routes. However, in Policy 6: Access and Transportation it states that the levels of growth in the Joint Core Strategy will require that the need to travel is managed. As part of this process, travel planning and smarter choices will be promoted to ensure that all residents have good access to local jobs, services and other facilities, preferably by walking and cycling, thus reducing the need to travel and to promote healthier lifestyles.

12.3 Baseline

Motorised Users

View from the road

- 12.3.1 The NDR would be a new road set within a rural setting, so a baseline scenario cannot be taken for users of the road. However, routes that are identified within the ZVI for the proposed Scheme (Volume 2, Chapter 7: Landscape, Drawing MMD-233906-DT-0953 to MMD-233906-DT-0955) are considered within the assessment presented, as the views from the road are likely to be affected by the proposed NDR. For those routes that are situated within the main residential or light industrial areas, within the urban area of northern Norwich, the views from the road are dominated by the adjacent semi-urban townscape, which affords few attractive views for vehicle travellers. Where existing routes would intersect with the NDR, the existing view is one of an attractive, rural setting, and intensively farmed agricultural fields. Users of the main roads within the ZVI or passengers in public transport on these main arterial routes are considered to be of low sensitivity to change, whereas users of more scenic roads are considered to be of

moderate sensitivity. All routes included within the assessment are identified below:

Table 12.6 Affected Routes for Views from the Road (west to east)

Route	Classification	Sensitivity to Change for Vehicle Travellers
A1067 Fakenham Road – intersects with proposed NDR	Main Road	Low
Fir Covert Road – intersects with proposed NDR	Main Road	Low
Breck Farm Lane/ Furze Lane – intersects with the proposed NDR; closed to all traffic at intersection	Main Road	Low
Reepham Road – intersects with the proposed NDR; runs parallel with proposed NDR within the ZVI	Main Road	Low
Dog Lane – within ZVI, to the north of the proposed NDR	Scenic Road	Moderate
Drayton Lane – intersects with the proposed NDR	Main Road	Low
B1149 Holt Road - intersects with the proposed NDR; closed to all traffic at intersection (proposed cycleway)	Main Road	Low
A140 Cromer Road – intersects with the proposed NDR	Main Road	Low
Hall Lane – within ZVI; intersects with Holt Road to the south of the Scheme and closed to all traffic at intersection (proposed cycleway)	Scenic Road	Moderate
Old Norwich Road – stops before intersection with the proposed NDR	Scenic Road	Moderate
Bullock Hill – intersects with the proposed NDR; closed to all traffic at intersection (proposed cycleway)	Scenic Road	Moderate
Spixworth Road – within ZVI, to the north of the proposed NDR	Main Road	Low

Route	Classification	Sensitivity to Change for Vehicle Travellers
St Faith's Road - intersects with the proposed NDR; closed to all traffic at intersection (proposed cycleway)	Scenic Road	Moderate
Quaker Lane - intersects with the proposed NDR; closed to all traffic at intersection (proposed cycleway)	Scenic Road	Moderate
Buxton Road – intersects with the proposed NDR; closed to all motorised traffic at intersection	Main Road	Low
Beeston Lane – Within ZVI to the south of the proposed NDR; closed to all traffic (proposed cycleway)	Scenic Road	Moderate
B1150 North Walsham Road – Intersects with the proposed NDR	Main Road	Low
A1151 Wroxham Road – Intersects with the proposed NDR	Main Road	Low
Green Lane West – within ZVI to the east of the proposed NDR	Main Road	Low
Green Lane East – within ZVI to the east of the proposed NDR	Main Road	Low
Salhouse Road – intersects with the proposed NDR	Main Road	Low
Broad Lane – within ZVI to the north-east of the proposed NDR	Scenic Road	Moderate
Plumstead Road – intersects with the proposed NDR	Main Road	Low
Middle Road – intersects with the proposed NDR (carried over on new overbridge)	Main Road	Low
Toad Lane – within ZVI to the east of the proposed NDR	Main Road	Low
Low Road - intersects with the proposed NDR; closed to all traffic at intersection	Scenic Road	Moderate

Route	Classification	Sensitivity to Change for Vehicle Travellers
Green Lane South – within ZVI, to the west of the proposed NDR	Main Road	Low
Smee Lane - intersects with the proposed NDR; closed to all traffic at intersection	Scenic Road	Moderate
A47 – on edge of ZVI to the south of the proposed NDR	Main Road	Low

Driver Stress

12.3.2 In respect of vehicle travellers, driver stress is currently a key issue for the Norwich area as a result of severe congestion and high HGV use, resulting in significant delays and unreliable journey times. The “Norwich Area Transportation Strategy Options Report” (produced for Norfolk County Council by Mott MacDonald, August 2005) concluded that there is currently a high adverse impact on driver stress arising from congestion on the existing road network in the northern suburbs of Norwich. This situation has been exacerbated through rising traffic levels in recent years.

12.3.3 The assessment of Driver Stress relies on forecasts of traffic flows for the with and without Scheme scenario for the 15th year after Scheme opening (2032), as predicted by the Traffic Model for the Scheme. The traffic model splits the road network up into different links, principally where a change in the road occurs. This may be at a junction between two main roads, or where a side road joins a main road, or where the road goes from a single lane to two lanes. The meeting point of any two links is a ‘node’. Each node is assigned a number, and each link is assigned a label. For the purposes of assessing Driver Stress associated with the proposed NDR, the change in traffic flows is presented as a percentage change. Drawing MMD-233906-DT-0882 of Volume 2, Chapter 12. Effects on All Travellers, Section C, illustrates the full list of all links included within the traffic model, and the associated percentage change in Annual Average Daily Traffic (AADT) flows between the Do Minimum (without Scheme) and Do Something (with Scheme) scenarios for 2032.

Accident Data (Personal Injury Collision)

12.3.4 The Transport Assessment for the Scheme provides a high level analysis of Personal Injury Collision (PIC) data relating to the proposed NDR. This analysis provides information on PICs and accident cluster sites to inform the Transport Assessment with regards to safety aspects relating to the NDR. The information has also been used within this chapter to inform the assessment of Driver Stress.

12.3.5 As part of the initial desk top study, the following tasks were completed:

- Production of an overview of PICs that have occurred in the Driver Stress defined study area and over the last five years (between 01/07/2008 and 30/06/2013); and,
- Analysis of the PIC data to identify individual accident cluster sites, within the defined study area/period.

12.3.6 The analysis was completed using the KeyACCIDENT analysis software package, with Police STATS 19 data. These statistics refer to personal injury records on public roads which became known to the police.

12.3.7 The PIC data has been obtained from Norfolk County Council (NCC, the local Highway Authority), who are provided with a copy of the Police data for their own analysis. The geographical area of the data provided, has been specified by Mott MacDonald, and occupies an area consistent with the Transport Assessment (which is the same study area used for Driver Stress).

12.3.8 Cluster sites for accidents have been identified by interrogating the PIC data using the Cluster Site Analysis function in the KeyACCIDENT software package. Analysis of the data has shown that within the principal routes study area, between 01/07/2008 and 30/06/2013, a total of 2,068 collisions have been recorded, resulting in 3,281 casualties. Of these, 28 PICs have been classified as Fatal, 231 as Serious and 1,809 as Slight.

12.3.9 Full details of the Cluster sites and analysis can be found within Volume 2, Chapter 12: Effects on All Travellers, Section D,

Non-Motorised Users

12.3.10 NCC manages approximately 2,400 miles of Public Rights of Way consisting of footpaths, bridleways, restricted byways and byways open to all traffic. In 2011 20% of adults in Norwich City Council's area cycled at least

once per week, the fifth highest of any Local Authority in England. In 2011 6% per cent of adults usually travelled to work by bicycle, the sixth highest local authority percentage. NCC want to build on these high levels and are committed to providing a good quality network of cycle routes in and around Norwich. In addition, the Norwich Transport Strategy includes a commitment to upgrade and provide additional measures to improve the environment for pedestrians, such as the provision of new zebra crossings, traffic lights, and central islands. Currently, a network of existing PRow that can be used by pedestrians, cyclists, equestrians and other non-motorised vehicles exist within the study area for the proposed Scheme, and are identified on Drawings MMD-233906-DT-0592-0597 and the Norwich Cycle Map (Volume 2, Chapter 12: Effects on All Travellers, Section E and F respectively). Existing rights of way that will be intersected by the NDR are described in Table 12.7 below.

Table 12.7: Existing Public Rights of Way affected by NDR

Definitive Map Ref.	Type	Description
Attlebridge RB3	Restricted By-way	Track passable by vehicles linking A1067 to Deighton Hills. It then continues as a restricted by way to Broad Lane, Attlebridge.
Marriott's Way	Long Distance Cycle Route and Permissive Path	Marriott's Way is a footpath, bridleway and cycle route, which follows the routes of two disused railway lines. Runs between the historic market town of Aylsham and the medieval city of Norwich. Forms part of National Cycle Route 1, which is a long distance cycle route connecting Dover and the Shetland Islands.
Drayton RB6	Restricted By-way	Track links Reepham Road to Dog Lane, Horsford and also links to footpath no.6 to Drayton Drewray.
Horsford RB5	Restricted By-way	Track links Reepham Road to Dog Lane, Horsford and also links with CRF3 to Horsford village.
Horsford RB7	Restricted By-	Track links B1149 Holt Road to Drayton Lane.

Definitive Map Ref.	Type	Description
	way	
Spixworth BR1/ Horsham St Faith and Newton St Faith BR6	Bridleway	Bridleway crosses parish boundary and runs from Quaker Lane to the perimeter fence of Norwich Airport
Great & Little Plumstead FP4	Footpath	Track links Low Road with Middle Road.
Great & Little Plumstead FP5	Footpath	Footpath links Low Road to Smee Lane. Forms part of a Broadland Great and Little Plumstead Circular walk no.8
Postwick FP2	Footpath	Footpath links Smee Lane to A1042 Yarmouth Road

12.3.11 A number of these existing PRoW and tracks, as well as some additional NMU amenities that do not intersect the proposed NDR but are within the footprint of works, would be closed or diverted with the proposed Scheme in place. All of these closures and diversions, as well as new and replacement NMU amenities included within the proposed Scheme design are illustrated on Drawings MMD-233906-DT-0592-0597 (Volume 2, Chapter 12: Effects on All Travellers, Section E.). The following tables identify the locations of all Public Rights of Way and tracks that would be stopped up or diverted as a result of the Scheme:

Table 12.8: Locations of Rights of Way to be stopped up or diverted

Private Means of Access	Chainage
Private means of access leading from Old Norwich Road to the northern entrance to Norwich airport to the north of the NDR)	7880
Diversions	Chainage
Attlebridge RB3 (to the north of the NDR) diverted adjacent to the NDR to the proposed A1067 Fakenham Road Roundabout	760
Horsford RB 7 between the proposed Drayton Lane and the existing Drayton Lane	5300
Postwick FP2 to be stopped up between Smee Lane and A47 Trunk Road and replaced with Footway/ Cycleway adjacent to NDR	19000
Tracks and Rights of Way	Chainage
Private: Access Track running north-south between the A1067 Fakenham Road and Attlebridge Restricted Byway No.3, to the north of the NDR).	700
Public: A 386 metre length of Attlebridge Restricted Byway No. 3, north westwards from its junction with the A1067 Fakenham Road (a diverted route from the northern side of the A1067 Fakenham Road Roundabout to be provided).	760
Private: A length of Access Track running along a co-existent route with Attlebridge Restricted Byway No.3, to the north of the NDR.	760
Private: Track running from the C261 Reepham Road to Glebe Farm on B1149 Holt Road, to the north and south of the NDR.	5150
Public: Horsford Restricted Byway No.7 – a 60 metre length from its junction with the C282 Drayton Lane.	5300
Private: Track at the southern termination point of C250 Old Norwich Road, to Norwich International Airport Control Tower and Airport curtilage, to the north of the NDR.	7900

Public: Spixworth Bridleway No.1, to the east of the NDR.	9800
Public: Horsham St. Faith and the Newton St. Faith Bridleway No.6, to the west of the NDR.	8900
Private: Track leading north of Red Hall Farm, Beeston Lane (U57186), to the north and south of the NDR.	11730
Private: Track leading north off Beeston Lane (U57186), approximately 400 metres east of Park Farm, to the north and south of the NDR.	13150
Private: Track leading south west from the C258 Green Lane West, to the pumping station, to the north and south of the NDR.	14800
Private: Track leading from the existing Newman Track west of Gazebo Farm in the northerly direction for approximately 250m.	15200
Private: Track leading from the realigned Newman Track on the east of overbridge leading northwards for approximately 80m.	15500
Private: Track leading southwards from Newman Road (U57490)/Long's Crescent (U57852) junction, over its length to the circulatory track around March Farm and Park Gardens.	15500
Private: Track leading from C258 Green Lane West to Hall Farm, west of the NDR.	15800
Public: Great and Little Plumstead Footpath No.5, to the north and south of the NDR.	18750
Public: Postwick Footpath No.2 – a 700 metre length from its junction with the A1042 Yarmouth Road.	19000
Diversions	Chainage
Public: Drayton Restricted Byway No. 6 diverted north of Reepham Road roundabout to join the roundabout.	3000
Public: Horsford Restricted Byway No. 5 diverted over the new Bell Farm Overbridge.	3950

12.3.12 There are also a number of unofficial footpaths and tracks that are regularly utilised by NMUs in the local area that constitute desirable routes or desire lines. Due to the scale of the proposed NDR, it has not been possible to identify every one of these desire lines within the study area (extents of the traffic model). However, those that would be directly affected by the Scheme through either a closure or diversion have been identified. The only identified route is a track that runs from the northern extents of Thorpe Mariott, along Long Dale, and connecting with Dog Lane to the north (Chainage 3750).

Pedestrian and Cyclist Counts

12.3.13 Counts of pedestrian and cyclist activity have been undertaken for the main radial routes to the North of Norwich City at locations where the proposed NDR would intersect these routes. These have been undertaken so as to ascertain the level of NMU activity on these main access routes into and out of the City. A high volume of cyclists have been recorded along these radial routes, which supports the statement that Norwich has the 5th highest cyclist activity of any local authority in England. Pedestrian counts are low as these radial routes do not have pavements or footways (cyclist counts are for road cyclists). The surveys were undertaken on Tuesday 30th April 2013.

Table 12.9: Pedestrian and cyclist counts: April 2013

Location	North bound/ East bound		South bound/ West bound	
	Pedestrians	Cyclists	Pedestrians	Cyclists
Fakenham Road	0	6	0	4
Fir Covert Road	19	5	9	24
Reepham Road	0	24	0	32
Holt Road	0	35	0	32
Cromer Road	1	33	2	44
North Walsham Road	0	31	1	19
Wroxham Road	0	26	0	26
Salhouse Road	2	30	1	31

Location	North bound/ East bound		South bound/ West bound	
	Pedestrians	Cyclists	Pedestrians	Cyclists
Plumstead Road	0	41	0	35

Communities

12.3.14 There are 19 parishes within the immediate influence of the NDR (Broadland (Greater Norwich)). Community facilities that constitute sensitive receptors for the assessment of Driver Stress and for Non-Motorised Users are identified within Table 12.10 for each of these parishes. The presence of sensitive receptors influences the overall impact assessment by affecting the level of Driver Stress or the impact upon community severance. For example, where a school is present, it is expected that there would be school children, which could influence Driver Stress. In addition, the relief of traffic from roads with sensitive receptors such as schools and medical facilities may result in some relief of existing community severance.

12.3.15 Drawing MMD-233906-DT-0716 of Volume 2, Chapter 12: Effects on All Travellers, Section G, identifies the location of schools and medical facilities. Drawing MMD-233906-DT-0716 also maps the percentage of the population that do not own a vehicle and are therefore reliant on non-motorised travel or use of public transport (percentage of non-motorised population).

Table 12.10: List of Parishes immediately affected by the proposed NDR

Parishes	Schools	Medical centre/ doctors surgery	Church/ Religious centre	Local shops	Home for the elderly	Recreational and other
Attlebridge	Attlebridge Nursery School, Old Fakenham Road	N/A	N/A	N/A	N/A	N/A
Taverham	Taverham High School, Beech Avenue Taverham Junior School, off Taverham Road	Taverham Surgery, Sandy Lane	St Edmunds, Taverham Lane Taverham Evangelical Church, Taverham Lane	Numerous local shops	Eastlands Residential care homes, Beech Avenue	N/A
Felthorpe	N/A	N/A	St Margaret's, Bilney Lane	N/A	N/A	N/A
Drayton	Drayton Infant School, School Road Drayton Church of England Junior School, School Road	Drayton and St Faith's Medical Practice, Manor Farm Close	N/A	N/A	Home Instead Senior Care	King George's Playing Fields

Parishes	Schools	Medical centre/ doctors surgery	Church/ Religious centre	Local shops	Home for the elderly	Recreational and other
Horsford	Horsford Church of England Junior School, Mill Lane Infant School, Holt Road	Horsford Medical Centre, Holt Road	All Saints Church	Co-op, Holt Road	N/A	N/A
Horsham St Faith	St Faith's Church of England Primary School, Manor Road	Horsham St. Faith Surgery (Norwich Road)	St Mary and St Andrew; and, St Faith Priory (both on Church Street)	Post Office (Back Street) Local shops	N/A	Aviation Museum Bowling Green Allotment Gardens Sports Ground
Newton St Faith	N/A	N/A	N/A	N/A	N/A	N/A
Hellesdon	Hellesdon High School, Middleton's lane Kinsale Junior	Hellesdon Medical Practice, Reepham Road	St Paul's Hellesdon Parish	Numerous local shops	Woodland Care Home, Woodlands Road	Hellesdon recreation centre, of Middleton's Lane

Parishes	Schools	Medical centre/ doctors surgery	Church/ Religious centre	Local shops	Home for the elderly	Recreational and other
	School, Middleton's Lane Hellesdon Community Pre-School, Kinsale Avenue Firside Junior School, Middleton's Lane Ardent Road Infant and Nursery School, Cottinghams Drive	Hellesdon Hospital	Church Meadow Way Chapel		Northgate House, Links Avenue	Royal Norwich Gold Club, Drayton High Road
Spixworth	Spixworth Infant School, Ivy Road Woodlands View Junior School, Ivy Road	Spixworth Surgery, St Peter's Way	Spixworth Methodist, Godfrey Road St Peters, Buxton Road	Post Office	St Mary's, North Walsham Lane	Recreation Ground Village Hall Spixworth Social Club, Crosswick Lane

Parishes	Schools	Medical centre/ doctors surgery	Church/ Religious centre	Local shops	Home for the elderly	Recreational and other
Croswick	N/A	N/A	N/A	N/A	N/A	N/A
Rackheath	Rackheath Primary School, Willoughby Way	Doctors Surgery, Newman Road	Holy Trinity, Salhouse Road	New Rackheath post Office, Bernard Close, New Rackheath	Ashfields, Salhouse Lane	Village Hall, Green Lane West Recreation Ground, Green Lane
Great and Little Plumstead	Hemblington Primary School Little Plumstead Primary School, School Road	N/A	St. Mary's, Church Road St Protease and St Gervase, Plumstead Hospital site	Village stores	N/A	Recreation Ground
Beeston St Andrew ¹	N/A	N/A	N/A	Farm Shop, B1150	N/A	Norwich Rugby Club, North Walsham Road
Old Catton	Old Catton Church of England Junior	Old Catton Surgery, Lodge	St Margaret's	Numerous	N/A	N/A

Parishes	Schools	Medical centre/ doctors surgery	Church/ Religious centre	Local shops	Home for the elderly	Recreational and other
	School, Church Lane Hall School, St Faith's Road White Women Lane Junior School, White Women Lane Lodge Lane Infant School, Lodge Lane Garrick Green Infant School, Garrick Green Road	Lane	Church Street Old Catton Methodist Church White Woman Lane	local shops		
Sprowston	Sprowston Infant School, Recreation Ground Sprowston Junior School, Recreation Ground	Willow Wood Surgery	St Mary and St Margaret's Church, Church Lane	Numerous local shops	The Warren, Wroxham Road	Recreation Ground

Parishes	Schools	Medical centre/ doctors surgery	Church/ Religious centre	Local shops	Home for the elderly	Recreational and other
Thorpe St Andrew	<p>Sprowston Community High School, Cannerby Lane</p> <p>Falcon Junior School, Falcon Rad West</p> <p>Cecil Gowing Infant School, Falcon Road West</p> <p>Sparhawk Infant and Nursery School, Sparhawk Avenue</p>	<p>Dussindale Surgery, Pound Lane</p> <p>Saltwood Doctors Surgery,</p>	<p>Thorpe St Andrew Parish Church, Yarmouth Road;</p> <p>The Church of the Good Shepherd, Thunder Lane;</p>	Numerous local shops	<p>Mary Chapman Court Care Home, Mary Chapman Close</p>	<p>Village Hall, Yarmouth Road</p> <p>Thorpe Recreation Ground, Laundry Lane</p>

Parishes	Schools	Medical centre/ doctors surgery	Church/ Religious centre	Local shops	Home for the elderly	Recreational and other
	Hillside Avenue Primary and Nursery School, Hillside Avenue	Plumstead Road	Our Lady's R C Church, St. Williams Way; Adat Yeshua Messianic Synagogue, Meets at Thorpe St Andrew Village Hall; Methodist Church, Heartsease Lane; and, Roman Catholic St George's Presbytery, Sprowston Road.			
Thorpe End ²	N/A	Norwich Histopathologists, (Norwich/ Plumstead)	St. Davids, St David's Drive	Thorpe End Post Office (Norwich / Plumstead	N/A	Community Hall (Norwich/ Plumstead Road)

Parishes	Schools	Medical centre/ doctors surgery	Church/ Religious centre	Local shops	Home for the elderly	Recreational and other
Postwick	N/A	Road) N/A	All Saints Church, Postwick	Road) N/A	Heron Lee (Mill Lane, Witton)	Sports ground, Postwick
<p>1 Beeston St. Andrew is a small parish comprising scattered properties. There is no defined village centre.</p> <p>2 Thorpe End is part of the Great and Little Plumstead Parish. This Garden Village would be separated from the rest of the parish by the proposed NDR, although the continuity of Plumstead Road would be maintained. In terms of distance, Thorpe End lies closer to the facilities of Thorpe St. Andrew than those in the Great and Little Plumstead parish</p>						

Public Transport

- 12.3.16 Norwich is well served by bus services with a range of service providers including Anglianbus, First Norfolk & Suffolk, Konectbus, Norfolk Green and Sanders.
- 12.3.17 Most bus and coach services run from Norwich bus station and/or from Castle Meadow. Norwich also has six Park & Ride sites run by Norfolk County Council using colour-coded buses, making Norwich's Park & Ride scheme one of the larger UK operations, providing over 5000 parking spaces.
- 12.3.18 The majority of public bus services operate in the urban areas and run mainly on the radial routes in and out of Norwich City. These offer good frequency services within the built-up areas during the day and in the evenings, although these can be hampered by traffic congestion in peak periods. The bus route linking the Norfolk and Norwich University Hospital and the University of East Anglia (UEA) to the railway station via Norwich city centre operates 24 hours a day.
- 12.3.19 There are a number of interchange points for onward bus or pedestrian journeys within the City centre (Castle Meadow, St Stephens Street and at Anglia Square, as well as the bus and rail stations and at the Park & Ride sites). Interchange points are also present at the airport, the hospital and UEA.
- 12.3.20 Rail routes and services would not be affected by the proposed NDR, and as a result, have not been considered within this assessment.

12.4 Mitigation

Construction

- 12.4.1 During construction, all diversion routes for PRoW and road closures will be sign posted clearly, with the intention of minimising construction delays and driver frustration. Since the road would be a new road passing across a predominantly agricultural landscape, the majority of the route will be built off-line with no interference to existing roads, reducing the disruption and consequent driver stress caused during construction. In addition, the construction programme will be developed to ensure that disruption to motorised and non-motorised users is minimised wherever possible. The following measures have already been agreed with regards to the construction programme, so as to ensure that disruption is minimised:

- Breck Farm Way will remain open until the new Marriott's Way structure is completed.
- A new roundabout is created where the NDR crosses Reepham Road. This will be constructed in phases using traffic signals to control the traffic.
- A new roundabout is created where the NDR crosses Drayton Lane. This will be constructed in phases using traffic signals to control the traffic.
- The construction of the new roundabout on Holt Road will be constructed in phases using traffic signals. This will be constructed before the permanent diversion of Drayton Lane is undertaken.
- A new roundabout is created where the NDR crosses Reepham Road. This will be constructed in phases using traffic signals to control the traffic.
- A new roundabout is created where the NDR crosses Drayton Lane. This will be constructed in phases using traffic signals to control the traffic.
- A new interchange is created where the NDR crosses Cromer Road. This will be constructed in multiple phases using traffic signals to control the traffic. As part of these works Holt Road, Hall Lane (Holly Lane) and New Home Lane will all be stopped up at the interchange. No closure will be applied for on this important county road.
- The emergency access to the airport from Old Norwich Road will be closed. Alternative emergency access through the site compound will be discussed with the Airport Authority.
- A new roundabout is created where the NDR crosses North Walsham Road. This will be constructed in phases using traffic signals to control the traffic.
- The construction of the tie-ins at Buxton Road will be undertaken in phases using traffic signals to control the traffic.
- A new roundabout is created where the NDR crosses North Walsham Road. This will be constructed in phases using traffic signals to control the traffic.
- A new roundabout is created where the NDR crosses Wroxham Road. This will be constructed in phases using traffic signals to control the traffic.
- A new roundabout is created where the NDR crosses Salhouse Road. This will be constructed in phases using traffic signals to control the traffic in order to construct the tie-ins.

- At Newman Road access to the park will be maintained at all times necessitating the use of traffic signals to construct the tie-ins.
- Plumstead Road will only be closed off peak to facilitate the delivery and placing of the bridge beams. At other times traffic will be controlled with signals to allow the abutments to be constructed.

Operation

12.4.2 Impacts for motorised and non-motorised users of the existing network have been taken into account with regards to severance and changes to journey length and amenity in developing the Scheme design. As a result, the Scheme incorporates several roundabout junctions along the route to give direct access to the following radial routes and the communities they link with. Where individual or joint access to properties would be severed by the proposed NDR, arrangements would be made to provide new access points to existing roads.

12.4.3 In addition, a grade separated junction would be provided at the crossing with the A140 Cromer Road, which would also give access to the B1149 Holt Road. The new junctions would be designed to meet the joint objectives of minimising delay for vehicles passing through the junction whilst maintaining a safe passage of all road users.

12.4.4 Visibility standards for the proposed NDR will be in accordance with DMRB Volume 6, thus providing good sight distances to junctions, across verges, and around obstacles such as safety barriers. The junctions at the A140 Cromer road and the A47 at Postwick would be grade separated, with the remaining junctions as roundabouts, although some may require traffic signal control to optimise traffic movements and enable safe crossing for non-motorised users. All junctions would have appropriate advance signing to assist drivers to make route choices in good time. Together with the inclusion of a series of dedicated cycle ways and footpaths, these measures would ensure that vehicle travellers' fear of potential accidents is low, thus resulting in a positive benefit for Driver Stress once the Scheme is open.

12.4.5 Approximately 25km of new links suitable for use by NMUs would be provided along the route, together with improved surfacing on some existing rights of way (refer to Drawings MMD-0592-0597 of Volume 2, Chapter 12: Effects on All Travellers, Section E). The new routes would link to existing facilities, and would be screened from the road by a combination of low mounds and/or hedge and tree planting. They include the following (approximate lengths):

- Bridleways = 11487m;
- Cycle Track = 2140m;
- Cycle Track (with right of way on foot) = 288m;
- Shared Use Footway Cycleway = 7039m;
- Private Means of Access (PMA) = 5848m;
- PMA combined with Cycle Track (with right of way on foot) = 425m;
- PMA combined with diverted Restricted Byways = 966m (RB6 93m + RB5 646m + RB3 227m);
- PMA combined with Bridleway = 2497m;
- PMA combined with Cycle Track = 1140m; and,
- Restricted Byway (RB7) = 73m.

12.5 Assessment of Impacts - Construction

12.5.1 Construction of new highways can have short-term impacts, which are defined as those that cease at the latest by the beginning of the design year. Beneficial and adverse impacts have been included within this assessment, and are detailed below.

Motorised Users

Views from the road

12.5.2 Since the proposed NDR is a new road set within a rural setting, the changes to views that vehicle travellers in private vehicles or users of public transport (coaches and buses) would experience during construction would be limited to those existing routes that intersect with the new road and construction footprint.

12.5.3 There would be no views of construction works for vehicle travellers using the Scheme as the road would not be open to vehicle travellers until the day of opening. Therefore the impact of the construction on views from the proposed Scheme is not relevant to this assessment.

12.5.4 A temporary adverse impact is likely to be experienced by those motorised users passing along routes within the ZVI and which intersect with the NDR

as a result of changes from a rural, high quality outlook to that of a temporary construction site. The location of construction compounds, storage areas and borrow pits outside the road corridor are defined in outline. Views for vehicle travellers within the ZVI may be restricted by construction plant, stock-piles and construction infrastructure. However, the construction sequence has been optimised to avoid double handling of material and excessive vehicle movements (e.g. the earthworks balance is designed such that only localised movement of material will be necessary along individual stretches of the new road). Intermittent views may be afforded for some affected routes for a temporary period, where the proposed Scheme or associated construction activities would be perceptible, but would not alter the overall balance of features and elements that comprise the existing view for motorised users. In some key locations, such as intersections with the proposed Scheme, the construction stage may result in a restricted view for a temporary period. In these instances, the proposed Scheme and associated construction plant and stockpiles/ earthworks would form a noticeable feature or element of the view which is readily apparent to the motorised user.

12.5.5 Impacts at each of the key locations within the study area are identified in Table 12.11 below.

Table 12.11 Construction stage impacts for the View from the Road for Affected Routes within the ZVI

Location	Sensitivity of receptor	Change in view from the road during construction	Significance of Impact
Fakenham Road	Low	To the north of Fakenham Road, an area of temporary topsoil storage has been allocated, in the vicinity of the proposed Fakenham Road Roundabout. In addition, two areas for the temporary diversion of traffic are included to the south-east and north-west of the proposed roundabout. Vehicle travellers would experience restricted or intermittent views as a result of the construction activities for the duration of the construction period, due to the presence of construction vehicles, stock-piles and equipment.	Slight Adverse
Fir Covert Road	Low	A temporary topsoil storage area has been allocated to the west of the Fir Covert Road roundabout. An area for the temporary diversion of traffic whilst the Fir Covert Road tie-in is completed is also identified on the northern approach to the proposed NDR. Combined with the presence of construction plant and materials storage, there would be a temporary restriction in views for vehicle travellers throughout the construction period.	Slight Adverse
Breck Farm Lane/ Furze Lane	Moderate	Breck Farm Lane/ Furze Lane would remain open until the Marriott's Lane structure is completed. A temporary topsoil storage area has been allocated to the west of the intersection with the proposed NDR and a compound area to the east of Marriott's Way (adjacent to Breck Farm Lane). The presence of construction plant, materials stockpiles, and welfare facilities for construction activities would result in intermittent and restricted views for vehicle travellers on	Slight Adverse

Location	Sensitivity of receptor	Change in view from the road during construction	Significance of Impact
Reepham Road	Low	<p>Breck Farm Lane for a temporary period, until the diversion of Breck Farm Lane is complete.</p> <p>At the intersection with the proposed NDR, vehicle travellers along the Reepham Road would experience restricted views due to the presence of two temporary topsoil storage areas, and temporary diversion areas to the east and west of the junction whilst the tie-ins are constructed. A haul road crossing point has been identified for off-peak times at the Reepham Road roundabout. The presence of construction plant crossing the Reepham Road would also result in a restricted view for a temporary period.</p>	Slight Adverse
Drayton Lane	Low	<p>A site compound is proposed to the west of the Drayton Lane roundabout, as well as a temporary topsoil storage area. The presence of construction plant, materials storage and welfare facilities would restrict views to the west for vehicle travellers on this route.</p>	Slight Adverse
Holt Road	Low	<p>Vehicle travellers along Holt Road would experience intermittent and restricted views at the tie-ins with the Holt Road/ Drayton Lane roundabout for a temporary period. However, for the majority of the route, views would be open, with no perceptible change in the view towards the proposed NDR since it is at such a distance that the road construction would be a barely noticeable feature.</p>	Neutral

Location	Sensitivity of receptor	Change in view from the road during construction	Significance of Impact
Cromer Road	Low	Cromer Road intersection would involve much construction activity, for a long duration. Temporary topsoil storage areas have been allocated within close proximity to Cromer Road, but these are likely to be at such a distance as to be barely perceptible for vehicle travellers. However, the main site compound is proposed to the east of the Cromer Road intersection, and the presence of construction plant and machinery, as well as site hoardings would be likely to result in restricted or no views for vehicle travellers for a temporary period.	Moderate Adverse
Hall Lane	Moderate	Hall Lane would be stopped up during the construction period for the proposed NDR. Prior to this commencing, vehicle travellers on this route would experience restricted or the complete loss of view to the north due to the presence of an extensive topsoil storage area.	Moderate Adverse
Old Norwich Road	Moderate	Old Norwich Road provides access to the Norwich Aviation Museum and some residential properties. Vehicle travellers using this route would experience intermittent views of construction activities within the close to middle distance.	Slight Adverse
Bullock Hill	Moderate	Bullock Hill would be stopped up during the construction period for the proposed NDR. Prior to this commencing, vehicle travellers on this route would experience intermittent views of construction activities to the south, for a temporary period.	Slight Adverse
Spixworth	Low	For the majority of Spixworth Road, views would be open, with no perceptible change in the view towards the NDR as it is at such a distance that the road	Neutral

Location	Sensitivity of receptor	Change in view from the road during construction	Significance of Impact
Road		construction would be a barely noticeable feature.	
St Faith's Road	Moderate	Vehicle travellers along St Faith's Road would experience intermittent or open views to the north, with no restriction in view to the south as a result of construction plant and activities until such time as the road is stopped up.	Neutral/ Slight Adverse
Quaker Lane	Moderate	Open views to the south would remain intact on the whole for Quaker Lane, although some intermittent views of construction plant and earthworks would be anticipated, particularly at the intersection with the proposed NDR. This would be until such a time as Quaker Lane is stopped up, where it currently meets with St Faiths Road.	Slight Adverse
Buxton Road	Low	Views to the east and west of Buxton Road for vehicle travellers would be restricted during the construction stage of the proposed NDR due to the presence of areas of topsoil storage, and a compound location and batching plant to the east of the intersection with the NDR. In addition, the construction of the proposed bridge over the NDR would result in restricted or no view for a temporary period whilst materials storage, site hoardings and significant construction plant are in situ. A temporary diversion strip would also be required to the west of Buxton Road.	Slight Adverse
Beeston	Moderate	Beeston Lane is currently used for access only, and would remain this way following completion of the Scheme. For the majority of Beeston Lane, views	Neutral

Location	Sensitivity of receptor	Change in view from the road during construction	Significance of Impact
Lane		would be open, with no perceptible change in the view towards the proposed NDR as it is at such a distance that the road construction would be a barely noticeable feature.	
North Walsham Road	Low	A large site compound area would be located to the west of North Walsham Road, with temporary topsoil storage areas situated to the east in the middle distance. Construction plant would make use of North Walsham Road to access the Haul Road (east and west bound access along the proposed NDR), and combined with the presence of welfare facilities and materials storage areas, vehicle travellers would experience restricted and in some cases no view during the construction period.	Moderate Adverse
Wroxham Road	Low	An off peak haul road crossing point is proposed at Wroxham Road, with two temporary diversions to enable the tie-ins to the proposed junction identified to the north and south of the proposed NDR. Intermittent views of construction activities would be afforded for vehicle travellers for the majority of the construction period, with some restricted views during peak activity.	Slight Adverse
Green Lane West	Low	For the majority of the construction period, views for vehicle travellers on Green Lane West would remain unchanged, as there are a number of residential and light industrial properties between Green Lane West and the location of construction activities. It is unlikely that there would be a perceptible change in	Neutral

Location	Sensitivity of receptor	Change in view from the road during construction	Significance of Impact
Green Lane East	Low	<p>views for vehicle travellers along this route.</p> <p>Some intermittent far reaching views of construction activities may be apparent for vehicle travellers passing along Green Lane East during the construction period. This is largely due to the presence of temporary topsoil storage areas, and also a site compound at a point adjacent to the railway line, in the middle distance from Green Lane East. On the whole, the distance from the proposed Scheme does mean that these activities are not likely to dominate the view for vehicle travellers.</p>	Slight Adverse
Salhouse Road	Low	<p>The presence of an area of topsoil storage to the west of Salhouse Road, when combined with the presence of construction plant and an off peak haul road crossing point means that views for vehicle travellers on Salhouse Road would be interrupted. Intermittent and restricted views for a temporary period are likely to occur throughout the construction period.</p>	Slight Adverse
Broad Lane	Moderate	<p>Some intermittent far reaching views of construction activities may be apparent for vehicle travellers passing along Broad Lane, particularly of the temporary compound that is located adjacent to the railway line. However, on the whole, the distance from the proposed Scheme does mean that these activities are not likely to dominate the view for vehicle travellers. Impacts upon views would be for a temporary period, until Broad Lane is stopped up at its junction with Plumstead</p>	Slight Adverse

Location	Sensitivity of receptor	Change in view from the road during construction	Significance of Impact
Plumstead Road	Low	<p>Road.</p> <p>Major earthworks to accommodate two new roundabouts, a site compound, batching plant and also topsoil storage areas are proposed at the intersection with Plumstead Road, with the NDR being carried over Plumstead Road on a bridge. The presence of construction plant, materials storage, welfare facilities and major earthworks does mean that the views from the road for vehicle travellers would be restricted, and in some instances completely blocked during the construction period.</p>	Slight Adverse
Middle Road	Low	<p>Middle Road would be carried over the proposed NDR on a bridge. As a result of these works, it is likely that there would be substantial earthworks, as well as presence of construction machinery and plant. Views for vehicle travellers would be restricted at the intersection with the proposed NDR for a temporary period.</p>	Slight Adverse
Toad Lane	Moderate	<p>For the majority of Toad Lane, any views of construction activities, earthworks and plant would be intermittent or in the middle to far distance. It is unlikely that views would be perceptible, with the exception of at the junction with Middle Road, where construction plant accessing the Middle Road bridge construction site may be present. Open views would be maintained for the majority of this route.</p>	Neutral

Location	Sensitivity of receptor	Change in view from the road during construction	Significance of Impact
Low Road	Moderate	A temporary topsoil storage area and compound location would be situated adjacent to Low Road. This road would be closed to vehicle traffic with the opening of the proposed NDR. However, until this point, views from the road would be interrupted for vehicle travellers, as a result of earthworks, materials storage and welfare facilities.	Slight Adverse
Green Lane South	Low	Some intermittent far reaching views of construction activities may be apparent for vehicle travellers passing along Green Lane South during the construction period. This is largely due to the presence of temporary topsoil storage areas to the north of Green Lane South, and major earthworks activities. However, the distance from the proposed Scheme and presence of agricultural structures between the road and construction site does mean that these activities are not likely to dominate the view for vehicle travellers.	Neutral
Smees Lane	Moderate	A temporary topsoil storage area would be situated within the middle distance to the east of Smees Lane. This road would be closed to vehicle traffic with the opening of the proposed NDR. However, until this point, views from the road would be interrupted for vehicle travellers, as a result of earthworks along the proposed Scheme.	Slight Adverse
A47	Low	The A47 is in cutting at the location where the majority of works associated with the proposed NDR would occur. As a result, there would be little or no change in	Neutral

Location	Sensitivity of receptor	Change in view from the road during construction	Significance of Impact
		the view from the road for vehicle travellers.	

12.5.6 Overall, the construction stage is unlikely to result in the total loss of view for any affected route, and all vehicle traveller receptors would be of low to moderate sensitivity to change (users of main roads or passengers in public transport on main arterial route, and users of scenic roads). On balance, it is considered that during the construction stage, there would be Slight Adverse impacts on the view from the road for all vehicle travellers for a temporary period.

Driver Stress

- 12.5.7 During the construction phase, the need to travel through road-works is likely to result in temporary short-term delays which may lead to driver frustration and route uncertainty due to the provision of traffic management and construction plant movement. On the whole, this would be limited to locations where existing roads would be stopped up during construction, but where the new route (the NDR) has not yet been opened, although there may also be disruption for motorised users in locations where utilities require upgrades or additional services to be installed as a result of the proposed NDR. In addition, construction traffic and route diversions may result in additional congestion on existing routes, through volume of traffic or the addition of HGVs on popular and rural routes.
- 12.5.8 The construction works would be for a temporary period only, but may result in potentially significant (temporary) impacts for some vehicle travellers due to route uncertainty and changes in journey length from traffic diversions. This is particularly likely to be the case for locations where sensitive receptors are present, such as school children or elderly people, and in locations with a poor accident record.
- 12.5.9 Table 12.12 discusses affected routes (as identified within the study area for Driver Stress; refer to Drawing MMD-233906-DT-0795, Volume 2, Chapter 12: Effects on All Travellers, Section A,) where temporary construction impacts for vehicle travellers are likely to occur. The current construction programme identifies locations where there would be substantial construction traffic and roadworks (refer to the NDR Construction Methodology prepared by Birse Civils in April 2013 for full details of public roads that construction plant would require access to in order to facilitate construction, as well as Volume 2, Chapter 12: Effects on All Travellers, Section B,, of this ES. This document also identifies the location of all construction plant crossing points). The proposed construction programme and suggested routes for construction

plant has been used to inform this assessment of construction stage Driver Stress.

Table 12.12 Construction stage impacts for motorised users (Driver Stress)

Route	Commentary	Presence of sensitive receptors/ Accident Record	Significance of Impact
A1067 Fakenham Road	The proposed NDR would commence with the construction of a new roundabout on the Fakenham Road. Traffic would be temporarily diverted at two locations adjacent to the existing road to enable the tie-ins to be completed. Construction plant would utilise this route (eastbound access required from the existing highway). Temporary adverse impacts as a result of driver frustration related to congestion, caused by slow moving plant is likely to occur.	Attlebridge nursery school located on the A1067. Accident Cluster E-005 at the junction with Breck Farm Way as the A1067 passes through Taverham.	Moderate Adverse during diversions, reducing to Slight Adverse for the remainder of the construction period.
Fir Covert Road	A new roundabout at Fir Covert Road is proposed. Temporary traffic diversions would be in place so as to enable the tie-ins to be completed at this location. Construction plant would utilise this route to access the proposed NDR.	No sensitive receptors. No accident records.	Moderate Adverse during diversions, reducing to Slight Adverse for the remainder of the construction period.
Breck Farm Way	Breck Farm Way would remain open until the new Marriots Way structure is completed. It is then intended to apply for a short term closure to allow all of the tie-ins to	No sensitive receptors. Accident cluster E-005 at the	Moderate Adverse during the closure of Breck Farm Way;

Route	Commentary	Presence of sensitive receptors/ Accident Record	Significance of Impact
Reepham Road	<p>be completed. Temporary adverse impacts are anticipated for motorised users of this route due to increased journey times, and from the presence of construction plant.</p> <p>A new roundabout would be created where the NDR crosses Reepham Road. This would be constructed in phases using traffic signals to control the traffic. A temporary closure may also be applied for to facilitate the final tie-ins. Adverse impacts for vehicle travellers are anticipated due to route uncertainty caused by diversions, leading to increased driver stress for a temporary period. In addition, construction plant will utilise this route, resulting in low to medium level driver frustration due to slow moving plant.</p>	<p>junction with Breck Farm Way and the A1067.</p> <p>Several schools, medical facilities and elderly care homes within Taverham – likely to use Reepham Road for access.</p> <p>Cluster V-002 and V-003 at the junction with Hall Lane and Drayton Lane.</p>	<p>Slight Adverse for the remainder of the construction period.</p> <p>Moderate Adverse throughout the construction period, at the intersection with the proposed NDR. Slight Adverse for other locations along the Reepham Road</p>
B1149 Holt Road	<p>The construction of the proposed new roundabout on Holt Road would be undertaken in phases using traffic signals to control the traffic. This would be completed prior to the permanent diversion of Drayton Lane. Holt Road would then also be stopped up at the intersection with the new NDR near to the Cromer Road roundabout. Adverse</p>	<p>Horsford Medical centre.</p> <p>Horsford junior and infant schools.</p> <p>Cluster N-001 at the Manor</p>	<p>Moderate Adverse whilst the construction of the roundabout is undertaken and construction vehicles</p>

Route	Commentary	Presence of sensitive receptors/ Accident Record	Significance of Impact
	<p>impacts (low level) for vehicle travellers are anticipated as a result of signalised traffic leading to increased journey times and driver frustration. In addition, construction plant will utilise this route, resulting in low to medium level driver frustration due to slow moving plant.</p>	<p>Farm Junction.</p>	<p>utilise this route. Slight Adverse for the remainder of the construction period.</p>
Drayton Lane	<p>A new roundabout is created where the NDR crosses Drayton Lane. This would be constructed in phases using traffic signals to control the traffic. A temporary closure may also be applied for to facilitate the final tie-ins, and construction plant will utilise this route to access the haul road. Adverse impacts are anticipated due to route uncertainty and increased journey times, leading to increased driver frustration and stress for a temporary period.</p>	<p>Drayton infant and junior school; Drayton medical centre. No accident records.</p>	<p>Large Adverse impact during the closure of Drayton Lane; Slight Adverse for the remainder of the construction period.</p>
Church Street	<p>No construction activities or diversions on this road. Construction plant not anticipated to use this route.</p>	<p>No sensitive receptors. No accident records.</p>	<p>Neutral</p>
A140 Cromer Road	<p>A new interchange would be constructed where the NDR crosses Cromer Road. This would be constructed in multiple phases using traffic signals to control the traffic.</p>	<p>No sensitive receptors. Cluster record I-001 at the</p>	<p>Moderate Adverse</p>

Route	Commentary	Presence of sensitive receptors/ Accident Record	Significance of Impact
	<p>No closure would be applied on this important county road, but construction plant will use this route (eastbound access to the main compound). Adverse impacts for vehicle travellers are anticipated as a result of signalised traffic leading to increased journey times and driver frustration, as well as slow moving construction plant leading to additional driver frustration.</p>	<p>junction with Horsham St Faith.</p>	
<p>Spixworth Road/ Church lane</p>	<p>No construction activities or diversions on this road. Construction plant not anticipated to use this route.</p>	<p>No sensitive receptors on this rural lane. No accident records.</p>	<p>Neutral</p>
<p>Buxton Road</p>	<p>There would be a temporary closure to construct the new Buxton Road tie-ins. This would result in a temporary low level adverse impact for vehicle travellers due to route uncertainty caused by diversions. In addition, construction plant access is required along this route, and as a result, there may be low level impacts for vehicle travellers due to increased driver frustration from slow moving construction plant.</p>	<p>Spixworth Infant School and Woodlands View Junior School – both on Ivy Road; access from Buxton Road. No accident records.</p>	<p>Large Adverse during the temporary closure of Buxton Road; Slight Adverse for the remainder of the construction period.</p>

Route	Commentary	Presence of sensitive receptors/ Accident Record	Significance of Impact
Croswick Lane	No construction activities or diversions on this road. Construction plant not anticipated to use this route.	No sensitive receptors, but lane passes directly through residential areas of Spixworth. No accident records.	Neutral
B1150 North Walsham Road	A new roundabout would be created where the NDR crosses this road. This would be constructed in phases using traffic signals to control the traffic. Adverse impacts for vehicle travellers are anticipated as a result of signalised traffic leading to increased journey times and driver frustration. Off peak use of this route would be required by construction plant, resulting in some low level, temporary impacts (driver frustration).	No sensitive receptors. No accident records at the intersection with the proposed NDR.	Slight Adverse
A1151 Wroxham Road	A new roundabout would be constructed at this location. This would be constructed in phases using traffic signals to control the traffic. Adverse impacts (low level) for vehicle travellers are anticipated as a result of signalised traffic leading to increased journey times and driver frustration. In addition, construction plant will utilise this route, resulting in low to medium level driver frustration	The Warren Home for the elderly; numerous schools within Sprowston with access from Wroxham Road, but no other sensitive receptors on the A1151. No accident records at the	Slight Adverse

Route	Commentary	Presence of sensitive receptors/ Accident Record	Significance of Impact
	due to slow moving plant.	intersection of the proposed NDR.	
Green Lane West	Green Lane West remains open to all traffic through the construction period. Construction plant are anticipated to utilise this road to access Plumstead Road and the temporary compounds located here, which would be likely to result in increased driver frustration from slow moving plant.	Village hall and recreation ground. Cluster T-001 at the junction with Salhouse Lane.	Slight Adverse
Salhouse Road	A new roundabout would be created where the NDR crosses Salhouse Road. This would be constructed in phases utilising a road closure to construct the tie-ins. Low level adverse impacts for vehicle travellers are anticipated due to route uncertainty caused by diversions, and increased journey times, leading to increased driver stress for a temporary period.	Holy Trinity Church and Ashfields Home for the elderly. Cluster T-001 at the junction with Green Lane West.	Moderate Adverse during closures, reducing to Slight Adverse for the remainder of the construction period.
Plumstead Road	Plumstead Road would only be closed off peak to facilitate the delivery and placing of the bridge beams. At other times traffic would be controlled with signals to	Sensitive receptors within Thorpe End – post office, community hall and medical	Large Adverse during closures (off peak only), reducing to

Route	Commentary	Presence of sensitive receptors/ Accident Record	Significance of Impact
	<p>allow the abutments to be constructed. This would result in low to moderate adverse impacts for vehicle travellers due to route uncertainty caused by diversions, as well as increased journey times, leading to increased driver stress for a temporary period. Access to site compounds and bridge construction sites for heavy plant would also be required, which may lead to increased driver frustration.</p>	<p>centre. Cluster U-004 at the junction with Broad Lane.</p>	<p>Slight Adverse for the remainder of the construction period</p>
Middle Road	<p>Middle Road would be closed to allow the bridge and side road to be constructed. This would result in adverse impacts for motorised users as a result of route uncertainty caused by the diversion.</p>	<p>No sensitive receptors. No accident records.</p>	<p>Moderate Adverse during the closure of Middle Road, reducing to Neutral once the road is re-opened</p>
Low Road	<p>Low Road would remain open until the Middle Road bridge has been constructed and is open for use. Traffic that has been temporarily diverted from Middle Road would be likely to utilise this route, resulting in increased Driver Frustration and Driver Stress for those existing users of this route.</p>	<p>No sensitive receptors. No accident records.</p>	<p>Slight Adverse</p>

Route	Commentary	Presence of sensitive receptors/ Accident Record	Significance of Impact
Smee Lane	Smee Lane would remain open until the Middle Road bridge has been constructed and is open for use. Traffic that has been temporarily diverted from Middle Road would be likely to utilise this route, resulting in increased Driver Frustration and Driver Stress for those existing users of this route.	No sensitive receptors. No accident records.	Slight Adverse
A1042/ A140 Outer Ring Road	No construction activities or diversions on this road. Construction plant not anticipated to use this route.	Sensitive receptors within close proximity of this road. Numerous accident clusters.	Neutral
A47	No construction activities on this road. Construction plant are anticipated to use the eastbound diverge.	No sensitive receptors. Several accident clusters at junctions.	Slight Adverse
A147 inner Ring Road	No construction activities on this road. Construction plant not anticipated to use this route.	Sensitive receptors within close proximity of this road. Numerous accident clusters.	Neutral
A1242 Yarmouth	No construction activities on this road. Construction plant	Sensitive receptors within close proximity of this road.	Neutral

Route	Commentary	Presence of sensitive receptors/ Accident Record	Significance of Impact
Road	not anticipated to use this route.	proximity of this road. Accident clusters at the junctions with the inner and outer ring-roads.	
A11	No construction activities on this road. Construction plant not anticipated to use this route.	No sensitive receptors. Accident clusters at junctions.	Neutral
A1074 Dereham Road	No construction activities on this road. Construction plant not anticipated to use this route.	Sensitive receptors within close proximity of this road. Several accident clusters.	Neutral
A1056 Ipswich Road	No construction activities on this road. Construction plant not anticipated to use this route.	Sensitive receptors within close proximity of this road. Accident clusters at the junction with the inner ring-road.	Neutral
B1108 Wotton/ Earlham	No construction activities on this road. Construction plant not anticipated to use this route.	Sensitive receptors within close proximity of this road.	Neutral

Route	Commentary	Presence of sensitive receptors/ Accident Record	Significance of Impact
Road		Several accident clusters.	

12.5.10 Large Adverse impacts have been identified for a number of locations where roads would be closed for a temporary period during the construction stage. These are:

- Large Adverse impacts during the closure of Drayton Lane. This would only be for the duration of the final tie-ins. All closures would be overnight with temporary diversion routes fully signposted so as to minimise impacts upon vehicle travellers and access;
- Large Adverse impacts during the closure of Buxton Road. This would only be for the duration of the final tie-ins. All closures would be overnight with temporary diversion routes fully signposted. This would minimise impacts upon vehicle travellers, and access to Spixworth and schools within this village; and,
- Large Adverse impacts during the closure of Plumstead Road. This would only be for the duration of the delivery and placement of the bridge. All closures would be off-peak with temporary diversion routes fully signposted.

12.5.11 Moderate Adverse impacts are anticipated at most of the intersections with the proposed NDR due to increased journey time from waiting at temporary signals and route uncertainty. Moderate Adverse effects are also likely for locations where temporary diversions, construction plant and congestion is likely and there are sensitive receptors and/ or a poor accident record. However, a Construction Environmental Management Plan (CEMP) would be implemented for the Scheme, which would incorporate the phasing strategy and measures to minimise impacts upon road users, such as through the use of signing and traffic signals. Adverse impacts as result of increased driver frustration due to the presence of construction plant and increased congestion would be minimised in many locations.

12.5.12 Several routes within the study area for Driver Stress would be unaffected by the proposed works during construction. A Neutral impact is anticipated for these routes.

12.5.13 Taken together, with the provision of temporary diversion routes immediately adjacent to the affected route, and construction sequencing so that the majority of road closures would occur outside of peak times, a Moderate to Slight Adverse impact for Driver Stress is anticipated for the duration of the construction period, with Large Adverse effects likely at only two locations for a temporary period.

Non-Motorised Users

12.5.14 It is anticipated that during the construction process, there would be increased movement of construction plant and associated road works. Together, this can lead to NMUs being deterred from making their usual routes, resulting in a temporary adverse impact for NMUs due to severance during construction. In addition, the construction stage is predicted to result in short term impacts upon NMUs as a result of the temporary closure or diversion of PRow, resulting in increased journey times due to diversions, or deterrence from making trips.

12.5.15 The current construction programme identifies the following locations (Table 12.13) where PRow used by NMUs would be closed or diverted for a temporary period only. Locations where there would be substantial construction traffic and roadworks that may result in NMUs being deterred from making journeys have also been assessed (refer to Volume 2, Chapter 42: CEMP for the NDR Construction Methodology prepared by Birse Civils in April 2013 which provides further details of public roads that construction plant would require access to in order to facilitate construction. This document also identifies the location of all construction plant crossing points).

Table 12.13 Construction stage impacts for Affected Roads

Location/ NMU Route	Commentary	Significance of Impact
A1067 Fakenham Road	A temporary diversion of this road for vehicle traffic (vehicles looped onto a 10m wide strip adjacent to the existing carriageway) would be required, but through access would be maintained. In addition, the haul road for the proposed Scheme would exit onto the A1067 and there would be construction plant associated with the temporary topsoil storage area at Chainage 0 to 1740. High cyclist activity has been recorded along the A1067 and this temporary diversion, plus the presence of construction plant may result in NMUs altering their journeys for a temporary period. NMUs, including school children, wishing to access facilities within Taverham such as Taverham High School, from north of the Fakenham Road may be deterred from making journeys on foot or bicycle due to increased congestion and construction traffic on the A1067.	Moderate Adverse
Attlebridge RB3	Temporarily diverted to the west at the point where it would cross the NDR, until the final diversion (to Fakenham Road Roundabout) is in place. Access would be maintained throughout the construction period.	Neutral
Marriott's Way	Temporarily closed to enable the new bridge over the NDR to be constructed. However, Breck Farm Way would remain open until the new structure is completed. A short term closure to allow all of the tie-ins to be completed would be required. This would result in a temporary Slight Adverse impact for NMUs accessing this route during the construction period.	Slight Adverse
Reepham	A temporary closure of Reepham Road for approximately 1 week is required to complete the tie-in to the new roundabout at this location. Long diversions for cyclists using this route may result,	Slight Adverse

Location/ NMU Route	Commentary	Significance of Impact
Road	<p>resulting in an adverse impact for 1 week. Construction plant would require access along this route, and an off-peak construction plant crossing point would also be required. NMU access to services to the south of Reepham Road would be maintained (within Thorpe Mariott and further south to Taverham and Drayton) since delays on Reepham Road would be unlikely to affect routes within these residential areas. To the north, access to services within Felthorpe and Horsford (such as Horsford Junior School) would also be maintained, with little or no disruption to local roads and NMU facilities. Delays for NMUs making medium to long distance journeys are likely on the Reepham Road, which will deter many from making their journey.</p>	
Bell Farm/ Horsford RB5	<p>To construct the side road to Bell Farm, a temporary closure would be required for the Bell Farm Track to construct the tie ins and also the Bell Farm overbridge. A temporary crossing point for construction plant would also be required. This temporary closure would result in a temporary severance for NMUs travelling between Horsford and Thorpe Mariott, particularly recreational walkers, cyclists and equestrians. Access to community facilities is unlikely to be affected since these are contained within the communities of Horsford to the north, and Taverham and Drayton to the south. Some school children travelling to Taverham High School from Horsford may be deterred from making their journeys, for a temporary period.</p>	<p>Slight Adverse, increasing to Moderate Adverse during the closure of Bell Farm Track</p>
Drayton Lane	<p>A temporary closure of Drayton Lane for approximately 1 week is required during construction of the new Drayton Lane roundabout. North/south access would be maintained via Cromer Road during this closure. This route will re-open as a cycle route only to the south of the NDR. However, long diversions for cyclists using this route for medium to long distance journeys may</p>	<p>Slight Adverse</p>

Location/ NMU Route	Commentary	Significance of Impact
Holt Road	<p>result during this construction timeframe, resulting in an adverse impact for 1 week. Construction plant will utilise this route for access to the haul road, and the presence of HGVs may deter some NMUs from making journeys during the construction period. It is unlikely that construction activities in this location would affect NMU journeys to community facilities, since facilities are contained within Horsford to the north and Drayton to the south.</p> <p>The construction of the new roundabout on Holt Road would be in phases, using traffic signals. Once the closure of Holt Road as a through road is complete, there would be a Moderate Beneficial impact for NMUs during construction due to reduced traffic volume. However, until this point, construction plant would utilise this route (east and westbound access), and as a result, impacts for NMUs would be adverse for a temporary period, particularly those making medium to long distance journeys by bicycle. NMU accesses to community facilities are unlikely to be affected.</p>	Slight Adverse
Cromer Road	<p>The new interchange at Cromer Road would be constructed in multiple phases, using traffic signals to control traffic. To facilitate the Cromer Road intersection and accommodate the proposed NDR, Hall/ Holly Lane and New Home Lane, along with Holt Road would be stopped up at this intersection. Cromer Road would remain open throughout the construction period, but the presence of construction plant (access along this route required), and the closure of minor through routes prior to new NMU routes (cycleways and footpaths) being in place, would result in a temporary adverse impact for NMUs. Some temporary severance of access to community facilities in Hellesdon to the south would be likely, particularly for school children travelling from</p>	Moderate Adverse

Location/ NMU Route	Commentary	Significance of Impact
Old Norwich Road	<p>Horsham St Faith to the north of the proposed NDR to Helleston High School. Other facilities (primary school and medical centre) are contained within Horsham St Faith.</p> <p>Old Norwich Road would be stopped up at the start of construction, removing the emergency access to the airport. An alternative emergency access will be provided (to be confirmed with the Airport Authority). This road does not have any through access, and therefore, NMUs are unlikely to be affected by this change.</p>	Neutral
Buxton Road	<p>A temporary closure of Buxton Road for approximately 1 week is required during construction of the new Buxton Road overbridge. North/ south access would be maintained via North Walsham Road during this period. Long diversions for cyclists using this route for middle to long distance journeys may result during this construction timeframe, resulting in an adverse impact for 1 week. Construction plant would utilise this route, which may further deter NMUs from making their journeys prior to and post closure of the road. Whilst the majority of community facilities can be found within Spixworth to the north of the proposed NDR, Buxton Road does provide a direct link for NMUs wishing to access the broader community facilities in Old Catton to the south, via the Spixworth cycleway. The closure of the Buxton Road would result in an adverse impact for NMUs accessing this route, with north/ south journeys curtailed for a temporary period.</p>	Slight Adverse, increasing to Moderate Adverse during the closure of Buxton Road
North Walsham Road	<p>A new roundabout would be created on North Walsham Road, with traffic signals to control the traffic alongside off-peak lane closures. This would temporarily affect cyclists accessing this route, during the construction period. In addition, the presence of construction plant on this route may deter some NMUs from making medium to long distance journeys on this route, for a</p>	Slight Adverse

Location/ NMU Route	Commentary	Significance of Impact
	temporary period. Shorter distance journeys by those on foot are unlikely to be made on this busy arterial road.	
Wroxham Road	A new roundabout would be created on Wroxham Road, with traffic signals to control the traffic alongside off-peak lane closures. Pedestrians and equestrians are unlikely to make use of this busy, main arterial road, and construction activities in this location are unlikely to affect NMU access to community facilities. However, the proposed works would temporarily affect cyclists accessing this route for middle to long distance journeys (such as commuters). In addition, the presence of construction plant on this route may deter some cyclists from making journeys on this route altogether, for a temporary period.	Slight Adverse
Newman Lane	A temporary crossing will be in place at the point that this track crosses the NDR while the site to the south is used as a temporary compound location. Access will be maintained throughout the construction period. No access to community facilities.	Neutral
Green Lane (east and west)	Construction plant would utilise this route so as to access the proposed NDR via Salhouse Lane, as well as the temporary works compounds off Plumstead Road. The presence of construction plant may deter some NMUs from using this route during the construction period, particularly those wishing to access community facilities within Rackheath.	Slight Adverse
Salhouse Road	A temporary closure of Salhouse Road for approximately 1 week is required during construction of the new Drayton Lane roundabout. Alternative east/ west access would be maintained along Plumstead Road during this period. Long diversions for cyclists using this route may result during	Slight Adverse, increasing to Moderate

Location/ NMU Route	Commentary	Significance of Impact
	<p>this construction timeframe, resulting in a significant adverse impact for 1 week only. Construction plant would use this route for access to the main haul road, and a construction plant crossing point would be required. Additional traffic would also be present on this route during the closure of Plumstead Road (see below). This may deter some NMUs from making their journeys. This could particularly influence NMU movement between Rackheath to the east of the proposed NDR and Sprowston to the west, which has a broader range of community facilities.</p>	<p>Adverse during the closure of Salhouse Lane.</p>
Plumstead Road	<p>Plumstead Road would be closed off-peak for a period of approximately 1 week to facilitate the construction of the bridge over Plumstead Road. Alternative east/ west access would be maintained via Salhouse Road during this period. When combined with the presence of construction plant (access for site compound and bridge construction sites required), and temporary traffic management for the remainder of the construction period, this would result in adverse impacts for cyclists and other NMUs passing between Thorpe End and Great and Little Plumstead.</p>	<p>Slight Adverse, increasing to Moderate Adverse during the closure of Plumstead Road.</p>
Middle Road	<p>Middle Road would be closed to all traffic for a temporary period during construction, to enable the new bridge to be constructed. This would result in a temporary adverse impact for NMUs using this route, particularly those gaining access to Great Plumstead. Low Road and Smea Lane would remain open during this period, allowing NMUs to move from east to west with only a minor diversion.</p>	<p>Moderate Adverse</p>
Low Road	<p>Construction plant would require access along this route whilst Middle Road is closed, and a construction plant crossing point would be required. The presence of construction vehicles may</p>	<p>Slight Adverse</p>

Location/ NMU Route	Commentary	Significance of Impact
	<p>deter some NMUs from making their journeys. Once Middle Road is open, Low Road would be permanently closed. Due to the nature of this narrow, rural road, it is unlikely that NMUs using this route would be accessing key community facilities within Great Plumstead or Thorpe St Andrew.</p>	
Smea Lane	<p>A construction plant crossing point at the junction with the proposed NDR (and haul road) would be required on this route. Once Middle Road is open, Smea Lane would be permanently closed. Until this point, impacts are only likely to be slight for NMUs as construction plant will not make use of this road (apart from at the crossing location).</p>	Slight Adverse
Pedestrian footpath within Thorpe End	<p>Construction of the proposed mini-roundabout at the Broadland Drive junction would result in temporary impacts for NMUs accessing the village shops in this location, due to the presence of construction plant and potential temporary diversions for existing footpaths. This would be for a temporary period only.</p>	Slight Adverse

12.5.16 Increased congestion and construction traffic on PRoW used by NMUs due to the proposed NDR construction period would result in adverse impacts for NMUs. When combined with potential increases in journey times, and temporary severance from community facilities for medium length trips due to road and rights of way closures, these impacts are likely to result in an adverse impact for pedestrians and cyclists for a temporary period.

12.5.17 Moderate Adverse impacts would arise during the temporary closure of some routes, for a maximum period of one week at any one location, such as at Buxton Road. However, when considered against the full construction timescale, and given that where a route would be temporarily closed, access would be maintained via an alternative route (albeit with increased journey times), it is not thought that the overall impact would be significant. Impacts upon equestrians would be minimal, since the majority of closures would be to existing motorised routes that are not suitable for equestrians. On balance, impacts at the construction stage for NMUs are considered to be Slight Adverse for a temporary period.

12.6 Assessment of Impacts – Operation

12.6.1 The predicted long-term impacts of the proposed NDR for both motorised and non-motorised users are identified below. This includes those impacts that will continue in or after the design year, with both beneficial and adverse impacts identified.

Motorised Users

View from the Road

12.6.2 The sections of the route identified accord with those sections identified within the Visual Impacts assessment of the Landscape and Visual Impact Chapter of this ES. In addition, existing routes that are within the boundaries of the ZVI for the NDR and are therefore considered to be affected by the proposals have been included within this assessment. It should also be noted that Motorised Users that make the change from the existing route network to the new NDR would expect to experience a change in the view from the road. Where the existing routes would intersect with the NDR, the view from the road for motorised users is likely to be restricted, changing from a rural setting to one of a dual carriageway corridor with associated landscape planting.

12.6.3 An assessment of views from the road for the proposed Scheme is presented within Table 12.14 below. This summarise the view from the road impacts

associated with the main links identified within the ZVI and for the NDR itself. In addition, Table 12.15 also provides an assessment of views from the road for vehicle travellers utilising the proposed Scheme.

Table 12.1 View from the road impacts for Affected Routes

Location	Sensitivity of receptor	Change in view from the road (2017/ 2032)	Significance of Impact
Fakenham Road	Low	There would be a change from open views over arable land from the Fakenham Road to restricted views in some locations due to the presence of the NDR and associated infrastructure. This is particularly true at the intersection with the NDR, where a new roundabout would be constructed. Existing and proposed planting along the proposed NDR would act to screen the road once it has matured at Year 15.	Slight Adverse visual impacts are reduced to Neutral by Year 15.
Fir Covert Road	Low	There would be little change from open views to the east and west of Fir Covert Road over arable land with the introduction of the proposed NDR, as Fir Covert Road runs north/south and the proposed NDR would be in cutting. Some intermittent and restricted views would be expected at the intersection with the NDR with the presence of a new roundabout and associated highways infrastructure.	Neutral.
Breck Farm Lane/ Furze Lane	Moderate	No views for vehicle travellers would be afforded on Scheme opening as these routes would be closed to all motorised traffic.	Receptor not applicable on Scheme opening.
Reepham Road	Low	Existing open views across arable land to the north or Reepham Road would be restricted due to the presence of the proposed NDR and associated planting. West of the intersection with the NDR, open views	Slight Adverse impacts would reduce to Neutral at

Location	Sensitivity of receptor	Change in view from the road (2017/ 2032)	Significance of Impact
		would be maintained with no change. In some locations, views towards the NDR from the Reephams Road would be screened by proposed woodland planting, and landscape mounding.	Year 15.
Dog Lane	Moderate	Existing open views to the north and east of Dog Lane would be maintained, as well as intermittent views through existing woodland to the west. Far reaching views of the Norwich urban fringe to the south of Dog Lane would be interrupted with the provision of the NDR and areas of associated woodland and grassland planting, affording an improvement for vehicle travellers on this rural route.	Views to the south are likely to be improved due to planting. Impacts are likely to be Slight Beneficial at Year 15.
Drayton Lane	Low	Drayton Lane would be re-aligned at the intersection with the proposed NDR. The realignment and provision of a new roundabout means that existing open views would be restricted as a result of new highways infrastructure, and due to the presence of the NDR. Open views over arable land to the west of the Scheme would be maintained.	Restricted views afforded in some locations due to the realignment of this road. Therefore, impacts are likely to be Slight Adverse at worst.
Holt Road	Low	The part of Holt Road that is within the ZVI for the Scheme would be closed to all motorised traffic on Scheme opening. No views for vehicle travellers	Receptor not applicable on

Location	Sensitivity of receptor	Change in view from the road (2017/ 2032)	Significance of Impact
Cromer Road	Low	<p>would therefore be afforded.</p> <p>Existing open views to the east and west of Cromer Road within the ZVI for the proposed NDR would become dominated by the proposed Scheme. This is because the Cromer Road would be carried over the NDR on an overbridge, and as such, views would be restricted by bridge parapets and the presence of two roundabouts to the north and south of the NDR, even from an elevated position.</p>	<p>Scheme opening.</p> <p>Due to the presence of highways infrastructure, impacts are considered to be Slight Adverse.</p>
Hall Lane	Moderate	<p>No views for vehicle travellers would be afforded on Scheme opening as this route would be closed to all motorised traffic.</p>	<p>Receptor not applicable on Scheme opening.</p>
Old Norwich Road	Moderate	<p>The Old Norwich Road does not provide a through route, but is stopped up prior to the intersection with the NDR. Vehicle travellers are likely to be restricted to those requiring access and recreational users. Open views over arable fields towards Norwich Airport would become intermittent as a result of the presence of the NDR and associated earthworks.</p>	<p>Slight Adverse impacts are anticipated for a small number of users of this rural route.</p>
Bullock Hill	Moderate	<p>No views for vehicle travellers would be afforded on Scheme opening as this route would be closed to all motorised traffic.</p>	<p>Receptor not applicable on</p>

Location	Sensitivity of receptor	Change in view from the road (2017/ 2032)	Significance of Impact
Spixworth Road	Low	Southern views from Spixworth Road are currently over open fields, towards Norwich Airport. Existing views would be interrupted by woodland planting that would be included along the northern edge of the proposed NDR, at the airport roundabout. This would improve views for vehicle travellers along this main, but rural route, as the airport would be screened from view.	Scheme opening Improvements in views to the south for vehicle travellers would result in Slight Beneficial impact at Year 15.
St Faith's Road	Moderate	The part of St Faith's Road that is within the ZVI for the Scheme would be closed to all motorised traffic on Scheme opening. No views for vehicle travellers would therefore be afforded.	Receptor not applicable on Scheme opening.
Quaker Lane	Moderate	The part of Quaker Lane that is within the ZVI for the Scheme would be closed to all motorised traffic on Scheme opening. No views for vehicle travellers would therefore be afforded.	Receptor not applicable on Scheme opening.
Buxton Road	Low	Buxton Road would be carried over the proposed NDR on an overbridge. Existing views to the east and west of Buxton Road are across open arable fields, and these views would be restricted by the presence of the NDR, associated highways infrastructure, and the extensive woodland planting that is proposed in this location.	Slight Adverse impacts on Scheme opening would be reduced to Neutral at Year 15.

Location	Sensitivity of receptor	Change in view from the road (2017/ 2032)	Significance of Impact
Beeston Lane	Moderate	No views for vehicle travellers would be afforded on Scheme opening as this route would be closed to all motorised traffic.	Receptor not applicable on Scheme opening
North Walsham Road	Low	Existing views from North Walsham Road are dominated by plantation woodland and arable fields, creating intermittent far reaching views for vehicle travellers. The NDR would restrict views at the intersection with the proposed Scheme, where a new roundabout would be constructed. A woodland belt would be provided to the north west of the Scheme, creating a visual barrier for those travelling north. For those moving in a southerly direction, views would be maintained due to the presence of existing plantation woodland.	Slight Adverse impacts would reduce to Neutral at Year 15.
Wroxham Road	Low	Existing views from Wroxham Road are intermittent due to the presence of existing woodland plots and agricultural buildings to the east and west of the road. Views would be restricted at the intersection of Wroxham Road with the NDR where a new roundabout is proposed. Woodland planting to the south of the NDR would screen views for those travelling north on the Wroxham Road.	The change to existing views is likely to be Neutral for the sections of Wroxham Road to the south of the Scheme.
Green Lane West	Low	Views to the north and south of Green Lane West are currently intermittent, with pockets of development (residential and light industrial) interspersed with arable fields. Far reaching views to the south towards the proposed	There would be little change to existing views as a result of

Location	Sensitivity of receptor	Change in view from the road (2017/ 2032)	Significance of Impact
		NDR are not likely to be substantially altered as a result of existing woodland which would be supplemented with new planting.	the NDR on Green Lane West. Impacts are likely to be Neutral.
Green Lane East	Low	No views for vehicle travellers would be afforded on Scheme opening as this route would be closed to all motorised traffic.	Receptor not applicable on Scheme opening.
Salhouse Road	Low	Existing views to the east of Salhouse Road are open and across arable fields, whilst restricted views are afforded to the west due to the presence of woodland plots. The suburban extension to Rackheath village is visible for vehicle travellers moving north along the route. Within the ZVI for the proposed NDR, views would be interrupted due to the presence of road infrastructure and a new roundabout with the NDR. Some woodland planting associated with the Scheme would screen the Scheme for vehicle travellers travelling north and south on this road.	The introduction of additional highways infrastructure would restrict and detract from some open views across a rural landscape for Salhouse Lane. Slight Adverse, reducing to Neutral at Year 15.
Broad Lane	Moderate	Far reaching open views are currently afforded for vehicle travellers along Broad Lane, across arable fields to the north and south towards the	A change from open views to the south to

Location	Sensitivity of receptor	Change in view from the road (2017/ 2032)	Significance of Impact
		suburban fringe of Thorpe End. Existing views to the south would be interrupted in the middle distance due to the presence of two roundabouts associated with the NDR and the presence of the road.	intermittent views would result in a Slight Adverse impact for receptors of moderate sensitivity along this route.
Plumstead Road	Low	Existing views on Plumstead Road are currently restricted and intermittent, due to the presence of agricultural building, some residential plots and woodland, interspersed with arable fields. The presence of highways infrastructure and the introduction of two new roundabouts within the visual envelope for vehicle travellers using Plumstead Road would further restrict this view. However, some woodland planting around the proposed roundabouts would provide a screening function for those moving along the Plumstead Road, providing some improvement to the view.	Changes to existing views for receptors of low sensitivity are likely to be Neutral since existing views are intermittent and restricted.
Middle Road	Low	Views are currently intermittent and open, across arable fields and scenes of a rural nature, with some farm and residential buildings and woodland plots. Great Plumstead to the north is screened by existing woodland, and views of the suburban fringe to the south are restricted due to the presence of the railway line. Middle Road would be carried over the proposed NDR	Restrictions to the view as a result of the proposed NDR would result in a Slight Adverse

Location	Sensitivity of receptor	Change in view from the road (2017/ 2032)	Significance of Impact
		on an overbridge, and the introduction of substantial woodland planting in this location would restrict potential far reaching views for vehicle travellers in an elevated position. The presence of the NDR would detract from the view from Middle Road.	impact for vehicle travellers on Middle Road.
Toad Lane	Moderate	Open views are currently afforded for vehicle travellers along Toad Lane, across arable fields to the north and south towards the suburban fringe of Thorpe End, but are restricted in the middle distance by the presence of the railway line. Existing views to the south would be interrupted and restricted due to the presence of the proposed NDR, although some woodland planting around the Middle Road junction would improve this view.	Interruptions to the view to the south from Toad Lane would result in a Slight Adverse impact for receptors of moderate sensitivity.
Low Road	Moderate	No views for vehicle travellers would be afforded on Scheme opening as this route would be closed to all motorised traffic.	Receptor not applicable on Scheme opening.
Green Lane South	Low	Existing views along Green Lane South are intermittent and restricted due to the presence of woodland along field boundaries, farm buildings to the north and south and the railway line to the south. Views to the north towards the NDR are unlikely to be substantially altered as screening vegetation along the southern boundary of the proposed NDR would not	Views are unlikely to be altered for receptors of low sensitivity. Impacts are therefore likely to

Location	Sensitivity of receptor	Change in view from the road (2017/ 2032)	Significance of Impact
		detract from the existing view.	be Neutral.
Smea Lane	Moderate	No views for vehicle travellers would be afforded on Scheme opening as this route would be closed to all motorised traffic.	Receptor not applicable on Scheme opening
A47	Low	No views are currently afforded from the A47 to the west within the ZVI of the proposed NDR as the A47 is in deep cutting at this location. No change is anticipated.	Neutral

12.6.4 The proposed alignment for the NDR would have an impact upon the view from the road for vehicle travellers using existing routes within the ZVI. The Scheme design includes extensive mitigation and screening planting, as well as landscape mounds which would help to blend the proposed Scheme into the landscape and screen it from affected receptors, including vehicle travellers. However, on Scheme opening, it is likely that views from the road for affected routes would be interrupted due to the presence of highways infrastructure, vehicles and earthworks. This would detract from existing views, which are predominantly of an open, arable landscape, with woodland plantations. It is therefore anticipated that views from affected routes for vehicle travellers would be Slight Adverse on Scheme opening. However, once the extensive screening planting has matured at Year 15, this impact would be substantially reduced, so that overall, views from affected routes would be Neutral in the longer term.

Table 12.15 View from the road impacts for the proposed NDR alignment

Location	Sensitivity of receptor	View from the NDR	Significance of Impact
A1067 to Fir Covert Road	Low	From the A1067, the NDR would swing north to follow a secluded shallow valley along the foot of the wooded Deighton Hills, before swinging east to cross Fir Covert Road. The NDR would pass through a currently undisturbed and attractive area of countryside, but would follow the topography with screening woodland to the north and south of the proposed road. Vehicle travellers would be afforded intermittent and restricted views of the surrounding countryside.	Neutral/ Slight Adverse
Fir Covert Road to Reepham Road	Low	From Fir Covert Road, the proposed Scheme would cross open fields to pass under the Marriots Way cycle path to join the Reepham Road at a roundabout junction. This section would be in cutting for much of its length, although the Marriots Way would be prominent. Views for vehicle travellers would be restricted, with no views where the road is in cutting.	Slight to Moderate Adverse
Reepham Road to A140	Low	From Reepham Road the proposed Scheme would cut through the corner of a coniferous plantation on the edge of Drayton Drewray before crossing open fields to the north of Thorpe Marriot. Beyond Drayton Drewray, the proposed Scheme would follow a low ridge across open arable land to the A140, running roughly parallel with the busy Reepham Road before crossing the A140 Cromer road. Much of this route would be screened by mounding, with restricted and	Slight Adverse

Location	Sensitivity of receptor	View from the NDR	Significance of Impact
A140 to Quaker Lane	Low	<p>views afforded for vehicle travellers along the length of the proposed Scheme.</p> <p>At this location, the proposed Scheme would follow the northern boundary of the airport, but views of the surrounding landscape for vehicle travellers would be restricted on the whole. Some open views to the south of the Scheme would be provided for some of the length.</p>	Neutral/ Slight Beneficial
Quaker Lane to B1150	Low	<p>The proposed Scheme would pass through an attractive well wooded landscape, with opportunities for large woodland belts to be provided to link with the existing vegetation, particularly around the coniferous shelterbelt near Spixworth. This woodland and associated planting plans would create intermittent and improved views for vehicle travellers at this locality. Some screening mounding would act to restrict views for vehicle travellers, so that overall, beneficial impacts are reduced.</p>	Neutral/ Slight Beneficial
B1150 to Salhouse Road	Low	<p>From the B1150 the proposed Scheme would cross the northern part of former parkland (now arable farmland) surrounding Beeston Hall, before crossing open fields to join the A1151 Wroxham Road at a roundabout. Mounding would be provided throughout the length of this section, which would result in restricted or no view for vehicle travellers to the south of the proposed Scheme. However, some intermittent views would be afforded to the north. The proposed Scheme would pass through woodland between the village of Rackheath and Rackheath Hall to join the Salhouse Road at a new roundabout. Extensive</p>	Neutral/ Slight Adverse

Location	Sensitivity of receptor	View from the NDR	Significance of Impact
Salhouse Road to Plumstead Road	Low	<p>woodland planting is proposed along this section of the route, which would result in intermittent and improved views for vehicle travellers.</p> <p>From Salhouse Road the landscape character changes to become flat, open and largely featureless. The proposed Scheme would be elevated at this location where it passes over the railway line and existing Plumstead Road, but a combination of earth shaping, fencing and planting would be used to screen the road from the surrounding landscape. Nonetheless, the view for vehicle travellers would be open for much of the route, with intermediate views to the urban fringe to the south and rural landscapes to the north afforded.</p>	Slight Beneficial
Plumstead Road to Smee Lane	Low	<p>The NDR crosses Plumstead Road at a new roundabout before passing through tranquil arable farmland, punctuated by farm buildings, mature woodland copses and country lanes. A combination of mounding and planting would be used over this length, resulting in restricted and intermittent views to the north and south of the proposed Scheme for vehicle travellers.</p>	Neutral/ Slight Adverse
Smee Lane to A47	Low	<p>From Smee Lane, the landscape becomes more open with urban influences of business parks on the edge of Norwich becoming more prominent. At this location, views for vehicle travellers would be on the whole open, but of medium to low quality due to the dominance of development and the A47 junction infrastructure.</p>	Neutral/ Slight Beneficial

12.6.5 For those users of existing routes who would transfer to the proposed NDR, it is likely that they would experience a change in views from the road from their existing routes to that of the dual carriageway corridor. Where the proposed Scheme would be in cutting or fully screened with landscape mounds, the view from the road would be partially or fully restricted, resulting in adverse impacts for vehicle travellers. However, for large stretches of the proposed route, open views of an arable landscape with woodland plantations would be afforded, resulting in a positive impact upon views for vehicle travellers. On the whole, it is considered that the view from the road for those vehicle travellers that switch to the proposed NDR on Scheme opening would be Neutral.

Driver Stress

12.6.6 Tables 12.16 below identifies the key routes within the study area that would be affected by changes to traffic flows as a result of the proposed NDR, and the effect of these changes on Driver Stress. The magnitude of impacts has been determined according to changes in traffic between the design year without the NDR and the design year with the NDR (refer to Table 12.3). The presence of sensitive receptors on these routes such as schools and medical facilities, and the safety (accident) record influences the overall significance of impacts (see Table 12.4). Routes that would be closed to vehicle users have been removed from this assessment. Full details of the traffic changes for all links, shown as a percentage difference between flows for Year 15 after opening for the Do Minimum (no NDR) and Do Something (with NDR) Scheme are provided within Volume 2 of this Environmental Statement.

Table 12.16: Driver stress during the operation of the Scheme

Route	Presence of sensitive receptors	Accident Record	Traffic Changes (Design Year Do Min/ Do Something)	Significance of Impact
A1067 Fakenham Road	Attlebridge Nursery School located on the A1067, to the north of the proposed NDR. Several schools, medical facilities and elderly care homes within Taverham (A1067 severs this settlement).	Accident Clusters E-004 and E-005 located at the junction with Drayton Lane/ Low Road and Breck Farm Way. Further Clusters on the approach to the outer ring-road.	8% to 57% decrease in traffic flows for all links on the Fakenham Road to the south of the NDR up until the Outer Ring Road – Moderate to Major decrease. Slight decrease between the Inner and Outer Ring Road within Norwich centre (2 to 8 %). 68% increase in traffic on the Fakenham Road link immediately to the north of the proposed NDR (link provides access to the NDR).	Moderate to Large Beneficial immediately to the south-east of the proposed NDR due to traffic changes on a route with sensitive receptors and a poor accident record, reducing to Slight Beneficial within Norwich City Centre. Slight Adverse immediately to the north-west of the NDR intersection due to traffic flow changes.
A1067 Fir Covert Road	No sensitive receptors.	No accident data available.	51% decrease at the intersection with the NDR - major decrease.	Slight Beneficial due to traffic changes, where no sensitive receptors and no accident record is present.
Reepham	Hellesdon recreation	Accident Clusters	Up to 80% decrease in traffic up until	Moderate Beneficial due to

Route	Presence of sensitive receptors	Accident Record	Traffic Changes (Design Year Do Min/ Do Something)	Significance of Impact
Road	ground.	V-001 and V-002 at the junctions with Hall Lane and Drayton Lane respectively.	the junction with the stopped up Hall Lane/ Holly Lane – major decrease in traffic adjacent to Thorpe Mariott. 7% to 24% increase in traffic flows on all links on the approach to the inner ring road – moderate to major increase.	substantial traffic changes on a route with a poor accident record. Slight Adverse on the approach to the inner ring road.
Church Street	No sensitive receptors on this rural lane.	No accident data available.	75% decrease in traffic on link connecting Horsford with the A140 Cromer Road.	Slight Beneficial due to traffic changes, where no sensitive receptors and no accident record is present.
A140 Cromer Road	No sensitive receptors.	Accident Cluster I-001 at the junction with Horsham St Faith. Cluster I-002 at the junction with the outer ring-road.	10% and moderate increase in traffic flows immediately to the north of the proposed NDR at the intersection with the new route. Moderate decreases on approach to outer ring road.	Moderate Beneficial on the approach to the outer ring-road due to traffic changes on a route with a poor accident record. Slight Adverse immediately to the north of the proposed NDR.

Route	Presence of sensitive receptors	Accident Record	Traffic Changes (Design Year Do Min/ Do Something)	Significance of Impact
Spixworth Road/ Church Lane	No sensitive receptors on this rural lane.	No accident data available.	Between 32% and 52% decrease in flows for all links – major decrease.	Slight Beneficial due to traffic changes, where no sensitive receptors and no accident record is present.
C246 Buxton Road	Spixworth infant school and Woodlands view junior School – both of Ivy road; access from Buxton Road	No accident data available.	30 to 41% decrease in flows on links located to the north of the proposed NDR – major decrease. Moderate increase in traffic flows immediately to the south and through Old Catton, until reaching the Outer Ring Road. Major decrease between the Inner and Outer ring road within Norwich centre.	Moderate Beneficial to the north of the proposed NDR (adjacent to Spixworth), and within Norwich City Centre. Moderate Adverse impact to the south of the Scheme within Old Catton.
Croswick Lane	Post-office; residential properties front onto the route.	No accident data.	Up to 31% decrease in traffic flows – major decrease.	Slight Beneficial due to traffic changes, where sensitive receptors are present.
B1150 North Walsham	No sensitive receptors	Accident Clusters O-001 and O-002 at the junction with	37% to 47% increase in traffic flows on links to the north of the proposed	Slight Adverse to the north of the proposed NDR due to traffic flow changes.

Route	Presence of sensitive receptors	Accident Record	Traffic Changes (Design Year Do Min/ Do Something)	Significance of Impact
Road		the outer ring-road and on the approach to the inner ring-road.	NDR. Major decreases in traffic flows to the south of the Scheme towards and within Norwich centre.	Moderate Beneficial on the approach to Norwich City Centre.
A1151 Wroxham Road	The Warren Home for the elderly; numerous schools within Sprowston with access from Wroxham Road, but no other sensitive receptors on the A1151.	Accident Cluster G-001 at the junction with the outer ring-road, and G-002 and G-003 as Wroxham Road passes through Sprowston.	Up to a 58% increase in traffic flows to the north-east of the intersection with the proposed NDR. Major decrease in traffic flows to the south-west of the intersection with the proposed NDR, through the built up area of Sprowston.	Slight Adverse impact to the north of the proposed NDR where the Wroxham Road passes through Sprowston on the approach to Norwich.
Green Lane West	Village hall and recreation ground.	Accident Cluster T-001 at the junction with Salhouse Lane.	Up to a 33% decrease in flows – major decrease.	Moderate Beneficial.

Route	Presence of sensitive receptors	Accident Record	Traffic Changes (Design Year Do Min/ Do Something)	Significance of Impact
Salhouse Road	Holy Trinity Church and Ashfields Home for the elderly.	Accident Cluster T-001 at the junction with Green Lane West. Accident Cluster W-001 at the junction with Blue Boar Lane on the edge of Sprowston.	Major increase to the east of the intersection with the proposed NDR (up to 11%). Major increase to the west of the intersection with the NDR, until the intersection with the outer ring road. Decrease in flows from this point towards Norwich centre.	Moderate Adverse.
Plumstead Road	Sensitive receptors within Thorpe End – post office, community hall and medical centre.	Accident Clusters U-001 and U-002 between the inner and outer ring-roads. Accident Cluster U-003 at the junction with the outer ring-road. Accident Cluster U-004 at the junction with Broad Lane.	Major increase in traffic flows immediately to the east and west of the intersection with the proposed NDR (up to 51% increase). Slight to moderate decrease in flows further west towards Norwich Centre, particularly between the inner and outer ring road.	Moderate Adverse immediately either side of the proposed NDR. Large Beneficial within Norwich City between the inner and outer ring road.

Route	Presence of sensitive receptors	Accident Record	Traffic Changes (Design Year Do Min/ Do Something)	Significance of Impact
Middle Road	No sensitive receptors	No accident data available.	35% decrease in flows on the link between Green Lane North (west of the NDR) and Great Plumstead – major decrease	Slight Beneficial due to traffic changes, where no sensitive receptors and no accident record is present.
A1042/ A140 outer ring road	Numerous sensitive receptors within close proximity of this road.	Numerous Cluster Records on outer ring road. The majority of these are at junctions.	Moderate to major decreases on all links between A1067 and A47. Slight to negligible change on links to the south of the A1067.	Moderate to Large Beneficial impacts due to substantial traffic changes on this road, with a poor accident record and sensitive receptors.
A47	No sensitive receptors.	Accident Cluster records for the majority of junctions on this road.	Variance between slight increase in traffic flows at the intersection with the proposed NDR (Postwick intersection), and slight to moderate decrease in flows to the west of Norwich centre.	Given that no sensitive receptors are present on this A-road, the change in traffic flows as a result of the proposed NDR would have an overall Neutral impact upon Driver Stress on the A47.
A147 Inner	Numerous sensitive receptors within close	Cluster Records on inner ring road. The	Slight to moderate increases for the majority of links associated with the	Moderate Adverse due to traffic flow increases on this

Route	Presence of sensitive receptors	Accident Record	Traffic Changes (Design Year Do Min/ Do Something)	Significance of Impact
Ring Road	proximity of this road.	majority of these are at junctions.	inner ring road.	route with sensitive receptors and poor accident record.
A1242 Yarmouth Road	Sensitive receptors within close proximity of this road.	Accident Cluster H-001 at the junction with the outer ring-road.	Moderate to major decrease in traffic flows on the approach to Norwich centre (up to 14%).	Moderate Beneficial.
A11	No sensitive receptors.	Accident Clusters at the junction with the A47, outer and inner ring-road.	Negligible change in flows	Neutral.
A1074 Dereham Road	Sensitive receptors within close proximity of this road.	Several accident Clusters between the A47 and the outer ring road, and on the approach to the inner ring road.	Slight to moderate decrease in flows at the intersection with the A47. Negligible change further towards Norwich centre.	Slight Beneficial due to traffic changes on a road with a poor accident record.
A1056	Sensitive receptors within close proximity of	No accident	Negligible to slight decrease in flows	Neutral to Slight Beneficial.

Route	Presence of sensitive receptors	Accident Record	Traffic Changes (Design Year Do Min/ Do Something)	Significance of Impact
Ipswich Road	this road.	records.	(up to 2% decrease).	
B1108 Watton/ Earlham Road	Hospital and crematorium located adjacent to the B1108.	Several accident Clusters between the A47 and the inner ring road.	Negligible to slight decreases in flows for the majority of links from the A47 towards Norwich centre.	Slight Beneficial due to decreased flows on a road with sensitive receptors and a poor accident record.

12.6.7 It is considered that for the operational period, there would be a long-term beneficial effect on Driver Stress for vehicle travellers using affected routes, due to reduced frustration from reduced congestion and improved journey time reliability. Following the opening of the NDR, current traffic forecasts predict reductions in traffic flows for the majority of radial routes, and within a number of the suburbs to Norwich such as Taverham, Sprowston, and Thorpe St Andrew, as well as for some villages to the north of the proposed NDR such as Horsham St Faith, Spixworth and Rackheath.

12.6.8 Traffic reductions are also predicted for the majority of links along the outer ring road. These areas, which are predominantly residential with properties fronting onto roads and sensitive receptors present, are likely to experience a reduction in Driver Stress due to reduced congestion, a reduction in the fear of potential accidents brought about by lower traffic flows, and reduced driver frustration.

12.6.9 Some locations are likely to result in an increase in traffic on routes where there is already a poor accident record or high number of sensitive receptors. This includes some radial routes to the north of the proposed NDR (Wroxham Road, North Walsham Road, Salhouse Road and Plumstead Road), and for the inner ring road in Norwich City Centre. This may result in increased Driver Stress in some locations, particularly where pedestrians are likely to be and frequent accidents already occur (i.e. along the inner ring road).

12.6.10 Since the Driver Stress is likely to be substantially reduced for a large number of key and secondary routes with the NDR in place, it is likely that overall impacts for Driver Stress would be Moderate Beneficial across the Study Area.

Non-Motorised Users

12.6.11 The predicted permanent effects of the Scheme on the existing NMU network and on pedestrians, equestrians and cyclist activity within and between local communities are included within Tables 12.17 and 12.18 below. The description of effects takes account of the following factors:

- Effects of the new NDR, new junctions and new side roads;
- Changes to the existing highway infrastructure (stopping up of existing roads);
- New facilities provided for pedestrians, equestrians and/or cyclists;
- Changes to existing facilities for pedestrians, equestrians and/or cyclists;

- Changes in journey lengths by diverting existing footpaths, cycle routes and bridle ways which make these journeys less attractive;
- Changes in traffic flows (Design Year);
- Separation from essential services e.g. doctors' surgeries, schools, shops, leisure facilities etc.; and,
- Detriment to the amenity and severance of community routes which are used either for recreation or essential journeys to work or school.

Table 12.17 Permanent impact of the NDR for the NMU network

Community or specific NMU Route	Route Type	Impact of the NDR – Description of Effects	Significance of Impact
Attlebridge RB3	Restricted By-way	RB3 would be stopped up and diverted where it would intersect with the NDR. The diversion route would be along a private means of access, linking to the Fakenham Road roundabout and a shared cycleway/ footpath which would allow pedestrians and cyclists to cross the NDR. Overall, there would be an increase in journey length. However, this would be tempered with an improvement in amenities (provision of a dedicated cycle way/ footpath).	Neutral
Fir Covert Road	C-Road	High levels of pedestrian and cyclist activity have been recorded for the Fir Covert Road intersection. A new roundabout would be provided at this location, maintaining north south links and enabling NMUs to continue to use this route through the provisions of a combined footpath and cycleway around the roundabout, and bridleway links to the east and west along the northern boundary of the proposed NDR. There may be a slight increase in journey length as NMUs would need to navigate the Fir Covert Road roundabout. However, improvements to the existing amenities and the provision of additional bridleways would mean that this impact would be offset. No community severance issues identified. A 51% decrease in traffic flows in 2032 at the intersection with the NDR is anticipated.	Slight Beneficial

Community or specific NMU Route	Route Type	Impact of the NDR – Description of Effects	Significance of Impact
Marriott's Way	Footpath and cycle path	Marriott's Way would be carried over the NDR on a new Green Bridge. The proposals include the provision of a new bridleway at this location, ensuring that the existing use as part of National Cycle Route 1 is maintained. Overall, this is considered to be of little impact upon the NMU route once the Scheme has been opened, as the connection would be maintained. An improvement in amenity means that this is likely to be a beneficial impact.	Slight Beneficial
Drayton FP5/ Felthorpe FP21	Footpath	This existing footpath would not be altered by the proposed NDR Scheme. Connections to the Drayton Restricted By-Way 6 would be maintained. There may be some ancillary improvements to this amenity through the provision of a new cycleway along Dog Lane, which would connect with FP5/ 21. However, on balance, impacts are considered to be Neutral.	Neutral
Drayton RB6	Restricted By-way	RB6 would be diverted prior to its existing intersection with Reepham Road. The diversion would link the by way onto the new Reepham Road roundabout, and a proposed bridleway at this location. The current design incorporates an uncontrolled crossing point to the west of the Reepham Road roundabout. Despite the provision of a cycleway, footpath and bridleway at this location, there is potential for conflict between NMUs crossing at this point, and vehicles on the NDR, resulting in a potentially adverse impact.	Slight Adverse

Community or specific NMU Route	Route Type	Impact of the NDR – Description of Effects	Significance of Impact
Reepham Road	C-Road	High levels of cyclist activity have been recorded for Reepham Road where it would intersect the NDR. It is anticipated that there would be a slight increase in journey time as a result of the introduction of a roundabout at this location, and the provision of an uncontrolled crossing point. This would result in an adverse impact for NMUs, particularly cyclists. However, the 2013 traffic model predicts up to 80% decrease in traffic flows from the intersection with the proposed NDR to the junction with the stopped up Hall Lane/ Holly Lane, which represents a major decrease in traffic adjacent to Thorpe Mariott. This would be of benefit to NMUs using the Reepham Road.	Neutral
Long Dale	Track/ Desire Line	The Long Dale track would be stopped up where it intersects with the NDR, thus resulting in an increase in journey times for NMUs utilising this path between Thorpe Mariott and additional tracks to the north of the proposed NDR (which link to the Horsford RB5). However, Horsford RB5 is located less than 200m from this track, and this track would provide almost exactly the same access as the Long Dale track. As a result, whilst there is a slight loss of amenity for NMUs and slight increase in journey time for a small number of users (mostly dog and recreational walkers), the impact of closing the Long Dale track is not considered to be significant.	Slight Adverse
Horsford RB4	Restricted	Proposals for RB4 with the Scheme in place include improvements to the existing	Slight

Community or specific NMU Route	Route Type	Impact of the NDR – Description of Effects	Significance of Impact
(Dog Lane)	By-way	surface, to improve the suitability of this route for cyclists and pedestrians. This would be likely to provide benefits in terms of enhanced amenity and subsequent slight improvement in journey time for those already utilising the route.	Beneficial
Horsford RB5	Restricted By-way	RB5 would be carried over the NDR on an overbridge, with the private means of access maintained and improvements to the road surface to ensure that it meets appropriate bridleway standards. This will ensure that connectivity for NMUs is maintained between the villages of Horsford to the north, and the Thorpe Mariott estate to the south of the NDR. The By-way would be linked to a new cycle track with right of way on foot to the north of the NDR (which would link to the Horsford RB4), as well as to a proposed footway/ cycleway to the south of the NDR on Reepham Road. This would be likely to promote NMU activity for this route, and is considered to be a beneficial change as a result of the Scheme.	Moderate Beneficial
Horsford RB7	Restricted By way	RB 7 would be stopped up prior to where it currently meets Drayton Lane. This is so as to enable the by way to cross the new side road by means of a combined footpath/ cycleway, which would then continue south to the Drayton Lane roundabout. An uncontrolled crossing point would be provided across the Drayton Lane roundabout at this location, which may result in the potential for conflict between NMUs crossing at this point, and vehicles on the NDR. Whilst there would be an improvement in amenity with the provision of a dedicated cycle path	Slight Beneficial

Community or specific NMU Route	Route Type	Impact of the NDR – Description of Effects	Significance of Impact
		<p>and footway, and little change to journey length, there would still be a potentially adverse impact as a result of this conflict. However, the cycleway/ footpath would be extended to the south of the Scheme, providing a direct link onto Reepham Road, and ensuring continued connectivity between Holt Road to the north of the Scheme and Reepham Road to the South. Overall, this is considered to be of benefit.</p>	
Track running between Reepham Road and Glebe Farm	Track	<p>The existing track that would cross the NDR at Chainage 5150 would be closed. This would result in an adverse impact for NMUs, particularly dog and recreational walkers, wishing to gain access to Glebe Farm and areas of countryside to the north. However, several new NMU amenities, to include cycleways, bridleway and footways are proposed as part of the Scheme design within close proximity to this track, which would allow for north/ south access across the NDR, as well as access to the countryside. Nonetheless, the closure of this track would result in an adverse, albeit not significant, impact for some NMUs due to increased journey time and the closure of amenity.</p>	Slight Adverse
Drayton Lane	C-Road	<p>The existing Drayton Lane would intersect the proposed NDR alignment, with a new roundabout proposed to facilitate this junction. To the north and south of the NDR, the current Drayton Lane would be stopped up and replaced with a new carriageway. Where this occurs to the south of the Scheme, the replaced</p>	Slight Beneficial

Community or specific NMU Route	Route Type	Impact of the NDR – Description of Effects	Significance of Impact
		<p>sections of Drayton Lane would be reduced to a 3m wide cycle track, with right of way on foot. A refuge area would ensure that Drayton Lane is connected to Reepham Road for NMUs, and a proposed cycleway across the new roundabout would ensure that the north/ south connections are maintained. To the north of the Scheme, the cycleway would connect to the replaced Drayton Lane, which would be converted to a private means of access as well as providing rights of way for NMUs. Further north, this would connect with RB7, and on to Holt Road, which would be closed to all motorised traffic (see below), thus providing a continuous link to the existing and proposed NMU network. Such connectivity and the provision of additional and improved amenity for NMUs that is separated from motorised traffic would result in a beneficial impact for pedestrians and cyclists. However, the presence of the Drayton Lane roundabout would temper these benefits, as despite the provision of a refuge area, some NMUs are likely to be deterred from fully utilising this route as NMUs would be forced to interact with road traffic at the crossing.</p>	
Holt Road	C-B Road	<p>Holt Road would be closed to all motorised traffic to the east of the Drayton Lane roundabout once the Scheme is opened and after access is available to the NDR from Drayton Lane. Access for NMUs is maintained. Since high levels of cyclist activity have been recorded at Holt Road, this would result in a positive effect once the Scheme is operational for NMUs. There would be some adverse</p>	Moderate Beneficial

Community or specific NMU Route	Route Type	Impact of the NDR – Description of Effects	Significance of Impact
Hall Lane/ Holly Lane	C-Road	<p>changes as a result of increased journey times for those wishing to access Cromer Road to the south of the NDR via Holt Road as they would need to navigate the new Cromer Road roundabout, but on balance, the provision of a dedicated cycle track would be beneficial.</p> <p>Hall Lane would intersect with the proposed NDR at the Cromer Road roundabout. However, an additional junction tie in at this location has not been proposed, and as a result, Hall Lane would be stopped up and reduced to a 3m wide cycle track with rights of way on foot. Connections to Hall Lane from the east of the Cromer Road roundabout and to the North of the proposed NDR would be provided through the provision of a dedicated cycleway across the proposed NDR on the Cromer Road overbridge, and the widening of an existing cycleway/ footway on the existing Holt Road (south of the proposed NDR). Whilst this new arrangement may result in some increased journey times for NMUs wishing to continue on Holt Road to the north of the proposed NDR (see above), the new cycle track and right of way along Hall Lane would be of benefit to NMUs, particularly cyclists.</p>	Slight Beneficial
Cromer Road	A Road	High levels of cyclist activity have been recorded at the Cromer Road intersection. Cromer Road would be carried over the NDR by way of a new overbridge, with the provision of a dedicated cycleway/ footway passing along the	Moderate Beneficial

Community or specific NMU Route	Route Type	Impact of the NDR – Description of Effects	Significance of Impact
		<p>overbridge and maintaining the north/ south link. Whilst the change in amenity would be likely to result in a Neutral impact upon NMUs in terms of journey time, the provision of a dedicated path, and links to wider NMU network proposals, such as the stopped up Holt Road and a proposed cycle track along New Home Lane, would result in a Moderate Beneficial impact for NMUs at this location.</p>	
Cromer Road Roundabout/s	A Road	<p>Whilst new amenities for NMUs would be provided on either side of the roundabouts at the intersection of the proposed NDR with Cromer Road, and a cycleway would be provided across the NDR on the Cromer Road overbridge, NMUs would be required to navigate several crossings of live traffic lanes in order to access some of these amenities at this intersection. The benefits in terms of new amenity are associated with the closure of Hall Lane/ Holly Lane and New Home Lane. Potentially significant adverse effects as a result of the requirement to cross live traffic on Cromer Road at at least four locations for pedestrians and cyclists passing between Cromer Road to the south of the proposed NDR and Holt Road to the north are highlighted here.</p>	Moderate Adverse
New Home Lane	Un-classified road	<p>New Home Lane would be converted to a cycle track with right of way on foot, thus providing additional amenity and north/ south connections to Horsham St Faith for NMUs that is separated from motorised users. The removal of motorised traffic from New Home Lane would be of benefit for NMUs.</p>	Moderate Beneficial

Community or specific NMU Route	Route Type	Impact of the NDR – Description of Effects	Significance of Impact
Horsham St Faith and Newton St Faith FP5	Footpath	The proposed NDR Scheme would not alter the existing FP5. There may be some ancillary benefits to this amenity through the provision of a new cycleway along New Home Lane and Bullock Hill (see below), which would connect with FP5. However, on balance, impacts are considered to be Neutral.	Neutral
Bullock Hill	Un-classified road	Bullock Hill would be closed to all motorised traffic to the north and south of the proposed NDR. A bridleway is proposed to link the closed off Bullock Hill to the Airport roundabout that is proposed as part of the NDR, which would also include a footway and cycleway crossing point and link to the section of Bullock Hill that continues south of the NDR. Whilst NMUs would need to navigate the new roundabout, there would be an improvement in NMU amenity from the closure of Bullock Hill to motorised users. Access to the airport for pedestrians and cyclists would be maintained, and improved amenity for cyclists would be provided with the link to a combined private means of access and cycleway to the east of Bullock Hill.	Slight Beneficial
Quaker Lane/ St Faith's Road	Un-classified road	Quaker Lane and St Faith's Road would both be closed at the point where they intersect with the proposed NDR. Where Quaker Lane intersects with the NDR, a private means of access combined with a bridleway would be provided to the west of the Scheme, linking to the Airport roundabout. To the east, Quaker Lane would be passable by NMUs, and would provide non-motorised links to Buxton	Slight Beneficial

Community or specific NMU Route	Route Type	Impact of the NDR – Description of Effects	Significance of Impact
		<p>Road. Despite some potential for increased journey times as NMUs would only be able to pass north or south of the NDR at Buxton Lane or the Airport roundabout, the improvement in amenity for NMUs would result in a beneficial impact. The same situation would result from the closure of St Faith's Road to the south, where a link to a bridleway and private means of access combined with cycleway would provide connections to the Airport roundabout and Buxton Lane, where the NDR could be crossed. Some increase in journey time would reduce the beneficial impacts associated with improved amenity.</p>	
Spixworth BR1	Bridleway	<p>This bridleway would be severed between St Faiths Road and Quaker Lane, with no new crossing point proposed at this location. However, alternative NMU routes would be provided both to the north and south of the NDR, with the provision of cycleways, footpaths and a bridleway to link St Faiths Road and Quaker Lane to NDR crossing points at Buxton Road and the Airport roundabout, where the NDR can be crossed. A private means of access to the south of the Scheme, and the bridleway could be used by cyclists as well, and would link to the Spixworth Cyleway at Buxton Road. The improvement in amenity would be a beneficial impact of the Scheme. However, journey length would be increased for some NMUs, which would result in some adverse impacts for dog walkers and recreational walkers, and would reduce the beneficial impacts of this much</p>	Slight Beneficial

Community or specific NMU Route	Route Type	Impact of the NDR – Description of Effects	Significance of Impact
Beeston Lane	Un-classified road	<p>improved amenity.</p> <p>Beeston Lane is currently an un-classified road which is on the whole used as private access. This lane would be closed to all motorised users, except for access. NMUs would benefit from the removal of traffic on this route, providing an additional link from the Spixworth cycleway to Wroxham Road, and connections to the proposed bridleway to the south of the Scheme at Chainage 13150. The removal of motorised traffic from this road, and improvement in amenity links would result in an overall beneficial impact for NMUs, particularly cyclists.</p>	Moderate Beneficial
Spixworth cycleway	Cycleway	<p>The Spixworth cycleway currently runs north/ south along Buxton Road, connecting Spixworth with Old Catton. The proposed NDR would not affect this route, since Buxton Road would be carried over the proposed NDR on a new overbridge, and the cycleway would be reinstated. However, traffic predictions for the 15th year after opening (2032) indicate that there would be a moderate increase in traffic flows immediately to the south of the proposed NDR where the cycleway is present, and through Old Catton, until reaching the Outer Ring Road. Whilst cyclists are separated from motorised traffic, this increased in flows may deter some cyclists from using this route.</p>	Slight Adverse
North Walsham	B Road	<p>High levels of cyclist activity have been recorded for North Walsham Road where it would intersect the NDR. It is anticipated that there would be a slight increase</p>	Slight Adverse

Community or specific NMU Route	Route Type	Impact of the NDR – Description of Effects	Significance of Impact
Road		<p>in journey time as a result of the introduction of a roundabout at this location, and the provision of an uncontrolled crossing point. This would result in an adverse impact for NMUs, particularly cyclists. The traffic predictions for the 15th year after opening (2032) suggest that there would be a 37% to 47% increase in traffic flows to the north of the proposed NDR, but a major decrease in traffic flows to the south of the Scheme towards and within Norwich centre on the North Walsham Road. Overall, the provision of the roundabout and the increase in traffic to the north of the proposed NDR would be likely to deter some NMUs from making trips.</p>	
Track to the north of Beeston Lane	Track	<p>The existing track that would cross the NDR at Chainage 13150 would be closed. This would result in an adverse impact for NMUs, particularly dog and recreational walkers. However, a newly proposed bridleway would be included as part of the NDR, linking this track to Wroxham Road to the east. In addition, Beeston Lane would be closed to motorised users (except access), thus providing an additional NMU link to the west of the track location. The NDR could be crossed at both locations. Nonetheless, the closure of this track would result in an adverse impact for some NMUs due to increased journey time and the closure of amenity.</p>	Slight Adverse
Wroxham Road	A Road	High levels of cyclist activity have been recorded for Wroxham Road where it	Slight Adverse

Community or specific NMU Route	Route Type	Impact of the NDR – Description of Effects	Significance of Impact
Newman Track	Private access	<p>would intersect the NDR. It is anticipated that there would be a slight increase in journey time as a result of the introduction of a roundabout at this location, and the provision of an uncontrolled crossing point. This would result in an adverse impact for NMUs, particularly cyclists. In addition, traffic forecasts for 2032 suggest an increase in traffic for this link to the north of the NDR on Scheme opening, with up to a 58% increase in traffic flows to the north-east of the intersection with the proposed NDR. However, a major decrease in traffic flows to the south-west of the intersection with the proposed NDR, through the built up area of Sprowston is also anticipated, and the dedicated cycle links and footpaths would link to a newly proposed bridleway running to the east and west of the NDR (southern side), which would provide improved amenity for NMUs. This means that impacts are unlikely to be significant.</p>	
		<p>Newman Track currently provides a private means of access to Home Farm. The track is also used by NMUs for recreational walking and cycling, as well as horse riders. The access would be maintained through the provision of a new overbridge, to carry Newman Track over the proposed NDR. As a result, it is not considered that there would be any impact upon NMU use as a result of the NDR. However, the NDR proposals include the provision of a new bridleway link to the south of the alignment at this location, and connecting to the Newman Track. As a result, a beneficial impact for NMUs is likely to result through the</p>	Moderate Beneficial

Community or specific NMU Route	Route Type	Impact of the NDR – Description of Effects	Significance of Impact
Broad lane	C Road	<p>provision of new amenity.</p> <p>Broad Lane would be closed at the junction with Plumstead Road, thus reducing the traffic levels on this road as it would become access only. Access to the propped NDR would be via Salhouse Lane roundabout, and as such, it is expected that there would be a beneficial impact for NMUs using both Broad Lane and also Green Lane East. New bridleways would link Broad Lane with Plumstead Road both to the north and south of the NDR, as a bridleway combined with a private means of access would also run parallel with the railway line and pass under the NDR at this location. Overall, it is considered that the closure of this lane would result in an overall beneficial impact for NMU use.</p>	Slight Beneficial
Salhouse Road	C Road	<p>High levels of cyclist activity have been recorded for Salhouse Road where it would intersect the NDR. It is anticipated that there would be a slight increase in journey time as a result of the introduction of a roundabout at this location, and the provision of an uncontrolled crossing point. This would result in an adverse impact for NMUs, particularly cyclists. However, the dedicated cycle links and footpaths would link to a newly proposed bridleway running east of the NDR (southern side), and Green Lane to the north would also have a cycle track running its full length. These connections would provide improved amenity for NMUs. In addition, whilst traffic forecast flows predict an increase of 11% to the</p>	Slight Beneficial

Community or specific NMU Route	Route Type	Impact of the NDR – Description of Effects	Significance of Impact
Plumstead Road	C Road	<p>east of the intersection with the proposed NDR, a decrease in flows towards Norwich centre is predicted. These changes in traffic would be likely to result in little change to NMU activity.</p> <p>High levels of cyclist activity have been recorded for Plumstead Road where it would intersect the proposed NDR. However, the NDR would pass over the top of Plumstead road on an overbridge, and as a result, it is not anticipated that there would be any change to NMU activity with regard to pedestrians and cyclists. A bridleway would be incorporated into the Scheme design at this location (adjacent to the NDR to the east of the Plumstead Road roundabout, and along the railway line), linking with a wider network of bridleways to the north and south of the Scheme. This would be suitable for off-road cyclists as well. In addition, a segregated footway would be incorporated along the Plumstead Road where it passes under the proposed NDR. 2032 traffic forecasts suggest that traffic flows would increase on Scheme opening to the north and south of the Scheme at this location (up to 51%). Whilst the links would be maintained, some NMUs may be discouraged from making trips due to increased traffic, but this would be offset by the improvements to NMU amenities.</p>	Neutral
Great & Little Plumstead FP4	Footpath	<p>The NDR proposals would sever the existing Low Road where it would cross the NDR. FP4 connects to Low Road and Middle Lane, enabling NMUs to pass onto</p>	Neutral

Community or specific NMU Route	Route Type	Impact of the NDR – Description of Effects	Significance of Impact
and Great & Little Plumstead FP5 and Low Road		Low Road and transfer onto FP5 which also connects to Low Road. In addition, NMUs can pass along Low Road to the south of the proposed NDR to gain access. Whilst there would be some severance for NMUs, there would also be new amenity provided in the form of bridleways (which may also be used by mountain and hybrid pedal bikes, as well as pedestrians) to the north and south of the NDR which provide connections east/ west and enabling the NDR to be crossed at Middle Road. On balance, and with the provisions of this amenity, the impact upon the NMU network is not considered to be significant.	
Middle Road	C-Road	Middle Road would be carried over the proposed NDR on an overbridge, with the provision of a new cycleway on this bridge, and connections to a new bridleway running east/ west along the northern side of the NDR. This bridleway would connect to the closed Low Road, which would provide additional amenity for NMUs as traffic on Low Road would be for access only. A 35% decrease in traffic flows on Middle Road between Green Lane North (west of the NDR) and Great Plumstead is also predicted, which would be of benefit to NMUs utilising this route.	Moderate Beneficial
Smee Lane	C-Road	Smee Lane would intersect the proposed NDR, and as a result, would be stopped up at this intersection and closed to all traffic. The lane would remain as a private means of access to the north and south of the NDR, and would be	Slight Beneficial

Community or specific NMU Route	Route Type	Impact of the NDR – Description of Effects	Significance of Impact
Postwick FP2	Footpath	<p>combined with a bridleway. To the south of the proposed NDR, the existing Great and Little Plumstead FP5 would be upgraded to a bridleway, and would therefore provide east/ west links to Middle Road, where the NDR could be crossed by NMUs. To the north of the Scheme, there would also be a new bridleway provided, which would link Smee Lane to the Business Park roundabout and further east, as well as provide links to the west to Middle Road. However, there would be some north/ south severance as a result of this closure, resulting in an increase in journey times for some NMUs. Overall, the beneficial impacts realised as a result of improvements to amenity would be reduced by this north/ south severance effect, but beneficial impacts are still likely to arise.</p>	
		<p>FP2 would be closed at the point in which it intersects the existing A47 Norwich Southern Bypass. Access to the west would be maintained, but the eastern access across the A27 would be provided via new pedestrian, equestrian and cyclist links along the proposed NDR Scheme. A bridleway, which could be used by pedestrians and cyclists, would be provided between the Business Park roundabout and the Postwick North East roundabout, with a cycleway provided across the Postwick Bridge and connecting to the A1042 Yarmouth Road, as well as a southern connection to the Postwick Park and Ride and existing Postwick Bridge. As a result, whilst there would be a closure in NMU amenity, this is considered to be a significant beneficial impact for NMUs as the current</p>	Moderate Beneficial

Community or specific NMU Route	Route Type	Impact of the NDR – Description of Effects	Significance of Impact
		arrangement prevents east/ west movement due to the presence of the A47 high speed road.	

Table 12.18 Permanent impact of the NDR for NMUs within and between communities

Local Community	Impact of the NDR – description of effects	Significance of Impact
Attlebridge	<p>Attlebridge is a small settlement of a few properties, centred immediately north and adjacent to the A1067. Traffic forecasts for the year 2032 predict a 63% increase in flows where the Fakenham Road would pass through Attlebridge. In addition, a substantial increase in traffic flows (up to 85%) is predicted for year 2032 between Attlebridge and the A47 to the south, through the Wensum valley. There are no known routes that are regularly used within and between Attlebridge, and there would be no change to NMU amenity as a result of the proposed NDR within and connecting to Attlebridge. Traffic increases on the Fakenham Road would not directly impact upon Attlebridge centre, and non-motorised journeys to and from Attlebridge Nursery are unlikely to be affected as the increase in traffic would not introduce new severance.</p>	Neutral
Taverham	<p>In 2001, Taverham had a population of 10,233. It has seen recent population growth with the building of Thorpe Marriott, a new residential development that straddles the boundary with the neighboring village of Drayton. There are numerous local facilities, including the high and junior school, Taverham surgery and two churches. Numerous local NMU routes within and between these facilities have been identified. Traffic reductions are predicted with the Scheme in place on the Reepham Road as it passes Thorpe Marriott (up to 80% decrease in traffic flows from the intersection with the proposed NDR to the junction with the stopped up Hall Lane/ Holly Lane for the year 2032), and additional traffic reductions on roads within Taverham would result in a beneficial impact for NMUs within this predominantly residential location. In addition, the</p>	Slight Beneficial

Local Community	Impact of the NDR – description of effects	Significance of Impact
	<p>Scheme would incorporate new bridleway links to the north of Taverham, which could be used by pedestrians and off-road cyclists, and also link to Breck Farm Way to the north and south of the Scheme (connecting via the Marriott's Way which would be carried over the NDR). This would provide additional amenity for NMUs by use of Breck Farm Way, which would be closed to motorised traffic, linking to the new bridleways and maintaining connections to Marriott's Way and longer distance connections to Felthorpe to the north.</p>	
Felthorpe	<p>The village of Felthorpe is located to the north of Taverham, on the Taverham Road. Traffic flows on the Taverham Road are predicted to reduce by 28% in the year 2032 with the NDR, and by up to 42% on the Street. Whilst there are no additional amenities for NMUs included within the proposed Scheme design within or connecting to Felthorpe, this reduction in traffic would be of benefit for users, particularly those making journeys to and from the Felthorpe Church, as well as longer distance journeys towards Horsford, Taverham and central Norwich (cyclists).</p>	Slight Beneficial
Drayton	<p>Drayton is situated immediately to the east of Taverham. No additional amenity for NMUs is proposed within this community, but connections to the existing NMU network would be maintained and upgraded with improvements to the Marriott's Way. Traffic flows are predicted to reduce by 8 to 57% on Fakenham Road to the south of the NDR up until the Outer Ring Road, and where it passes through Drayton for the year 2032. This traffic reduction is likely to reduce existing community severance for NMUs accessing facilities within Drayton, and also those accessing facilities in Taverham and Hellesdon to the east. Particular relief from</p>	Moderate Beneficial

Local Community	Impact of the NDR – description of effects	Significance of Impact
Horsford	<p>severance is likely to be felt for school children travelling to the high school in Taverham, and elderly residents of the Home Instead Senior Care home.</p> <p>Horsford is a village situated 6 miles to the north of Norwich and to the north of the proposed NDR. Whilst there would be no additional amenity for NMUs proposed as part of the NDR Scheme, the closure of Holt Road to motorised users to the east of the new Holt Road roundabout would improve connections for NMUs between Horsford and Norwich. In addition, connections to Thorpe Marriott would be maintained as Horsford RB5 would be carried over the NDR. However, 8% to 12% traffic flow increases are predicted for the B1149 Holt Road as it passes through Horsford, which may deter some NMUs from making journeys. This may also slightly increase severance within the village as the Holt Road passes directly through the village, particularly for school children and parents wishing to access the pre and infant school located on one side of the Holt Road, or vulnerable users making journeys to the Horsford medical centre on the same side of Holt Road.</p>	Slight Adverse
Horsham St Faith	<p>Horsham St Faith lies immediately to the north of the proposed NDR and Norwich airport. Two newly proposed cycle tracks with rights of way on foot are included within the NDR design, which would provide connections to the Cromer Road roundabout and the proposed bridleways and cycleways at this location, and to the Airport roundabout. A proposed footpath and crossing point at the Airport roundabout would maintain NMU access from Horsham St Faith into the airport for users making this journey. Substantial reductions in the predicted traffic flows on the Spixworth Road and Church Road as they pass through Horsham (up to 75% for the year</p>	Moderate Beneficial

Local Community	Impact of the NDR – description of effects	Significance of Impact
	2032) would be of benefit for NMUs such as parents and school children making journeys to the primary school on the Manor Road, which would also see a reduction in traffic flows of 50%.	
Newton St Faith	Newton St Faith lies directly to the north of Horsham St Faith. No additional NMU amenities are proposed as part of the NDR Scheme for Newton St Faith. However, reductions in predicted traffic flows of 50% on Manor Road, which connects Newton St Faith with Horsham St Faith for the year 2032, would result in substantial relief of existing severance between the two villages for NMUs, particularly those making journeys to the primary school in Horsham St Faith.	Slight Beneficial
Hellesdon	Hellesdon is situated further to the east of Drayton towards Norwich centre. No additional amenity for NMUs is proposed within this community. Traffic flows are predicted to increase on the Reepham Road in the year 2032 where it passes through the centre of Hellesdon (7 to 24% increases in traffic flows on the approach to the inner ring road). This increase in traffic on Reepham Road would marginally increase severance within and between Hellesdon for school children making journeys to and from the numerous schools, as well as vulnerable users accessing the Hellesdon hospital and several residential care homes. However, this would be offset slightly by some decreases in predicted traffic flows on minor roads within Hellesdon, which are more likely to be used by pedestrians and cyclists.	Slight Adverse
Spixworth	Spixworth lies immediately to the north of the proposed NDR. Connections to communities to the south, and to Norwich would be maintained and enhanced thorough the provision of a footpath/ cycleway across Buxton Road, which would link to the existing Spixworth cycleway. Substantial reductions in traffic flows on the Crostwick Road as it passes through Spixworth for	Moderate Beneficial

Local Community	Impact of the NDR – description of effects	Significance of Impact
	<p>the year 2032 are predicted (up to 31%), which would result in relief from existing severance caused by high traffic flows on this road. This would be specifically beneficial for NMU journeys to and from the residential areas to the south of Crostwick Road to the infant and junior school on Ivy Road.</p>	
Crostwick	<p>Crostwick is a small settlement, focussed mostly on the North Walsham Road. There are no community facilities within the settlement, and there are no proposals within the NDR Scheme to provide additional amenities for NMUs. Traffic flow forecasts for the North Walsham Road show a 37% increase in flows for 2032, which may increase existing severance for NMUs making journeys to neighbouring parishes, particularly to the schools in Spixworth, and longer distance journeys to Norwich.</p>	Slight Adverse
Rackheath	<p>Rackheath lies immediately to the north of the proposed NDR, and would be connected to the NDR via Salhouse Road and also Plumstead Road (access from Green Lane East). The private means of access to Home Farm would be maintained with the Newman Track being carried over the NDR. This would provide links to new amenities for NMUs in the form of the proposed bridleway to the south of the NDR, which would also be used by pedestrians and off-road cyclists. In addition, traffic flows for Green Lane East and Broad Lane are predicted to substantially reduce as these roads are maintained as access only following the opening of the NDR, so that almost all traffic is reduced from this road, making this route highly suitable for NMU use. Traffic flows on Green Lane West would also substantially reduce for the year 2032 with the NDR in place by up to 33%. Whilst there would be some increase in flows on Salhouse</p>	Moderate Beneficial

Local Community	Impact of the NDR – description of effects	Significance of Impact
	<p>Road as it passes through Rackheath (up to 11% in 2032), the reduction in motorised users on other roads within the settlement would be of significant benefit to NMUs, particularly those making journeys to the primary school and recreation ground.</p>	
<p>Little Plumstead</p>	<p>Little Plumstead lies to the east of the proposed NDR, approximately 2500m away. There are no proposed amenities for NMUs included as part of the NDR Scheme, and the NDR is unlikely to affect NMU movements within and between the village from changes to amenity associated with the NDR. However, traffic flows on the Salhouse Road and Hospital Road as it passes through Little Plumstead are predicted to substantially reduce by the year 2032 with the proposed NDR in place (86% reduction, from 3369 vehicles a day to 468). These roads provide access between Little Plumstead Primary School and Little Plumstead Pre-school. Such a reduction in traffic flows would result in relief from existing severance for those wishing to access these key community facilities by non-motorised means, as well as those wishing to travel further afield such as Great Plumstead and on to Norwich.</p>	<p>Moderate Beneficial</p>
<p>Great Plumstead</p>	<p>Great Plumstead is located to the east of the proposed NDR within approximately 1200m. Connections to communities to the south would be maintained and enhanced for NMUs as a result of the inclusion of a network of bridleways, cycleways and footpaths running east/ west along the NDR in this location, and linking to Great Plumstead via the closed Low Road. In addition, traffic flows on all routes that converge in Great Plumstead are predicted to reduce by up to 86% with the NDR (for the year 2032), which would result in relief from some existing severance for NMUs within this village and making journeys between communities. This</p>	<p>Moderate Beneficial</p>

Local Community	Impact of the NDR – description of effects	Significance of Impact
Old Catton	<p>includes those wishing to access the primary and pre-school in Little Plumstead.</p> <p>There are no proposals as part of the NDR to increase or improve NMU amenities within Old Catton, but existing links with Spixworth would be maintained and enhanced through the provision of footpaths and bridleways centering on the Buxton Road overbridge. Traffic flows for the year 2032 with the NDR in place are predicted to increase by up to 13% on Buxton/ Spixworth Road where it passes through Old Catton, and there would be some increase on Lodge Lane with the infant and first school, as well as Old Catton Surgery. This would result in an increase in existing severance for local residents making non-motorised journeys to these community facilities. However, there would also be some traffic flow decreases along White Woman Road, where the junior school is located. In addition, traffic flows would decrease on routes moving further towards the outer ring road, and on the North Walsham Road to the east (which forms the village boundary with Sprowston).</p>	Slight Adverse
Sprowston	<p>Sprowston borders and expands the urban fringe of Norwich, to the north-east of the City, and sits between Old Catton and Thorpe St Andrew. No specific NMU amenities are included within the proposed NDR design for the Sprowston area. However, traffic flow reductions are predicted for the year 2032 for the majority of routes within the Sprowston area. In particular, a 63% reduction is predicted for the year 2032 with the NDR in place on Falcon Road, where the Falcon Junior School is located. Traffic reductions in this area would be of benefit for non-motorised journeys due to relief from existing severance caused by high traffic flows.</p>	Slight Beneficial
Thorpe St	Thorpe St Andrew borders Sprowston, and forms the eastern boundary of Norwich City. Links	Slight

Local Community	Impact of the NDR – description of effects	Significance of Impact
Andrew	<p>within this community would be maintained, with connections further afield also maintained or enhanced through the closure of Low Road and Smea Lane to motorised users, which would become suitable for NMUs. No additional amenities for NMUs would be provided as part of the proposed NDR within Thorpe St Andrew. However, the majority of links within Thorpe St Andrew are predicted to see a reduction in traffic flows for the year 2032 with the NDR in place, with increases in traffic flows localised around the Broadland Gate Business Park only. Traffic flow reductions are likely to result in some relief from existing severance caused by high traffic flows, particularly in the location of the numerous schools within Thorpe St Andrew.</p>	Beneficial
Thorpe End	<p>Thorpe End is a garden village on the outskirts of Norwich City. It is situated immediately to the west of the proposed NDR, adjacent to Thorpe St Andrew on the Plumstead Road. Whilst there would be some traffic increases on the Plumstead Road as it passes through Thorpe End (up to 11% on the approach from the proposed NDR to the village for the year 2032), the Scheme proposals include a mini-roundabout to be provided at the junction of Broadland Drive with Plumstead Road. Broadland Drive provides access to the Thorpe End local shops, including the Post Office. The existing junction causes localised congestion, and the provision of a mini-roundabout is anticipated to smooth flows. In addition, traffic flows to the south of this link are predicted to substantially reduce (27% reduction) by the year 2032 on the link between Plumstead Road. The existing zebra crossing and associated footways to the south of the Broadland Drive would be maintained, as well as the bus stop outside of the village shops, providing a dedicated crossing for NMUs in this location. An additional footway linking the Thorpe End village shops to St David's Drive to the south-west on the east-bound side of</p>	Slight Beneficial

Local Community	Impact of the NDR – description of effects	Significance of Impact
	<p>Plumstead Road would also be provided. This new amenity and the reduction in traffic on Plumstead Road adjacent to the village shops would mean that some relief from existing community severance would be expected for NMUs within Thorpe End. Movements between Thorpe End and local communities such as Thorpe St Andrew, Sprowston and central Norwich would be improved through traffic reductions on local roads.</p>	
Postwick	<p>Postwick is a village located to the south of the A47 on the outskirts of Norwich. It is separated from the proposed NDR by the A47. However, whilst no additional amenities for NMUs would be provided within the village itself, the Scheme proposals do include the provision of a network of footpaths and a cycleway to cross the A47 at the Postwick junction and which would connect up with Church Road and Oaks Lane leading into Postwick. This would improve NMU connections for the Postwick community, which is currently severed from Norwich by the A47 for NMUs.</p>	Slight Beneficial

12.6.12 Traffic increases for some rural and radial routes within the Norwich area would result in some localised adverse impacts for NMUs due to potential increases in community severance. This is because some NMUs may be deterred from making their existing journeys where roads with traffic increases would need to be crossed or where existing footways, cycleways and bridleways run adjacent to roads with traffic increases. Locations include:

- Traffic increases on Holt Road as it passes through Horsford;
- Traffic increases on North Walsham Road as it passes through Crostwick;
- Traffic increases on the Buxton Road where it passes through Old Catton (affecting the Spixworth cycleway); and,
- Traffic increases on Wroxham Road.

12.6.13 In addition, some slight increases in journey times for NMUs would be experienced as a result of the proposed junctions included within the NDR, such as at Cromer Road. This would be particularly relevant for cyclists, where navigating junctions may deter some users from making their journeys. However, these adverse impacts would be offset by approximately 25km of new links suitable for use by NMUs that would be provided along the proposed NDR and within adjacent communities, together with improved surfacing on some existing rights of way. In addition, the proposed NDR would incorporate seven locations with dedicated NMU crossings that are separated from traffic. These include:.

- Marriott's Way - cycleway and bridleway (no access for motorised vehicles);
- Bell Farm Track - Restricted By-Way and PMA;
- Cromer Road – dedicated cycleway adjacent to motorised traffic;
- Buxton Road – dedicated cycleway adjacent to motorised traffic;
- Newman Track – PMA;
- Plumstead Road - dedicated cycleway adjacent to motorised traffic; and,
- Middle Road - dedicated cycleway adjacent to motorised traffic.

12.6.14 Slight to Moderate Beneficial impacts would be experienced for NMUs in some locations where additional and new amenity would be provided, and

particularly where this would provide connections to essential community services such as schools and medical facilities. In addition, some relief from existing severance caused by high volumes of motorised traffic on rural and secondary routes, passing within residential communities, is to be expected for the year 2032, with the proposed NDR in place. This relief would be experienced for communities immediately adjacent to the new alignment, as well as for suburbs on the north-eastern fringe of Norwich, and would result in Moderate Beneficial impacts where access to key community services would be improved. On balance, the proposals would be expected to result in an overall Moderate Beneficial impact for NMUs by the year 2032 across the full study area for the Scheme.

Public Transport

12.6.15 Based on the current level of service provision, 18 public bus services would cross the route of the proposed NDR. These routes are illustrated on Drawing MMD-233906-DT-0938 of Volume 2, Chapter 12: Effects on All Travellers, Section H,. Of these, the majority would remain unaffected by the Scheme. Only a very small proportion of the existing bus services would have their route changed as a result of the proposed NDR. Impacts for these routes are described below.

- The bus services that currently use the A1067 Fakenham Road would continue to do so but would have to pass through the proposed Fakenham Road roundabout. The additional travel time is likely to be offset by reduced traffic congestion on the Fakenham Road (8% to 57% decrease in predicted traffic flows on Fakenham Road to the south of the NDR up until the Outer Ring Road for the year 2032).
- At Reepham Road, services intersecting the proposed NDR would be unaffected and would travel through the new at-grade junction with the NDR (Reepham Road roundabout).
- As Holt Lane would be converted to a restricted route between the proposed NDR and Horsford, services that currently run on Holt Road servicing Horsford would divert to the proposed NDR to travel between the Cromer Road and the Drayton Lane roundabouts, before re-joining Holt Road at the proposed Holt Road roundabout. This may result in an increase in journey times for those travelling to and from Horsford. However, it is anticipated that traffic flow reductions on the Cromer Road would also result in improved journey times for buses operating on this route.

-
- Services that currently use Cromer Road (A140) will pass through the dual roundabout junctions of the Cromer Road / NDR junction. This change to the route would be unlikely to impact upon journey times.
 - Services accessing Spixworth Road / Buxton Road would be unaffected as they would make use of the proposed bridge crossing over the NDR corridor.
 - Services that use North Walsham Road would make use of the proposed at-grade junction with NDR (North Walsham Road Roundabout). Any slight delay to journeys born from the requirement to navigate this roundabout would be offset by major decreases in traffic flows to the south of the Scheme towards and within Norwich centre on the north Walsham Road.
 - On Wroxham Road (A1151), services using this route would make use of the proposed at-grade junction with NDR (Wroxham Road roundabout). This minor change to the route would be offset by major decrease in traffic flows to the south-west of the intersection with the proposed NDR, through the built up area of Sprowston.
 - Services that use Salhouse Road at the point it intersects with the proposed NDR would make use of the proposed at-grade junction (Salhouse Road roundabout). However, predicted traffic flow increases on the Salhouse Road (up to 11% increase to the east of the intersection with the proposed NDR, and major increases to the west of the intersection with the NDR. Some decrease in flows from the Outer Ring Road to Norwich centre) may result in increased congestion affecting bus journeys.
 - On Plumstead Road, bus services using this route will pass under the NDR, but will travel through a new roundabout (off-set) junction linking to the proposed Plumstead Road roundabout. Journey times are unlikely to be affected.

12.6.16 Further information on the effects of the proposed NDR on Public Transport provision and journey times for Norwich is provided within the Transport Assessment for the Scheme (DCO Document 5.5). The Transport Assessment concludes that the proposed NDR and its associated complementary measures are predicted to reduce journey times overall. Bus services should achieve journey time savings due to reduced traffic flows on many of the key routes which currently experience congestion at peak times. Some increases to journey length and times would be offset by these improvements in traffic flows. On balance, impacts are considered to be de minimal for bus routes and bus users.

Climate Change mitigation and adaptation

12.6.17 Climate change is expected to have significant implications for infrastructure assets, particularly those with long operational lifetimes. This makes them sensitive not only to the existing climate at the time of their construction, but also to climate variations over the decades of their use.

12.6.18 With respect to All Travellers, there are a number of ways in which Climate Change can influence their behaviour and activities, and make an impact upon their journeys. For example, high and low temperature extremes may impact on thermal comfort for users of the road. However, this can easily be mitigated for users of private vehicles, through their heating and cooling facilities within the vehicle. Snow and ice build-up along the proposed NDR could affect vehicle travellers through reduced speeds and slower journey times, and also through an increase in risk and fear of road accidents. This could influence the levels of Driver Stress during times of adverse weather. In addition, an increasing number (in duration and intensity) of heavy precipitation events are predicted with Climate Change for the UK. Heavy precipitation events may result in standing water on the proposed NDR road surface, and reduced driving visibility for vehicle travellers, all of which may contribute towards enhanced levels of Driver Stress. Equally, adverse weather conditions may deter some NMUs from making their journeys.

12.6.19 Table 12.19 below provides a summary of potential impacts associated with Climate Change for All Travellers, and the broad measures that would be incorporated within the Scheme design to mitigate and adapt for Climate Change.

Table 12.19 Climate Change and Effects on All Travellers

Potential Impacts for All Travellers	Relationship to Climate Change Resilience	Proposed mitigation
Driver Stress - frustration, fear of potential accidents, and uncertainty relating to the route being followed.	Frustration from traffic jams or road closures/ diversions due to extreme weather events or flooding. Accidents due to poor driving conditions or flooding.	All proposed diversions and road closures will be sign posted clearly and diversions and closures are assessed as part of the Transport Assessment.
Stopping up and diversion of local road network and public rights of way.	Climate impacts can cause road closures and diversions due to inclement weather. The proposed Scheme would increase the area of hard standing, increasing surface run-off, which may increase flood risk for adjacent PRow. Climate impacts can affect pedestrians through direct exposure in open spaces as well as impacts such as spray from passing vehicles (pedestrians, people waiting in refuges or passengers waiting at bus stops).	All road closures to be fully sign-posted. Flood risk associated with the proposed road to be fully assessed within this ES and the FRA. This would account for Climate Change. A network of dedicated footpaths, bridleways and cycle routes that are segregated from vehicle traffic is included within the proposed NDR Scheme design.
Reduction of traffic levels on local roads, providing a better environment for pedestrians, equestrians and cycleways.	No significant climate change adaptation issues.	A network of dedicated footpaths, bridleways and cycle routes that are segregated from vehicle traffic is included within the proposed NDR Scheme design.

12.7 Conclusion

12.7.1 Impacts of the proposed NDR for Vehicle Travellers and NMUs have been fully considered within this assessment for a wide study area in relation to the proposed alignment. Following this assessment, it is considered that proposals for the NDR would result in an overall long term benefit for All Travellers, through the provision of a network of approximately 25km of new or improved routes suitable for NMUs, and by relieving some communities of high volumes of traffic which would transfer to the proposed NDR. However, some adverse impacts have been identified for some locations and some user groups.

12.7.2 Table 12.20 provides a summary of potential impacts for the construction and operational stage of the proposed NDR for All Travellers.

12.7.3 Overall, the assessment presented within this ES concludes that a Slight Adverse but not significant impact is anticipated for All Travellers during construction for a temporary period, as a result of construction delays, route diversions and the presence of construction plant. However, once the Scheme is operational, it is considered that there would be a Moderate Beneficial and therefore significant impact for All Travellers. This is as a result of reduced traffic and congestion on the majority of radial routes, improved amenity for NMUs and relief from existing severance within and between communities caused by existing high traffic levels.

Table 12.20 Summary of predicted impacts

Impact	Construction	Operation	Significance Construction/Operation
View from the Road	<p>During the construction stage, it is anticipated that there would be temporary Slight Adverse impacts on the view from the road for users of private vehicles and public transport passing along affected routes as a result of changes from a rural, high quality outlook to that of a temporary construction site. However, the construction stage is unlikely to result in the total loss of view for any affected route, and as a result, impacts are not considered to be significant.</p>	<p>The proposed alignment for the NDR would have an impact upon the view from the road for vehicle travellers using existing routes within the ZVI. The Landscape Design for the Scheme includes extensive mitigation and screening planting. By Year 15 when this screening planting has matured, it is expected that Slight Adverse impacts on Scheme opening for vehicle travellers would be substantially reduced, so that overall, long-term, views from affected routes would be Neutral. For those users of existing routes who would transfer to the proposed NDR, it is likely that they would experience a change in views from the road from their existing routes to that of the dual carriageway corridor. Where the proposed Scheme would be in a cutting or fully screened with landscape mounds, the view from the road would be partially or fully restricted. However, large stretches of the proposed route would provide open views of an</p>	<p>Slight Adverse/ Neutral (not significant)</p>

Impact	Construction	Operation	Significance Construction/Operation
		<p>arable nature and of woodland plantations for vehicle travellers. On the whole, it is considered that the view from the road for those vehicle travellers that switch to the proposed NDR on Scheme opening would be Neutral.</p>	
<p>Driver Stress</p>	<p>The need to travel through road-works for some motorised users, particularly at the intersections with the proposed NDR, is likely to result in temporary short-term delays which may lead to low to moderate level driver frustration and route uncertainty due to the provision of traffic management and construction plant movement. However, measures to minimise impacts, such as the phasing of works, and considering that the majority of the route would be constructed off line as it is a new road in a rural landscape, means that the</p>	<p>The appraisal of affected routes within the study area for Driver Stress which would experience traffic changes as a result of the NDR concludes that there would be a long-term Moderate Beneficial effect on Driver Stress for users of these routes due reduced congestion and improved flows on routes with sensitive receptors and a poor accident record. Traffic forecasts predict reductions in traffic flows for the majority of radial routes for the year 2032 with the NDR in place, as well as within a number of the suburbs to Norwich. However, some locations are likely to result in an increase in traffic on routes where there is already a poor accident record or high number of sensitive receptors. This includes some</p>	<p>Slight to Moderate Adverse/ Moderate Beneficial (significant long-term benefit)</p>

Impact	Construction	Operation	Significance Construction/Operation
	overall impact is likely to be Moderate to Slight Adverse , for a temporary period.	radial routes to the north of the proposed NDR (Wroxham Road, North Walsham Road and Plumstead Road), and for the inner ring road in Norwich City Centre.	
Non-Motorised Users	Overall, the construction stage is predicted to result in short term impacts upon NMUs as a result of the temporary closure or diversion of PRoW, resulting in an increase in journey times for some NMUs in a small number of locations. In addition, some NMUs may be deterred from making certain journeys during the construction stage due to the presence of construction plant and increased traffic on alternative routes due to diversions. However, some beneficial impacts are anticipated, where routes would be closed to motorised users during the	For NMUs, traffic increases for some rural and radial routes within the Norwich area would result in some localised adverse impacts due to potential increases in community severance, and journey time. This would be particularly relevant for cyclists, where navigating junctions may deter some users from making their journeys. However, adverse impacts would be mitigated by the provision of approximately 25km of new links suitable for use by NMUs that would be provided along the proposed NDR and within adjacent communities. In addition, the proposed NDR would incorporate seven locations with crossings that are suitable for NMUs and are separated from traffic. This provision, as well as some relief from existing severance within some communities, brought	Slight Adverse/ Moderate Beneficial (significant long-term benefit)

Impact	Construction	Operation	Significance Construction/Operation
	<p>construction stage (either temporary or permanent closures), thus enhancing the NMU environment. On balance, a Slight Adverse but not significant impact is anticipated during the construction stage.</p>	<p>about by a reduction in traffic flows in the Year 2032, particularly where key NMU routes have been identified (such as routes between schools), would result in an overall Moderate Beneficial impact for NMUs across the full study area for the Scheme.</p>	

13. Community and Private Assets

13.1 Introduction

13.1.1 Community and Private Assets is identified as a DMRB Topic within Interim Advice Note 125/09 Supplementary guidance for users of DMRB Volume 11 'Environmental Assessment'. However, the guidance contained within DMRB Volume 11, Section 3 has not yet been updated. As a result, the Community and Private Assets assessment incorporates the DMRB Topic of Land Use and includes a Socio- Economic assessment of the proposed Scheme in Section 15.5 of this chapter.

13.1.2 Following the guidance contained within DMRB Volume 11 part 6, the overall approach for the assessment of Community and Private Assets will consider the following impacts on:

- Private Property
- Land used by the Community
- Development Land
- Agricultural Land
- Proposed or existing waterway restoration projects
- Community Severance

13.1.3 The following are the overarching requirements set out in DMRB Volume 11. Section 3 Part 6 for the effects on Land Use.

13.1.4 DMRB Volume 11, Section 3 Part 6 states *"The increasing efficiency of agricultural producers and changes in agricultural policy mean that retaining as much land as possible in agricultural use is no longer a top priority"*.

13.1.5 In addition POSTnote 418 September 2012 states: *Achieving efficient and productive agriculture to ensure food security while conserving biodiversity is a key challenge considering predicted scenarios of rapid human population growth. Agriculture is highly dependent on benefits derived from nature, known as 'ecosystem services' (POSTnote 377). These include pollination, pest control and nutrient cycling. Although agriculture is dependent on biodiversity, agricultural intensification is also a major driver of biodiversity*

decline. Within this context, there is debate about the best way of balancing food production and wildlife protection.

13.1.6 The following are the overarching requirements set out in DMRB Volume 11. Section 3 Part 6 for the effects on Land Use.

Private Property

13.1.7 DMRB Volume 11, Section 3 Part 6 DMRB guidance states “Where properties need to be demolished for a scheme to be built, the environmental impact of their loss should be included in the assessment” and “Confirm the number of properties potentially affected by demolition or land take and categorise the impacts on affected land accordingly”.

13.1.8 The route of the NDR has been selected to minimise loss of private property.

13.1.9 Hall Farm is a derelict building currently owned by NCC, and will be demolished to enable the Scheme to be built. There are ecological impacts arising from the demolition of this property, these are fully assessed in Volume 1 of the ES Chapter 8: Nature Conservation, Section 8.5.

13.1.10 Gazebo Farm (Location) is owned by the Birse the contractor, and is currently being used as a site office. There are derelict outbuildings within the grounds that require demolition. The heritage and ecological effects of the demolition of these properties are covered in Volume 1 of the ES: Chapter 6. Cultural Heritage and Chapter 8 Nature Conservation Section 8.5 respectively.

13.1.11 The landuse effects on these derelict properties are not considered further.

13.1.12 There are 15 properties where a proportion of garden will be permanently lost to the Scheme or where a small percentage of land belonging to the property (but not used for agricultural purposes) will be permanently lost to the Scheme. These small areas are spread throughout the Scheme footprint and are detailed in the Land Plans. Individual negotiations with landowners are taking place regarding this land take and associated compensation.

13.1.13 These It should be noted that the areas of land take may be proportionally small or large however this is an inadequate indicator of value to the owner. Therefore individual consultations are being undertaken with each landowner so that the appropriate level of compensation can be arrived

at. These negotiations are necessarily confidential and therefore will not be reported within this chapter. However, compensation will represent the value of land lost and therefore effects are not considered significant.

Loss of Land Used by the Community

- 13.1.14 DMRB Volume 11. Section 3 Part 6 states “The Environmental Statement should set out the scheme's impact on land used by the public, taking account, where relevant, of exchange land to be provided in mitigation”.

Marriott's Way

- 13.1.15 Marriott's Way is a disused railway path which provided a green corridor for walkers, riders and cyclists from Norwich to Reepham. It is part of Sustran's National Cycle Route 1. The NDR crosses the Marriott's Way at chainage 2400. It is an important wildlife corridor and the ecological impacts of the NDR are discussed in Volume 1 Chapter 8: Nature Conservation, Section 8.5 of the ES and Chapter 12 Effects on All Travellers. Marriott's Way is a County Wildlife Site and as it is open to walkers, cyclists and horse riders it has considerable amenity value..

- 13.1.16 A green bridge will be provided at the location of land -take to provide for both amenity users and wildlife, only the footprint required for the NDR carriageway is being acquired from the owner Broadland District Council . Rights are being taken over other areas owned by the District Council to tie in to the new bridge, and the areas being acquired for new embankments to the Bridge from third parties are to be given to the District Council in exchange. Broadland District Council will also be granted replacement rights over the bridge itself. Temporary provision to provide safe crossing places to users will be provided during construction.

- 13.1.17 Therefore the effects of land take on Marriott's Way are not considered further.

Fuel Allotments

- 13.1.18 Fuel and Field Garden Allotments consist of land that was allotted for public or semi-public purposes under the Enclosure Acts. It is not technically common land but is held in trust by its owner and generally falls within the jurisdiction of the Charity Commissioners.

13.1.19 A 2800m² area is being acquired from the Great Plumstead Fuel Allotment Charity land to provide a link road for agricultural vehicles that bypasses the local road that is closed by the NDR. The area of land falls below the requirement to provide exchange land, however an adjoining, larger, area of agricultural land is to be given in exchange to the Charity.

13.1.20 There will be no loss of amenity or use associated with this land take and therefore it is not considered further in this chapter.

Development Land

13.1.21 DMRB Volume 11. Section 3 Part 6 states *“The environmental assessment should take authorities’ development designations. account of, as far as is practicable, future changes in land use due to new development which would be likely to occur in the absence of a scheme”* .

13.1.22 The NDR passes over an area of development land at Norwich International Airport (Norwich City Council planning reference 13/00520/0). Provision for the NDR crossing this area is provided within the application.

13.1.23 The NDR is part of the Greater Norwich Development Partnerships Joint Core Strategy, so consideration to future development has been developed with the possibility of the construction of the proposed Scheme. The economic effects of the NDR with regard to future development are assessed within the second section of this chapter: Socio – economic effects section.

13.1.24 The effects on development land take are therefore not considered further.

Proposed or Existing Waterway Projects

13.1.25 There are no proposed or existing waterway restoration projects within the study area and therefore these were scoped out of this assessment.

Community Severance

13.1.26 This is considered within Chapter 12. Volume 1 Effects on All Travellers and within the Socio-Economic Assessment Section 13.5 of this chapter.

Effects on Agricultural Land

13.1.27 DMRB Volume 11. Section 3 Part 6 states “*The report should assess the impact of the preferred route on land use and assess boundary arrangements for individual farm units, using maps where necessary, and comment on the likely future viability of affected units, should the preferred route be constructed*”.

13.1.28 The proposed Norwich Northern Distributor Road (NDR) will have a total spatial footprint of 354 hectares. The majority of the land within this footprint is currently used for agriculture (329.40 ha). Farming is a major source of income and employment for the area and agricultural land can therefore be considered an important community and private asset.

13.1.29 The two aspects assessed further within this chapter are:

- The effects of the NDR on agricultural land as a national resource;
- and the effects on the viability of individual farm units.

13.2 Agricultural Land

Introduction

13.2.1 The proposed route could have a range of potential impacts on agricultural land, including the temporary and permanent loss to the scheme, changes in land quality, and modifications to the access of fields. All of these changes have the potential to affect the commercial viability of individual farms within or near the scheme boundary and the long term use of the land for agricultural purposes..

13.2.2 The impacts likely to arise from the proposed route have been identified, and how they might affect the commercial viability of individual farms have been assessed as part of the EIA process.

Methodology

13.2.3 In accordance with the Highways Agency Design Manual for Roads and Bridges (DMRB Volume 11. Section 3 Part 6), this study was based on an assessment of the land-take (permanent and temporary), changes in land quality, alterations in farm husbandry, field severance, and changes in farm access likely to be imposed on individual farm businesses as a result of the proposed NDR.

- 13.2.4 No methodological guidance exists for assessing forestry, equestrian or game shooting operations and the impacts identified for these land uses therefore followed the above guidance on agriculture. Climate change and flooding impacts were also considered in light of the NDR Climate Change Risk Assessment (CCRA) and the Flood Risk Assessment (FRA).
- 13.2.5 A technical definition of the terms “farm”, “individual farm holding”, and “farm business” were developed for this project to provide a basic unit of assessment for the purposes of this study. This was because of the complex tenancy and family arrangements which surround land ownership in the area.
- 13.2.6 Therefore, these farms are defined as “an area of land that consists of one or more land parcels or group of fields that are managed by a named person or named business entity as an owner, tenant or in any other commercial agricultural capacity, for the production of food, forage or fibre”.
- 13.2.7 This definition grouped land parcels according to individuals or companies who have commercial interests in that land which provided the unit of assessment on which this study was based. Under this definition, forestry, equestrian, and game shooting operations were included because of the land based dependence of their activities.
- 13.2.8 Within 250 m of the proposed route, land parcels used for agricultural and other purposes identified above were assessed, and land not used for these purposes were excluded from this study. The existing condition (i.e. baseline) of farm businesses within the NDR’s area of influence were compared with those expected as a result of impacts arising during the construction period and subsequent land restoration (temporary), and those expected once the scheme is operational (permanent).
- 13.2.9 Along the proposed NDR route, 66 individual farm businesses were identified within its area of influence. Direct communications were established with land users to discuss farm-specific operations, husbandry requirements and mitigation options. An agricultural soil survey was also conducted to determine the quality of agricultural land, which was predominantly Grade 2 and 3a, “the best and most versatile” by DEFRA standards. This information was combined with land registry data on the location and size of land holdings to construct a profile of baseline agricultural conditions on each farm.
- 13.2.10 These data were then plotted within a GIS in tandem with the NDR DCO boundary. The areas of permanent and temporary land-take were then calculated for each farm business. These modifications to farm sizes were

mapped for individual businesses showing land wholly or partially overlapping the 250m buffer zone, including their planned changes in farm access.

13.2.11 These classifications were based on the predicted effects of the road balanced with the range of mitigation measures designed to limit them, such as financial compensation, land restoration, field access provision, and maintenance of private irrigation systems (see below section).

Table 13.1: Impacts on Agricultural Land as a Resource and Agricultural Holdings

Magnitude of Impact	Criteria
Major adverse	Where the Scheme would lead to the direct loss of over 50 ha of the best and most versatile agricultural land (grades 1, 2 and 3a), and/or the impact of the proposal would be likely to render the whole farm unviable.
Moderate adverse	Where the Scheme would lead to the loss of between 20 and 50 ha of the best and most versatile land, and/or require significant day-to-day changes in management of the business but not threaten its viability.
Minor adverse	Where the Scheme would lead to the loss of less than 20 ha of the best and most versatile agricultural land, and/or slight changes in business practices would be required but the viability of the business will not be affected.
Negligible	The scheme would have no impact on the viability of the business.
Beneficial	The scheme would improve the commercial viability of this farm business.

Table 13.2: Impacts on Rural Based Businesses

Magnitude of Impact	Criteria
Major adverse	Above 25% permanent land loss and/or the impact of the proposal would be likely to render the operation unviable.
Moderate adverse	10-25% permanent land loss and/or the impact of the proposal would require significant day-to-day changes in management of the business but not threaten its viability.
Minor adverse	1-10% permanent land loss and/or slight changes in business practices would be required but the viability of the business will not be affected.
Negligible	The scheme would have no significant impacts.
Beneficial	Landscaping would enhance woodland areas and/or the scheme would improve the commercial viability of this business.

13.2.12 An impact may be ‘positive’ or ‘negative’. The significance of the predicted impacts on agriculture and soil has been assessed as either ‘Large’, ‘moderate’, ‘minor’ or ‘negligible’ according to the magnitude of the effect and sensitivity of the receptor.

13.2.13 These classifications were based on the predicted effects of the road balanced with the range of mitigation measures designed to limit them, such as financial compensation, land restoration, field access provision, and maintenance of private irrigation systems.

13.3 Context

Legislation

13.3.1 The NDR requires an Environmental Impact Assessment (EIA) defined by EC Directive 85/337/EEC which states that, among other factors, soils, material assets, human beings and the broader landscape likely to be impacted upon

by a proposed development should be identified and their impacts described and assessed.

13.3.2 No legislation or planning guidance exists at EU level which is concerned specifically with maintaining the commercial viability of individual farm holdings affected by major new developments. Each of the factors outlined above contribute to the functioning of agricultural systems and thereby the commercial viability of individual farms. Maintaining the financial integrity of agricultural businesses is also a key priority of the long-standing European Common Agricultural Policy (CAP). Within the context of EU policy it is therefore important that impacts on agricultural holdings arising from major developments are assessed during the EIA process and that the commercial viability of individual farms are maintained as far as possible.

13.3.3 The NDR will interact with a large area of commercial farmland. Individual farm holdings can therefore be identified as important impact receptors whose viability is of deserved interest when evaluating the environmental impacts of the proposed development.

Policy

13.3.4 A core principle of UK planning policy, as stated in the National Planning Policy Framework (NPPF), is to support thriving rural communities. This document also recognises agriculture and other land-based enterprises as being central to delivering sustainable development in the UK countryside. This guidance thus provides the broader policy context for this study because maintaining the viability of existing agricultural enterprises can be considered an important prerequisite for the success of rural communities. Therefore, from a national perspective, it is important that any potential impacts of a proposed road scheme on the viability of farming enterprises are assessed, and that the commercial integrity of the affected farms be maintained as far as possible.

13.3.5 Another key principle of UK planning policy regarding agriculture also stated in the NPPF (and further elaborated upon in the Natural England Technical Information Note TIN049) is to protect the “best and most versatile” agricultural land. This land is defined as “the land which is most flexible, productive and efficient in response to inputs and which can best deliver future crops for food and non-food uses”. This land falls within the land classification categories 1, 2 and 3a according to the Agricultural Land Classification (ALC) of England and Wales (Ministry of Agriculture Fisheries

and Food, 1988) and can be considered highly valuable not only in a national context, but also from the perspective of individual farm holdings. Land quality therefore needs to be assessed when evaluating the potential impacts of a proposed road scheme on the viability of individual farm holdings.

- 13.3.6 Related to the quality of agricultural land, the “Construction Code of Practice for the Sustainable Use of Soils on Construction Sites” Department for Environment, Food and Rural Affairs (DEFRA) details how soils should be handled during construction operations in the UK. This document provides guidance on producing Soil Resource Plans for construction sites to ensure soil quality is considered as part of operations planning. In addition, the Environmental Liability Directive (2004) imposes obligations on developers to ensure damaged soils are returned to their baseline condition. Major road schemes which require areas of farmland to be temporarily taken out of production to facilitate construction works should therefore restore this land to its baseline (i.e. original) grade in order to meet these obligations and to mitigate the effects of the scheme on agricultural viability.
- 13.3.7 Local planning and development policy guidance for the Greater Norwich area does not specifically refer to maintaining the commercial viability of local agricultural holdings as a key priority. However, viable farming enterprises in the surrounding region would nevertheless make an invaluable contribution to developing a sustainable local economy, a goal to which the local authorities claim to be working towards. Revitalising rural economies is one of the spatial planning objectives in the Joint Core Strategy for Broadland, Norwich and South Norfolk devised by the Greater Norwich Development Partnership. This strategy also refers to expanding farm shops and farmers’ markets within Norwich which – presumably – are to be supplied by viable farming enterprises in the locality. That local agricultural holdings are commercially viable is thus an unstated assumption of local policy and development objectives. The impacts of a proposed road scheme on agricultural holdings in this region therefore have been assessed and mitigation put in place.
- 13.3.8 In addition POSTnote 418 September 2012 states: *Achieving efficient and productive agriculture to ensure food security while conserving biodiversity is a key challenge considering predicted scenarios of rapid human population growth. Agriculture is highly dependent on benefits derived from nature, known as ‘ecosystem services’ (POSTnote 377). These include pollination, pest control and nutrient cycling. Although agriculture is dependent on biodiversity, agricultural intensification is also a major driver of biodiversity decline. Within this context, there is debate about the best way of balancing food production and wildlife protection.*

Baseline

13.3.9 The majority of the land the NDR passes over is under intensive arable cultivation with smaller areas of permanent pasture, poultry rearing, horse paddocks and woodland. Agricultural land to the west of the airport is mainly Grade 3a while to the west it is mainly grade 2. Therefore the majority of the land under these agricultural holdings is considered “the best and most versatile” by DEFRA standards. The total areas of land in each ALC category are shown in Table 3.1.

13.3.10 Along the proposed NDR route, 66 individual farm businesses were identified as being within the area of influence of the NDR and were therefore included in this assessment. The area of land managed by each business was highly variable ranging between 0.52 ha and 2063 ha.(please refer to Volume 2 Chapter 13 Sec A for the Agricultural Impact Assessment .

Table 13.3

ALC land grade	Total area across scheme (ha)
2	168.30
3a	114.20
3b	46.90
Non-agricultural land	24.62
Total	354.02

Mitigation

13.3.11 The only practical mitigation available for agricultural soils is to restore as much as possible back to pre-construction condition once construction is complete. This will involve the careful stripping and storage of soils (Volume 2, Chapter 19: CEMP + SWMP, Section 10 Contaminated Land and Soil Plan). This will be managed through the CEMP.

13.3.12 The following table shows that 45.64 ha will be returned to agricultural use post construction.

Table 13.4

Land class	Baseline	Permanent LT (ha)	Temporary LT (ha)
Grade 2	168.30	142.53	23.28
Grade 3A	114.20	99.95	15.84
Grade 3B	46.90	44.15	2.61
Non-agri land	24.62	20.94	4.72
Total	354.02	307.57	45.64

13.3.13 Included in the NDR design, a number of mitigation measures are to be applied to many farm businesses throughout the scheme's area of influence but within the context of each individual farm. These are summarised in Table 13.5 and information regarding the parties responsible and compliance mechanism are also included.

Table 13.5: Table summarising impacts on farm viability and mitigation

Mitigation measure	Description	Action taken by	Compliance mechanism
Land user consultation	Persons or companies with commercial interests (owners, tenants, etc) in agricultural land inside the scheme's area of influence were identified through the Land Registry records. Throughout the design process, negotiations were conducted with these businesses to determine their individual agricultural requirements, how the scheme may impact upon their operations, and what measures the scheme could include to mitigate these impacts. The consultation process	NCC	Compensation Code, agreements with individual land users

Mitigation measure	Description	Action taken by	Compliance mechanism
	therefore enabled the design to take account of the needs of individual land users.		
Financial compensation	Farm businesses with the potential to be impacted upon by the NDR will be compensated financially. The price that Norfolk County Council will pay for the Parties interests in the Land will be calculated in accordance with the Compensation Code, including the Land Compensation Act 1961, Compulsory Purchase Act 1965, Land Compensation Act 1973, Planning and Compensation Act 1991, Planning and Compensation Act 2004 and any other related legislation and case law (unless specifically altered under the Development Consent Order). This compensation will generally be provided as a lump sum and will be designed to cover land-taken, severance, injurious affection and disturbance (e.g. crop loss). This compensation will be provided differently depending on whether the affected party is a freeholder farming their own land (Option 1), a freeholder whose land is farmed by a tenant (Option 2), or a tenant farming a freeholder's land (Option 3).	NCC	Compensation Code, agreements with individual land users
Field access provision	Farms severed by the proposed NDR route or whose existing field access arrangements are to be	NCC, contractor	Scheme design, Compensation

Mitigation measure	Description	Action taken by	Compliance mechanism
	<p>removed by the scheme will have new field access points installed according to the land user's wishes. Such access points could take the form of new gateways leading off existing or new highways, or farm access tracks also used for highway maintenance purposes.</p>		<p>Code, agreements with individual land users</p>
Irrigation	<p>Water pipes used for irrigation purposes will be maintained wherever possible during the construction and operational phases of the scheme according to land users' wishes.</p>	Contractor	<p>Scheme design, Compensation Code, agreements with individual land users</p>
Land restoration	<p>Developers are obliged to return land used to accommodate construction workings – that is, land considered under “temporary land-take” – to its baseline condition. Agricultural land temporarily taken out of production will therefore be returned to its original land grade throughout the scheme. According to the developer's construction plans, soil will be excavated, stored and re-spread according to best practice as outlined in DEFRA's “Construction Code of Practice for the Sustainable Use of Soils on Construction Sites”. For certain holdings the developers have also agreed for the land to be sown in accordance with each land user's</p>	Contractor	<p>Soil Management Plan, agreements with individual land users</p>

Mitigation measure	Description	Action taken by	Compliance mechanism
	wishes.		
Tenancy agreements	Where tenant farmers are renting land from Norfolk County Council their tenancy agreements will be terminated and, where possible, new agreements arranged on other areas of land.	NCC	Tenancy contracts, agreements with individual land users
Flooding and climate change	The measures designed into the scheme to mitigate flooding and climate change impacts are outlined in detail in the NDR CCRA and the FRA. These measures include the provision of infiltration lagoons and culverts to minimise impacts on existing drainage impacts. Landscaping measures will also help to provide ecosystem services to surrounding farmland which will help farms to adapt to climate change, such as providing habitats for pollinating species and the use of woodland for sheltering.	Contractor	Scheme design

13.4 Assessment of Effects

Construction

13.4.1 The effects on agricultural land as a national resource is considered through the operational assessment.

13.4.2 The only temporary effects that were identified for individual farm businesses was that of temporary land-take during construction and severance of fields and irrigation systems. This land will be fully restored to agricultural use once construction is completed and the mitigation put in place for construction is similar to mitigation for the operational phase of the Scheme. Where possible, access to fields and water systems will be maintained. Compensation will be

paid for any loss of revenue from severance and temporary land-take and therefore the impacts during construction are not considered significant.

Operation

13.4.3 The majority of the land lost to the Scheme is considered “Best and Most Versatile” Table 13.6

13.4.4 It is not possible to replace agricultural land permanently taken as a result of the Scheme and therefore there would be a significant effect from the loss this good quality land.

13.4.5 In addition Defra have indicated in REF that:

“In examining the economic performance of farms, a key issue that has stimulated much debate over many decades is the degree of association between performance and farm size. Clearly there are potential economies of scale that mean that larger farms may be, on average, more efficient than smaller ones. However, some have argued that there are also diseconomies of scale that may counteract these”.

13.4.6 An “Ecosystems Services Assessment” was undertaken by Cranfield University to understand the overall effects of the loss of this agricultural land. This is somewhat limited as it is a new type of assessment with no established commonly used methodology,. The assessment was undertaken to explore and add value to the assessment on agricultural land. (Volume 2 Chapter 13 Sec A)

Table 13.6: Loss of Agricultural Land as a National Resource

ALC Land Grade	Mitigation	Impact magnitude	Effect significance
Loss of approximately 142.53 ha (low magnitude) of Grade 2 (high sensitivity)	Restore post construction Safeguard soil resources following approach of Defra Code of Practice for	Major adverse	Significant

ALC Land Grade	Mitigation	Impact magnitude	Effect significance
	Sustainable Use of Soil on Construction Sites (2009)		
Loss of approximately 99.95 ha (medium magnitude) of Subgrade 3a (medium sensitivity)	Restore post construction Safeguard soil resources following approach of Defra Code of Practice for Sustainable Use of Soil on Construction Sites (2009)	Major adverse	Significant
Effect of developing 44.15 ha (medium magnitude) on soil resources (medium sensitivity)	Restore post construction Safeguard soil resources following approach of Defra Code of Practice for Sustainable Use of Soil on Construction Sites (2009)	Major adverse	Significant

13.4.7 When the DMRB criteria for assessment are applied there is a significant effect resulting from the loss agricultural land as a resource. However, this assessment must be considered in relation to current farming practices and the benefits arising from a potential increase in biodiversity from intensively farmed land lost to habitat creation. Increases in biodiversity are known to be beneficial to farming practices by increasing numbers of pollinators. See this chapter. Sec 5 Conclusion.

Impact on Agricultural Holdings

13.4.8 This study indicates (Volume 2 Chapter 13 Sec A) that the impact of the NDR on the viability of individual farm businesses was dependent on the unique prevailing conditions on each individual farm, such as it size, choice of husbandry, diversity of operations, the nature of potential impacts, and which mitigation measures will be applied. The table 13.7 below summarises these results.

Table 13.7

Farm I.D.	Mitigation	Impact magnitude	Effect significance
1	Financial compensation, land restoration, field access provision	Minor adverse	Not significant
2	Financial compensation	Minor adverse	Not significant
3	Financial compensation, land restoration, field access provision, rerouting and maintenance of private irrigation systems	Minor adverse	Not significant
4	None – termination of tenancy	Minor adverse	Not significant
5	Financial compensation	Negligible	Not significant
6	Financial compensation	Minor adverse	Not significant
7	Financial compensation	Minor adverse	Not significant
8	Financial compensation, land restoration, field access provision,	Minor adverse	Not significant

Farm I.D.	Mitigation	Impact magnitude	Effect significance
	rerouting and maintenance of private irrigation systems		
9	Financial compensation, land restoration, field access provision	Negligible	Not significant
10	Financial compensation	Minor adverse	Not significant
11	Financial compensation	Minor adverse	Not significant
12	Financial compensation, field access provision	Minor adverse	Not significant
13	Financial compensation	Negligible	Not significant
14	Financial compensation	Minor adverse	Not significant
15	Financial compensation	Negligible	Not significant
16	Financial compensation	Minor adverse	Not significant
17	Financial compensation, land restoration, field access provision, rerouting and maintenance of private irrigation systems	Minor adverse	Not significant
18	Permanent land-take will be exchanged for new land of an equivalent size and agricultural grade adjacent to the farm	Minor adverse	Not significant
19	Financial compensation, field access provision	Minor adverse	Not significant
20	Financial compensation, land restoration, field access provision, rerouting and maintenance of private irrigation systems	Negligible	Not significant
21	Financial compensation	Minor adverse	Not significant

Farm I.D.	Mitigation	Impact magnitude	Effect significance
22	Financial compensation	Negligible	Not significant
23	Financial compensation, land restoration	Minor adverse	Not significant
24	Financial compensation, land restoration, field access provision	Negligible	Not significant
25	Access maintained	Beneficial	Not significant
27	Financial compensation	Minor adverse	Not significant
28	Financial compensation	Minor adverse	Not significant
29	Financial compensation	Negligible	Not significant
30	Financial compensation	Minor adverse	Not significant
31	Financial compensation, land restoration	Minor adverse	Not significant
32	None	Negligible	Not significant
33	Financial compensation, field access provision	Minor adverse	Not significant
34	Financial compensation	Minor adverse	Not significant
35	Financial compensation, field access provision	Minor adverse	Not significant
36	Financial compensation, land restoration	Minor adverse	Not significant
37	Financial compensation, land restoration	Minor adverse	Not significant
38	Financial compensation	Minor adverse	Not significant
39	Financial compensation, land restoration, field access provision	Negligible	Not significant

Farm I.D.	Mitigation	Impact magnitude	Effect significance
40	Financial compensation, field access provision	Beneficial	Not significant
41	Financial compensation	Negligible	Not significant
42	Financial compensation, land restoration, field access provision, rerouting and maintenance of private irrigation systems	Minor adverse	Not significant
43	Financial compensation	Negligible	Not significant
44	None	Negligible	Not significant
45	Financial compensation, land restoration, field access provision	Minor adverse	Not significant
46	Financial compensation	Negligible	Not significant
47	Financial compensation	Negligible	Not significant
50	Financial compensation, land restoration, field access provision	Minor adverse	Not significant
51	Financial compensation, land restoration, field access provision, rerouting and maintenance of private irrigation systems	Minor adverse	Not significant
52	Financial compensation	Minor adverse	Not significant
53	Financial compensation	Minor adverse	Not significant
55	Financial compensation	Minor adverse	Not significant
56	Financial compensation, land restoration	Negligible	Not significant
57	Financial compensation, land restoration, field access provision	Minor adverse	Not significant
58	None	Negligible	Not significant

Farm I.D.	Mitigation	Impact magnitude	Effect significance
59	None	Negligible	Not significant
60	Financial compensation, field access provision	Minor adverse	Not significant
61	Financial compensation, field access provision	Minor adverse	Not significant
62	None	Negligible	Not significant
64	None	Negligible	Not significant
65	None	Beneficial	Not significant
66	None	Negligible	Not significant
67	Financial compensation	Negligible	Not significant
68	Financial compensation	Minor adverse	Not significant
69	Financial compensation, land restoration, field access provision	Minor adverse	Not significant
70	Land restoration	Beneficial	Not significant
71	Financial compensation, land restoration	Minor adverse	Not significant

13.4.9 The Agricultural Impact Assessment Volume 2 Chapter 13 of the ES predicted “minor adverse” impacts for 40 farm businesses, “negligible” impacts for 22 farms, and “beneficial” impacts for 4 farms. No farms were predicted to suffer “moderate adverse” or “major adverse” impacts. The overall effect on farm viability is not significant.

13.5 Socio-economic Assessment

Introduction to socio-economics

13.5.1 This technical appendix presents the technical assessment of the socio-economic effects of the development of the Norwich Northern Distributor

Road (NDR) scheme, as part of the Environmental Statement (ES) for the scheme. The assessment addresses the potential effects detailed below.

13.5.2 During construction of the NDR scheme, potential socio-economic effects include the following:

- Direct employment through construction;
- Short-term increase in economic activity due to construction process;
- Temporary disruption to local businesses and reduced or disrupted access to businesses; and
- Land-take from existing businesses, disrupting business operations.

13.5.3 During operation of the NDR scheme, potential socio-economic effects include the following:

- Improved access to employment and other strategically important economic sites;
- Improved access to strategically important new housing sites;
- Supporting job creation and Gross Value Added (GVA) growth;
- Supporting development and housing growth; and
- Supporting tourism.

13.5.4 The assessment comprises the following sections:

- Legislative and policy framework: identifying the socio-economic and planning framework relevant to the development of the NDR scheme;
- Methodology: explaining the assessment methodology including the spatial and temporal scope, the identification of receptors, the criteria used to assess the significance of the impacts and relevant study assumptions and limitations;
- Baseline: presenting the baseline demographic, social and economic conditions for the impact area;
- Mitigation and prediction of effects: providing a high level description of key construction and operational activities which have socio-economic implications, setting out likely socio-economic effects during construction and operation, together with identification of mitigation measures;

- Conclusions: describing the predicted impacts following the implementation of mitigation measures, and the extent to which the development complies with planning and relevant socio-economic policy; and
- References: containing the references and source materials relating to the socio-economic assessment.

13.6 Scheme design in the context of socio-economics

Introduction

13.6.1 The Scheme (the Norwich Northern Distributor Road, known as the NDR) is a dual carriageway all-purpose strategic distributor road, to be classified as the A1270 Principal Road, which would link the A1067 Fakenham Road, near Attlebridge to the A47 Trunk Road (T) at Postwick,. This will be over a length of approximately 20.4km. See the scheme General Arrangement Plans in document number 2.6 for further information on the scheme.

General Description: Scheme Route

13.6.2 From west to east, the NDR is proposes to start at a new at-grade roundabout junction on the A1067 Fakenham Road, located to the west of Taverham. It would then continue eastwards as a dual carriageway to its new at-grade roundabout junction with the C262 Fir Covert Road. From this roundabout, the NDR would then cross the Marriott's Way (a permissive path providing a pedestrian, cycling and horse riding facility along the route of a disused railway) which will be taken across the NDR via a new bridge), to a new at-grade roundabout junction with the C261 Reepham Road. The NDR would then continue south eastwards, crossing Bell Farm Track/Horsford Restricted Byway No. 5 (which will be taken up over the NDR via a new Restricted Byway and private access accommodation bridge) before connecting with a new at-grade roundabout junction, just west of the existing C282 Drayton Lane, and which new roundabout will have two new link road connections, one with the C261 Reepham Road and one with the B1149 Holt Road, to replace the existing Drayton Lane.

13.6.3 From here, the NDR would then continue south eastwards to a new grade-separated junction (provision of a bridge over the NDR with slip roads to/from the NDR) with the A140 Cromer Road, located close to and just northwest of Norwich International Airport. The provision of this grade-separated junction will require the stopping up of lengths of the B1149 Holt Road and Holly Lane (U57142), as well as a length of of the A140 Cromer Road, which will be replaced by a new highway west of its existing position, which will be taken

over the NDR and provide the connection for its four connecting slip roads. East of the A140, the NDR would continue as a dual carriageway, turning north eastwards around the northern boundary of the airport to a further new at-grade roundabout junction at the northern tip of the airport. The primary purpose of this roundabout is to allow the NDR to undertake a roughly 90 degree change of direction around the Airport site. From this roundabout, the NDR would continue south eastwards, skirting the north east boundary of the airport, before turning eastwards and passing under a new highway, which be carried by bridge over the NDR, immediately to the east of the existing C246 Buxton Road, and which would provide the new connection for its realignment sections north and south of the NDR. The route of the dual carriageway NDR would then continue eastwards through the north of Beeston Park. It would then connect with both the B1150 North Walsham Road and the A1151 Wroxham Road via a new at-grade roundabout at each location, before turning south eastwards and entering the north eastern section of Rackheath Park approximately 250 metres from the western end of Sir Edward Stracey Road (U57538). It would then continue south eastwards, passing under a new bridleway and access bridge across the NDR, some 200 metres south west of the junction of Newman Road (U57490) with Long's Crescent (U57852).

13.6.4 The NDR would then connect with the C283 Salhouse Road via a new at-grade roundabout, before rising up on an embankment (maximum height approximately 8.5 metres), to cross both the Norwich to Cromer & Sheringham rail line and the C874 Plumstead Road on individual bridges in close proximity, prior to a new at-grade roundabout on the NDR, which would connect it via a new link road to a further small at-grade roundabout on the C874 Plumstead Road.

13.6.5 The NDR route would then continue southwards, crossing under the C442 Middle Road (which would be raised to pass over the NDR, on its existing alignment, via a new bridge) before connecting with a new at-grade roundabout known as the Business Park Roundabout.

13.6.6 At this point a single carriageway link is provided westwards to the existing C829/C830 Broadland Way/C831 Peachman Way roundabout and includes an at-grade roundabout on the link road to the proposed Broadland Gate Business Park.

13.6.7 From the Business Park roundabout the NDR proceeds southwards as a dual carriageway to a new Postwick North East at-grade roundabout immediately north of the A47(T) Norwich Southern Bypass. This roundabout has links from

a new A47(T) eastbound diverge slip road and a new A47(T) eastbound merge slip road. The NDR continues over the A47(T) as a four lane carriageway, one lane north and three south, on a new bridge and terminates at its southernmost point at a signalised junction, which replaces the existing Park and Ride roundabout with the A1042 Yarmouth Road.

13.6.8 This signalised junction provides further links:

- Directly to and from the park and ride site for buses;
- West to the existing Postwick North West roundabout, via the existing Postwick bridge over the A47(T);
- East to the proposed park and ride site entrance at the proposed Oak's Lane roundabout and further east to the Brundall Low Road junction with the A1042 Yarmouth Road to Postwick village; and
- West to the A47(T) via an existing westbound merge slip road.

13.6.9 The works at Postwick Junction, will include modifications to the existing Postwick North West roundabout (as a result of closing the existing eastbound diverge slip road) and to the existing A1042 Yarmouth Road overbridge of the A47(T), to provide revised traffic lanes and the provision of a shared use cycle/footway.

13.6.10 The route of the NDR that has been described above is, for the majority of its length, within Broadland District. It does, however, for a short stretch close to Norwich International Airport, fall within the administrative area of Norwich City Council. A very small part of the works at Postwick falls within the administrative area of The Broads Authority. The new road from west to east runs through the following parishes:

- Attlebridge;
- Taverham;
- Drayton;
- Horsford;
- Horsham St. Faith and Newton St.Faith;
- Spixworth;
- Beeston St. Andrew;

- Sprowston;
- Rackheath;
- Great and Little Plumstead; and
- Postwick with Witton.

Overview of scheme features

13.6.11 As described above, the scheme consists of a number of different features which are detailed further below. The location of the proposed Scheme features is measured by reference to the “chainage”, which is the distance from the start of the scheme, at its junction with the A1067 Fakenham Road, in metres.

13.6.12 There will be ten new highway structures, which consist of six overbridges and four underbridges carrying the following existing routes, or new routes as necessary, either under or over the NDR.

Socio-economic context

13.6.13 Norwich is the largest city in East Anglia and the economic centre of Norfolk. The success of ‘Greater Norwich’ – which includes the city and two surrounding districts (Broadland and South Norfolk) – is vital to the economic success of Norfolk and of the East Anglian sub-region.

13.6.14 The Scheme (the Norwich Northern Distributor Road, known as the NDR) is a dual carriageway all-purpose strategic distributor road, which would link the A1067 Fakenham Road, near Attlebridge to the A47 Trunk Road (T) at Postwick. This will be over a length of approximately 20.4km. A full description of the NDR can be found in in the Scheme Description within Chapter 2 :, Volume 1 of the Environmental Statement. See also General Arrangement Plans within Appendix A :, Volume 1 of the Environmental Statement.

13.6.15 The scheme objectives which are most relevant in terms of socio-economics are:

- To provide access to and help to deliver, planned and potential areas of growth, and enable those areas to be free of the need to incorporate provision for extraneous traffic and provide improved transport connectivity, including

with the national strategic road network, for existing and future areas of residential and employment development, Norwich International Airport and the wider area of north and north-east Norfolk.

- To increase the opportunities for improving provision for public transport and other sustainable forms of transport and for improving traffic management within the City Centre, thereby encouraging modal shift.
- To improve traffic related environmental conditions for residents in the northern suburbs of Norwich and outlying villages, whilst minimising the adverse environmental impacts of the NDR.

13.7 Legislation and policy

13.7.1 The following section presents the key planning, transport and economic policy documents which relate to the socio-economic assessment of the NDR scheme.

National Policy

13.7.2 In 2010, The Cabinet Office White Paper 'Local growth realising every place's potential' introduced its vision of a fairer and more balanced economy. At the heart of this vision lies a commitment to achieving sustainable growth for all areas of the country including a new approach to local growth. As part of this vision, Regional Development Agencies (RDAs) were replaced by Local Enterprise Partnerships (LEPs). Subsequently, 39 LEPs have been created, one of which is the New Anglia LEP, which covers Norfolk and Suffolk (see below).

13.7.3 The Localism Act 2011 further reinforced the policy commitment to local growth, by introducing a wider range of measures that devolved more powers to councils and neighbourhoods, giving local communities more control over local decisions. Of specific relevance, was the Core Cities Amendment, now to be found in section 15 to 20 of the Localism Act 2011, which allowed Local Authorities in cities such as Norwich to make the case for new powers to promote economic growth and to set their own distinct policies.

13.7.4 In support of this, the Cabinet Office's White Paper 'Unlocking growth' in cities introduced the City Deal initiatives. 'City Deals' agreements have since been established between government and key national cities in England. Selected cities, including the city of Norwich, will be granted new powers and freedoms

in exchange for taking on responsibility for creating economic growth. The deal is currently being negotiated with central government.

13.7.5 The fusion of sustainable growth and localism have also proved central to the Department for Transport's (DfT) vision of local transport as demonstrated in its White Paper 'Creating Growth Cutting Carbon: Making Sustainable Local Transport Happen' published in 2011. Sustainable growth was identified within the White Paper as one of the country's biggest tests, with transport playing an essential role in meeting this challenge. As both an engine for growth and key to improved, safer and greener living standards, the report presented a number of provisions that enable sustainable transport choices; make public transport more attractive; support more active travel (shifting from the car to walking and cycling); and facilitate traffic management that reduces carbon emission and tackles congestion. Provisions also focused on 'decentralising power' through the local delivery of transport. This included the establishment of Local Transport Bodies in 2012 (DfT (2012) Local frameworks for funding major transport schemes: guidance of local transport bodies) and increased 'decentralised planning' through the establishment of the 'New Planning Policy Framework' (NPPF) and powers provided by the Localism Act (2011).

13.7.6 In 2012, the DCLG published the NPPF which simplified and consolidated national planning guidance and replaced the existing DCLG 'Planning Policy Statements'. The delivery of sustainable development is central to the NPPF. Thirteen headings are included that aim to meet this challenge, with the following headings of particular relevance to the NDR:

- 1) Building a strong, competitive economy
- 2) Ensuring the vitality of town centres
- 3) Supporting a prosperous rural economy
- 4) Promoting sustainable transport; and
- 5) Delivering a wide choice of high quality homes.

13.7.7 The NPPF continues to demonstrate a commitment to localism. Under the NPPF, local authorities are now granted greater control over local planning, alongside a new statutory duty to cooperate (as public bodies involved in plan-making). In addition, the 'Local Plan', the keystone of the planning system, is also produced local by community partners working together. In Greater Norwich, following the publication of the NPPF this has resulted in

‘Emerging Local Plans’ in Norwich, Broadland and South Norfolk, which feed into and correspond with the JCS for the Greater Norwich area.

Sub-national policy

13.7.8 LEPs, established in 2011, are seeing increasing resources and responsibilities devolved to them by Government. The New Anglia LEP (New Anglia LEP (2013): ‘New Anglia LEP: Operating Plan 2013-14 – 2014/15’) is regarded by the Government as one of the best performing LEPS. It has so far secured more than £22m in Government funding, has been awarded an Enterprise Zone and is a national leader in green economy initiatives. It has published three key policy documents of relevance to the NDR – ‘Towards a Growth Plan’, the accompanying Operating Plan (2013) and the Green Economy Pathfinder.

13.7.9 ‘Towards a Growth Plan’ and the ‘Operating Plan for 2013/14 – 2014/15’ form the wider strategic plan for growth for the New Anglia area and set out the key challenges and aims identified by the LEP. The plan sets out the path for sustainable development within the region and identifies the priority areas of tourism, energy, business support and the green economy as sectors for immediate growth and private sector job creation. The LEP’s aims for development reflect Norfolk County Council’s (NCC) economic growth strategy, identifying the NDR as a key element of transport infrastructure which will help to facilitate the current and forecasted rates of economic, employment and housing growth by creating links to key employment and strategic development sites. The NDR also complements the plan’s six overlapping themes, in particular: (1) the green economy, (2) sector groups with reference to energy and (3) business support specifically rural businesses.

13.7.10 The New Anglia ‘Green Economy Pathfinder Manifesto 2012–15’ sets out a vision to build a green economy in a sustainable way and to lead the transition towards a green economy. The overall ambition of the pathfinder is to achieve sustainable low-carbon growth, skills development and employment in Norfolk and Suffolk, and to contribute to the better positioning the UK in the competitive global marketplace. Of relevance to the NDR, is the role that the manifesto envisages transport as playing in the green economy and specifically, investment in transport infrastructure and public transport are recognised as essential to promoting environmentally efficient economic growth. The NDR objectives of reducing congestion in Norwich and the rat running communities in North and East Norfolk, and the freeing up of road

space for improvements to public transport and cycling and pedestrian facilities complement these goals.

13.7.11 The other key regional policy documents of significance to the NDR are produced by NCC – ‘Delivering Economic Growth in Norfolk – The Strategic Role for Norfolk County 2012–17’ and Connecting Norfolk- Norfolk’s Transport Plan for 2026’

13.7.12 NCC has produced its economic growth strategy to support the area’s development for 2012-2017. The strategy identifies a number of key challenges including infrastructure constraints; securing infrastructure funding; encouraging business start-ups; securing investment from key growth sectors and tackling the mismatch between skills and employability. To meet these challenges, the strategy has identified five priority themes; the aims and objectives of the NDR complement these aims, in particular themes 1, 2 and 3 which make reference to the contribution the NDR and its role in contributing to the Infrastructure Plan (1) business growth (2) and support for the key sector of off shore energy (3). In addition, the NDR is recognised as a key infrastructure priority and considered by the strategy as vital to the continued economic success of the Greater Norwich area and also beneficial to the surrounding areas of North Norfolk and Great Yarmouth.

13.7.13 NCC’s Third Local Transport Plan ‘Connecting Norfolk’, sets the longer term strategy for transport delivery up to 2026. The transport vision put forward within the plan is ‘a transport system that allows residents and visitors a range of low carbon options to meet their transport needs and attracts and retains business investment in the county’. The implementation of the NDR is considered as central to the aims of sustainable growth and strategic connections within the plan and to the achievement of policy 6: ‘Transport Infrastructure to Support Growth’ and policy 7: ‘Strategic Connections’.

Local policy

13.7.14 NATS was originally introduced in the 1980s, with the present NATS4 strategy adopted in 2004. NATS4 sets out a transportation and implementation strategy until 2021, covering the city of Norwich, its suburbs and immediate surrounding villages. It is a strategy prepared by Norfolk County Council, in partnership with Norwich City Council, Broadland District Council and South Norfolk Council. NATS4 recognises the need for essential infrastructure to accommodate growth within Norwich and the major urban extension to the north east of Norwich. Norwich is also envisioned as a

sustainable community, which requires policies that will help to reduce the impact of traffic on the city, whilst extending the pedestrian dominance of the city centre. The strategy identifies the NDR as essential to achieving both.

13.7.15 In addition to being a specific NATS4 policy area (policy 2), the NDR is also identified as critical to a number of other NATS4 polices including:

- Policy 1 - Development and growth – this focuses on the implementation of transport improvements that support and enhance the local economy and role of the Norwich Area as a regional centre; the NDR is identified as a key part of this strategy.
- Policy 6: Residential streets and minor rural roads around the north of Norwich - the NDR is recognised as a solution to the use of unsuitable routes by traffic travelling around the north of the city.
- Policy 46: Congestion – tackling congestion on the primary distributors is targeted for action, where this is consistent with environment and air quality, road safety, economic regeneration or other community benefit aims.

13.7.16 The Greater Norwich Economic Strategy is prepared by the Greater Norwich Development Partnership (GNDP) . The Greater Norwich Development Partnership is composed of Broadland District Council, Norwich City Council, and South Norfolk Council working together with Norfolk County Council and the Broads Authority. The Partnership is responsible for the local growth strategy for the area and has recently produced the Joint Core Strategy for Broadland, Norwich and South Norfolk. It defines the priorities in Greater Norwich for 2009 – 2014 and the strategy for sustainable growth within the region. The strategy includes a vision of Greater Norwich as one of England’s major city regions with a rapidly growing diverse and sustainable economy’ that provides ‘all its residents with opportunities and a great quality of life’. The NDR is recognised as a key component of this vision.

13.7.17 The strategy highlights a number of key challenges for Greater Norwich that include the need to improve ‘international, national and regional connectivity through air rail and roads and [to] promote sustainable transport”. Objective 3 of the strategy ‘ Infrastructure for Business’ aims at ensuring that Norwich has the necessary infrastructure and quality of environment to attract and retain investment and support business’ growth. Central to achieving this objective is priority 1: the development of an improved and sustainable transport and communications infrastructure to support planned growth and development. The NDR is explicitly identified within the strategy as an

essential action for achieving objective 3 and developing and supporting local business infrastructure.

13.7.18 As part of wave two of the 'City Deals' negotiations in February 2013 to the Cabinet Office, Greater Norwich was granted City Deal status (though the deal itself is still being negotiated) following the submission prepared by NCC, Norwich City Council, Broadland District Council, and South Norfolk Council. The importance of infrastructure in supporting economic growth in Greater Norwich is reiterated through the City Deal objectives. A key aim is to catch up on the 'lost decade' of lost jobs and output. Specific emphasis is put on planned growth at the Norwich Research Park (NRP), which will act as a catalyst to deliver for economic growth and releasing private sector investment and jobs to support business and employment development. The City Deal aims to deliver

- 40,000 new jobs;
- 37,000 new homes for greater Norwich;
- 50 per cent increase in knowledge based businesses;
- 30 per cent increase in GVA above trend; and
- An international flagship for life sciences enterprises.

13.7.19 The NDR is a key piece of infrastructure to assist in the realisation of these aims.

13.7.20 The JCS for Broadland, Norwich and South Norfolk has been prepared by the three councils of Broadland, Norwich and South Norfolk, working together with NCC as the GNDP, as described above. The JCS sets out an over-arching strategy for growth across the three districts, identifies key locations for growth and sets out policies for future sustainable development. It contains twelve over-riding objectives, which underpin the spatial vision for housing and employment in the area. It aims to create some 36,000 new homes and 27,000 new jobs between 2008 and 2026 in the Norwich urban area, as well as mixed use urban extension into the Old Catton, Sprowston, Rackheath and Thorpe St Andrew growth triangle. It should be recognised that the housing and employment figures will not match for each strategy due to contrasting ambitions, geographical areas and the rapidly changing economic environment.

13.7.21 The NDR has a strategic role in supporting development and growth in the area and is identified as important to the following spatial planning objectives:

- Allocating enough land for housing, and affordable housing, in the most sustainable settlements.
- Promoting economic growth and diversity, and providing a wide range of jobs
- Promoting regeneration and reduce deprivation.
- Making sure people have ready access to services - wherever new homes and jobs are developed there will be a need to provide adequate supporting services.
- Enhancing transport provision to meet the needs of existing and future populations while reducing travel need and impact.
- Encouraging the development of healthy and active lifestyles - giving people better opportunities to make healthy travel choices as part of their daily lives.

13.7.22 The JCS also provides the overarching vision for the Local Development Frameworks (LDFs) at district and city level. LDF include a suite of planning policy documents that guide and manage new developments in the area and replaces the local plan and is constituted by the JCS, the Site Allocations Plan, the Development Management Policies (DMP) specific area action plans, and the remaining local plan policies consistent with the NPPF. Each of the three local councils have prepared DMPs, with a number of specific area action plans for the Growth Triangle (Broadland), Long Stratton (South Norfolk) and Wymondham (South Norfolk).

13.7.23 The NDR will support and complement a number of policy objectives included within the local DMPs. For example the 'Development Management Policies Development Plan' for Norwich submitted in April 2013, includes a number of policy areas of where the implementation of the NDR is relevant – this includes sustainable development (DM1), housing development (DM12), employment and business development (DM18 and DM19), development and the airport (DM27) and sustainable transport (DM28). This is also reflected within the DMP for Broadland, where the NDR will also support policies for employment sites (E1, E2 and E3), transport including the protection of land for transport infrastructure (TS1), airport development (TS4) and access to principal and main distributor routes (TS6). In addition to this, the DMP for South Norfolk – specifically policies addressing sustainable development (DM

1.1), infrastructure requirements (DM 1.2), economic development and growth (DM 2.1.1), rural tourism development (DM 2.9) and the promotion of sustainable transport (3.11) will also be supported by the scheme.

13.7.24 In addition, the aims and objectives of the NDR will also be of key relevance for areas covered by area action plans. The Area Action Plans for Long Stratton and Wymondham in South Norfolk for example, show that the NDR may help to support the policy objectives related to housing and employment. The NDR is of particular relevance to the Area Action Plan for the Growth Triangle in Broadland, where the implementation of the NDR is identified as critical to the growth strategy for the area and the policy areas related to housing (6.3), employment (6.4), transport and accessibility (6.7) and sustainable development of the overall area (6.2) including the development of the new urban quarter and villages within the growth triangle.

Policy summary

13.7.25 The policy context for the NDR has, within recent years, experienced a great of change – as the policy drivers of localism and sustainable development have transformed the shape of national, regional and local level. It is evident that the objectives and aims of the NDR complement the aims and objectives found across the different policy levels. It is also clear that scheme is regarded as critical to the achievement of county and local sustainable transport policy and sustainable economic growth.

13.8 Approach and methodology

Introduction

13.8.1 This chapter explains the approach that has been used to produce this socio-economic assessment. It is structured as follows:

- identification of the spatial scope of the assessment;
- identification of temporal scope of the assessment;
- identification of sensitive receptors;
- methodology – which sets out the different research stages undertaken;
- development of assessment criteria; and
- assumptions and limitations.

13.8.2 It should be noted that the methodology set out below has been updated from that set out in the scoping document. The approach remains consistent but expands on the assessment process in order to make the assessment more quantitative and robust.

13.8.3 In addition, the methodology used to undertake this socio-economic assessment differs from the approach used within the 'Land-use and economic development report' for NDR, published separately. The purpose and as such the assessment criteria of each assessment is different and as such the predicted effects (see chapter four) are also different.

Spatial scope

13.8.4 Socio-economic effects have been assessed according to two key impact areas:

- The Local Area of Influence (LAI) for socio-economic effects (such as impact on local businesses and improved accessibility) within the study area that covers the 500m buffer zone either side of the NDR route.
- The Wider Area of Influence (WAI) for socio-economic effects on the areas of 'Greater Norwich; for the purposes of this assessment Greater Norwich is defined as the three districts of Norwich, Broadland and South Norfolk

13.8.5 Figure F.1 in Appendix F illustrates the location of the proposed NDR scheme, the LAI and the WAI,

13.8.6 For comparative purposes (i.e. to compare the LAI and WAI to wider geographies), where available, baseline socio-demographic data has also been compiled for the county of Norfolk and for New Anglia LEP, where available and appropriate.

Temporal scope

13.8.7 The baseline for this assessment is 2011, with Census 2011 data being the most reliable and up to date data available.

13.8.8 The current construction programme assumes that construction would commence in May 2015 and preliminary work in relation to the construction methodology indicates that construction works would last for approximately 24 months. This provides the timescales in which immediate impacts as a result

of construction will be felt – though for all identified impacts in this technical appendix, more specific timescales are provided where possible.

13.8.9 The scheme will be operational by 2017 and long-term operational impacts are assessed over a period of 15 years.

Sensitive receptors

13.8.10 Socio-economic receptors are individuals, groups or entities whose access to, and control over, socio-economic assets, resources and opportunities may be affected by the proposed development. These include people using the route, living in the LAI and WAI as well as local businesses.

Whilst this socio-economic assessment will also consider the effects on receptors within the WAI, sensitive receptors are considered to be those within the LAI.

Methodology

13.8.11 This assessment considers both direct and indirect socio-economic effects of the NDR scheme. It should be noted that EIA Regulations do not prescribe in detail the types of issues that should be considered within a socio-economic assessment, nor do they set out a precise methodology. The approach within this assessment is based on EIA best practice, the requirements of Volume 11, Section 2, Chapter 3 of the Design Manual for Roads and bridges (DMRB), and tailored to specifically reflect the proposed development. The steps undertaken are set out below:

- 1) Review of policy to identify local, sub-national and national planning and economic development objectives.
- 2) Identification of socio-economic resources and receptors along the route and within the LAI and WAI, through site visits and analysis of maps of the route.
- 3) Development of a baseline of the socio-economic conditions in the LAI and WAI together with county, LEP and England comparators to enable an analysis of the wider socio-economic effects including jobs created and wider economic effects. This is supported by wider economic impact work assessing multiplier effects and uplift in GVA.
- 4) Identification of components of the scheme that could have an effect on those receptors and resources (including, for example, employment uplift, economic

activity, access to housing and employment land), through examination of the planned route and its supporting documentation; and

- 5) Assessment of the significance of those effects on the receptors and resources in question, incorporating any mitigation measures included within the scheme design as well as any further mitigation measures identified as part of this assessment, and assessing any residual effects.

13.8.12 The following additional processes were used to support the findings of the assessment:

- Consultation: While there is no statutory consultation process required specifically for the purposes of a socio-economic assessment, public consultation has been undertaken as part of the Development Consent Order (DCO) processes and the Environmental Statement. Where relevant, this has been captured in the sections that follow. No additional consultation with local businesses or local residents has been undertaken specifically for this part of the assessment.

13.9 Assessment criteria

13.9.1 The significance of the socio-economic effects associated with the proposed NDR scheme is assessed using the approach described in the following sections.

Construction

13.9.2 For the construction period, the direct and indirect effects on the following have been considered:

- economic conditions – temporary employment for construction workers and short-term increases in economic activity due to construction;
- existing local businesses – temporary disruption to local businesses and reduced or disrupted access to businesses during construction works; and
- local people – temporary disruption to residents during construction works, including community severance; reduced residential amenity; and loss of community services / facilities.

Operation

13.9.3 For the operation, the direct and indirect effects on the following have been considered:

13.9.4 economic conditions – any permanent changes to employment or economic activity as a result of the scheme; attraction of new businesses;

13.9.5 existing local businesses – any changes in trade likely to result from operation of the trolleybus routes, and impacts on journey times;

13.9.6 local people – impacts on journey times and economic inclusion; and

13.9.7 regeneration – contribution to wider local and sub-national regeneration, economic development and social inclusion objectives.

Determining significance

Magnitude of effect

13.9.8 Each effect identified will be assessed in terms of the following indicators:

- beneficial or adverse – whether the development will benefit or dis-benefit socio-economic receptors;
- spatial scope – whether impacts will be felt in the LAI or more widely;
- extent – how many socio-economic receptors are likely to be affected;
- duration – whether the impacts will be short or long-term; and
- reversibility – whether the effects are permanent or temporary.

13.9.9 Taking these indicators into consideration, and also mitigation measures that can be applied to overcome any adverse effects, the criteria will be used as guidelines to assess the magnitude and significance of each effect. This is described in more detail in Table 13.8.

Table 13.8: Socio-economic magnitude

Magnitude	Criteria Guidelines
Major	A probable effect that either affects the well-being of many receptors within a widespread area or continues beyond the project life and is effectively permanent, requiring considerable intervention to return to the baseline. Alternatively, a probable effect that affects a high value socio-economic resources or processes that services large areas (e.g. at a district -level.)
Moderate	A possible effect that will likely affect either the well-being of receptors beyond the site boundary into the local area or continue beyond the project life so that the baseline is re-established within a year or so, perhaps with some intervention. Alternatively, a possible effect that affects a medium value socio-economic resource that services areas at a ward level.
Minor	An effect that may affect the well-being of a small number of receptors, or occurs exceptionally, mostly within the site boundary and does not extend to beyond the life of the project so that the baseline returns naturally or with limited intervention within a few months. Alternatively, an effect that affects a lower value community resource that provides a local service.
Negligible	An effect that is localised to a specific location within the project site and is temporary or unlikely to occur with no detectable effect on the well-being of people or a socio-economic resource so that the baseline remains consistent.

13.9.10 The magnitude of both beneficial and adverse effects is recorded for the assessment.

Sensitivity of receptors

13.9.11 Receptors relevant to the socio-economic assessment are set out above. The sensitivity of receptors is governed by their capacity to cope with

changes that ultimately reflect their vulnerability; that is their access to, or control over, additional or alternative resources of a similar nature.

Table 13.9: Sensitivity criteria

Sensitivity	
High	An already vulnerable receptor with very little capacity and means to absorb changes
Medium	A non- vulnerable receptor with limited capacity and means to absorb changes
Low	A non-vulnerable receptor with sufficient capacity and means to absorb changes.

Level of significance

13.9.12 Significance is a product the magnitude of an effect and the sensitivity (importance) of the receptor that is experiencing the impact. Each type of effect will be allocated a level of significance as shown in Table 13.10 below.

Table 13.10: Evaluation of significance

		Sensitivity		
		Low	Medium	High
Magnitude	Negligible	Not significant	Not significant	Not significant
	Minor	Not significant	Not significant	Significant
	Moderate	Not significant	Significant	Significant
	Major	Significant	Significant	Significant

13.10 Assumptions and limitations

Assumptions

13.10.1 This assessment has been based on the following assumptions:

- The majority of the data used to define the baseline economy and social conditions is compiled from existing published sources (including Census 2011 data, mid-year population estimates, Neighbourhood Statistics, Nomis and the Department for Communities and Local Government).
- The assessment of certain effects including those concerning jobs created, journey times and wider economic impact are based on modelling undertaken as part of the scheme development.
- The assessment includes no references to community resources or facilities, such as education, health or Public Right of Ways (PRoWs). These are covered in the relevant chapters of the ES Report – including ‘Effects on All Travellers’, ‘Noise and Vibration’ and ‘Air Quality’.

Limitations

13.10.2 The following limitations should be taken into account when considering of the findings of this assessment:

- The assessment was undertaken primarily through the review and analysis of available secondary data such as publicly available reports, policies, published data and the scheme design details.
- The baseline used is 2011, although wherever possible assessments are based on the most recent data available for the LAI and wider areas covered by the assessment. The currency of data varies from dataset to dataset depending on how frequently information is collected; dates for each dataset are highlighted in the baseline section.
- Only limited information is available regarding from where the construction workforce will be drawn, making attribution of local employment effects more challenging.
- Impacts and effects relating to other environmental topics such as noise, visual, traffic and air quality that could also affect socio-economic receptors will be addressed in the respective sections and only be raised in the socio-economic assessment if there is a particular effect likely to arise beyond any

individual impacts on resources and receptors. This will avoid double counting of significant effects.

- Qualitative assessments of the impacts to socio-economic receptors (i.e. in terms of disruption, access and quality of life) have been based upon best practice.
- This assessment does not serve as a cost benefit analysis or a financial analysis of the proposed development. These are provided in other assessments of the scheme.

13.11 Baseline

Introduction

13.11.1 This chapter sets out the socio-economic baseline data that has been collated to inform the assessment. This section is not intended to be a full socio-economic profile of the impact areas; the data focuses on baseline data that is relevant to the scope of the potential effects of the development of the scheme. The baseline provides the social and economic context for the scheme and presents a snapshot of the relevant surrounding socio-economic receptors that are likely to experience any effects.

13.11.2 Greater Norwich has the largest economy in East Anglia and the highest ranking retail centre (GNDP (2012): 'GNDP Annual Monitoring Report 2011-12'). Outside of Norwich the area retains a largely rural character but with an urban fringe. Large parts of Broadland fall within the urban area and areas close to the city centre maintain a strong relationship to Norwich. Away from the urban area the district extends into a rural landscape distinguished by market towns and small villages. South Norfolk has a smaller urban fringe and large parts of the district are rural and remote, making use of a network of major centres such as Wymondham, Diss and Harleston, and smaller centres such as Loddon and Long Stratton to meet their everyday needs.

13.11.3 Across Greater Norwich, there are significant differences in wealth, and wages remain low. Broadland and South Norfolk for example, are generally relatively affluent with small dispersed pockets of deprivation in only some rural areas. Norwich by contrast is more deprived, with extensive areas experiencing high levels of deprivation. Traditional industries of manufacturing and farming are also now of declining importance. Whilst, agriculture remains the largest user of land and automotive engineering remains strong, the service sector has grown considerably in both strength and importance in recent decades. (GNDP (2010): 'An economic assessment of Greater Norwich').

13.11.4 Figures presented below are for the LAI (consisting of a 500m buffer surrounding the proposed NDR scheme boundary), while wider comparisons are made with the WAI (Greater Norwich - Norwich, Broadland and South Norfolk), Norfolk and the New Anglia LEP area. Figures for England are provided to provide the context for local figures – to show whether the profile of the assessment area is broadly in line with national averages or not.

Population

Population, growth and density

13.11.5 The population within the Greater Norwich area has been increasing steadily over recent years. In all three districts the population has continued to increase with nearly 30,000 more people living in the area now compared to 10 years ago.

13.11.6 The table below shows the total population for the LAI, WAI, constituent districts as well as Norfolk and the New Anglia LEP area:

Table 13.11: Population of LAI and WAI(Source: Census 2011)

Area	Total population
LAI (500m Buffer)	10,175
Norwich	132,512
Broadland	124,646
South Norfolk	124,012
WAI (Greater Norwich)	381,170
Norfolk	857,888
New Anglia LEP	1,586,051

13.11.7 The area within 500m of the NDR route (the LAI) had a population of just over 10,000 according to Census 2011 data. The total population in the Greater Norwich area (the WAI) was just over 380,000 in 2011. (Norfolk Insight (2012): 'Demography').

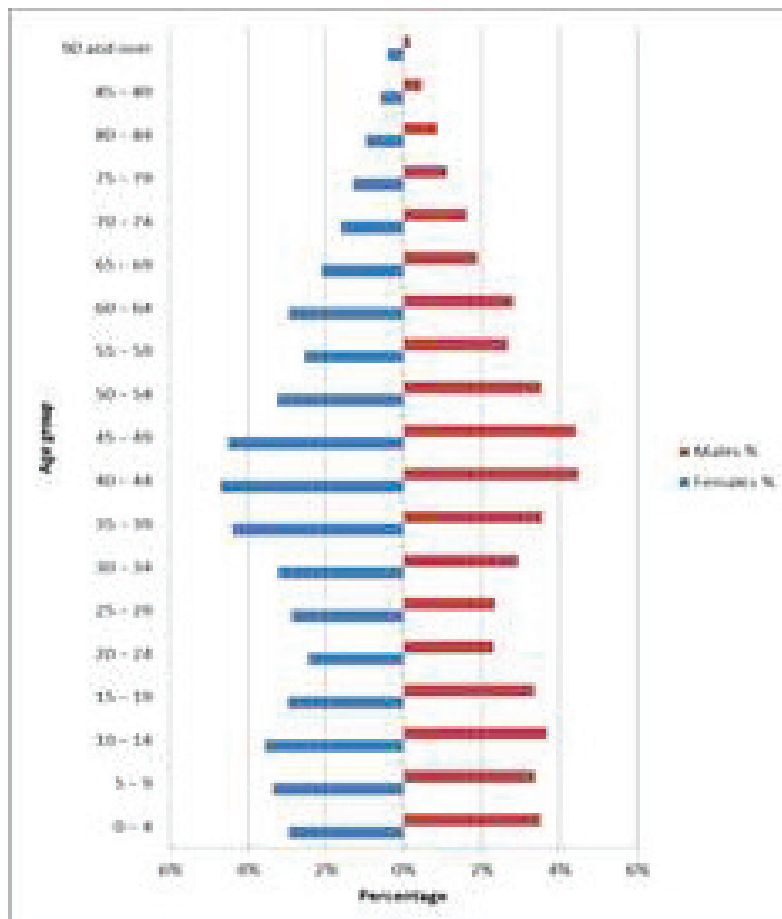
13.11.8 Figure F.2 in Appendix F illustrates the population density of the LAI and WAI.

13.11.9 Overall the WAI is characterised by low population density, however much of Norwich and a few areas in the south of Broadland are densely populated. Within the LAI itself population density is low.

Age profile

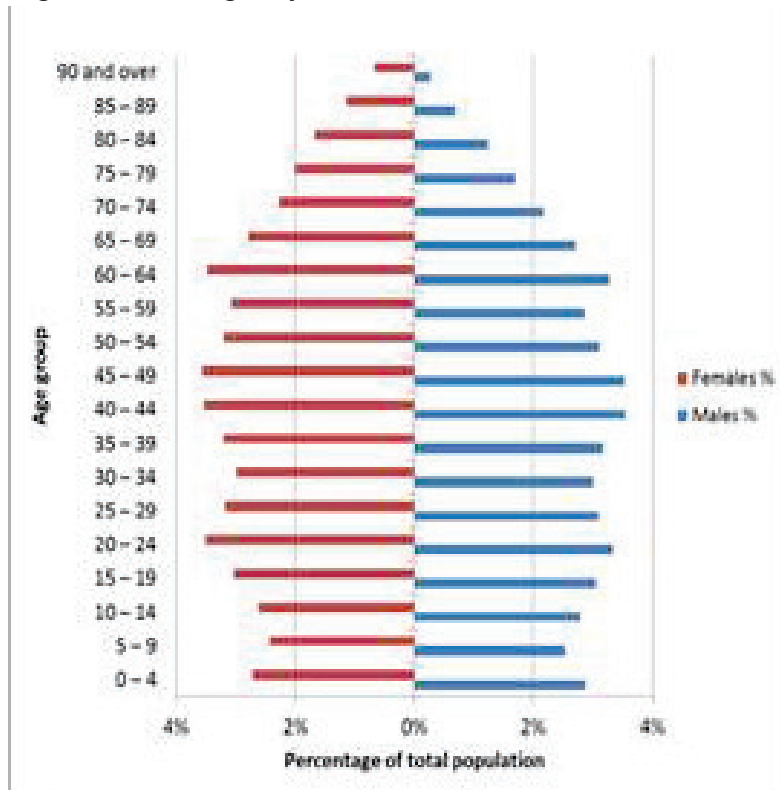
13.11.10 The age pyramids below illustrate the population by five year age bands.

Figure 13.1: Age Pyramid for LAI



Source: Census 2011

Figure 13.2: Age Pyramid for WAI



Source: Census 2011

13.11.11 Within the LAI and WAI it can be noted:

- The LAI has a slightly higher proportion of children aged under 16 (22%) than the WAI and Norfolk (both 17%) and New Anglia LEP (19%)
- The LAI and the WAI have slightly higher proportions of working age people (aged 16 – 64) (65% and 64% respectively) than Norfolk and New Anglia LEP (both 62%).
- A lower proportion of older people (aged 65 and over) live within the LAI (13%) compared to the other geographic comparators (WAI,19%, Norfolk 22%,New Anglia LEP, 21%)
- There is variance within the WAI itself; Norwich has a higher proportion of working age people and a lower proportion of older people compared to both Broadland and South Norfolk.

The economy

Please note that the separately produced 'Land-use and economic development report' for NDR contains similar but slightly different data sets to those contained in this report, including OS Labour Market Statistics, 2013. The September 2013 data is based on economically active residents aged 16-64 and is not directly comparable with unemployment from Census 2011 though it does provide a reflection on the current position. As such, direct comparisons between the findings of the two reports should be avoided.

Employment and jobs

13.11.12 The employment rate in the LAI is 74%. This is high compared to the WAI (68%), Norfolk (64%) and New Anglia LEP area (65%).

13.11.13 Key employment sectors in Greater Norwich (the WAI) include public administration, banking and hospitality. The table below highlights the sector profile for Greater Norwich and its constitutive districts compared with Norfolk and East Anglia LEP. It shows that:

- Just over a quarter of the jobs in Greater Norwich are in the public sector (incorporating health and education), this is broadly equivalent to the LEP area percentage but remains lower than Norfolk.
- Greater Norwich also has a higher than average proportion of people working in the financial sector (21%) compared with 15% for the LEP area.
- Other key sectors in Greater Norwich include distribution, hotels and restaurants, where the proportion is similar to that for the LEP area and Norfolk.
- The lowest proportion of the population work in the agricultural sector (3%) and in energy and water (3%) across Greater Norwich. In both instances this is in line with the county and LEP area (2%).

*Table 13.12: Employment sector profile (Source: Annual Population Survey 2012
(Note that no figures were available for the LAI due to a lack of small area data
within this data set)*

	<i>Agriculture & fishing</i>	<i>Energy & water</i>	<i>Manufacturing</i>	<i>Construction</i>	<i>Distribution, hotels &</i>	<i>Transport & Communication</i>	<i>Banking finance & insurance etc.</i>	<i>Public admin education & health</i>	<i>Other services</i>
<i>Norwich (%)</i>	0%	0%	10%	6%	19%	7%	23%	31%	3%
<i>Broadland (%)</i>	2%	2%	12%	8%	17%	5%	20%	29%	5%
<i>South Norfolk (%)</i>	6%	6%	10%	8%	20%	10%	19%	20%	7%
<i>WAI (Greater Norwich) (%)</i>	3%	3%	10%	7%	19%	7%	21%	27%	5%
<i>Norfolk</i>	2%	2%	12%	8%	20%	7%	17%	30%	6%
<i>New Anglia LEP</i>	2%	2%	12%	8%	20%	8%	15%	27%	6%

Unemployment and worklessness

13.11.14 Within the LAI, unemployment remains low, with only 2% of the total population claiming Job Seekers Allowance (JSA). Whilst this proportion is similar to that of the WAI, it is lower than the figure for Norfolk (4%).

Table 13.13: Number and proportion of working age population claiming JSA (Source: Department for Work and Pensions (DWP via Nomis). Data relates to November, 2012.)

Area	Population 16-64	JSA Claimants (no.)	JSA Claimants (%)
LAI (500m Buffer)	6,609	104	2%
Norwich	91,460	4,540	5%
Broadland	75,841	1,520	2%
South Norfolk	75,194	1,620	2%
WAI (Greater Norwich)	242,495	7,680	3%
Norfolk	527,672	18,700	4%
New Anglia LEP	977,894	32,050	3%

13.11.15 Worklessness, which includes people not looking for work, also remains relatively low. The number of workless people claiming a key out of work benefit in the LAI is 385, equating to 6% of the working age population. This remains in line with levels for both Broadland and South Norfolk but is markedly lower than the district of Norwich (14%), Greater Norwich (10%), Norfolk (11%) and the LEP area (10%).

Table 13.14: Number and proportion of working age people claiming an out of work benefit (Source: Department for Work and Pensions (DWP via Nomis). Data refers to February 2013)

Deprivation

13.11.16 Figure F.3. in Appendix xF shows aggregate deprivation within the LAI and WAI by IMD quintile within the study impact area. The blue and green areas are less deprived while the orange and red areas are more deprived. Every three years the Department for Communities and Local Government publishes the Index of Multiple Deprivation (IMD) an index of all Lower Super

Output Areas (the smallest unit of local geography), ranked according to an aggregated score relating to deprivation (which covers a number of areas including employment, income, crime, health and access to services). All 34,000 LSOAs in England are ranked and divided into quintiles. The highest scoring 20 per cent are the 'most deprived' while the lowest scoring 20 per cent are the 'least deprived'.

- 13.11.17 Within the LAI deprivation remains low. All areas immediately surrounding the route fall within the least deprived IMD quintiles (one to three). The most deprived areas within the WAI are in Norwich.

Land use

The NDR passes through land that is predominantly rural farmland and former parkland (Beeston and Rackheath Halls) for most of the route. The route does also include some urban fringes particularly around Norwich Airport and Broadland Business Park – where land use includes residential, employment and commercial.

Residential sites

- 13.11.18 Within the WAI, housing allocations have been made as part of the JCS to ensure the delivery of at least 36,000 new homes between 2008 and 2026, of which approximately 33,000 will be within the Norwich Policy Area (NPA).
- 13.11.19 The strategic housing development areas within the WAI (those of over 300 dwelling, which are included within the JCS and therefore included in this assessment) are included in the table below. Allocation figures include allocations for Broadland (NPA) and the Andrew Growth Triangle. Both are proposed submission content following a high court decision to take both back to Regulation 19: Publication of Local Plan Stage. This content has now been resubmitted to the high court, following representations under Regulation 20 of the Town and Country Regulations.

Table 13.15: Strategic housing sites within the WAI (site in excess of 300 new homes)(Source: GNDP (2013): 'Joint Core Strategy for Broadland, Norwich and South Norfolk')

Location	Local Authority	Number of housing units
Core Development Area 3	Broadland	3000 - 4000
Core Development Area 2	Broadland	3000 - 4000
Core Development Area 1	Broadland	3000 - 4000
Sites R0983a, R0983b, 0542 & 0719 Long Stratton	South Norfolk	1200 - 1800
Three Score Bowthorpe	Norwich	1200
Site R1016, Site R0169, Site R0249a	South Norfolk	1200
Land north of Hethersett (Site no 950a)	South Norfolk	1080
Royal Norwich Golf Club, either side of Drayton High Road, Hellesdon	Broadland	800 - 1000
South and East of Easton (Site no 1152)	South Norfolk	900
Deal ground and May Gurney Sites	Norwich	600
Sites 0319, 0951c, R0983d & 0729	South Norfolk	600
West of Lodge Farm (site 0270a), Costessey	South Norfolk	500
Land adjoining Norwich City football Club, Kerrison Road	Norwich	400
Kerrison Road, Hardy Road Gothic Works	Norwich	400
Carpenters Barn (1)	South	350

Location	Local Authority	Number of housing units
	Norfolk	
King Street, Norwich	Norwich	335
Norwich Common (2)	South Norfolk	323
Rose Land and Mountergate, Norwich	Norwich	300
Hospital Grounds, southwest of Drayton Road, Hellesdon	Broadland	300
land north of Burgh Road and west of A140, Aylsham	Broadland	300
Land north of Shotesham Road, Poringland/ Framingham Earl	South Norfolk	300

13.11.20 Of these, the following are in part located within the LAI:

- Broadland Core Development Area 1 (The Growth Triangle)
- Broadland Core Development Area 2 (The Growth Triangle)
- Broadland Core Development Area 3 (The Growth Triangle)
- Royal Norwich Golf Club, either side of Drayton High Road, Hellesdon
- Hospital Grounds, south west of Drayton Road, Hellesdon

13.11.21 The total housing allocation for the areas within or intersecting with the LAI is between 10,000 and 13,300

13.11.22 The largest area of planned growth will therefore occur at the 'Growth Triangle' that is focussed on Old Catton, Sprowston, Rackheath and Thorpe St Andrew in Broadland, which will see an allocation of between 9,000 and 12,000 new homes including the eco-town at Rackheath.

Employment sites

13.11.23 Site analysis is also undertaken within the 'Land-use and economic development report'. Site analysis within this Socio-economics TA analyses different sites (and a different number of sites) for a different purpose to the analysis within the economic development report.

13.11.24 The key employment sites in the WAI and LAI are shown on Figure F.4 in Appendix F. These sites are comprised of the following land use types:

- mixed employment / commercial / retail land; and
- office / research space with a number of business parks and mixed use estates.

13.11.25 Within the WAI, key existing employment sites include:

- University of East Anglia/ Norwich Research Park (NRP)
- Norwich City Centre
- Bowthorpe Employment Area
- Hall Road
- Norwich International Airport
- Norwich Airport Industrial Estate
- Vulcan Road Industrial Estate
- Mason Road/Mile Cross Area
- Whiffler Road
- City Trading Estate
- St Andrews Business Park
- Broadland Business Park
- Meridian Business Park
- Rackheath Industrial Estate
- Aylsham estate

- Longwater
- Vinces Road Industrial Estate, Diss
- Border Valley Industrial Estate, Harleston
- Hethel (Lotus)
- Loddon Industrial Estate
- Broadhill Industrial Estate and Tharston Industrial Estate, Chequers Road, Long Stratton
- Ayton Road, Wymondham
- Gateway 11 Business Park, Wymondham

13.11.26 The WAI also includes a number of proposed new employment sites. These are:

- Norwich Aeropark
- Broadland Gate Business Park
- Rackheath Eco-town
- Beyond Green Land
- Hethel Technology Park
- Wymondham Employment Estate

13.11.27 The LAI includes a number of existing employment sites, including business parks and industrial estates.

- The south east of the NDR route includes two Business Parks in Thorpe St Andrew – Broadlands Business Park and Meridian Business Park.
- To the north east of the scheme, the Rackheath area includes Rackheath Industrial Estate and the proposed Rackheath eco-town development.
- Whilst immediately north of the route, a number of key developments are included surrounding Norwich International Airport – this includes the airport itself, Norwich Aeropark, Norwich International Airport Estate and Vulcan Road Industrial Estate.

13.11.28 A closer view of the LAI is shown in Figure F.5 in Appendix F, identifying clustered individual businesses along the NDR route.

13.11.29 A list of these businesses is provided in Appendix D. Appendix C also includes a table that describes the key employment sites that are within the WAI.

13.12 Mitigation and prediction of effects

Introduction

13.12.1 The following chapter describes the anticipated activities to be undertaken during the construction and operational phases of the NDR scheme which may result in impacts that could affect socio-economic receptors and resources. Mitigation measures to address the anticipated impacts are described, and then any remaining effects predicted to occur as a result of the scheme and post-mitigation are then outlined.

Works affecting socio-economics

Construction phase effects

13.12.2 During construction of the NDR scheme, potential socio-economic effects include the following:

- Direct employment through construction;
- Short-term increase in economic activity due to construction process;
- Temporary disruption to local businesses and reduced or disrupted access to businesses; and
- Land-take from existing businesses, disrupting business operations.

Operational phase effects

13.12.3 During operation of the NDR scheme, potential socio-economic effects include the following:

- Improved access to employment and other strategically important economic sites;
- Improved access to strategically important new housing sites;

- Supporting wider job creation and GVA growth in the WAI;
- Supporting wider growth in the WAI and East Anglia; and
- Supporting tourism in the WAI and Norfolk.

Mitigation

This section outlines the mitigation measures that will be incorporated into the scheme.

Construction phase mitigation

Construction Environmental Management Plan

13.12.4 This section outlines the key mitigation measures that will be incorporated into the scheme for the construction period. During the construction period, a Construction Environmental Management Plan (CEMP) will be produced (of which only a draft is currently available), which sets out measures to manage the effects of construction activities. The key measures that are established in the CEMP include:

- Communication and public liaison: Including with Broadland District Council; Natural England; Environment Agency; English Heritage; landowners and their agents; the general public
- Air quality: including management and minimisation of the effects of dust during the process.
- Noise control and monitoring: including use of 'best practicable means' for noise control and appropriate construction noise management in accordance with the Code of Practice BS 5228
- Lighting: In order to prevent excessive disruption, measures will be taken including: using downward directed lighting; avoiding excessive additional lighting; and directing lighting to where it is needed to avoid light spillage.
- Traffic disruption: construction movements and deliveries are subject to controls regarding routing, time of day, and point of access.
- Other aspects of construction: Including: construction compound layout and reinstatement; ecological management; pollution control; air quality management plan; and construction waste management.

13.12.5 Mid Norfolk Shooting School, a business located on the route, will experience severance of its access. Alternative access is being provided as part of the scheme.

Operational phase mitigation

13.12.6 No operational phase mitigation measures have been identified for socio-economics, as predicted operational effects for this discipline are considered to be positive.

Other proposed mitigation

13.12.7 Other mitigation measures are not incorporated into the programme of works as it currently stands. However, mitigation measures for both the construction and operational stages were also proposed during the consultation process. Stakeholders and consultees called for:

- Provision of safe diversionary routes around construction works.
- A footpath for pedestrian use on at least one side along the NDR. .
- Active management of obstacles on any walking routes so that they do not cause problems for those with visual impairments.
- Communication of changes to be made through NCC and Norwich City Council and interest groups (for example, the NNAB).
- Provision of adequate notice to local residents and facility managers prior to commencing works.
- Maintenance of existing traffic, cycling, pedestrian and public transport links where possible throughout the construction phase.
- Maintenance of pedestrian access to all adjacent properties and businesses.

13.12.8 Additionally, the contractors are seeking replacement land adjacent to the site of the City of Norwich Aviation Museum, who will lose an area of aeroplane display space to the scheme. Details on whether this land has been secured are not currently available.

Predicted effects

13.12.9 The following sections provide details of the effects predicted to occur as a result of the NDR scheme following implementation of the mitigation measures identified above.

Construction phase effects

13.12.10 This section predicts the direct and indirect effects of the development of NDR during the construction phase.

Direct construction effects

Direct employment through construction

13.12.11 The development of NDR will create temporary employment over the construction period. It is forecast that, at peak construction periods in the summer months (April to September) of 2016 and 2017, there will be approximately 200 employees working on the project. The majority of Birse Civils (the appointed contractor) staff will be existing employees, however it is anticipated that some agency staff from within the WAI (the Greater Norwich area) will also be employed. (Norfolk County Council (2013): 'Norwich Northern Distributor Road: Construction Methodology').

13.12.12 It is anticipated that a large proportion of staff will be based in the WAI (Greater Norwich) and that general labour and potentially some sub-contractors would be sourced from companies based in East Anglia. NDR works will be sublet in packages and the following packages have already been agreed (with core location of contractor identified in brackets):

- Earthworks package to Lancasters (Newmarket based);
- Surfacing package to Tarmac (Norfolk and Suffolk based); and
- Traffic Management to Road services (Peterborough based).

13.12.13 In terms of other trades, such as landscaping, a shortlist of three further sub-contractors has been agreed however details on these cannot be specified until sub-contracts have been let. (Norfolk County Council (2013): 'Norwich Northern Distributor Road: Construction Methodology').

- 13.12.14 Magnitude of effect: Minor beneficial as there will be a relatively small effects on employment opportunities in the LAI and WAI and these effects will be temporary.
- 13.12.15 Sensitivity of receptors: Low as many of the jobs that will result from the scheme will go to existing employees or contractors outside the LAI and WAI (although still in East Anglia). In addition, unemployment in the LAI and much of the surrounding area is low
- 13.12.16 Significance: Not significant

Short-term increases in economic activity during construction

- 13.12.17 There is likely to be an increase in economic activity as a result of the NDR contractor construction workers utilising local goods and services whilst employed on the scheme.
- 13.12.18 This activity is likely to be relatively minor as the vast majority of businesses in close proximity to the route are not retail-focussed in a way that would see them benefit (e.g. from additional trade, or service use).

Magnitude of effect: Negligible as additional activity is likely to be minor, temporary in nature and concentrated in the LAI.

Sensitivity of receptors: Low as additional activity and trade within the LAI and WAI would be a small increase when compared with existing business

Significance: Not significant

Disrupted access to existing local businesses due to construction traffic

- 13.12.19 The main construction site compound will be located on the airport land north of the NDR. This compound will have full welfare facilities, parking, accommodation, offices, plant storage and maintenance compound. Access to the compound will be from Cromer Road. Satellite compounds will also be constructed for office, parking and plant storage facilities at Drayton Lane, Buxton Road, Plumstead Road and Postwick. Smaller compounds will also be established at the sites of proposed bridges along the route. These will also provide welfare facilities, parking and material storage associated with construction activity. These sites will be restored and reinstated to their former

use on completion of the bridge construction. (Norfolk County Council (2013): 'Norwich Northern Distributor Road: Construction Methodology'). The list of compounds and their access and plant crossing activity is included in the table below.

Table 13.16: Compound sites during construction

Road	Site access requirements	Plant crossing
Fakenham Road	Eastbound access from existing highway	No
Marriott's and Breck Farm Way	None	Temporary crossing point
Reepham Road	Eastbound and westbound access	Yes (off peak)
Bell Farm	None	Temporary crossing point
Drayton Lane	Eastbound and westbound access	Yes
Holt Road	Eastbound and westbound access	Yes
Cromer Road	Eastbound access to Main Compound	Yes (off peak after Holt Road is closed)
Old Norwich Road	None	Temporary crossing point
Northern Airport access	None	Temporary crossing point
Quaker Road	None	Temporary crossing point
Buxton Road	Eastbound and westbound access	Yes
North Walsham Road	Eastbound and westbound access	Yes (off peak)
Beeston Farm	None	Temporary crossing point

Road	Site access requirements	Plant crossing
Wroxham Road	Eastbound and westbound access	Yes (off peak)
Newman Road	To offices and bridge site only	Temporary crossing point
Salhouse Road	Eastbound and westbound access	Yes
Plumstead Road	Access to compounds and bridge sites	No
Middle Road	None	No
Low Road	Eastbound and westbound access	Yes
Smee Lane	None	Yes
Postwick	Westbound access from new northern roundabout	No

13.12.20 4.22 Businesses located on the route, near to construction compounds, or along routes heavily used by construction traffic may experience negative impacts during construction. These impacts would include increased congestion and slow moving traffic and would cause disruption of usual access to these sites.

13.12.21 4.23 During the construction phase, the amount of traffic and numbers of Heavy Goods Vehicles (HGVs) are expected to increase on the road networks around the construction compounds and worksites. It is anticipated that during peak periods there will be up to 75 deliveries per day predominantly in 20 tonne eight wheeled wagons, in addition to staff and workforce transport.

13.12.22 4.24 The table below outlines the construction areas for the NDR route, and for each area where business are affected, these are identified, along with the duration of the disruption, calculated from likely start and end dates:

Table 13.17: Construction disruption to business sites along the proposed NDR route

Business areas impacted	Works areas (as specified in Construction Methodology)	Months' disruption
Broadlands Business Park/ Meridan Business Park	Low Road Overbridge To NDR Roundabout	32
Drayton	Bell Farm Overbridge To Drayton Lane Roundabout	22.5
	Drayton Lane Roundabout	
Horsford	Bell Farm Overbridge To Drayton Lane Roundabout	20.5
	Drayton Lane Roundabout	
	Drayton Lane Roundabout To Cromer Road Roundabout	
Great Plumstead	Railway Crossing To Plumstead Road Roundabout	32.5
	Borrow Pit - Plumstead Road To Postwick Hub	
	Plumstead Road North Roundabout & Link Road	
	Plumstead Road Rbt To Low Road Overbridge	
	Low Road Overbridge	
	Low Road North Embankment	
	Low Road South Embankment	
Rackheath	Buxton Road To North Walsham Roundabout	34.5
	North Walsham Roundabout	
	North Walsham Rbt To Wroxham Roundabout	
	Wroxham Road Roundabout To Newman Rd Overbridge	
	Newman Road Overbridge	

Business areas impacted	Works areas (as specified in Construction Methodology)	Months' disruption
	Newman Rd O/B. North Embankment	
	Newman Rd O/B. South Embankment	
	Newman Rd O/B To Salhouse Road Roundabout	
	Surplus Excavated Material Wroxham Rd To Salhouse Rd	
	Salhouse Road Roundabout	
	Salhouse Road Roundabout To Railway Crossing	
	Rackheath Railway Bridge	
	Rackheath Road Bridge	
Rackheath Industrial Estate	Wroxham Road Roundabout	33
	North Walsham Roundabout To Wroxham Roundabout	
Taverham	A1067 To Fir Covert Road	24
	Fir Covert Road (Turning Heads)	
	Fir Covert Road To Marriots Way Overbridge	
	Marriots Way Overbridge	
	Marriots Way - North Embankment	

Magnitude of effect: Moderate adverse as effects caused by construction traffic will last for as much as three years in some areas and will largely affect eight employment sites within the LAI.

Sensitivity of receptors: Low as most affected businesses will still be able to function.

Significance of effect: Not significant

Land-take from existing businesses, disrupting business operations

13.12.23 Construction of the NDR scheme will require land from Mid Norfolk Shooting School, which is located on Fakenham Road. Presently this business is accessed from the A1067; some of the land used for this access will be required for construction of the NDR but will be re-provided. Works in this vicinity will last for approximately 20 months, and access to the site will, therefore, be temporarily disrupted during this time. However, it is anticipated that the business will be able to trade as normal.

Magnitude of effect: Minor adverse because access will not be lost and will not have a permanent impact on the ability of the businesses to trade effectively

Sensitivity of receptors: Low due to the ability of the business to absorb the effects and continue to do business

Significance of effect: Not significant

13.12.24 The City of Norwich Aviation Museum is located on the Old Norwich Road at the airport site. Construction of the NDR will require land which is used for aeroplane displays. The loss of this land will mean reduced exhibition space and reduced capacity to earn revenue from operations using the space.

13.12.25 At the time of writing the contractors are seeking replacement land adjacent to the museum site but this had not been confirmed. Assessment is therefore made on the basis of this land being lost.

Magnitude of effect: Moderate adverse because a proportion of the display space will be lost, potentially affecting business revenue

Sensitivity of receptors: Low due to the overall ability of the business to absorb the loss of space and continue to do business

Significance of effect: Not significant

Operational phase effects

Direct operational effects

Access to employment and economic centres

13.12.26 The NDR will improve road access to a number of existing strategically-important employment sites and to other key economic drivers such as nearby business parks and Norwich Airport.

13.12.27 The changes in journey times to existing key strategic employment locations, economic centres and business districts throughout Greater Norwich are outlined in the tables below. Table 4.3 includes existing sites, while table 4.4 includes proposed sites.

- For each identified site three locations have been selected to provide indicative journey origin points. For these origin points the ‘centre’ for the largest settlements in each of the three districts that make up the study area have been chosen – Norwich, Taverham (in Broadland) and Wymondham (in South Norfolk). Clearly, not all journeys originate from these locations; they are intended to be indicative of potential changes and journey time savings as a result of the implementation of the NDR.
- The times indicated are for private transport during the AM peak for the year 2017. These times are intended to be indicative only. The detailed transport model for the NDR scheme has produced similar tables for the inter-peak and PM peak periods, for the return journey during that PM peak period, and for the second reference year 2032. Travel time impacts for other modes (such as public transport) have also been produced.
- The table provides journey times for two scenarios: one for ‘do nothing’, representing the network in its current form; and one for the ‘NDR’ in its current JCS configuration (which includes the Postwick Hub). The change in journey time between the two is illustrated in the far right column where decreases in journey time are marked in green and increases marked in red. No change in journey time is coloured orange.
- Using the traffic model to calculate journey times for the purposes of analysis in the HIA means that certain journey times in the ‘Do Something Scenario’ include Park and Ride interchanges, where this occurs there is scope for an additional artificial increase to the journey time included.

Table 13.18: Impact on journey times to existing strategic employment locations within Greater Norwich

Business District	Origin Point	Journey times		
		Do nothing	NDR	Change
Aylsham estate	Norwich	06 min 43 sec	06 min 36 sec	-00 min 07 sec
	Taverham	20 min 49 sec	17 min 16 sec	-03 min 33 sec
	Wymondham	21 min 10 sec	20 min 40 sec	-00 min 31 sec
Ayton Road, Wymondham	Norwich	18 min 26 sec	18 min 21 sec	-00 min 05 sec
	Taverham	25 min 58 sec	24 min 08 sec	-01 min 50 sec
	Wymondham	00 min 00 sec	00 min 00 sec	00 min 00 sec
Border Valley Industrial Estate, Harleston	Norwich	32 min 34 sec	32 min 41 sec	00 min 07 sec
	Taverham	42 min 28 sec	40 min 36 sec	-01 min 53 sec
	Wymondham	23 min 26 sec	23 min 26 sec	00 min 00 sec
Bowthorpe Employment Area	Norwich	15 min 53 sec	15 min 43 sec	-00 min 10 sec
	Taverham	12 min 12 sec	11 min 56 sec	-00 min 15 sec
	Wymondham	13 min 53 sec	13 min 44 sec	-00 min 08 sec
Broadhill Industrial Estate and Tharston Industrial Estate, Long Stratton	Norwich	30 min 58 sec	31 min 05 sec	00 min 07 sec
	Taverham	40 min 52 sec	39 min 00 sec	-01 min 53 sec
	Wymondham	21 min 50 sec	21 min 50 sec	00 min 00 sec
Broadland Business Park	Norwich	14 min 39 sec	14 min 31 sec	-00 min 07 sec
	Taverham	32 min 40 sec	18 min 58 sec	-13 min 43 sec
	Wymondham	14 min 53 sec	16 min 59 sec	02 min 06 sec

Business District	Origin Point	Journey times		
		Do nothing	NDR	Change
City Trading Estate	Norwich	06 min 43 sec	06 min 36 sec	-00 min 07 sec
	Taverham	20 min 49 sec	17 min 16 sec	-03 min 33 sec
	Wymondham	21 min 10 sec	20 min 40 sec	-00 min 31 sec
Gateway 11 Business Park, Wymondham	Norwich	18 min 26 sec	18 min 21 sec	-00 min 05 sec
	Taverham	25 min 58 sec	24 min 08 sec	-01 min 50 sec
	Wymondham	00 min 00 sec	00 min 00 sec	00 min 00 sec
Great Plumstead/ Thorpe End	Norwich	15 min 52 sec	15 min 44 sec	-00 min 08 sec
	Taverham	31 min 33 sec	17 min 46 sec	-13 min 48 sec
	Wymondham	21 min 17 sec	19 min 12 sec	-02 min 04 sec
Hall Road	Norwich	11 min 59 sec	12 min 6 sec	00 min 06 sec
	Taverham	27 min 18 sec	3 min 7 sec	-00 min 11 sec
	Wymondham	12 min 51 sec	12 min 49 sec	-00 min 02 sec
Hethel (Lotus)	Norwich	18 min 33 sec	18 min 41 sec	00 min 07 sec
	Taverham	32 min 55 sec	7 min 6 sec	-01 min 49 sec
	Wymondham	11 min 54 sec	11 min 54 sec	00 min 00 sec
Horsford (general area)	Norwich	19 min 17 sec	19 min 59 sec	00 min 42 sec
	Taverham	11 min 58 sec	9 min 29 sec	-02 min 29 sec
	Wymondham	2 min 43 sec	2 min 29 sec	-00 min 14 sec
Loddon Industrial Estate	Norwich	0 min 53 sec	0 min 59 sec	00 min 06 sec
	Taverham	14 min 56 sec	12 min 53 sec	-02 min 03 sec
	Wymondham	1 min 1 sec	0 min 49 sec	-00 min 13 sec

Business District	Origin Point	Journey times		
		Do nothing	NDR	Change
Longwater Park	Norwich	19 min 13 sec	19 min 14 sec	00 min 01 sec
	Taverham	17 min 43 sec	15 min 55 sec	-01 min 49 sec
	Wymondham	10 min 34 sec	10 min 33 sec	-00 min 01 sec
Mason Road/Mile Cross Area	Norwich	12 min 55 sec	12 min 41 sec	-00 min 15 sec
	Taverham	18 min 15 sec	14 min 44 sec	-03 min 30 sec
	Wymondham	1 min 14 sec	0 min 36 sec	-00 min 38 sec
Meridian Business Park	Norwich	14 min 57 sec	14 min 49 sec	-00 min 08 sec
	Taverham	8 min 58 sec	18 min 56 sec	-14 min 01 sec
	Wymondham	14 min 51 sec	16 min 58 sec	02 min 06 sec
Norwich Airport Industrial Estate	Norwich	16 min 28 sec	15 min 34 sec	-00 min 54 sec
	Taverham	16 min 23 sec	13 min 15 sec	-03 min 09 sec
	Wymondham	4 min 49 sec	3 min 46 sec	-01 min 04 sec
Norwich City Centre	Norwich*	7 min 53 sec	7 min 36 sec	-00 min 17 sec
	Taverham	20 min 26 sec	16 min 48 sec	-03 min 37 sec
	Wymondham	23 min 45 sec	23 min 4 sec	-00 min 41 sec
Norwich International Airport	Norwich	16 min 28 sec	15 min 34 sec	-00 min 54 sec
	Taverham	16 min 23 sec	13 min 15 sec	-03 min 09 sec
	Wymondham	4 min 49 sec	3 min 46 sec	-01 min 04 sec
Rackheath Industrial Estate	Norwich	18 min 16 sec	18 min 35 sec	00 min 18 sec
	Taverham	4 min 11 sec	14 min 28 sec	-13 min 43 sec
	Wymondham	22 min 8 sec	19 min 14 sec	-02 min 54 sec

Business District	Origin Point	Journey times		
		Do nothing	NDR	Change
St Andrews Business Park	Norwich	14 min 36 sec	14 min 29 sec	-00 min 07 sec
	Taverham	8 min 38 sec	20 min 16 sec	-12 min 22 sec
	Wymondham	16 min 12 sec	18 min 16 sec	02 min 04 sec
Taverham	Norwich	21 min 3 sec	20 min 7 sec	-00 min 56 sec
	Taverham	0 min 0 sec	0 min 0 sec	00 min 00 sec
	Wymondham	20 min 7 sec	20 min 4 sec	-00 min 04 sec
University of East Anglia/ Norwich Research Park (NRP)	Norwich	15 min 13 sec	15 min 8 sec	-00 min 05 sec
	Taverham	21 min 7 sec	19 min 57 sec	-01 min 10 sec
	Wymondham	11 min 41 sec	11 min 42 sec	00 min 01 sec
Vinces Road Industrial Estate, Diss	Norwich	8 min 34 sec	8 min 41 sec	00 min 07 sec
	Taverham	18 min 28 sec	16 min 36 sec	-01 min 53 sec
	Wymondham	23 min 26 sec	23 min 26 sec	00 min 00 sec
Vulcan Road Industrial Estate	Norwich	13 min 44 sec	13 min 33 sec	-00 min 11 sec
	Taverham	17 min 35 sec	14 min 51 sec	-02 min 45 sec
	Wymondham	2 min 21 sec	1 min 40 sec	-00 min 41 sec
Whiffler Road	Norwich	10 min 50 sec	10 min 6 sec	-00 min 44 sec
	Taverham	16 min 3 sec	12 min 34 sec	-03 min 29 sec
	Wymondham	23 min 3 sec	22 min 29 sec	-00 min 34 sec

*The origin point for Norwich is City Hall, just outside the centre of town.

13.12.28 Of the 26 employment sites analysed (using the three origin points) resulting in 78 journey time changes:

- 58 (64 per cent) journey times will decrease
- 13 (17 per cent) journey times will increase
- seven (nine per cent) journey times will not change
- 58 (64 per cent) journey times will see change (either increase or decrease) of two minutes or less

13.12.29 The vast majority of journey times will be reduced as a result of the NDR. In particular journey times from Taverham to Meridian Business Park, Great Plumstead/Thorpe End, Rackheath Industrial Estate, Broadland Business Park, and St Andrews Business Park will all reduce by more than 10 minutes.

13.12.30 Journey times from Wymondham to Meridian Business Park, Broadland Business Park, and St Andrews Business Park will see the largest increases in journey time, of more than two minutes. Other journey time increases, where they exist, are of less than one minute.

13.12.31 NDR will also provide access to a number of future employment sites identified in the JCS. These are detailed in the table below, applying the same methodology.

Table 13.19: Impact on journey times to proposed future employment locations within Greater Norwich

Business District	Origin Point	Journey times		
		Do nothing	NDR	Change
Beyond Green Land	Norwich	17 min 22 sec	16 min 57 sec	-00 min 24 sec
	Taverham	24 min 08 sec	15 min 19 sec	-08 min 49 sec
	Wymondham	33 min 12 sec	23 min 36 sec	-09 min 37 sec
Broadland Gate Business Park	Norwich	15 min 58 sec	14 min 55 sec	-01 min 03 sec
	Taverham	33 min 27 sec	17 min 03 sec	-16 min 24 sec
	Wymondham	15 min 13 sec	15 min 01 sec	-00 min 12 sec

Business District	Origin Point	Journey times		
		Do nothing	NDR	Change
Hethel technology park	Norwich	18 min 33 sec	18 min 41 sec	00 min 07 sec
	Taverham	32 min 55 sec	7 min 6 sec	-01 min 49 sec
	Wymondham	11 min 54 sec	11 min 54 sec	00 min 00 sec
Norwich Aeropark	Norwich	19 min 13 sec	19 min 21 sec	00 min 08 sec
	Taverham	20 min 7 sec	12 min 55 sec	-07 min 12 sec
	Wymondham	11 min 1 sec	21 min 40 sec	-13 min 21 sec
Rackheath Eco-town	Norwich	23 min 42 sec	0 min 13 sec	00 min 32 sec
	Taverham	9 min 54 sec	21 min 32 sec	-12 min 23 sec
	Wymondham	23 min 58 sec	23 min 56 sec	-00 min 02 sec
Wymondham Employment Estate	Norwich	18 min 26 sec	18 min 21 sec	-00 min 05 sec
	Taverham	1 min 58 sec	0 min 8 sec	-01 min 50 sec
	Wymondham	0 min 0 sec	0 min 0 sec	00 min 00 sec

13.12.32 Of the 6 employment sites analysed (using the three origin points) resulting in 18 journey time changes:

- 13 (72 per cent) journey times will decrease
- 3 (17 per cent) journey times will increase
- two (11 per cent) journey times will not change
- 11 (61 per cent) journey times will see change (either increase or decrease) of two minutes or less

13.12.33 The vast majority of journey times to proposed employment sites will be reduced. The biggest reductions are to Broadland Gate Business Park, Norwich Aeropark, Beyond Green Land and Rackheath Eco-town. All will see

reduction of more than five minutes for at least one (and generally more than one) of the origin points identified in the table.

13.12.34 There will be some increases in journey times from Norwich (namely to Hethel Technology Park, Norwich Aeropark and Rackheath Eco-town) but these are expected to be very minor (around 30 seconds or less).

13.12.35 The greatest journey time savings are for those accessing the sites from outside of Norwich centre.

Magnitude of effect: Major beneficial as the vast majority of employment current and future locations are likely to experience permanent reductions in journey times from Norwich (where much of the population of the WAI live) and Taverham, Broadland (where the scheme is located)

Sensitivity of receptors: Medium as accessibility will be improved for people living within the WAI and wishing to travel to those sites – for example, those newly employed at the locations.

Significance of effect: Significant

Improved access to new housing sites

13.12.36 The separately published 'Land-use and economic development report' of the NDR scheme (Norfolk County Council (2013): 'Norfolk NDR: Land-use and economic development report') acknowledges that the NDR will have substantial effects on traffic flows and congestion in the immediate vicinity and in the Greater Norwich area (WAI) reducing journey times and improving accessibility.

13.12.37 In particular, the NDR will improve road access to a number of new strategically-important housing sites as identified in the JCS and other strategic local planning documents.

13.12.38 The change in journey times to each of these housing locations – using the same parameters as set out above – is detailed in the table below:

Table 13.20: Impact on journey times to strategic housing locations identified in the JCS during the Inter Peak period

Business District	Origin Point	Journey times		
		Do nothing	NDR	Change
Broadland Core Development Area 1	Norwich	13 min 30 sec	13 min 23 sec	-00 min 07 sec
	Taverham	19 min 49 sec	19 min 14 sec	-00 min 36 sec
	Wymondham	26 min 09 sec	19 min 46 sec	-06 min 23 sec
Broadland Core Development Area 2	Norwich	16 min 28 sec	16 min 32 sec	00 min 04 sec
	Taverham	18 min 37 sec	15 min 53 sec	-02 min 45 sec
	Wymondham	29 min 06 sec	23 min 58 sec	-05 min 07 sec
Broadland Core Development Area 3	Norwich	22 min 43 sec	23 min 10 sec	00 min 27 sec
	Taverham	27 min 47 sec	21 min 44 sec	-06 min 02 sec
	Wymondham	23 min 08 sec	23 min 05 sec	-00 min 02 sec
Long Stratton (Sites R0983a, R0983b, 0542 & 0719)	Norwich	28 min 29 sec	39 min 49 sec	11 min 20 sec
	Taverham	35 min 16 sec	34 min 37 sec	-00 min 39 sec
	Wymondham	21 min 50 sec	21 min 50 sec	00 min 00 sec
Norwich - Three Score Bowthorpe	Norwich	15 min 25 sec	16 min 11 sec	00 min 45 sec
	Taverham	12 min 48 sec	12 min 45 sec	-00 min 03 sec
	Wymondham	14 min 33 sec	14 min 33 sec	00 min 00 sec
South Norfolk (Site R1016, Site R0169, Site R0249a)	Norwich	18 min 25 sec	19 min 21 sec	00 min 56 sec
	Taverham	23 min 40 sec	23 min 01 sec	-00 min 39 sec

Business District	Origin Point	Journey times		
		Do nothing	NDR	Change
(Site no 950a)	Wymondham	06 min 44 sec	06 min 44 sec	00 min 00 sec
Broadland - Royal Norwich Golf Club, either side of Drayton High Road, Hellesdon	Norwich	11 min 01 sec	11 min 07 sec	00 min 05 sec
	Taverham	10 min 31 sec	10 min 09 sec	-00 min 21 sec
	Wymondham	18 min 22 sec	18 min 17 sec	-00 min 04 sec
South Norfolk - South and East of Easton (Site no 1152)	Norwich	16 min 34 sec	17 min 24 sec	00 min 50 sec
	Taverham	11 min 15 sec	11 min 11 sec	-00 min 04 sec
	Wymondham	10 min 51 sec	10 min 51 sec	00 min 00 sec
Norwich - Deal ground and May Gurney Sites	Norwich	11 min 29 sec	12 min 32 sec	01 min 03 sec
	Taverham	28 min 02 sec	27 min 28 sec	-00 min 33 sec
	Wymondham	16 min 50 sec	16 min 57 sec	00 min 08 sec
South Norfolk (Sites 0319, 0951c, R0983d & 0729)	Norwich	28 min 29 sec	39 min 49 sec	11 min 20 sec
	Taverham	35 min 16 sec	34 min 37 sec	-00 min 39 sec
	Wymondham	21 min 50 sec	21 min 50 sec	00 min 00 sec
South Norfolk - West of Lodge Farm (site 0270a), Costessey	Norwich	16 min 05 sec	16 min 55 sec	00 min 50 sec
	Taverham	12 min 42 sec	12 min 03 sec	-00 min 38 sec
	Wymondham	10 min 22 sec	10 min 22 sec	00 min 00 sec

13.12.39 Of the 11 housing sites analysed (using the three origin points) resulting in 33 journey time changes:

- 16 (48 per cent) journey times will decrease
- 11 (33 per cent) journey times will increase
- six (18 per cent) journey times will not change

13.12.40 27 (82 per cent) journey times will see change (either increase or decrease) of two minutes or less

13.12.41 4.42 The majority of journey times will be reduced, with the largest reductions at Broadland Core Development Areas 1, 2 and 3 when travelling from Taverham and Wymondham (all of which will see reductions of more than five minutes with the NDR in place).

13.12.42 4.43 The largest journey time increases are from Norwich, to new sites in Long Stratton and South Norfolk, where journey times are likely to increase by more than 11 minutes. These longer journey times are the result of a shift of travellers onto the Norwich Park and Ride system within the traffic model and should be considered as such. The journey time data in these cases accounts for possible journey switching to Park & Ride which, for trips into Norwich, can produce large journey time increases (although overall journey costs are reduced, accounting for the difference between city centre parking charges and Park & Ride fares). This switching can occur between Do Minimum and NDR JCS (Do Something) journeys, especially when city centre measures within the Do Something option would make car journeys less attractive. This causes drivers to switch to the Park & Ride in some circumstances, resulting in seemingly anomalous increases of the journey times into Norwich.

13.12.43 4.44 However, in general journey times from Norwich see a disproportionate number of increases to new housing sites including: Deal ground and May Guerne sites, the housing land north of Hethersett and the land south and east of Easton.

13.12.44 4.45 Journey times from Wymondham are unlikely to change significantly to most strategic housing locations as a result of the NDR scheme.

Magnitude of effect: Moderate beneficial as most housing locations are likely to experience reductions in journey times, though very few effects will be felt

for travellers from South Norfolk, and travellers from Norwich (for example, those who work in Norwich and may live in one of the new housing locations in the future) may experience journey time increases.

Sensitivity of receptors: Medium as accessibility will be improved, particularly for people living in Broadland.

Significance of effect: Significant

Indirect effects

Supporting job creation and GVA growth

13.12.45 The NDR scheme is likely to support wider job creation and subsequent GVA uplift in the WAI. The MSBC for NDR, submitted in 2008, and revised in 2011 anticipates positive effects in terms of employment. (Norwich County Council (2011) 'Norwich Northern Distributor Road Major Scheme Business Case addendum to 2008 Financial Delivery, and Commercial Case') Similarly, the separately published Land-use and economic development report of the NDR scheme states that the NDR and Postwick Hub will have positive effects on the economy of the WAI and more widely in terms of job creation. (Norfolk County Council (2013): 'Norfolk NDR: Land-use and economic development report'. Note that this report does not analyse all of the sites mentioned in this report. It does, however, provide the most up to date analysis of the likely employment effects of the DNR scheme and as such provides the most effective assessment of the likely employment impacts in the WAI.) These include:

13.12.46 4,358 net additional direct jobs arising from the development sites listed in the land use and economic development report;

13.12.47 when multiplier effects are included this figure (of 4,358) rises to 5,230 net additional jobs that would not otherwise arise in Greater Norwich;

13.12.48 £1.099bn of additional GVA is forecast to be generated by those 5,230 jobs over some 30 years;

13.12.49 £966m of net additional physical investment in roads, infrastructure and housing; and

- 13.12.50 an average of 426 construction jobs (rising to 511 when multiplier effects are included) in each of the years until development is complete (estimated at 2034).
- 13.12.51 These jobs will primarily be located at strategic employment sites as part of the JCS. These include the following, also identified in the Land-use and economic development report:
- 13.12.52 A number of business parks, including Broadland Business Park and Meridan Business Park, where a wider labour catchment could be of value to new or existing businesses. However, many sites also have constraints which would not be overcome by the NDR, which could depress the positive effect of the scheme. After deadweight is taken into account, the NDR scheme may stimulate site development, accommodating a maximum of 1,300 jobs. (Norfolk County Council (2013): 'Norfolk NDR: Land-use and economic development report')
- 13.12.53 Norwich International Airport and Airport Industrial Estate. The NDR will help to remove planning restrictions imposed on the airport due to poor surface access. Based on the assumption that expected growth in passenger numbers materialises, this could generate a maximum of 350 jobs by 2015 (though it should be recognised that due to the above-noted delays in the timetable, this target date is unlikely to be met).

Magnitude of effect: Moderate beneficial as the scheme will most likely result in permanent uplift in jobs and GVA in the WAI and more widely in East Anglia

Sensitivity of receptors: Medium as employment opportunities will be indirectly enhanced for people living within both the WAI, which contains high number of unemployed people.

Significance of effect: Significant

Cumulative effects

Supporting future development

- 13.12.54 The Land-use and economic development report notes that the NDR will support wider cumulative impacts in the WAI and in East Anglia.

13.12.55 The scheme is anticipated to help to enhance Norwich's strategic road infrastructure to help distribute the growth and development sought within the JCS. North-east Norwich in particular is proposed as a sustainable urban extension and the NDR is considered an important piece of infrastructure, providing a spine along which the spatial development of the area is dependent. Other areas of growth and development that will benefit include:

- The Broadland Gate Business Park Development releases 25 hectares of employment land and is supported by, amongst other developments the NDR and Postwick Hub schemes.
- The Former RAF Coltishall site: The former RAF Coltishall site has a prison on site presently but demonstrates longer-term potential for employment uses, The NDR will improve access and connectivity to the site making it more attractive for employment uses.
- Growth in Aylsham: Aylsham is a market town to the north of Norwich which will benefit from links to the NDR via the A140 where it joins the NDR west of Norwich Airport. The settlement has capacity for housing growth and its attractiveness will be enhanced by improved connectivity to employment opportunities along the NDR corridor, including those at Broadland Business Park, Norwich Airport, Rackheath and NRP.
- Growth in North Walsham: North Walsham will also benefit from links to the NDR via the B1150 where it joins the NDR near Spixworth. Though positive effects will be less pronounced, North Walsham will still be connected to the NDR via a 'B' road or via the A1151 through Wroxham.

Supporting tourism

13.12.56 The MSBC estimates that the NDR scheme will stimulate growth in employment opportunities in tourism and local services. Many disadvantaged and benefit-dependent residents of Norwich and the immediate vicinity will be able to take these jobs. NCC estimates that around 15-20% of jobs will be taken by residents in these categories.

13.12.57 The Land-use and economic development report confirmed this, noting the tourism effects for Norwich and Norfolk in particular:

- In Norwich: Other historic city centres with heritage and cultural attractions at their core (such as York) benefitted from removing traffic from the centre. Reduced traffic volumes in the city centre will make it more attractive as a

place to live, invest in and visit, with potential additional positive effects on property and land values, and visitor numbers. Simultaneously, visitor economy effects could well stimulate additional consumption leading to job creation over time through multiplier effects as the central area attracts more people, whose dwell time is longer and who spend more money in the process.

- In Norfolk: While it is difficult to assess the exact impact of the NDR on the volume and value of tourism in the WAI and wider Norfolk area, the scheme will improve connectivity for tourists visiting the Norfolk Broads, north Norfolk coast, Great Yarmouth and Norwich. The NDR supports greater intra-County connectivity enabling visitors to move around and between destinations with greater ease avoiding the need to travel through central Norwich.

13.12.58 No assessment of significance is applied to cumulative effects.

13.12.59 Table 4.6 below summarises the effects of the construction and operational stages of the NDR.

Table 13.2.1: Summary of mitigation and effects – socio-economics

Project Phase	Receptor	Summary of effect	Level of Effect	Nature of effect		Mitigation	Residual Effect
				Adverse / Beneficial	Permanent / Temporary		
Construction	Local residents of working age	Direct employment through construction	Minor	Beneficial	Temporary	None required	Not significant
	Local businesses	Short-term increase in economic activity due to construction process	Negligible	Beneficial	Temporary	None required	Not significant
	Local businesses	Temporary disruption to local businesses and reduced or disrupted access to businesses	Moderate	Adverse	Temporary	Implementation of the Construction Environmental Management Plan to limit construction effects such as disruption,	Not significant

	Local businesses (Mid Norfolk Shooting School and City of Norwich Aviation Museum)	Land-take from existing businesses, disrupting business operations	Minor-Moderate	Adverse	Temporary	Replacement of existing access for Shooting School. Replacement of land sought for Museum	noise and dust levels	Not significant	
Operation	Local residents of working age	Improved access to employment and other strategically important economic sites	Major	Beneficial	Permanent	None required		Significant: permanent overall improvements to access	
	Local residents	Improved access to strategically important new housing sites	Moderate	Beneficial	Permanent	None required		Significant permanent overall improvements to access	

	Working age people	Supporting wider job creation and GVA growth in the WAI	Moderate	Beneficial	Permanent	None required	Significant: permanent increase in jobs and GVA
	Local residents and businesses	Supporting wider growth in the WAI and East Anglia	N/A	N/A	N/A	N/A	N/A
	Local businesses	Supporting tourism in the WAI and Norfolk	N/A	N/A	N/A	N/A	N/A

13.13 Conclusions

Summary of Assessment

13.13.1 Although there will be some negative effects of the NDR scheme, during both the construction and operational phases, the majority of the effects will be beneficial, especially during the operational phase.

Community and Private Assets

13.13.2 It is considered that the impacts on agriculture during the Construction and Operational phases are similar. The impacts during Construction are marginally worse than Operation as they take into account both the temporary and permanent loss of agricultural land.

13.13.3 The effects on soils as a national resource are considered significant however this must be considered within the context of agricultural activity in Norfolk and current agricultural practice generally. DMRB Volume 11. Section 3 Part 6 states "The increasing efficiency of agricultural producers and changes in agricultural policy mean that retaining as much land as possible in agricultural use is no longer a top priority".

13.13.4 In addition POSTnote 418 September 2012 states: Achieving efficient and productive agriculture to ensure food security while conserving biodiversity is a key challenge considering predicted scenarios of rapid human population growth. Agriculture is highly dependent on benefits derived from nature, known as 'ecosystem services' (POSTnote 377). These include pollination, pest control and nutrient cycling. Although agriculture is dependent on biodiversity, agricultural intensification is also a major driver of biodiversity decline. Within this context, there is debate about the best way of balancing food production and wildlife protection.

13.13.5 The Parliamentary Office of Science and Technology: Postnote 418. September 2012 explores two approaches to managing land for balancing nature conservation with sustainable food production. Land sharing integrates the objectives of agriculture and benefits to wildlife on the same land. Land sparing on the other hand separates intensive farming areas from protected natural habitats at larger scales. Within this context, there is a wider debate about the best way of balancing food production and wildlife protection.

13.13.6 An ecosystem services assessment of the NDR (Volume 2, Chapter 13) was undertaken with regard to land use changes to enable the Scheme, and assessed the land lost to agriculture when balanced against habitat

creation (Volume 1, Chapter 8 of the ES). This demonstrated that there is the potential for long term environmental benefits associated with the Scheme with regard to agriculture. The land taken from intensive agriculture that will be used for landscaping, lagoons and habitat compensation may have the effect assisting the resilience of farming practices by enhancing biodiversity.

13.13.7 As regards the viability of farming units there are not considered to be significant effects as a result of either temporary or permanent land-take arising from construction of the NDR. As access and replacement irrigation systems are provided to severed fields and compensation will be given for any loss of land. Volume 2, Chapter 13, Section A provides a detailed report with drawings of the extent and effects of the NDR on individual farm units.

Socio-economics

Construction phase

13.13.8 The construction phase is likely to deliver some beneficial effects, which will be temporary, particularly in terms of:

- The creation of a number of fixed term construction jobs and the creation of new jobs for some local agency workers in Norwich.
- Some minor increased economic activity associated with the influx of construction workers during the construction period.

13.13.9 Some minor residual adverse effects are also likely to be experienced including:

- Unavoidable disruption to businesses along the route throughout the construction process.

13.13.10 However, these residual effects are not considered to be significant.

Operational phase

13.13.11 The operational phase is also likely to deliver positive effects. These include:

- Improved access to business centres providing jobs and economic output across the sub-region.

- Improved access to strategically important new housing developments as set out in the JCS.
- Support growth, job creation and GVA uplift in the WAI and beyond
- Supporting the development of and unlocking potential in a range of wider sites considered strategically important for the continued prosperity of Norwich, Broadland and Norfolk as a whole.
- Support for sectors such as tourism

13.13.12 No significant residual adverse effects are predicted as a result of the scheme.

Compliance with Planning Policy

National, sub-regional and local policy

13.13.13 The NDR scheme is consistent with and highly supportive of national, sub-national and local economic development policy objectives. By enhancing accessibility to businesses, services and employment for populations in both the north of Norwich, and by supporting economic development activity across Norfolk and East Anglia (and supporting the priorities of the New Anglia LEP area), NDR is clearly compatible with the Government's economic goals. Benefits should therefore be felt by local residents and businesses in terms of accessibility and the wider economic output of the LAI and WAI.

14. Road Drainage and the Water Environment

14.1 Introduction

- 14.1.1 The water environment encompasses surface water in rivers, streams and ponds, and groundwater within underground strata. The government is committed to maintaining and improving the quality of surface water and groundwater environments, and the drinking water supplies they support.
- 14.1.2 Historically, roads have not been considered a major source of pollution and rainfall has been allowed to run off and discharge with little or no treatment. In recent years, diffuse pollution from road drainage has been identified, in some circumstances, as contributing to poor water quality. Pollution can arise from a variety of sources including accidents, general vehicle and road degradation, and vehicle related fuel leaks. Mitigation techniques are now used to control this pollution and the impact on the natural environment.
- 14.1.3 This chapter assesses the potential impact on water quality and water resources arising from the construction and long term operation (including maintenance) of the Scheme. The Scheme is located in an area of groundwater sensitivity and has the potential to impact the water quality within this area. The chapter also addresses the potential indirect impacts of the Scheme on the River Wensum SAC. The impact of the Scheme in the vicinity of public and private water supplies is also assessed, as well as the potential impact on flooding risks in the area.
- 14.1.4 A separate Flood Risk Assessment (FRA) (Volume 2, Chapter 21: FRA, Section A) is submitted with the application and is summarised in this chapter.
- 14.1.5 A Habitats Regulations Assessment (Volume 2, Chapter 17: Habitats Regulations Assessment, Section A), assessing the potential impacts of the Scheme on the River Wensum SAC, also supports this assessment.
- 14.1.6 Potential impacts on wildlife associated with water resources in or near the Scheme are addressed in Chapter 8: Nature Conservation.

14.2 Scoping and Consultation

- 14.2.1 The Scoping Opinion provided by the Secretary of State (see Volume 1, Appendix 5), and responses from other consultees, raised the following issues:

- the provision of an FRA was welcomed, but it was pointed out that the management of additional surface water runoff should be addressed and that there should be consultation with the Environment Agency (Environment Agency), the Broads Internal Drainage Board and Norfolk County Council (NCC);
- details of the methodologies used to establish the baseline conditions in terms of water quality should be provided, including any abiotic and biotic indicators of water quality measures or assessed;
- opportunities to install Sustainable Drainage Systems (SuDS) should be taken, with a clear methodology on how systems are selected and an assessment of their impact;
- on-going monitoring should be addressed and agreed with the relevant authorities to ensure any mitigation measures proposed are effective; and
- the hydrology of The Broads should not be adversely affected.

14.2.2 The draft drainage proposals and FRA were submitted to the Environment Agency for comment. The Environment Agency advised on methods for testing infiltration rates (using minimum rather than average rates), agreed on how to estimate and manage overland flow and advised on changes required to the road and drainage design to further protect surface water or groundwater bodies.

14.2.3 Six separate meetings have taken place between NCC, Mott MacDonald and the Environment Agency to address water resources issues arising from the proposed Scheme. During these meetings specific discussions took place about the groundwater and surface water monitoring, and the road drainage design. The regulatory controls that would have to be complied with were identified, and the Environment Agency's views on conservation and pollution control were obtained.

14.2.4 Details of the consultation undertaken during the preparation of the Environmental Statement (ES) are given in Document 5.1: Consultation Report. The responses from consultees have been taken into account in preparing this ES.

14.2.5 In addition, two combined meetings were held with the Environment Agency and Natural England (NE) to discuss the Scheme and the specific requirements for an appropriate assessment of the western section of the

Scheme (from chainage 0 to 1900), given its proximity to the Wensum Valley SAC.

14.2.6 NCC met with the Internal Drainage Board (IDB) to discuss Scheme drainage proposals at 'The Springs' (Rackheath) where runoff from the Scheme would drain into an area under their jurisdiction.

14.2.7 The table below summarises consultees and purpose of consultation:

Table 14.1 Consultees and purpose of consultation

Consultee	Purpose
Environment Agency	<p>Request data</p> <p>To allow the Environment Agency to comment and provide feedback on land and road drainage design and assessment methodologies.</p> <p>To agree on appropriate surface water and groundwater quality monitoring regime.</p> <p>To agree how the impact on the Water Framework Directive (WFD) should be incorporated within this chapter (no separate WFD assessment report required).</p>
Natural England	<p>To discuss water features and their protection with respect to NE's interests (mainly River Wensum SAC but also discussed 'The Springs' area at Rackheath).</p>
North Norfolk District Council	<p>Requested information on strategic flood risk assessment around Dobbs Beck.</p>
Internal Drainage Board	<p>Requested information on strategic flood risk assessment around Dobbs Beck.</p> <p>To comment on and agree in principle to road drainage design within the IDB boundary ('The Springs' at Rackheath)</p>
Local private abstractors	<p>To obtain information regarding the supplies</p> <p>To ensure protection of supplies</p> <p>To obtain views on the proposed development with a view to</p>

	including appropriate mitigation where considered necessary.
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14.3 Overall Approach and Methods

Overall approach

14.3.1 Roads have the potential to impact on surface water and groundwater flow by:

- Intercepting and blocking existing overland flow routes and watercourses
- Increasing the runoff from the hard surface of the road, increasing overall runoff rates in the area of the road.
- Intercepting or blocking shallow groundwater flow where below ground works intercept groundwater.

14.3.2 In addition, any road with high levels of traffic has the potential to impact on the water quality of the water resources in the area of the road. This impact arises from the release of contaminating substances through wear and tear of vehicles, road surfaces and contained within exhaust emissions. These substances are picked up by rainfall or other liquids running off the road, either as solid particles or as soluble components of the runoff. Depending on the nature of the discharge of runoff impacts can arise in receiving water bodies (surface or groundwater).

14.3.3 Finally, accidents on roads can release significant quantities of liquids which can have significant impacts on water resources if the discharge of these is not managed appropriately.

14.3.4 To measure impacts on water quality from road runoff an assessment is required of the traffic levels on the road. High traffic is measured in terms of the Annual Average Daily Traffic (AADT), and where this is over 10,000 there is a recognised risk of a significant potential impact on water resources occurring. AADT data for the 'Do Something' scenarios for 2017 and 2032 predict AADT over 10,000, as shown on Volume 2, Chapter 14, Section R, Drawing No. MMD-233906-DT-0981-0987. Therefore a full detailed impact assessment of the proposed Scheme was carried out in accordance with the Highways Agency (HA) guidance provided in the Design Manual for Roads and Bridges (DMRB) Volume 11, section 3, Part 10 (HD 45/09): Road Drainage and the Water Environment (hereafter referred to as HD45/09).

14.3.5 To assess the potential impacts from accidental spillage a risk assessment is carried out based on the layout of the road, the percentage of heavy goods

vehicles and the AADT predicted to use the road. The risk assessment is documented in HD45/09 which sets what are acceptable levels of risk, and which levels of risk require additional mitigation in the road design.

14.3.6 Consultation has been undertaken with the statutory bodies and other organisations (see Volume 2, Chapter 14: FRA, Section K).

14.3.7 The impacts have been assessed against significance criteria that have been developed in accordance with the requirements of DMRB (HD45/09) and which are summarised in Table 1.2, Table 1.3 and Table 1.4.

14.3.8 Using the baseline information collected for the EIA, the areas considered most sensitive to changes in traffic or the Scheme itself have been identified. The impact assessment includes the assessment of risk and consequence of accidental spillage and water quality. Hydrological or physical changes have also been assessed.

14.3.9 The detailed impact assessment using the HD45/09 methodology of the drainage network associated with the Scheme has been produced in Volume 2, Chapter 14: Road Drainage and the Water Environment, Section H.

14.3.10 An FRA has been prepared as a separate document to meet the requirements of the National Planning Policy Framework (NPPF, paragraph 103), and is included in Volume 2, Chapter 21: FRA. Key aspects of the FRA are summarised in this Chapter (sections 21.5.6 and 21.6.2).

Assessment area

14.3.11 The study area for the water quality and drainage assessment extends approximately 500m either side of the centre line of the route corridor in a band with a total width of 1000m. During the collection of baseline data and the assessment of impacts, the study corridor was extended around larger junctions (e.g. Cromer Road junction) and sensitive areas (e.g. River Wensum SAC), to ensure any significant impacts are adequately assessed (see Volume 2, Chapter 14, Section R, Drawing No. MMD-233906-DT-0684).

Data collection and surveys

14.3.12 Information for this assessment has been collated from the following sources:

- Environment Agency website (www.environment-agency.gov.uk);

- Defra's 'Magic' interactive map (<http://magic.defra.gov.uk>);
- National River Flow Archive data on the Centre for Ecology and Hydrology website (www.ceh.ac.uk);
- Review of information made available by the Environment Agency on the hydrogeology, hydrology, water quality and aquatic ecology characteristics of the study area;
- Study of 1:50,000 and 1:25,000 OS maps, the 1:125,000 regional hydrogeological map (BGS, 1976), 1:50,000 regional geology mapping (BGS, 1992) and online aerial photography (maps.google.co.uk);
- Information and comments from consultation with the Environment Agency, NE and local private water abstractors;
- Field measurements of water quality, groundwater levels and stream flows (2006 – 2013);
- Groundwater quality and level data from Attlebridge Landfill Site operators (2006 – 2013);
- Ground investigations completed by May Gurney (2006/2007);
- Landmark Envirocheck Report (2012);
- Norwich Northern Distributor Road, Scoping Report (Mott MacDonald);
- Norwich Northern Distributor Road, Appropriate Assessment Scoping Report (Mott MacDonald);
- Norwich Northern Distributor Road, final Habitat Regulations Assessment (Mott MacDonald) submitted with this ES (Chapter 17: Habitats Regulations Assessment, Section A);
- Norwich Northern Distributor Road, Flood Risk Assessment (Mott MacDonald) submitted with this ES (Volume 2, Chapter 21: FRA); and
- Traffic data for the Scheme (DCO Documents 5.5: Transport Assessment and 5.6: Forecasting Report).

14.3.13 A more detailed methodology used to establish the baseline conditions in terms of water quality is provided in Volume 2, Chapter 14, Sections C and E.

Assessment Process

14.3.14 The assessment of the impacts to the water environment has been carried out by applying the criteria as defined in the Scoping Report. The assessment follows HD45/09, which has the following requirements:

- Identify the baseline conditions, to record the existing quality or value of the water environment, the uses and any areas vulnerable to change;
- Define mitigation measures based on best practice and informed by initial results from HD45/09 risk assessments for surface water, groundwater, accidental spillage and flood risk;
- Predict the impacts (adverse/beneficial) on the baseline conditions as a result of the Scheme, with the embedded mitigation of the Scheme applied (see section G); and
- Identify significance of effects on the water environment.

14.3.15 The conservation value of water resources are in part defined by legislation (see section 14.4) which protects all controlled waters in England and Wales and, in effect, protects all water bodies (surface water or groundwater). Thus there cannot be any water feature which has negligible value. The value of controlled waters can be defined further by taking into account the use and conservation importance of the water body. The criteria used in this assessment to determine the value of each water feature and its attributes are set out in Table 14.2. Definitions of acronyms used in this table can be found in the Glossary.

Table 14.2 Criteria for Determining Conservation Value and Sensitivity of Water Environment Attributes

Value	Criteria	Typical Examples
Very High	Attribute has high quality on regional, national or international scale	<p>Surface Water: EC Designated Salmonid/Cyprinid fishery; Site protected under EU or UK wildlife legislation (SAC, SPA, SSSI, Ramsar site); River Basin Management Plan WFD Ecological Quality is 'high' and not at risk of deterioration.</p> <p>Groundwater: Groundwater vulnerability is classified as high; Principal aquifer providing a regionally important resource or supporting site protected under wildlife legislation; or SPZ 1.</p>

Value	Criteria	Typical Examples
		<p>Flood Risk: Receptor is at high risk from flooding (Flood Zone 3b); or floodplain or defence protecting more than 100 residential properties from flooding.</p>
High	Attribute has high quality and rarity on local scale	<p>Surface Water: Major Cyprinid Fishery; Species protected under EU or UK wildlife legislation; River Basin Management Plan WFD Ecological Quality is 'Good'.</p> <p>Groundwater: Groundwater vulnerability is classified as high; Principle aquifer providing locally important resource or supporting river ecosystem; SPZ 2.</p> <p>Flood Risk: Receptor is at high risk from flooding (Flood Zone 2 or 3a); floodplain or defence protecting between 10 and 100 residential properties or industrial premises from flooding.</p>
Medium	Attribute has a medium quality and rarity on local scale	<p>Surface Water: Receptor is of medium environmental importance; RBMP WFD water quality status 'moderate'.</p> <p>Groundwater: Moderate classification of groundwater vulnerability; Secondary aquifer providing water for agricultural or industrial use with limited connection to surface water; SPZ 3.</p> <p>Flood Risk: Receptor is at moderate risk from flooding (Flood Zone 2); floodplain or defence protecting 10 or fewer industrial properties from flooding.</p>
Low	Attribute has a low quality and rarity on local scale	<p>Surface Water: Receptor of low environmental importance; RBMP WFD water quality status 'poor'.</p> <p>Groundwater: Secondary aquifer with poor water quality not providing baseflow to rivers; non-aquifer.</p> <p>Flood Risk: Receptor is at low risk from flooding (Flood Zone 1); floodplain with limited constraints and a low probability of flooding of residential and industrial properties.</p>

14.3.16 Potential impacts of the proposed Scheme on water resources are identified through an evaluation of the sensitivity of the water resources within the study area, and consideration of the sources of potential impacts after mitigation (with design and best practice mitigation applied) including:

- construction processes, particularly those that could give rise to pollution from spills or siltation from run-off;
- operational processes, such as pollutants from vehicles;
- loss or gain of surface water features;
- change in infiltration resulting from alteration of land-use; and
- flood risk.

14.3.17 Measures already embedded within the Scheme design or best practice to mitigate potential adverse impacts are described in section 14.6 below and Volume 2, Chapter 14: Road Drainage and the Water Environment, Section G. They include elements of the design, such as the use of soft landscaping and surface water features to attenuate surface water run-off, and pollution control measures to be implemented both during construction and operation.

14.3.18 The assessment of impacts to the water environment has been carried out in accordance with the HA's DMRB HD 45/09, which includes the detailed assessment of the following risks:

- surface water risk from routine runoff (Method A);
- groundwater risk from routine runoff (Method C);
- spillage risk to both surface water and groundwater (Method D); and
- flood risk to and from the Scheme (Method E).

14.3.19 The risk assessment methodologies have also been used to inform the mitigation measures to be embedded within the Scheme design. The results are described in more detail in Volume 2, Chapter 14: Road Drainage and the Water Environment, Section H.

14.3.20 There are three discharges to surface waters incorporated in the Scheme (see section 14.6.2 'Mitigation strategy to protect water quality' and drawings Volume 2, Chapter 14: Road Drainage and the Water Environment,

Section R, MMD-233906-DT-0690 and MMD-233906-DT-0691). The potential impact of pollutants from routine road runoff on receiving surface waters has been assessed using the HA Water Risk Assessment Tool (HD45/09, HAWRAT, Method A). In Step 1, HAWRAT predicts the statistical distribution of key pollutant concentrations in untreated and undiluted highway runoff (worst case scenario) and is reported as a 'pass' (no predicted short-term impact associated with road runoff) or 'fail' (unacceptable impact and further assessment required).

14.3.21 If the design includes measures that would prevent undiluted or untreated water to discharge to the environment then the HAWRAT Step 2 takes account of the embedded mitigation in the drainage design discharging to the outfall, the flow rate of the receiving watercourse and the physical dimensions of the watercourse to calculate the available dilution of soluble pollutants and potential dispersion of sediments. A further comparison with pollutant thresholds is then made. The results from this assessment identify the magnitude of the potential impact which is then used with the value of the receiving water body to determine the magnitude of the effect, and thus the significance of the impact.

14.3.22 Only if these standard design measures fail to prevent a significant effect is additional mitigation required.

14.3.23 Impacts on groundwater are assessed in terms of the risk of pollution occurring from drainage from a road i.e. through infiltration from a swale or an infiltration pond (using HD45/09 Method B). The drainage network proposed has several final disposal points which would enable water running off the Scheme to eventually reach groundwater (see Volume 2, Chapter 14: Road Drainage and the Water Environment, Section R, Drawing No. MMD-233906-DT-0981-0987 and Volume 2, Chapter 14: FRA, Section O, Appendix E).

- The spillage risk assessment (HD45/09 Method D) identifies the risk of spillages from a highway and potential pollution to the receiving water environment. The following criteria were considered as per the guidance:
- the calculated spillage risk return period must not be greater than 1 in 100 years;
- the calculated spillage risk return period must not be greater than 1 in 200 years where spillage could affect: protected areas for conservation, important drinking water supplies or important commercial activities; and
- spillage risk from existing outfalls must not be increased.

14.3.24 The results of these risk assessments are presented in section 14.6.2, with more detailed results in Volume 2, Chapter 14: FRA, Section H. The Scheme design and embedded mitigation was informed by the results of these assessments.

14.3.25 The risk of flooding (HD45/09 Method E) to and from the Scheme has been considered in the FRA (Volume 2, Chapter 21:FRA, Section A) and the results summarised in section 14.6.2 'Mitigation strategy to manage flood risk'.

14.3.26 The assessment of the magnitude of the impact of the Scheme takes into account any embedded mitigation measures or strategies, including the likely effectiveness of the mitigation, the timescale over which the impact occurs and the substitutability of the attribute. The criteria used for determining the magnitude of impact is based on Table A4.4 in DMRB HD45/09 (see Volume 2, Chapter 14: FRA, Section H) and summarised in Table 14.3.

Table 14.3 Assessing Magnitude of Potential Impacts

Magnitude	Criteria
Major adverse / major beneficial	Adverse impact would be a loss of attribute and/or quality and integrity of the attribute or function, e.g. loss or extensive change to a fishery. Beneficial impact results in major improvement of attribute quality or function, e.g. removal of existing polluting discharge, or removing the likelihood of polluting discharges occurring to a watercourse.
Moderate adverse / moderate beneficial impact	Adverse impact results in moderate decline in the attribute quality or function, e.g. calculated risk of pollution from spillages >1% annually and <2% annually. Beneficial impact results in moderate improvement of attribute quality or function, e.g. reduction in peak flood level (1% annual probability) >50 mm.
Minor adverse / minor beneficial	Adverse impact results in measurable change in attribute quality or function, e.g. failure of either soluble or sediment-bound pollutants in HAWRAT. Beneficial impact results in some beneficial effect on attribute or function, or reduced risk of an existing negative effect occurring, e.g.

Magnitude	Criteria
	calculated reduction in existing spillage risk by 50% or more (when existing spillage risk is <1% annually).
Negligible	No measurable impact on an aquifer, or one that is so slight as to have no effect on the quality or function of the attribute.

14.3.27 The impact assessment has to take into account the minimum protection measures likely to be required by regulators in the design of the scheme. These are embedded mitigation measures, and are taken account of in the assessment process. Only if the impact assessment indicates that even with these measures is there a significant impact is it necessary to identify additional mitigation measures to be included in the scheme.

14.3.28 The potential significance of effects for the construction and operation (including maintenance) of the proposed Scheme was predicted with reference to Table A4.5 in DMRB HD45/09 as provided below in Table 14.4 (see section 14.7.1 and 14.7.2). The significance of potential effects is considered separately for construction and operation of the proposed Scheme and is based on criteria set out in Table A4.6 in DMRB HD45/09 (Qualifying Conditions for Overall Assessment Scores). Effects that are moderate, large or very large are considered significant effects. Effects that are slight or neutral are not significant.

Table 14.4: Assessing Significance of Potential Effects

Magnitude of Potential Impact	Value / sensitivity of attribute			
	Very high	High	Medium	Low
Major	Very large	Large / Very large	Large	Slight / Moderate
Moderate	Large / Very Large	Large / Moderate	Moderate	Slight
Minor	Moderate / Large	Slight / Moderate	Slight	Neutral

Negligible	Neutral	Neutral	Neutral	Neutral
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Note: Effects are negative or positive or neutral.

14.3.29 The implications and compliance of the proposed Scheme in relation to the Water Framework Directive (WFD) have also been considered. The aims of the Directive (amongst other things) are to improve the water quality and ecological status of watercourses and the quality of groundwater, addressing diffuse pollution from urban and rural sources, including roads. Following consultation with the Environment Agency, and consideration of the implications of the Scheme on WFD objectives, it was determined that no separate WFD compliance assessment would be required (email from the Environment Agency dated 26th May 2013 (Volume 2, Chapter 14: Road Drainage and the Water Environment, Section K). The Environment Agency’s view is that it is unlikely that the Scheme would compromise the achievement of WFD objectives in any of the adjacent or underlying waterbodies. Measures were considered which could be incorporated in the Scheme to enhance and improve nearby waterbodies, particularly Dobbs Beck. As a result, the waterbodies might achieve good ecological potential (see conclusions in section 0).

14.4 Relevant Regulatory and Planning Background

14.4.1 The legislation and policies set out below are the key documents relevant to the water environment and related to water attributes within the study area.

EU Legislation

14.4.2 The key EU legislation covering the water environment which has a bearing on this Scheme includes:

- The Groundwater Directive (80/68/EEC as amended by 91/692/EEC)
- The Groundwater Daughter Directive (2006/118/EC)
- The Water Framework Directive (2000/60/EC)
- The Habitats Directive (92/43/EEC)

14.4.3 The Groundwater Directive (91/692/EC) sets out the basis for groundwater protection from pollution. Hazardous and non-hazardous substances are defined. There are strict limits and controls in relation to groundwater.

Hazardous substances should not enter groundwater, and non-hazardous substances should be prevented from entering groundwater.

14.4.4 The Groundwater Daughter Directive (2006/118/EC) aims to prevent the deterioration in status of all bodies of groundwater. It sets out requirements for countries to establish boundaries around groundwater bodies, to identify trends of chemical substances in the groundwater bodies, and to establish criteria from which to assess good groundwater chemical status. The Directive also requires countries to prevent or limit inputs of pollutants to groundwater.

14.4.5 The Water Framework Directive (2000/60/EC) (WFD) established a framework for management of water resources throughout the European Union. The Directive was translated into English and Welsh law through The Water Environment (Water Framework Directive) (England and Wales) Regulations 2003, which came into force in January 2004. The WFD will be fully effective by 2015. In the short term, the Directive requires the development of new monitoring and classification of surface waters, groundwaters, wetlands and protected sites. The key objectives, relating to the WFD, are defined for this study area within the Anglian River Basin Management Plan (RBMP). The key objectives of the WFD, provided for in the RBMP, are to:

- prevent deterioration, enhance and restore bodies of surface water, achieve good chemical and ecological status of such water and reduce pollution from discharges and emissions of hazardous substances;
- protect, enhance and restore all bodies of groundwater, achieve good chemical and quantitative status of groundwater, prevent the pollution and deterioration of groundwater, and ensure a balance between groundwater abstraction and replenishment; and
- preserve protected areas.

14.4.6 The WFD places most importance on the health of animal and plant groups. It requires that the water environment be looked at as a whole, integrating water quality, quantity and physical habitat with ecological indicators. The Environment Agency provides WFD ecological status classes (High, Good, Moderate, Poor, Bad) and chemical status classes (Pass/Fail) for most surface water bodies. In addition, groundwater status (quantitative and chemical status) has been assigned to groundwater bodies, defined as 'Good' or 'Poor'.

14.4.7 One of the main goals of the Directive is to aim for at least 'good' ecological and 'good' chemical status for surface waters, and 'good' chemical and 'good' quantitative status for groundwaters by 2015. For water bodies designated as 'artificial or heavily modified', such as canals or reservoirs, the Directive aims to achieve 'good ecological potential' rather than 'good ecological status'. The Drinking Water Protected Area (DrWPA) objectives of the WFD aim to protect waterbodies where 'raw' water is abstracted for human consumption at a rate of at least 10m³/day, or over 50 people are served by the abstraction. Classification can result in the establishment of non-statutory Safeguard Zones, where actions to address pollution are required (Environment Agency, 2013).

14.4.8 The EC Habitats Directive (1992) on the Conservation of Natural Habitats and of Wild Fauna and Flora, as amended (92/43/EEC), is also relevant due to the close proximity of the Scheme to the River Wensum SAC (see Chapter 8: Nature Conservation for more details).

UK Acts and Regulations

14.4.9 The EU legislation is implemented in the UK through various acts and regulations. The key UK legislation, directly regulating the water environment in relation to new roads, is as follows:

- Water Act 2003 (WA 2003);
- Water Resources Act 1991 (WRA 1991);
- Environmental Permitting (England & Wales) Regulations (2010) (EPR 2010); and
- Highways Act 1980 (HA 1980).

14.4.10 The EPR 2010 aim to protect groundwater and surface waters from pollution by controlling the inputs of potentially harmful and polluting substances. The Regulations implement the WFD, the Groundwater Daughter Directive 2006 and the Groundwater Directive 1980 (until it is repealed in December 2013). The EPR 2010 replaces those parts of the WRA 1991 that relate to the regulation of discharges to controlled waters (including groundwater).

14.4.11 Substances controlled under EPR 2010 fall into two lists:

- Hazardous substances – most toxic and prevented from entering groundwater; and
- Non-hazardous – less toxic but could be harmful to groundwater, and the entry of these substances into groundwater must be limited.

14.4.12 Under the EPR 2010 no environmental permit is required for uncontaminated surface water runoff from roads, pathways or clean hardstanding areas, provided the Environment Agency's Pollution Prevention Guidance is followed e.g. surface water runoff is passed through a well-designed and maintained oil interceptor (see section 1.6.1).

Legislation regarding pollution prevention and discharges of road runoff

14.4.13 Section 85 of the WRA 1991 makes it an offence to knowingly pollute controlled waters, which includes all groundwater and surface waters (ponds, streams and rivers) located along the Scheme.

14.4.14 The Groundwater Regulations (1998) protect all groundwater in England absolutely. Aquifers are protected as being valuable in their own right. NCC is not required to hold a discharge consent under the Groundwater Regulations, but must comply with the technical requirements of the Regulations. Currently, the Regulations primarily restrict the discharge of List I and List II substances.

14.4.15 Under the Highways Act (section 100), NCC has a right to discharge runoff from highways into inland and tidal waters, or groundwaters (i.e. controlled waters as defined under the Water Resources Act 1991), but is subject to the requirement not to pollute controlled waters (WRA 1991, section 85).

14.4.16 The NCC is exempted by section 89(5) of WRA 1991 from applying for discharge consents for road runoff under WRA 1991 or under the Groundwater Regulations 1998. However, the Environment Agency has powers under section 86 of WRA 1991 to serve a prohibition to stop pollution occurring from discharges. For discharges to ground, the Environment Agency has a duty to use section 86 powers to prevent pollution.

14.4.17 Before construction of drainage outfalls, agreement for the outfall design is required from the Environment Agency and the IDB.

Protecting groundwater quality and public water supply

14.4.18 Section 93 of the WRA 1991 provides for the establishment of water protection zones. The requirements of section 93 are implemented under the Environment Agency's document 'Groundwater Protection: Principles and Practice (GP3)' issued in August 2013. Source Protection Zones (SPZs) are defined for groundwater sources used for public water supply. The Environment Agency's position statement relating to the use of sustainable drainage systems within these zones is also set out in GP3.

14.4.19 The SPZs are defined as follows:

- Inner Protection Zone (SPZ 1) - defined by a travel time of 50 days or less from any point within the zone at, or below, the water table, to the abstraction source. Additionally, the zone has, as a minimum, a 50 m radius. The SPZ 1 is based principally on biological decay criteria and is designed to protect against the transmission of toxic chemicals and water-borne disease. The Environment Agency expects strict controls on development implemented within the SPZ 1.
- Outer Protection Zone (SPZ 2) - defined by the 400 day travel time from a point below the water table to the abstraction source. This zone has a minimum radius of 250 or 500 metres around the abstraction source, depending on the size of the abstraction. The travel time is derived from consideration of the minimum time required to provide delay, dilution and attenuation of slowly degrading pollutants. The Environment Agency expects some control on development implemented within the SPZ 2.
- Total Catchment Zone (SPZ 3) - defined as the area around an abstraction source within which all groundwater recharge is presumed to be discharged at the abstraction source. The shape and size of the zones is controlled by many factors. Some of these reflect natural hydrogeological conditions, other environmental factors and the operation of the groundwater abstraction. The Environment Agency expects normal best practice to be implemented to ensure the protection of groundwater in SPZ 3.

14.4.20 The presence of SPZs has implications for any potentially polluting activities proposed within the zones. The most severe restrictions on construction activities, drainage and development are generally applied within the inner zone.

14.4.21 No Environmental Quality Standards (EQS) have been published for protecting groundwater. In the absence of such standards, the drinking water

standards are frequently used for comparing with groundwater quality. This practice has been adopted in the ES.

Legislation and policies protecting surface water quality

14.4.22 The Environment Agency classifies rivers under WFD using defined criteria, and also sets objectives that the Environment Agency considers should be achieved in terms of improving water quality for sections of river. The criteria and objectives for the region are set out in the Environment Agency's Anglian River Basin Management Plan (RBMP). The objectives are set for 'main rivers' which are the surface water bodies maintained by the Environment Agency. There is one main river, the River Wensum, located within the study area extending 500m to either side of the centreline of the route corridor. The River Wensum, and other main rivers beyond the study area, have been monitored by the collection and assessment of physical, chemical and biological data.

14.4.23 Policies and plans affecting water resources are summarised below. The National Planning Policy Framework (NPPF) was issued in March 2012 and resulted in the withdrawal of a number of planning policy guidance notes, including Planning Policy Statement 25: Development and Flood Risk. This assessment for road drainage and the water environment takes into account the NPPF (Chapter 10 "Meeting the challenge of climate change, flooding and coastal change"), and the supporting technical guidance in relation to flood risk.

14.4.24 Chapter 10 of the NPPF states in paragraph 99 that ".....New development should be planned to avoid increased vulnerability to the range of impacts arising from climate change. When new development is brought forward in areas which are vulnerable, care should be taken to ensure that risks can be managed through suitable adaptation measures, including through the planning of green infrastructure." The technical guidance to the NPPF is more generic than the superseded PPS25, but the principles and intent are the same. The requirements are described further in the FRA (Volume 2, Chapter 21: FRA, Section A).

14.4.25 Furthermore the NPPF indicates that the Floods and Water Management Act (FWMA) 2010 establishes a Sustainable Drainage Systems Approving Body in unitary or county councils. This body must approve drainage systems in new developments and re-developments before construction begins. In the case of Norfolk County Council, the approving

body (currently the Flood Risk and Water Management team) is in the process of being set up (due to be established April 2014) and have been consulted during the design process. The approving body will review any new planning application or reserved matters relating to drainage arising since April 2012 should construction not have commenced before April 2014. This will include approval of any drainage works prior to construction.

14.4.26 Schedule 3 of the FWMA defines the key aims of sustainable drainage systems, as follows:

- reduce damage from flooding;
- improve water quality;
- protect and improve the environment;
- protect health and safety; and,
- ensure the stability and durability of drainage systems.

14.4.27 Joint Core Strategy (as amended February 2013) has one relevant area-wide policy, Policy 1. This addresses climate change and the protection of environmental assets; this includes both surface and ground water. The development should *“be located to minimise flood risk, mitigating any such risk through design and implementing sustainable drainage; minimise water use and protect groundwater sources; and improve the resilience of ecosystems to environmental change”*.

14.4.28 The Norfolk Structure Plan includes:

- Policy RC.1: “Development which will lead to a material deterioration in the quality of underground, surface or coastal water will not be acceptable.”
- Policy RC.3: “New development or the intensification of existing development will only be acceptable in areas at risk from fluvial flooding or in areas where it is likely to increase the risk of flooding elsewhere to an unacceptable level, including defined washlands, natural flood plains, and other areas adjacent to rivers to which access is required for maintenance purposes, where suitable mitigation measures have been agreed.”

14.4.29 The Broadland Local Plan includes:

- Policy CS2: “Surface water drainage from new developments should be by way of a sustainable drainage system where appropriate. Where such

systems are not feasible a positive piped system incorporating adequate anti-pollution measures should be used.”

- Policy CS9 “for all development proposals consideration will need to be given to flood risk issues, including the possibility of the development increasing flood risk elsewhere and where necessary, appropriate flood defence or prevention measures will be required.”
- Policy CS10 “within areas at high risk of flooding new development or the intensification of existing development will not be permitted except:
 - Within a defined settlement limit, or
 - There is a particular need for the development to be in that location, or
 - The proposed use is a low key use of land e.g. playing fields, nature reserve etc.
- And the appropriate minimum standard of flood defence (including suitable warning and evacuation procedures) will be provided and maintained for the lifetime of the development.”

14.5 Baseline

Hydrology

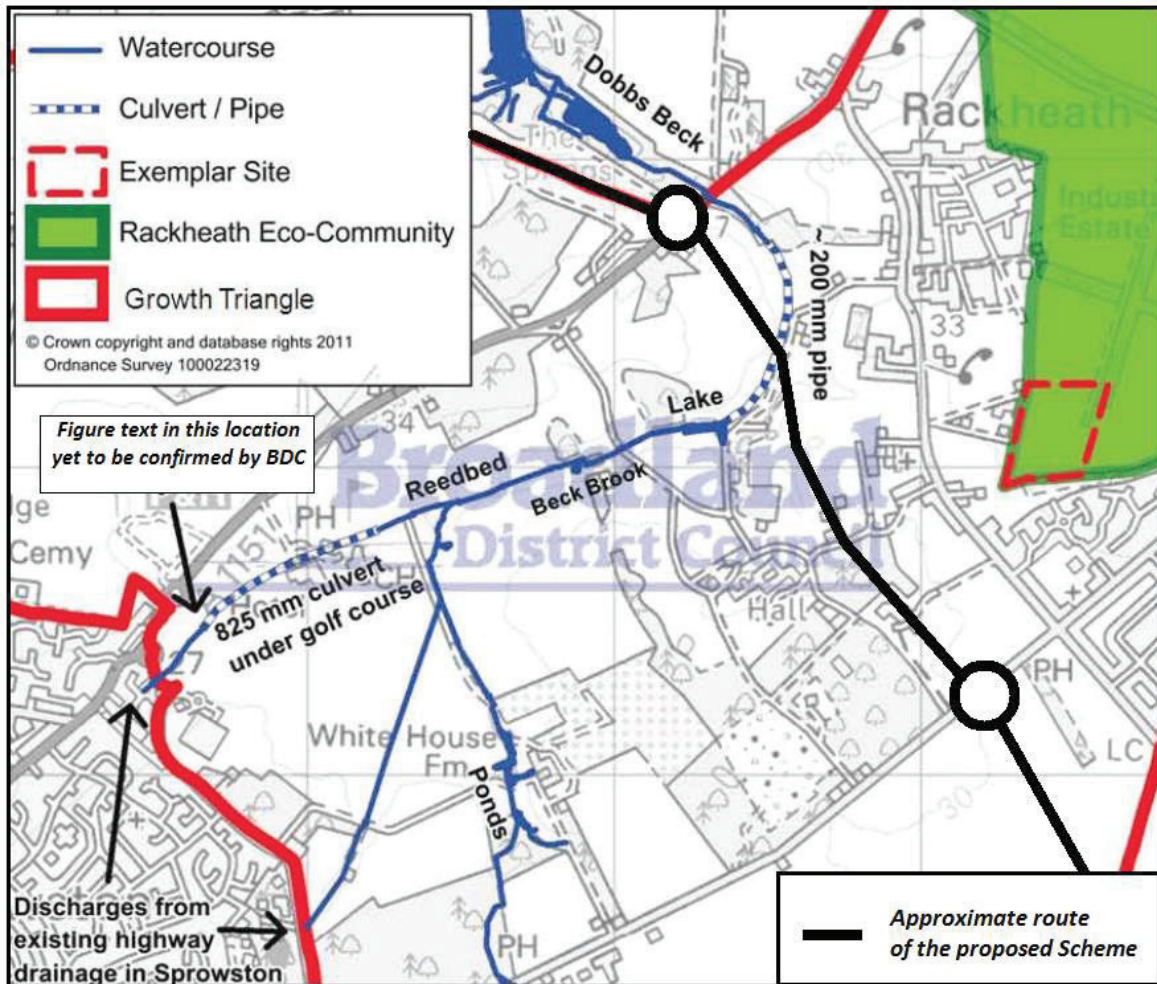
14.5.1 The study area falls within the surface water catchments of three Main Rivers: the River Wensum, the River Bure and the River Yare. The locations of the rivers and catchment watersheds, in relation to the Scheme, are shown in Volume 2, Chapter 14: Road Drainage and the Water Environment, Section R, Drawing No. MMD-233906-DT-0684. At no point would the Scheme route cross an open watercourse.

14.5.2 The River Wensum is located within 300m of the Scheme near Attlebridge. The river then flows south east out of the study area to the confluence with the River Yare (at Whitlingham). The Scheme does not cross the floodplain of the River Wensum.

14.5.3 On the eastern side of Norwich, the River Yare and floodplain are approximately 600 m from the A47 and the eastern end of the Scheme. The River Bure is located to the North of the Scheme. However, several tributaries in the vicinity of the Scheme drain to the River Bure, including Horsford Brook, Dobbs Beck, Spixworth Beck and Spixworth Brook.

- 14.5.4 The route passes within 300m of the River Wensum SAC, and within 100m of 'The Springs' at Rackheath which form part of the Ladies Wood, Church Carr and Springs County Wildlife Site (CWS). Dobbs Beck and Spixworth Beck are also within the CWS.
- 14.5.5 The junction improvement at Crostwick Lane is approximately 850m south of Spixworth Brook and 1.35km west of Spixworth Beck. The improvements at the Green Lane West junction are located approximately 490m north-east of Dobbs Beck. Plumstead Road East junction improvements are about 1.8km from Witton Run, which is a tributary of the River Yare.
- 14.5.6 The Scheme crosses the catchment of Beck Brook which continues as Dobbs Beck immediately south of Wroxham Road. Dobbs Beck is a tributary of Spixworth Beck. Figure 1.1 shows the location of Beck Brook and associated drainage features. The Scheme crosses at the point where Beck Brook flows underground through a 200mm (approx.) diameter pipe connecting the 'Lake' (also known as the 'Dry Lake' on other OS maps) to a ditch comprising the Dobbs Beck just south of Wroxham Road. Water primarily leaves the lake as infiltration to ground. Any overflow is via the underground pipe.
- 14.5.7 A drainage survey of this area, undertaken by Birse in November 2012 (see Volume 2, Chapter 21: FRA, Section A), identified sections of this 200mm pipe that had collapsed. The pipe structure itself may no longer function to convey surface water between the Lake and Dobbs Beck, however the construction and back fill of the pipe trench with granular material is likely to maintain part, if not all, of this flow path to Dobbs Beck.
- 14.5.8 Flows in the ditch south of Wroxham Road also pass through a 200 mm (approximate) diameter pipe under Wroxham Road. North of Wroxham Road, Dobbs Beck is fed by a number of springs and surrounding field drains.

Figure 1.1: Dobbs Beck and associated drainage features (Source: Figure 4-6 extracted from the draft North East Norwich WCS provided by Broadland District Council (BDC) (June 2013))



14.5.9 Three watercourses or water bodies will receive discharges of road runoff from the proposed Scheme as follows:

- the second lake between Dobbs Beck and Spixworth Beck;
- Dobbs Beck; and
- River Yare, via the existing A47 drainage

14.5.10 Data from a gauging station on the River Yare at Colney is held on the National River Flow Archive. The data shows a 95 percentile river flow (Q95) of 0.32m³/sec and a base flow index (BFI) of 0.65.

14.5.11 Q95 is the flow exceeded 95% of the time i.e. it is a measure of the flow of water in the river when flow is very low. The BFI is a measure of the proportion of the river flow that derives from storage in bedrock, superficial deposits and soils (i.e. from groundwater). The base flow index is greater in catchments where there is a higher level of storage and contribution from groundwater. The baseflow sustains river flow during periods of dry weather. The Q95 and BFI are indications of the capacity to dilute and disperse contaminants discharged into the watercourse, without significant harm to the watercourse or the dependent ecosystem.

14.5.12 There is no gauging station on Dobbs Beck or for the lake at 'The Springs'. A BFI of 0.5 is used in the assessment, as per the DMRB guidance HA DMRB HD 45/09 para A.5, Annex 1), and a Q95 of 0.01m³/sec based on flow monitoring between 2007 and 2008.

14.5.13 Numerous small ponds have been highlighted during surveys. However, none of these are considered to be linked to any significant watercourses and are, thus, not considered to comprise a major component of local water resources. Some are considered important habitats and are discussed further in Chapter 8: Nature Conservation.

14.5.14 Minor field drains and ditches are crossed by the Scheme. Where this occurs, drains will be culverted to ensure that flow paths are not obstructed. Where the routes of overland flow are intercepted by the Scheme alignment, flow will be drained to soakaway systems e.g. spreader ditches, and/or a flow path will be maintained.

Groundwater

14.5.15 The regional geology within the study area of the route is described in Chapter 9: Geology and Soils.

14.5.16 The bedrock underlying the study area consists of White Chalk and Crag Group (formally referred to as Upper Chalk and Norwich Crag), both of which are classified by the Environment Agency as principal aquifers. Principal aquifers may support water supply and/or river base flow on a strategic scale. Glacial deposits present on the higher ground consist of Boulder Clay (Lowestoft Formation) and Glacial Sand and Gravel (undifferentiated Corton Formation and Lowestoft Formation), which are 'Secondary A' aquifers capable of supporting water supplies at a local rather than strategic scale. Norwich Brickearth (a part of the undifferentiated Corton Formation), a superficial deposit of homogenous unstructured loam or silt, is

found widely across the study area. The permeability of the brickearth is significantly lower than that of glacial sands and gravels and the Crag.

- 14.5.17 There are no published SPZs 1 or 2 within the study area. However, the Environment Agency has advised a temporary 750m radius Source Protection Zone 1 (SPZ 1) surrounding one licensed (but currently unused) public water supply borehole near Postwick. This temporary SPZ1 is intended to protect the area that is most vulnerable to pollution until the Environment Agency define a more accurate SPZ outline. This supply is discussed further in section 14.5.5.
- 14.5.18 A default area with a 50 m radius has been designated as a SPZ1 around private water supplies located within the study area (as required under Environment Agency GP3 2013). Volume 2, Chapter 14: Road Drainage and the Water Environment, Section R, Drawing No. MMD-233906-DT-0978-0980 shows the location of these sites.
- 14.5.19 The Scheme crosses SPZ 3 of two public water supplies within the study area, at the locations described in Table 14.5 and as shown on Volume 2, Chapter 14: Road Drainage and the Water Environment, Section R, Drawing No. MMD-233906-DT-0978-0980.
- 14.5.20 SPZs relate purely to groundwater flow below the water table and do not take into account the depth to groundwater and the nature of the overlying soils and rock. It is important to use the groundwater vulnerability mapping (Environment Agency online maps, 2013) to assess the risks and potential impacts of spillages to the unsaturated zone overlying the water table. The maps take into account the properties of the overlying rocks and soils in defining groundwater vulnerability. Groundwater vulnerability maps show that the majority of the Scheme is located on soils with a high leaching potential . Thus the groundwater vulnerability is also high.
- 14.5.21 The groundwater vulnerability and SPZs relevant to the Scheme are shown in Volume 2, Chapter 14: Road Drainage and the Water Environment, Section R, Drawing No. MMD-233906-DT-0975-0977 and MMD-233906-DT-0978-0980. A summary of source protection zones and vulnerability classifications along the route is given below.

Table 14.5: Groundwater protection along the route

Chainage Section (m)	Source Protection Classification and/or Groundwater Vulnerability
0 – 2200	High vulnerability
2200 – 3200	SPZ 3 and high vulnerability
3200 – 13300	Low and high vulnerability
13150 – 13300	Intermediate vulnerability
13300 – 16300	SPZ 3 and high vulnerability
16300 – 16550	High vulnerability
16550 – end	SPZ 1, SPZ 3 and high vulnerability

Groundwater Levels and Flows

14.5.22 Generally the main regional groundwater table is located in, or close to the surface of, the White Chalk (see Chapter 9: Geology and Soils for depths). However, the Crag Group also contains significant groundwater in some areas. The two formations are in variable states of hydraulic continuity in places where the Crag overlies the Chalk.

14.5.23 Superficial deposits that contain lenses of silty sands, sands or gravels could also hold significant groundwater.

14.5.24 The regional hydrogeological map, produced by the British Geological Survey (BGS, 1976), provides groundwater level contours which give an indication of the direction of groundwater flow in the region. From chainage 0 to about chainage 2900, the hydrogeological map indicates that flow is towards the Wensum. From chainage 2900 to 6500 the Scheme is along a groundwater divide. Groundwater could flow either south towards the Wensum or north towards Horsford Brook. From chainage 6500 to about 16000 the groundwater divide is south of the road and groundwater flow tends to be northwards away from the Wensum. Beyond chainage 16000, groundwater again flows southwards towards the River Wensum.

14.5.25 Groundwater level information was also sourced from monitoring carried out at the Attlebridge Landfill site and, most recently, from the ground

investigations carried out specifically for the Scheme. Groundwater levels have been monitored on either a monthly or quarterly basis intermittently between September 2006 and August 2013 at these boreholes. The monitoring locations are shown on Volume 2, Chapter 14: Road Drainage and the Water Environment, Section R, Drawing No. MMD-233906-DT-0971-0974 together with maximum, minimum and average groundwater elevations.

14.5.26 A cross section showing the depths at which groundwater was encountered during the ground investigations is shown on Volume 2, Chapter 14: Road Drainage and the Water Environment, Section R, Drawing No. MMD-233906-DT-0815-0827. The section is based on borehole data within 50 m of the Scheme. Road levels indicate that the Scheme elevation is above maximum observed groundwater levels except possibly in the vicinity of chainage 15750. Groundwater levels along the route vary between about 0.95 m AOD (P196) and 31.08 m AOD (BH6B). The ground level varies between 15.10 and 39.70 m AOD and the road level generally between 17.90 and 38.94 m AOD. The unsaturated thickness below the road ranges between 2.44 and 28.62 m along the route, apart from at chainage 15750, as discussed further below. The Scheme does not intersect the Chalk water table.

14.5.27 In general, Chalk groundwater levels within 50 m of the Scheme range between 2.44 m (at P153, chainage 15750) and 20.29 mBGL (at P196, chainage 22100) (0.76 to 31.34 mAOD). Volume 2, Chapter 14: Road Drainage and the Water Environment, Section R, Drawing No. MMD-233906-DT-0975-0977 shows the depth to water table for the area, as well as the elevation of the top of the Chalk (as m AOD), based on contouring for the drought period in 1976, taken from the Hydrogeological Map.

14.5.28 There is one main area of groundwater discharge along the route, at 'The Springs', located between 120 m and 50 m north of the Scheme between chainage 13250 and 14500. The relationship between the lakes at 'The Springs' and groundwater has been assessed through the installation of a number of borehole piezometers to measure groundwater levels. The piezometers include:

- GW2A (Chalk), GW2B and GW2C (both Crag, piezometers at different depths)
- GW3A (Chalk), GW3B (Corton Till)
- GW4A and GW4B (both Crag, piezometers at different depths)

- GW7A (Crag) and GW7B (glacial sand and gravel)
- GW9A (Chalk) and GW9B (Alluvium)
- GW10A (Chalk), GW10B (Crag) and GW10C (Corton Till)
- GW11A (Chalk) and GW11B (Crag)

14.5.29 The piezometer sites are shown on Volume 2, Chapter 14: Road Drainage and the Water Environment, Section R, Drawing No. MMD-233906-DT-0971-0974. Sites GW3, GW5, GW6, GW9 and GW11 are located within 250 m of the centreline of the proposed route. GW1, GW2, GW7, GW8 GW10 and GW12 are more distant, ranging from 300 to 600 m away.

14.5.30 A cross section through the two lakes and the monitoring boreholes shows that the Chalk groundwater level in the area is above the water levels in the lake and Dobbs Beck (see Volume 2, Chapter 14: Road Drainage and the Water Environment, Section D, Figure D.1). As a result, the lakes and the Dobbs Beck should be receiving groundwater inflow from the Chalk in this area. This is undoubtedly the reason why this area is called “The Springs”.

14.5.31 The groundwater levels at the sites were monitored to show whether there was any difference between groundwater levels in the overlying formations and the Chalk. This was achieved by installing piezometers at the same location but in different formations. Changes in groundwater levels in the various formations were found to be reasonably consistent, i.e. levels tend to rise in all formations in the same periods. However, the relationship at individual locations between the overlying and deeper formations is not as consistent. Hydrographs showing the variation in groundwater levels over and time and between sites is provided in Volume 2, Chapter 14: Road Drainage and the Water Environment, Section L. These show the groundwater table does not vary much over any 12 month period (typically about 0.2m) and over the almost 6 years of records the maximum variation is around 1 to 1.5m. These annual variations are relatively small for the Chalk.

14.5.32 Although no significant and widespread perched water tables have been observed, localised perched water tables appear to be present as follows:

- Shallow groundwater is observed at BHP153 (chainage 15750) within the glacial sand and gravel deposits, potentially overlying the Corton Till. The water table varied by 1.0 m, between 28.87 and 27.87 m AOD. The range in groundwater levels is estimated to be between 0.6 m below and 0.4 m above

the construction base of the proposed bridge at Newman Road (~28.47mAOD).

- Shallow groundwater is found in the crag in GW3B and these groundwater levels vary in a different manner to the chalk groundwater levels in GW3A. At times the chalk has higher groundwater levels, whilst at other times the relationship is reversed. When groundwater levels in the chalk are higher than in the crag groundwater would flow from the chalk into the overlying crag. As GW3B is close to “The Springs” this is what would be expected in this area. It is worth noting that GW4A / 4B located close to GW3A/ 3B shows no difference between the crag and chalk groundwater levels.
- Shallow groundwater is found in the alluvium in GW9B which shows almost exactly mirrors the groundwater variations seen in the chalk borehole GW9A. The groundwater in the alluvium maintains a head difference over the chalk groundwater levels of about 20 to 30cms and indicates groundwater would flow from the alluvium into the chalk.
- Shallow groundwater is found in piezometers GW10C (Corton Till) and GW2C (Crag) which are located on opposite sides of Dobbs Beck, close to chainage 13750 and 15300. The groundwater levels are both significantly higher than the land elevation in the valley of Dobbs Beck or the Scheme. This is not unusual as for springs to occur you need to have groundwater levels higher than the land surface, and so in area of “The Springs” this phenomena should be observed.

14.5.33 From the groundwater level monitoring it was concluded that overlying formations are often in hydraulic continuity with the underlying Chalk, and there are no significant widespread perched water tables in superficial deposits in the study area. Minor perched water bodies occur where glacial sands and gravels overlie Corton or Lowestoft Till. The presence of the Till reduces rainfall infiltration to the Crag and Chalk aquifers below.

Springs and Seepages

14.5.34 During site walkovers, wet and boggy ground was observed in areas, surrounding the lakes at ‘The Springs’, as shown on Volume 2, Chapter 14: Road Drainage and the Water Environment, Section R, Drawing No. MMD-233906-DT-0690.

14.5.35 The most noticeable area of seepages was downstream of the Anglian Water Services (AWS) wastewater treatment plant in the woodland marked as

Lady's Carr on Ordnance Survey maps. The extent of this wet/boggy ground changed seasonally. The closest point on the Scheme is at chainage 13300. The wetland area is also close to a proposed drainage lagoon (Lagoon 17).

- 14.5.36 Monitoring of surface water flows upstream and downstream of the two fishing lakes in the CWS was carried out between March 2007 and May 2008. The results confirmed the indications that the lakes receive substantial inflow from groundwater as the inflow was much lower than the outflow e.g. 0.004 m³/s compared to 0.02 m³/s in March 2007. Detailed results from the monitoring are presented in Volume 2, Chapter 14: Road Drainage and the Water Environment, Section D.
- 14.5.37 Surface water inflow into the upstream lake is very small except when there has been significant rain. However, flow downstream of the lakes is quite substantial, even in summer. Even allowing for contributions to the system from the AWS wastewater treatment plant, there is still a much greater outflow than inflow.
- 14.5.38 Monitoring of the quality and source of groundwater and surface water in and near the CWS has been carried out intermittently between 2006 and 2013 as described in Volume 2, Chapter 14: Road Drainage and the Water Environment, Section C and E. The water quality results are discussed further in the Water Quality section below.
- 14.5.39 The CWS is designated for its woodland, marshy grassland and standing water habitat. As the area is spring fed, any alterations to the groundwater flow or quality could have a significant effect on the species within these habitats.
- 14.5.40 No other springs or seepages of any significance have been identified within 500 m of the Scheme.

Water Quality

Surface Water Quality

- 14.5.41 The Anglian River Basin Management Plan (RBMP) identifies the current status of main rivers in the region. Those relevant to the Scheme are as follows:
- The section of the River Wensum nearest the Scheme at Attlebridge is a heavily modified waterbody that is currently at 'poor' ecological potential and failing for biological and chemical elements (Waterbody ID

GB105034055881). The RBMP target for the River Wensum is good ecological potential by 2027 and good chemical status by 2015 to meet WFD objectives;

- Spixworth Beck (Waterbody ID GB105034050960) and the River Bure (Waterbody ID GB105034050930) are considered heavily modified waterbodies. Both are considered to have a ‘moderate’ ecological potential currently, and are predicted to sustain this status in 2015. No chemical status has been given. The RBMP target for Spixworth Beck is good ecological potential by 2027; and
- The tidal section of the River Yare (Waterbody ID GB105034051370), located to the south of the A47, is considered to have a ‘moderate’ status. The RBMP target for the River Yare is to achieve good ecological status by 2027 to meet WFD objectives.

14.5.42 A programme of water quality monitoring of surface watercourses was implemented and samples taken at quarterly intervals between September 2006 and June 2013 at the locations shown in Table 14.6 and as shown on Volume 2, Chapter 14: Road Drainage and the Water Environment, Section R, Drawing No. MMD-233906-DT-0971-0974. Monthly samples were collected at ‘The Springs’ at Rackheath. The purpose of the surveys was to establish the baseline water quality conditions, and to provide data for the assessment of the potential impact of road runoff to watercourses. The water samples were analysed for a suite of parameters that included standard quality indicators used by the Environment Agency, and also indicators for typical road runoff pollutants (see Volume 2, Chapter 14: Road Drainage and the Water Environment, Section E.

Table 14.6: Surface Water Monitoring Details

Location	Number/ID	Grid Ref		Frequency
		Easting	Northing	
River Wensum	Wensum-001	612800	316700	Quarterly
River Wensum	Wensum-002	615900	313700	Quarterly
River	Yare-004	626800	307800	Quarterly

Location	Number/ID	Grid Ref		Frequency
		Easting	Northing	
Yare				
River Yare	Yare-005	629600	306100	Quarterly
Dobbs Beck	Rackheath-001	627200	313900	Monthly
Dobbs Beck	Rackheath-002	626600	314500	Monthly
Dobbs Beck	Rackheath-003	627327	313860	Monthly (2013 only)
Horsford Stream	Horsford 001	617900	316400	Quarterly
Horsford Stream	Horsford 002	619400	315700	Quarterly
Horsford Stream	Horsford 003	622600	316000	Quarterly

14.5.43 Samples from 'The Springs' show measurable levels of some Polycyclic Aromatic Hydrocarbon (PAH) compounds, which are typically found in road runoff. The Total PAH concentration (the sum of a standard set of four PAH compounds) exceeded the drinking water standard of 100 ng/l (100 nanograms per litre), with concentrations ranging between 228 and 1310 ng/l. Concentrations of total Benzo(a)pyrene also exceed the drinking water standard (>10 ng/l), ranging between 17 and 330 ng/l. The source of these PAH compounds has not been specifically identified but is most likely to be runoff from the A1151 Wroxham Road as runoff from the A1151 discharges into this location without any treatment, as there are no other probably sources in this area.

14.5.44 Elevated concentrations of dissolved copper and total zinc at 'The Springs' also support this theory of road runoff contributing to the poor water quality in this area. Dissolved copper concentrations exceeded the EQS, ranging between 13 and 72 µg/l at Rackheath-001 and between 25 and 29

µg/l at Rackheath-002. Total zinc concentrations at Rackheath-001 and Rackheath-002 also exceeded the EQS, with concentration ranges of 93-270 µg/l and 77-190 µg/l respectively.

- 14.5.45 The chloride EQS of 250 mg/l (250 milligrams per litre) was also exceeded at 'The Springs' for five samples, ranging between 371 and 900 mg/l. The chloride was probably derived from runoff from gritted roads as the concentrations exceed the EQS during winter months (between October and January).
- 14.5.46 The River Wensum and the River Yare samples showed no detectable levels for the sum of the four PAH compounds.
- 14.5.47 Total PAH and benzo(a)pyrene concentrations at Horsford-003 exceeded the drinking water standard in January 2008 (176 ng/l and 56 ng/l respectively). However, the concentration may have been the result of an unusual or exceptional event as all other samples from this site showed undetectable levels of these parameters. The source of the high PAH and benzo(a)pyrene concentrations in one sample is not known and could have been an incidence of contamination during sampling.
- 14.5.48 Total zinc concentrations at sampling sites Wensum-001 and Yare-005 exceeded the EQS concentration in September 2006 and March 2007 respectively. The total zinc concentration at Wensum-001 was 125 µg/l and at Yare-005, 780 µg/l. In September 2006 a total zinc concentration of 150 µg/l was recorded at Horsford-003. The source of these higher concentrations are not known.
- 14.5.49 Water quality monitoring carried out intermittently at 'The Springs' since September 2006 showed moderate to good biological water quality.

Groundwater Quality

- 14.5.50 The Anglian RBMP identifies the current status of groundwater in the region, for the Broadland Rivers Chalk & Crag waterbody (Waterbody ID 'GB40501G400300'). Groundwater in the region has a current and predicted 2015 chemical quality status of 'poor (deteriorating)' due to a failure in the general chemical assessment (high levels of nitrate, phosphate and pesticides). Groundwater also has a 'poor' quantitative status due to concerns for groundwater dependent terrestrial ecosystems. The RBMP predicts good quantitative and chemical status by 2027.

- 14.5.51 A programme of groundwater monitoring was implemented and water samples collected from site investigation and groundwater level monitoring boreholes installed for this EIA. The location of monitoring points is shown on Volume 2, Chapter 14:FRA, Section R, Drawing No. MMD-233906-DT-0971-0974. Water samples were taken at quarterly intervals between September 2006 and 2008, with further samples in May and June 2013. Groundwater quality data was also obtained from the operator of the Attlebridge Landfill Site.
- 14.5.52 Samples were analysed for a suite of parameters that included standard quality indicators used by the Environment Agency and typical road runoff pollutants. The purpose of the monitoring was to establish an understanding of the seasonal variations in the baseline groundwater chemistry.
- 14.5.53 Detailed groundwater quality results are presented in Volume 2, Chapter 14: Road Drainage and the Water Environment, Section C, Table C.2.
- 14.5.54 Generally the groundwater is good quality. Few contaminants associated with road runoff were detected in the samples taken.
- 14.5.55 Chromium was measured in concentrations above the drinking water standard of 50 µg/l in a number of boreholes. The elevated levels of Chromium and other metals in groundwater (as listed above) occur in four areas as follows:
- Down gradient from the Attlebridge Landfill, where a leachate plume is known to exist (at the proposed location for Drainage Lagoon 1A).
 - Down gradient from the industrial area at the northern end of Norwich Airport (near to the proposed location for Drainage Lagoon 12).
 - Down gradient of the Rackheath Landfill (at the proposed location for Drainage Lagoon 17).
 - In two boreholes located up gradient of the A47 Postwick area (near to proposed infiltration ponds at the Postwick Junction). No obvious source of contaminants exists in the area.
 - The four areas are shown on Volume 2, Chapter 14: Road Drainage and the Water Environment, Section R, Drawing No. MMD-233906-DT-0971-0974.

- 14.5.56 The source of chromium is unknown. The presence of other metals in elevated concentrations was also noted (total zinc, total copper, lead, nickel) as well as higher than normal levels of chemical oxygen demand (COD) for groundwater. The metals were monitored as they are often found in road runoff, but it is unlikely that these minor roads are the source of the elevated levels as the AADT on these roads is less 10,000 - which DMRB states would not be high enough to generate metals at these levels in groundwater.
- 14.5.57 BHGW11 at 'The Springs' showed elevated sodium concentrations about the EQS (280 mg/l) in October 2007. The highest sodium concentrations in the remaining samples was 43.5 mg/l. The source of the high sodium concentration is not known and could have been an incidence of contamination during sampling.
- 14.5.58 Total PAH concentrations were higher than the drinking water standard in three boreholes (BHGW3A, BHGW8 and BHP87). Only one sample at BHGW3A and BHGW8 exceeded the drinking water standard during the monitoring period and the source of the high levels of PAH is not known. BHP87 is located down gradient from the industrial area at the northern area of Norwich Airport. Concentrations at BHP87 ranged from 131 and 269 µg/l. Higher concentrations were recorded at this site in July (348,000 µg/l) and September 2009 (16,000 µg/l). Given the location of this borehole down gradient from the Airport, it is possible some contamination by hydrocarbon leak or spillage occurred in the past and caused these excessively high levels of PAH has occurred in the past, but it is not known where or what this might have been.
- 14.5.59 Total Petroleum Hydrocarbons (TPH) was detected at boreholes at 'The Springs' ranging between 32 and 1500 ng/l, most of which were sampled in January 2008. Concentrations were also detected at BHP87 (460 ng/l), BHPW2 (35 ng/l), BHP190 (530 ng/l) and BHP196 (63 ng/l), all of which were also sampled in January 2008. The source of TPH at these groundwater locations is unknown.

Consented Discharges

- 14.5.60 The only consented discharge located within 500 m of the Scheme, is for the treated effluent from the Anglian Water Services Wastewater Treatment Works (WwTW) located between the two lakes at 'The Springs', as shown on Volume 2, Chapter 14: Road Drainage and the Water Environment, Section R, Drawing No. MMD-233906-DT-0978-0980. The cumulative impact

of the proposed discharges into Dobbs Beck and the second lake at 'The Springs' and the WwTW discharge could affect the ability of the receiving water body to dilute and remove chemical parameters.

Abstractions

Public Water Supplies

14.5.61 There is one licensed public water supply for groundwater abstraction (by AWS) within the study area, located approximately 500m south-east of the Scheme, near Postwick. The exact location of this supply cannot be shown on a plan to ensure protection of the supply. The Environment Agency has advised a temporary 750m radius SPZ1 surrounding the supply, representing the area that is most vulnerable to pollution as shown on Volume 2, Chapter 14: Road Drainage and the Water Environment, Section R, Drawing No. MMD-233906-DT-0978-0980. The borehole at the source is approximately 100m deep but it is not yet operational. Abstractions will be made from the Chalk, which is in direct hydraulic continuity with the overlying Crag (17m thick at this location). It is understood that non-pumping groundwater levels are approximately 20m below ground level. The abstraction is licensed for 4,000m³ per day.

14.5.62 As indicated in section 14.4, the Environment Agency expects strict controls on development implemented within the SPZ 1 but has not raised objections to the proposed road drainage network in this area in the meetings held with the Environment Agency about the Scheme.

14.5.63 Volume 2, Chapter 14: Road Drainage and the Water Environment, Section R, Drawing No. MMD-233906-DT-0978-0980 also shows that the Scheme crosses an SPZ 3 in some areas as described in section 14.5.2. This is the total catchment zone supporting abstraction for public water supplies in the area. As indicated in section 14.4, the Environment Agency expects normal best practice to be implemented to ensure the protection of groundwater in SPZ 3.

Private Water Supplies

14.5.64 Details of licensed abstractions (more than 20 m³/day) from surface water and groundwater in the area were obtained from the Environment Agency. A postal survey of landowners within 250m of the proposed route provided information on both licensed and unlicensed private supplies (less

than 20 m³/day) potentially affected by the Scheme. The 250m study area was chosen to ensure the survey took into account:

- the default 50m radius around each private water supply, taking into account Environment Agency guidance on groundwater protection (as discussed in the following paragraph); and
- a 200m buffer to allow for variations to the route alignment, and the extent of features such as junctions associated with the route.

14.5.65 All private supplies are from groundwater and used either to supply domestic properties with drinking water or for agricultural purposes. In accordance with Environment Agency guidance on groundwater protection (GP3), a default SPZ 1 with a 50m radius was applied around abstraction points used for human consumption or food production purposes (but not irrigation of crops). No further default SPZs (SPZ2 or SPZ3) are required, and no associated restrictions on the use of infiltration features for road runoff beyond the 50m SPZ1.

14.5.66 None of the proposed drainage network infiltration ponds are located within 50m of any potable groundwater source.

14.5.67 The closest private source of drinking water to the Scheme is located at chainage 17000. The source is separated from the proposed Scheme by a railway line and houses on either side of the railway. The actual abstraction is located more than 75 m from the outer boundary of the Scheme.

14.5.68 Another private water supply used for agricultural purposes (irrigation) is located in close proximity to the slip road at chainage 5350. The location of the supply is immediately east of the slip road running north to the proposed roundabout at Drayton Lane. The slip road alignment has been adjusted to ensure sufficient separation (>50m) to prevent any significant impact on the supply due to the Scheme.

14.5.69 No other private or licensed abstractions are sufficiently close to the Scheme to warrant special protection measures.

14.5.70 Consultation with private abstractors suggested that the groundwater supplies are reliable, with the exception of the abstraction at Spring Farm (chainage 1400) which was noted to dry up in times of drought. Comments on the quality of the water stated that the groundwater was generally always clear, with a pleasant taste. Only three abstractors stated that the water contained some sediment and appeared discoloured as a result. This poor

water quality is almost certainly related to borehole construction rather than the quality of groundwater.

- 14.5.71 The Environment Agency commented that mains water has been supplied to properties down gradient of the Attlebridge Landfill site due to the contamination of groundwater from landfill leachate. However, the properties still have the right to use any private sources of water in this area. These private supplies are the only private supplies down gradient of proposed infiltration ponds.

Licensed Surface Water Abstraction

- 14.5.72 One licensed surface water abstraction is located within the study area at 'The Springs'. The abstraction is from the second lake, and has a licence for a total yield of 1637 m³/d (annual licence 50,000 m³/year). The supply is used for general agricultural purposes (spray irrigation).

Flood Risk

- 14.5.73 The FRA (see Volume 2, Chapter 21:FRA, Section A) was carried out in accordance with the requirements of the NPPF and NPPF Technical Guidance. Consideration was given to both the flood risk to the proposed Scheme and the impact of the Scheme on the flood risk to the surrounding area. Allowances were made for increased flows due to climate change. The proposed Scheme, including the three offline junction improvements, was assessed as essential infrastructure under the NPPF Technical Guidance.
- 14.5.74 According to Environment Agency flood maps the entire Scheme is located in Flood Zone 1 (low risk) and as such has less than a 0.1 per cent probability of annual fluvial flooding. The Scheme is not located in an area likely to be affected by coastal flooding or by extreme tidal and surge events. Historic flooding reports from the Environment Agency also suggest there is little fluvial (or tidal) flood risk to the Scheme. The nearest area of historic flooding is at Attlebridge which was flooded in 1993 along the River Wensum. However the flood extent boundaries were more than 200m from the western end of the Scheme, along Fakenham Road.
- 14.5.75 The proposed Scheme will cross 43 natural surface water catchment drainage areas (see Figure 3.2 in the FRA, which illustrates the location of each of these catchments, and Table 3.2 in the FRA, which summarises their characteristics). Whilst none of the catchments include an open watercourse

at the Scheme crossing location, the catchments could pose a potential flood risk to the route as a result of overland flow during a storm event. The Scheme may also have the potential to increase flood risk elsewhere within a catchment if, for example, overland flow gathered upstream of an embankment.

14.5.76 'Surface water' is defined the Flood and Water Management Act 2010 as the 'surface runoff' generated by rainwater (including snow and other precipitation) which is (a) on the surface of the ground (whether or not it is moving), and (b) has not yet entered a watercourse, drainage system or public sewer (excludes overflowing watercourses, drainage systems or public sewers caused by catchment-wide rainfall events or river flow).

14.5.77 The Environment Agency Flood Maps for Surface Water (FMfSW) indicate that the Scheme will cross an area of "deeper surface water flooding" (more than 0.3m deep) during a 1 in 30 and 1 in 200 rainfall event within the catchment of Dobbs Beck. This is supported by the Environment Agency maps of Areas Susceptible to Surface Water Flooding that shows the Scheme crosses just one area 'more' susceptible to surface water flooding. Both these maps are presented in FRA (Volume 2, Chapter 21: FRA, Section A). This vulnerability occurs where the route crosses the catchment of Beck Brook and Dobbs Beck. The overland flow catchment area for Dobbs Beck (OL20) at the intersection with the proposed route of the Scheme is 6.77km², as shown on Volume 2, Chapter 14: Road Drainage and the Water Environment, Section R, Drawing No. MMD-233906-DT-0981-0987.

14.5.78 The 0.3m threshold is chosen as it represents a typical value for the onset of significant property damages when property flooding may start (above doorstep level) and because it is at around this depth that moving through floodwater (driving or walking) may become more difficult; both of which may lead users to consider the need to close roads or evacuate areas.

14.5.79 There are no known records of groundwater or surface water flooding from Norfolk County Council, and no Highways Agency records of any known surface water issues along the proposed route, or within the immediate vicinity of the route. However, the lack of historic evidence may be because such flooding goes unreported.

Aquatic Ecology

- 14.5.80 Chapter 8: Nature Conservation describes sites which are protected for ecological reasons. The two sites linked to water are the River Wensum SAC and the 'The Springs' CWS.
- 14.5.81 The watercourses and lakes at 'The Springs' CWS is the closest water body with a potential hydraulic link to the proposed Scheme. The CWS is designated for its woodland, marshy grassland and standing water habitat. A number of small ponds are located within 100m of the proposed Scheme, but these are isolated and are not fed by watercourses.
- 14.5.82 Macro-invertebrate sampling was undertaken at four points around 'The Springs' and in two ditches in the area. Section J in Chapter 8 describes in detail the sampling at the CWS and the analysis of this information.
- 14.5.83 The results show that 'The Springs' currently has moderate to good biological water quality, with relatively diverse macro-invertebrate communities present, particularly in the emergent vegetation habitats at the edges of the first fishing lake and connecting ditches. Further details are provided in section J in Chapter 8. Of particular note was the presence of the Desmoulin's Whorl Snail. This was identified in the seepage areas at the first lake, and in the area of Dobbs Beck. Desmoulin's Whorl Snails were not present in the vegetation surrounding the second lake, which will receive the treated road runoff, and are therefore unlikely to be affected by any potential changes in water quality.
- 14.5.84 The CWS is predominantly groundwater fed. Any alteration in the groundwater flow or quality could have a significant effect on the habitats mentioned above. The HRA considers the River Wensum SAC aquatic ecology and the potential impacts of the proposed Scheme on the SAC designated features (Volume 2, Chapter 17: Habitat Regulations Assessment). The conclusions of the HRA are summarised in more detail in Chapter 8: Nature Conservation, Section 6, with an overall conclusion that the Scheme would not have an adverse impact on the SAC.

Existing Road Drainage

- 14.5.85 No existing road drainage is being replaced along the route, as the Scheme is a new road. However, there are intersections with existing roads, with new junctions in most places, as shown on the Scheme engineering layout (Document 2.6). There are also three offline junction improvements.

- 14.5.86 Information on existing drainage is generally very poorly recorded for minor roads, including the minor roads crossed by the Scheme. Almost all minor roads in the area have no formal drainage. Road runoff from the edge of the carriageway generally drains into ditches or infiltrates into the soil. In some areas, kerbs exist with some drainage, for example on the Wroxham Road (A1151) which discharges into the watercourse at Rackheath.
- 14.5.87 Road runoff is not treated on these roads, and in most cases treatment would not be justified as the Annual Average Daily Traffic (AADT) levels are lower than 10,000 (vehicles per day).
- 14.5.88 As there is no formal treatment of runoff along Wroxham Road (A1151) there are also no pollution control measures in the event of a significant accident.

14.6 Mitigation

Mitigation during Construction

14.6.1 During construction, best practice for pollution prevention and water management, set out in the following documents, will have to be implemented as part of the overall Construction Environmental Management Plan (CEMP) as appropriate to the specific circumstances of the Scheme and where this is practicable to do so:

- Environmental good practice on site (CIRIA, 3rd Edition, 2010)
- Control of water pollution from construction sites – guide to good practice (CIRIA, 2002);
- Control of water pollution from linear construction projects (CIRIA, 2006); and
- Environment Agency Pollution Prevention Guidelines (PPG), in particular:
 - PPG1 Understanding your environmental responsibilities - good environmental practices;
 - PPG2 Above ground oil storage tanks;
 - PPG3 Use and design of oil separators in surface water drainage systems
 - PPG5 Works and maintenance in or near water;
 - PPG6 Working at construction and demolition sites;
 - PPG21 Incident Response Planning; and

- PPG22 Dealing with spills.

14.6.2 Some examples of specific mitigation measures which will be required in the CEMP (Volume 2, Chapter 24: CEMP) are as follows:

- Works will be undertaken in accordance with any conditions imposed in consents for temporary discharges and abstractions (e.g. dewatering excavations) obtained from the Environment Agency;
- Measures to control discharge of surface water run-off from construction compounds will be implemented;
- All fuel and oils will be stored in accordance with the Control of Pollution (Oil Storage) Regulations 2001. Storage areas will be located away from surface water drainage, and will be within bunds with sealed bases. Refuelling would always be undertaken remote from drainage and surface water features and using automatic shut-off fuel delivery systems. Similar measures will be implemented for the storage of chemicals;
- Pumps, generators and other small items of plant will be provided with drip trays to collect any oil/fuel spills;
- Where wheel washes are installed adjacent to site accesses/egresses, these will be self-contained, will recycle wash water where possible and will not discharge directly to the environment;
- Where practicable, topsoil (with vegetation) will be replaced on earthworks areas to limit scouring and the generation of silt-laden runoff;
- Drainage from existing roads will not be impeded during construction of road crossings ; and
- Monitoring of surface water and groundwater quality, groundwater levels and flows in the streams at 'The Springs' will commence six months prior to any pre-construction works. The monitoring will continue during construction at frequencies to be agreed with the Environment Agency.
- Emergency response procedures will be developed and implemented to cover any incidents that might lead to release of pollutants to the aquatic environment (including spillages to ground).

Mitigation during operation

Mitigation strategy to protect water quality

14.6.3 There are three watercourses receiving runoff from the Scheme: (i) the second lake between Dobbs Beck and Spixworth Beck; (ii) Dobbs Beck; and (iii) River Yare via the existing A47 drainage (Eastbound A47 Off-slip). Due to a lack of other suitable watercourses in the locality, most of the road runoff will be discharged into systems that eventually result in the runoff infiltrating into the ground.

14.6.4 To minimise risk to the water environment in accordance with the SUDS Manual (CIRIA, 2006), discharges of routine runoff to surface water and groundwater will flow through a three tiered treatment system. Where carriageway alignment and safety considerations permit, runoff will flow through a grassed swale, then discharge to a lined settlement pond, followed by an infiltration pond (if discharging to groundwater) or a surface flow wetland (if discharging to surface water), as agreed with the Environment Agency. Where swales are not feasible, a two tiered treatment train is provided (lined pond and infiltration pond). Each treatment stage reduces the concentration of contaminants present in the road runoff to different degrees, as defined in DMRB Surface and Sub-surface Drainage Systems for Highways, Volume 3, Section 2, Part 3 (HD 33/06). Further details on treatment systems proposed in each drainage catchment are provided in Volume 2, Chapter 14: Road Drainage and the Water Environment, Section G.

14.6.5 A substantial proportion of the contaminants from highway runoff are held in suspended particles in the runoff. Partial removal of dissolved pollutants including some metals and salts, prior to discharge to surface water, would occur through:

- Settlement of suspended sediment in swales and settlement ponds.
- Adsorption of colloidal particles and soluble chemical compounds onto organic materials and clays in fine sediments held in vegetated treatment areas in retention ponds.
- Uptake (and breakdown) of chemical elements and compounds as part of the metabolic activity of bacteria/algae in areas of vegetative treatment (particularly in the root zone).

14.6.6 The majority of the road runoff will be discharged to infiltration ponds as there are very few watercourses along the route suitable for accepting the runoff (see Volume 2, Chapter 14: Road Drainage and the Water Environment,

Section R, Drawing No. MMD-233906-DT-0981-0987. As agreed with the Environment Agency, the main mitigation measure taken to protect groundwater has been to establish that 1.2 m or more of unsaturated ground would exist between the base of an infiltration pond and the underlying water table in high groundwater level conditions. The maximum groundwater levels observed during monitoring from 2007 to 2013 were used as a guide to high groundwater level conditions. Although the maximum groundwater levels in the period are unlikely to be as high as the long term maximum levels, the levels used should be reasonably representative of high water table conditions for many wet winter periods.

14.6.7 The distance between the base of the proposed infiltration ponds and the maximum observed groundwater level (the unsaturated zone) is provided in Table 14.7.

Table 14.7: Assessment of Unsaturated Zone Thickness beneath Proposed Infiltration Ponds

Lagoon Number	Chainage (m)	Lagoon Base Elevation (Invert Level) (mAOD)	Maximum Observed Groundwater Level (mAOD)	Minimum Thickness of Unsaturated Zone (m)
1	650	13.4	9.9	3.5
1A (Overland flow only)	600	15.0	9.9	5.1
2	1625	32.8	9.9	22.9
3	2820	32.4	30.9	1.5
4	3125	31.3	30.9	0.4
5	4200	26.8	DRY	-
6	5350 (1075	26.0	DRY	-

Lagoon Number	Chainage (m)	Lagoon Base Elevation (Invert Level) (mAOD)	Maximum Observed Groundwater Level (mAOD)	Minimum Thickness of Unsaturated Zone (m)
	Offline)			
6A	5350 (500 Offline)	30.9	DRY	-
8	6700 (385 Offline)	22.1	20.99	1.11
8A (Overland flow only)	6700 (340 Offline)	24.6	21.0	3.6
9	6750 (400 Offline)	21.2	20.38	1.12
12	8900	19.4	15.31	4.09
13	9800	20.5	DRY	-
13A (Overland flow only)	9900	21.2	DRY	-
14	11000 (180 Offline)	16.6	13.18	3.42
14A	11000 (430 Offline)	19.8	13.3	6.5
16	12800	14.1	DRY	-
17 (Lined)	13400	12.0	12.63	-0.63
18	14600	13.2	12.4	0.8

Lagoon Number	Chainage (m)	Lagoon Base Elevation (Invert Level) (mAOD)	Maximum Observed Groundwater Level (mAOD)	Minimum Thickness of Unsaturated Zone (m)
(Lined)				
18A	14450	14.0	12.4	1.6
19	16200	25.1	18.2	6.9
20	16400	25.9	18.2	7.7
21	17000 (140 Offline)	22.2	18.0	4.2
22	17200 (160 Offline)	21.6	18.0	3.6
23	18160	23.4	18.0	5.4
24	18760	21.8	9.1	12.7
25	19350	22.8	9.1	13.7
26	19500 (120 Offline)	17.5	8.7	8.8
27 (swale - lined)	19750	24.15	8.7	15.45
28 (lined)	20000 (100 Offline)	18.35	1.4	16.94
29	20350	9.4	1.4	7.99
30	20000 (300 Offline)	15.4	1.4	13.99

14.6.8 In five locations the requirement for the depth of unsaturated zone (1.2m) is unlikely to be achieved (at Lagoons 4, 8, 9, 17 and 18). Lagoons 17 and 18 at

‘The Springs’ will be lined and discharged to surface water. The drainage design will incorporate permanently wet surface flow wetlands within the second lagoon, with a hydro-brake controlling the outflow rate.

14.6.9 It is not possible to line the infiltration pond at Lagoons 4, 8 and 9 as there is no watercourse to receive a positive outfall. However, the risk assessment results confirm that, without lining this lagoon, the level of risk to groundwater from road runoff and from an accidental spillage is considered acceptable, and this risk is further reduced by the treatment systems and pollution prevention measures proposed (see Volume 2, Chapter 14: Road Drainage and the Water Environment, Section G). The detailed design will be agreed with the Environment Agency, including the potential need to raise invert levels or incorporate other pollution control mechanisms (e.g. penstock valves to isolate the primary lagoon in the event of a spill), where possible, at these locations.

14.6.10 All drainage networks will be constructed with measures to contain any accidental spillage of harmful substances. The measures will prevent the spillage reaching the final discharge point by containment within the initial lined settlement pond.

Mitigation strategy to manage flood risk

14.6.11 Flood risk will be mitigated in the following ways:

- Drainage networks will be installed, capable of storing volumes of road runoff and overland flow for a 1:100 year event;
- Soakaway systems and culverts under the road will be installed to control and direct overland flow (i.e. flow originating from outside the Scheme boundary), in circumstances where the flow cannot be directed to a drainage lagoon;
- Lagoons 1A, 8A and 13A will provide storage for overland flow during a 1:100 year event for their associated catchments;
- The drainage lagoons will regulate discharge rates to surface waters at the existing greenfield runoff rates (Lagoons 17 and 18);
- Infiltration lagoons with half drain-down times exceeding 7 days will be designed to contain additional runoff from a follow-on 1 in 10 year storm within the freeboard, as requested by the Environment Agency; and

- The area of new slip roads to be drained to the A47 surface water drainage system would be no greater than the area of the existing merge slip road onto the A47 eastbound that is to be decommissioned. As such, there will be no significant change to existing drainage. There will be no change to flood risk in this area as concluded in the FRA.

14.6.12 As described in section 14.5.6 in this chapter, and in section 3.1.4 of the FRA (Volume 2, Chapter 21: FRA), the Scheme has the potential to increase flood risk from overland flow. To compensate for this potential increase, culverts are proposed at the low points of larger overland flow catchments, where flow is not directed and stored within the proposed infiltration lagoons. The culverts will convey the overland flow to the down gradient side of the road to prevent flooding upstream of the road and embankments. In most catchments, spreader ditches are also proposed along the road edge or embankment toe. The ditches will direct flow to the culverts and promote infiltration.

14.6.13 Lagoons 17 and 18 will be constructed with a hydro-brake controlling the outflow rate at a greenfield runoff rate. Using the overland flow catchment areas draining to Lagoon 17 and Lagoon 18 (see Volume 2, Chapter 14: Road Drainage and the Water Environment, Section R, Drawing No. MMD-233906-DT-0981-0987), and the FEH catchment descriptors e.g. permeability of the soils of these catchments, the greenfield runoff rate was estimated. Methods used to estimate the greenfield runoff rate were selected based on the catchment size (as defined in the SuDS Manual (CIRIA 2007)). The Institute of Hydrology Report 124 (IOH124) method was used for both Lagoon 17 and Lagoon 18 (catchments less than 200 ha). Detailed calculations are presented in Volume 2, Chapter 14: Road Drainage and the Water Environment, Section N, Appendix D.

14.6.14 The greenfield runoff rates were calculated for a 1:100 year event plus 30% for climate change. These calculations do not include any increased runoff from urban areas within the catchments, providing a conservative estimate. The resulting greenfield runoff rates are compared to the proposed discharge rates from the lagoons in Table 14.8 below, and show the proposed discharge rates are below the greenfield runoff rates for these catchments.

Table 14.8: Greenfield Runoff Rates

Lagoon Number	Overland flow catchments draining to discharge point	Greenfield Runoff Rates (1:100 yr+ 30% cc)		Maximum proposed discharge rate from Lagoon
		litres per second	litres per second per hectare	Litres per second
17	OL16, OL16A and OL16B	7.53	0.66	7.5
18	OL19 and OL20	22.66	0.66	20

14.6.15 There is the potential for the Scheme to deviate from the current proposed elevation by +/- 0.5m during the detailed design stage. Road elevations may be varied within these limits provided they remain:

- above the estimated maximum flood levels for overland flow for a culvert blockage scenario, as described in the FRA; and
- above the long term maximum groundwater levels.

14.6.16 This assessment assumes there will be no change to the high and low points of the road as a result of any variations in road elevations. As a consequence, therefore, the associated road drainage arrangements would remain unchanged. It also assumes no significant changes to the level and slope of culverts proposed to convey overland flow under the Scheme.

14.6.17 At chainage 100 there is a bridleway that is at risk of flooding from overland flow during a 1:100 year storm event. To avoid this occurring a retention bund will be constructed (see Volume 2, Chapter 14: Road Drainage and the Water Environment, Section R, Drawing No. MMD-233906-DT-0815) with a crest level to be specified with reference to the maximum flood levels calculated in the FRA, plus a 300mm freeboard. The flood bund will ensure access to the bridleway is maintained during and following storm events.

Mitigation strategy for private and public water supplies

- 14.6.18 As described in section 14.5.2 and 14.5.5, and as agreed with the Environment Agency, a default 50m radius SPZ1 has been assigned to all private water supplies used for drinking water and all infiltration systems have been excluded from within this zone to protect its integrity.
- 14.6.19 Swale no. 27 and Lagoons 28, 29 and 30 are located within the temporary SPZ1 surrounding the AWS public water supply. Swale no. 27 and Lagoon 28 are both lined and discharge to Lagoon 30. The only structures discharging to groundwater within the SPZ1 are Lagoons 29 and 30. A three stage treatment step and pollution control systems is proposed in both these locations as described under 'Mitigation strategy to protect water quality' in this section. An unsaturated zone of more than 5m has been provided beneath the base of Lagoons 29 and 30 as agreed with the Environment Agency.
- 14.6.20 The Environment Agency's position on sustainable drainage systems in SPZ1 is set out in their policy on Groundwater Protection: Principles and Practice (GP3, August 2013). The Environment Agency requires a risk assessment to determine whether pollution to groundwater would occur from the proposed infiltration systems within the temporary SPZ1 of the new proposed public water supply based on the source-pathway-receptor approach. This approach considers the pollutants potentially contained within the road runoff, the processes that may modify, contain or convey the pollutants through the soil and subsoil, and whether the pollutants are likely to reach the groundwater. As indicated in section 14.3, the framework behind the DMRB groundwater risk assessment is based on the source-pathway-receptor approach that has been developed and supported by the Environment Agency. Therefore the mitigation proposed to effectively treat runoff and contain accidental spillages (see 'Mitigation strategy to protect water quality' in this section) is considered adequate to mitigate risks to protect the integrity of the supply. This mitigation has been discussed with and approved by the Environment Agency.

SuDS maintenance and monitoring

- 14.6.21 The process undertaken to select appropriate and effective road drainage systems for the Scheme in each drainage catchment is provided in Volume 2, Chapter 14: Road Drainage and the Water Environment.

- 14.6.22 The culverts, spreader ditches, swales and attenuation lagoons proposed by the drainage design will be maintained in accordance with policies, standards and practices of NCC's Transport Asset Management Plan and The SuDS Manual (CIRIA, 2007).
- 14.6.23 NCC have agreed to install erosion protection measures at the discharge points from Lagoons 17 and 18, and at the downstream outfall point of all culverts conveying overland flow beneath the Scheme. Regular monitoring by NCC will be undertaken to ensure these measures are effective.
- 14.6.24 In order to maintain the efficiency of the SuDS elements of the proposed drainage design, regular maintenance will be required. It is anticipated that swales, filter trenches and detention ponds will require regular inspection, litter and debris removal, and grass cutting, as well as occasional maintenance such as sediment management and vegetation replacement to retain design capacities and functionality. As outlined in the NCC's Transport Asset Management Plan (2013/14-17/18), the routine maintenance of the Scheme and its associated drainage will be the responsibility of Norfolk County Council including the actions outlined in section 5.4.5 and 5.4.6 of the Plan.

14.7 Assessment of Effects

14.7.1 This outlines the potential impacts arising from the construction and operation of the proposed Scheme on the water environment. The assessment takes into account the mitigation already set out in section 14.6 Mitigation.

Construction

- 14.7.2 Construction of the proposed Scheme has the potential to give rise to negative impacts from:
- spills of fuel and chemicals, which could enter groundwater or nearby ponds or drains;
 - surface water run-off with high sediment loading being generated from working areas, which could contaminate surface water features, leading to lowered water quality and potentially the blockage of small drains and ponds; and
 - a reduction in permeability along the route, from construction of access roads, materials stores and compounds, with the consequence of increasing maximum surface water run-off and increasing flood risk elsewhere.

14.7.3 Measures to manage surface water during construction is provided in the CEMP (Volume 2, Chapter 24: CEMP) and is based on the mitigation measures identified in the FRA (Volume 2, Chapter 21: FRA, Section A) and section 14.6.1 above.

14.7.4 During a major storm event there is the potential for sediment laden runoff to overwhelm site protective measures at locations protecting nearby watercourses and alter overland flows, however this impact would be temporary and localised. Due to the large overland flow catchment draining to Dobbs Beck, the risk is greatest in this location.

14.7.5 Table 14.9 provides the assessment of potential positive and negative impacts during construction and the significant effects of these impacts with the mitigation applied (section 14.6.1). The mitigation proposed in the table highlights measures to reduce any significant adverse effects.

Table 14.9: Assessment of Potential Impacts and Significant Effects – Construction

Potential Impact	Feature	Attribute (as defined in Table A4.1 in HD45/09)	Value of the Attribute (see Error! Reference source not found.)	Importance of Receptor	Mitigation Proposed (Construction)	Magnitude of Impact	Significance of Effect (as defined in Table A4.6 in DMRB HD45/09)
Surface Water							
Change in surface water quality	River Wensum (chainage 0 -1600)	Biodiversity	Special Area of Conservation	Very High	Road drainage network and infiltration ponds to be installed at an early stage. No direct discharges into ditches or watercourses feeding the Wensum.	Negligible	Neutral
Change in surface	Dobbs Beck and	Dilution and Removal of	Discharge consent for	Medium	No impact on the discharge consent	Minor Adverse –	Slight adverse

<p>water quality</p>	<p>d/s Spixworth Beck (chainage 14500)</p>	<p>Waste Products (Lagoon 18)</p>	<p>AWS WwTW to Dobbs Beck at 'The Springs'. Spixworth Beck: WFD classification 'moderate'.</p>		<p>operation itself will arise from the Scheme. No direct discharge to be permitted in and around 'The Springs'. All runoff in these areas to be controlled and contained in ponds prior to discharge to enable settlement. CEMP method statements to be developed based on appropriate Environment Agency Pollution Prevention Guidelines (PPG). Permanent drainage installed as soon as practical so control of</p>	<p>short term flushing from drainage outfalls.</p>	
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Change in surface water quality (and flow)	Dobbs Beck (chainage 14500)	Biodiversity	County Wildlife Site	Medium	runoff can be managed more effectively. Managing discharge from construction requires careful planning. Road drainage network and infiltration ponds to be installed at an early stage. No direct discharge to be permitted. Only discharge via temporary storage and silt trap systems.	Minor Adverse – potential temporary changes to flow	Slight adverse
Change in surface water quality	River Yare (Offline at chainage 20000)	Dilution and Removal of Waste Products (Runoff from	WFD classification 'moderate'	Medium	As for Dobbs Beck & Spixworth Beck.	Minor Adverse – short term flushing from drainage	Slight adverse

Change in surface water quality	Other minor field ditches potentially connected to larger surface water bodies	A47 slip road)	Dilution and Removal of Waste Products	Unknown quality status.	Low	CEMP method statements to be developed based on appropriate Environment Agency PPG. All construction compounds to have properly bunded and contained storage facilities for hazardous soluble substances. All batching plant areas (e.g. concrete or bitumen) to be on concrete pads with properly constructed drainage to contain spillages.	outfalls. Negligible (no direct discharge permitted into any ditch)	Neutral
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Change in surface water quality	First lake d/s of Dobbs Beck (chainage 13900)	Recreation	Carp fishery	Medium	No discharges permitted directly into the lake.	Negligible impact	Neutral
Change in surface water quality	Second lake d/s of Dobbs Beck, (chainage 13500) and d/s Spixworth Beck (500m offline at chainage 13300)	Private Water Supply (surface water)	Local abstraction for spray irrigation. Spixworth Beck: WFD classification 'moderate'	Low	None required	Negligible, No change	Neutral
Change in surface water	Four ponds (Chainag	Biodiversity (Stillwater ponds --	Great Crested Newts (protected)	Very High	No direct discharge permitted. Temporary silt traps	Negligible	Neutral

quality	e 4000, 9000, 10000 and 15250)	holding Great Crested Newts)	species)		(straw bales or other suitable method) to prevent construction site runoff entering the ponds.		
Groundwater							
Change in groundwater quality	Principal aquifer (Crag and Chalk)	Groundwater supply (public water supply)	Regionally important resource & SPZ1	Very High	Compliance with Environment Agency PPG. Following pollution prevention measures required in SPZ1 within GP3.	Negligible	Neutral
Change in groundwater quality	Principal aquifer (Crag and Chalk)	Groundwater supply (private domestic supplies)	Local resource	Medium	No abstraction/dewatering permitted within 50m radius (nominal SPZ1).	Negligible	Neutral

Change in groundwater quality	Principal aquifer (Crag and Chalk)	Vulnerability	Area of high leaching potential soils and unconfined principal aquifers.	High	No routine discharges will be permitted to ground of any contaminated water. Compliance with Environment Agency PPG.	At a local scale, road cuttings will remove some of the protective unsaturated zone and thus increase vulnerability. However, scale of impacted area is small in relation to whole aquifer.	Negligible	Neutral
Flood Risk								

Flooding from groundwater	Principal aquifer (Crag and Chalk)	Conveyance of Flow	Perched water table serving small catchment	High	Consent required from Environment Agency/IIDB for any temporary dewatering during earthworks and road construction.	Negligible	Neutral
Flooding from increased surface water runoff	Dobbs Beck (chainage 14500)	Conveyance of Flow	Dobbs Beck serving small catchment.	Low	Discharge from Lagoon 18 at or near the greenfield runoff rate. Improved conveyance of overland flow through the new culvert and ditch under track that leads to AWS pumping station; a larger culvert installed under Wroxham Road and 2500mm culvert at chainage	Negligible (see also the FRA (Volume 2, Chapter 21, Section A))	Neutral

							14750.		
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14.7.6 Based on the implementation of mitigation measures described in section 14.6.1 and the conclusions of the FRA, no significant adverse impacts as a result of construction works are predicted on the water features described under section 14.5.

Operation

14.7.7 During operation the Scheme has the potential to impact water resources from:

- Discharging poor quality water from the road drainage network to surface water and groundwater bodies and the associated water users;
- Improving existing road runoff treatment and spillage containment discharging to surface water or groundwater;
- Increasing the runoff from land occupied by the road and associated low permeability structures;
- Intercepting and blocking overland flow during high intensity rainfall events; and
- Disturbance and transportation of potentially contaminated sediments during SuDS maintenance into surface and groundwater bodies.

14.7.8 These potential impacts are discussed further in the following sub-sections.

Potential impacts on surface water quality

14.7.9 The potential for pollutants from routine road runoff to have an adverse impact on the three surface water bodies receiving drainage discharges is considered low. Application of the DMRB HAWRAT indicates that the quantities of sediment and soluble copper and zinc entering surface waters are acceptable. Detailed calculation worksheets to support this conclusion are provided in Volume 2, Chapter 14: Road Drainage and the Water Environment, Section P.

14.7.10 The low return periods for spillage risk suggest no additional pollution prevention measures would be required. Detailed calculation worksheets to support this conclusion are provided in Volume 2, Chapter 14: Road Drainage and the Water Environment, Section P. However, due to the sensitivity of the receiving watercourses and aquifer, the requirements set out by the Environment Agency and suggested best practice in the SuDS Manual (CIRIA 2006), the three tiered treatment system has been applied.

Potential impacts on groundwater quality

- 14.7.11 HD 45/06 requires the groundwater assessment to use a source-pathway-receptor approach and predicts whether risks of contamination to groundwater are high, moderate or low. The action required to mitigate any identified risk depends on the value and sensitivity of the groundwater, for example, the groundwater may contribute baseflow to ecologically important habitats, or could be used for public water supply.
- 14.7.12 A risk assessment has been undertaken for the Scheme for all the road drainage networks that would discharge to ground, which includes the risk of routine runoff on groundwater (Method C) and the risk of accidental spillage (Method D), as described in section 14.3. The results are provided in detail in Volume 2, Chapter 14: Road Drainage and the Water Environment, Section O, Appendix E and Section Q.
- 14.7.13 As described in section 14.6.2, as there was insufficient unsaturated zone available to help protect groundwater (less than 1.2m) Lagoons 17 and 18 at 'The Springs' will be lined and discharged to surface water due to high groundwater levels in the area. The drainage design will incorporate permanently wet surface flow wetlands within the second lagoon, with a hydro-brake controlling the outflow rate.
- 14.7.14 The groundwater risk assessment (HD45/09 Method C) considered the depth to groundwater beneath each infiltration pond. Table 14.10 summarises the results of the groundwater risk assessment using the method in HD45/09, which assumes runoff discharges directly from the road to the ground, with no mitigation measures incorporated. The individual assessments for each lagoon are included in Volume 2, Chapter 14: Road Drainage and the Water Environment, Section O, Appendix E. Although Lagoons 18 is lined, it has been included in this assessment as the receiving water body (Dobbs Beck) varies seasonally between dry and wet conditions. Therefore in dry conditions the discharge will be to ground and not to surface water.

Table 14.10: Summary of Groundwater Risk Assessment for Drainage Network

Lagoon Number	Chainage (m)	Overall Groundwater Risk Score	Risk of Impact on Groundwater
1	650	150	Medium
1A (Overland flow only)	600	N/A	N/A
2	1625	137.5	Low
3	2820	170	Medium
4	3125	170	Medium
5	4200	162.5	Medium
6	1075 Offline	157.5	Medium
6A	50 Offline	142.5	Low
8	385 Offline	170	Medium
8A (Overland flow only)	340 Offline	N/A	N/A
9	0 Offline	200	Medium
12	8900	162.5	Medium
13	9800	142.5	Low
13A (Overland flow only)	9900	N/A	N/A
14	180 Offline	177.5	Medium
14A	430 Offline	180	Medium
16	12800	162.5	Medium
17 (Lined)	13400	155	Medium

Lagoon Number	Chainage (m)	Overall Groundwater Risk Score	Risk of Impact on Groundwater
18 (Lined)	14600	162.5	Medium
18A	14450	177.5	Medium
19	16200	150	Medium
20	16400	135	Low
21	140 Offline	155	Medium
22	160 Offline	170	Medium
23	18160	150	Medium
24	18760	150	Medium
25	19350	135	Low
26	500 offline (west)	150	Medium
27 (lined swale, discharges to Lagoon 30)	300 offline (south)	N/A	N/A
28 (lined, discharges to Lagoon 30)	200 offline (south)	N/A	N/A
29	20350	150	Medium
30	500 offline (east)	150	Medium

14.7.15 In many cases, the ground investigation for the Scheme provided information on lithology and clay content. In some locations, no relevant information was available, and so information from the nearest boreholes was used to assign values for the assessment. The boreholes used in the assessment of each lagoon are listed in Volume 2, Chapter 14: Road

Drainage and the Water Environment, Section B, Table B.1. Conservative values were generally selected for the relevant parameter.

14.7.16 The risk of pollutants entering groundwater from routine runoff is shown to vary between low to moderate adverse along the route. A medium risk is assigned to any site which scores between 150 and 250. Most lagoons are in the lower half of the Medium Risk range. Five lagoons have low risk (<150). When using the risk matrix, all drainage catchments have the same drainage catchment characteristics i.e. flow type, rainfall volume and intensity, and all drainage catchments have AADT less than 50,000. The factors which changed in the risk assessment tables were:

- the soakaway geometry;
- the size of sand particles and proportion of clay in the underlying lithology; and
- the depth to the water table from the base of the proposed pond.

14.7.17 Lagoon 9 has the highest risk due to the shallow depth to groundwater and low proportion of clay in the lithology.

14.7.18 The ground water risk assessment provides only an approximation of the risk as substantial generalities are included. The method does not allow for mitigation measures to be adequately represented. SuDS treatment systems described in section 14.6.2 can provide a reduction in contaminants before runoff reaches the infiltration pond, reducing the risk to groundwater and resulting in a lower risk than presented above. For example, the reduction factors associated with the combination of a grass swale and settlement ponds are not taken into account in the assessment. Vegetated systems can produce a reduction of pollutants which exceed 60% in some circumstances, as discussed in DMRB Volume 4, Section 2, Part 1 (HA 103/06).

14.7.19 The risk of a pollution incident arising from spillage at all drainage discharge points has been assessed and Volume 2, Chapter 14: Road Drainage and the Water Environment, Section Q shows these are all well below maximum acceptable probability set out in HD45/06 (i.e. the probability of a spillage for any drainage network has been calculated to have an annual probability of less than 1%). As described in section 14.6.2, this risk will be reduced further with the proposed measures to contain any accidental spillage of harmful substances (containment within the initial lined settlement pond).

14.7.20 The only users of groundwater that could be affected by runoff infiltration are the private water supplies and the AWS public water supply. No

significant adverse effects are predicted on private water supplies used for drinking water as all lagoons are located outside the default 50m buffer. The risk of pollutants entering the groundwater via the proposed infiltration ponds and other soakaway structures within the temporary 750m radius SPZ1 is considered low using the DMRB groundwater and spillage risk assessment tools. The risk to the public water supply abstraction is therefore also considered low.

Potential impacts on flood risk

- 14.7.21 As shown on Volume 2, Chapter 14: Road Drainage and the Water Environment, Section R, Drawing No. MMD-233906-DT-0689, the Scheme is in close proximity to the environmentally sensitive area of 'The Springs'. This gives rise to a potential flood risk due to increased surface water runoff, as indicated in the FRA (Volume 2, Chapter 21: FRA). Greenfield runoff rates have therefore been used in the highway drainage design to size settlement and balancing ponds, with a controlled discharge point to 'The Springs' (see section 1.6.2 'Mitigation strategy to prevent flood risk'). The design incorporates SuDS and addresses the potential risk due to increased runoff.
- 14.7.22 The outfall from Lagoon 17 at 'The Springs' will discharge to the second lake that outfalls to Spixworth Beck. However, no additional flood risk is predicted for the Spixworth Beck due to the restricted greenfield runoff rate for the 1:100 year flood. A similar approach to the design of Lagoon 18 at 'The Springs' (chainage 14600) will ensure that flood risk is not enhanced by the Scheme.
- 14.7.23 It is therefore concluded that, in terms of flood risk, the Scheme meets the requirements of NPPF providing the proposed mitigation measures and SuDS design are employed.
- 14.7.24 Table 14.11 provides the assessment of potential positive and negative impacts during operation, and the significant effects of these impacts taking into account the mitigation measures proposed in section 1.6.2. The mitigation proposed in the table highlights measures to reduce any significant adverse effects.

Table 14.1.1: Assessment of Potential Impacts and Significant Effects – Operation

Potential Impact	Feature	Attribute (as defined in Table A4.1 in HD45/09)	Value of the Attribute (see Error! Reference source not found.)	Importance	Mitigation Proposed (Operation)	Magnitude	Significance of Effect (as defined in Table A4.6 in DMRB HD45/09)
Surface Water							
Change in surface water quality	River Wensum (chainage 0 – 1600)	Biodiversity	Special Area of Conservation	Very High	No direct discharges into ditches or watercourses feeding the Wensum. Discharge to ground in this area.	Negligible – no change	Neutral
Change in surface water quality	Dobbs Beck, downstream am second	Dilution and Removal of Waste Products	Discharge consent for AWS WwTW to Dobbs Beck at 'The	Medium	Discharge is via settlement ponds, vegetated treatment ponds and then into natural boggy area	Negligible – final discharge has acceptable	Neutral

	lake and Spixworth Beck (chainage 13300-14500)	(Lagoons 17 and 18)	Springs'. Spixworth Beck: WFD classification 'moderate'		before discharge into streams and lake. Pollution controls installed to contain spillages and isolate discharge points.	water quality	
Change in surface water quality	Dobbs Beck (chainage 14500)	Dilution and Removal of Waste Products (runoff from existing A1151)	Surface water body with WFD classification 'moderate' ecological potential	Medium	Existing discharge from A1151 will be routed through new treatment before discharge into Dobbs Beck.	Minor beneficial	Slight Beneficial
Change in surface water quality	Dobbs Beck and first lake downstream (chainage 13300-	Recreation & Biodiversity	Carp fishery	Medium	Discharge via treatment system. Discharge located to enter Dobbs Beck through lagoons 17 and 18, via vegetated wetland. Very high contamination removal	Negligible impact	Neutral

	14500)					potential even after treatment system due to wetland and reed beds in the area		
Change in surface water quality	Dobbs Beck (chainage 14500)	Biodiversity	County Wildlife Site	Medium	Discharge via treatment system. Discharge located to enter Dobbs Beck through lagoons 17 and 18, via vegetated wetland. Very high contamination removal potential even after treatment system due to wetland and reed beds in the area	Negligible	Neutral	
Change in surface water	Dobbs Beck (chainage	Biodiversity	County Wildlife Site	Medium	Existing discharge from A1151 will be routed through new treatment before	Minor beneficial	Slight Beneficial	

quality	14500)					discharge into Dobbs Beck.		
Change in surface water quality	River Yare (offline at chainage 20000)	Dilution and Removal of Waste Products (runoff from A47 slip road)	Surface water body with WFD classification 'moderate' ecological potential	Medium	No additional measures to those already in place for the A47 drainage are required based on HAWRAT assessment results ('passed').	Negligible	Neutral	
Change in surface water quality	Ponds (Chainage 4000, 9000, 10000 and 15250)	Biodiversity (Stillwater ponds – holding Great Crested Newts)	Great Crested Newts (protected species)	Very High	Discharge of road drainage is to ground. Alignment of road avoids affecting ponds directly.	Negligible	Neutral	
Groundwater								

Change in groundwater quality	Principal aquifer (Chalk and Crag)	Water supply (public water supply)	Principal aquifer providing a regionally important resource	Very High	Infiltration lagoons within SPZ1 are preceded by passive treatment systems (swales and/or silt traps) and containment systems to prevent spillages entering infiltration pond areas. Significant unsaturated zone provides additional protection and opportunity for removal of contaminants infiltrating into the Chalk.	Negligible	Neutral
Change in groundwater quality	Principal aquifer (Chalk and Crag)	Water supply (private supplies)	Chalk and Crag aquifers are used for private and agricultural water supplies	Low	No discharge from road runoff occurs within 50 m of any private source. Discharge to ground only where maximum groundwater levels (as	Minor Adverse – some supplies downstream of infiltration	Slight adverse

Change in groundwater quality	Principal aquifer (Chalk and Crag)	Vulnerability	Areas with high leaching potential soils and unconfined main aquifers. Road is to be constructed in cutting in places,	High	The impermeable road surface and drainage network provides equivalent or greater protection in cuttings than the lost unsaturated zone. Drainage for the Scheme is designed taking into account	Negligible	Neutral
					monitored) at least 1.2m below base of infiltration ponds. All infiltration ponds are preceded by passive treatment (swales and silt traps) and containment systems to prevent spillages entering infiltration ponds.	ponds. However, the unsaturated zone below the infiltration ponds will provide attenuation potential.	

			<p>reducing the unsaturated zone which provides protection to the aquifer.</p>		<p>spillage risks. Risk assessment shows that no sections of the Scheme have significant risks from accidents.</p> <p>Drainage networks and treatment designed to intercept and remove significant contaminants loading in the runoff prior to discharge to infiltration ponds.</p> <p>No infiltration pond is located where highest measured main water table, as monitored, is less than 1.2 m below base of infiltration pond except Lagoons 4 and 9 (see section</p>		
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Flood Risk					1.6.2).		
Flooding from increased surface water runoff	Large catchment (OL20) of Beck Brook and Dobbs Beck (chainage 14500)	Conveyance of flow	Minor watercourse draining surrounding land	Medium	All runoff is discharged at greenfield runoff rates from the lined Lagoons 17 and 18 at 'The Springs' to the receiving watercourse. Spreader ditches, large box culvert (2500mm) and new ditch providing flow path to Dobbs Beck, to maintain runoff from associated overland flow catchment. Permanent drainage installed as soon as practical. Regular maintenance	Minor beneficial – improving conveyance of overland flow under track near AWS pumping station and under Wroxham Road	Slight beneficial

Flooding from increased surface water runoff	Large overland flow catchment (chainage 1000)	Conveyance of flow	Catchment draining towards Fakenham Road and potentially the River Wensum	Low	to prevent blockage. Flood bank to protect the bridleway proposed at chainage 1000. Permanent changes to overland flowpath.	Negligible	Neutral
Flooding from increased surface water runoff	Other surface water catchments	Conveyance of flow	Small catchments draining to field ditches or infiltrating to ground	Low	Spreader ditches and/or culverts to maintain runoff from overland flow catchments downstream of the road crossing. Regular maintenance to prevent blockage.	Negligible	Neutral

Climate change considerations

- 14.7.25 A climate change risk assessment considers the impact of climate change on the Scheme and the wider environment. This is provided in Volume 2, Chapter 16: Climate Change Risk Assessment, Section A) and points of relevance to the water environment summarised below.
- 14.7.26 The only aspect of climate change likely to affect the proposed route of the Scheme is the variation in rainfall patterns. This has been considered using the DEFRA/NPPF guidance which suggests an increase of 30% should be expected in peak rainfall intensity by the year 2115. A precautionary increase of 30% has been applied to calculations of surface water runoff from the road and adjacent natural catchments. As a result, the attenuation lagoons have been designed to contain a 100-year event plus 30% allowance for climate change, as described in (Volume 2, Chapter 21: FRA, Section B). Where the half drain-down time exceeds 7 days, lagoons have been designed to have the capacity for a follow on 1 in 10 year event within the freeboard. In addition, capacity and flow routing for extreme events (up to the 1 in 1000-year event) have been incorporated within the system.
- 14.7.27 Maintenance of drainage structures (see section 14.6.2) will provide a degree of resilience to climate risks. These activities also provide the opportunity to assess vulnerability and impacts and make improvements as part of maintenance, modification or replacement regimes. Retrofitting of assets to reduce vulnerability can be undertaken during asset management and maintenance activities e.g. unblocking drains.

14.8 Conclusions

- 14.8.1 During construction the overall effect of the Scheme during construction on surface water quality is predicted to be slight adverse at worst (not significant). During a major storm event there is the potential for sediment laden runoff to overwhelm site protective measures at locations protecting nearby watercourses and alter overland flows, however this impact would be temporary and localised.
- 14.8.2 During operation the overall effect on surface water quality is considered to be neutral to slight beneficial. A slight beneficial effect will result from the improvement of treatment to existing runoff from the A1151. Runoff from the A1151 currently discharges into the CWS without any form of treatment.
- 14.8.3 The Scheme crosses areas of high leaching potential soils and unconfined principal aquifers, and is in reasonably close proximity to some private

abstraction sites and an AWS public water supply source. There may be a slight adverse effect on groundwater quality for some private water supplies which are located down-gradient of infiltration ponds. However, all infiltration ponds are outside the default 50m radius SPZ1 under Environment Agency guidance, applied to all potable groundwater abstraction sites (unlicensed). Otherwise, during construction and operation, the overall effect of the scheme on groundwater quality and flow is predicted to be neutral.

14.8.4 The overall effect of the Scheme on flood risk is predicted to be neutral to slight beneficial. The Scheme provides a new flow path between the Scheme and Dobbs Beck, along the dry valley, to convey flood flows. With the mitigation measures in place, no increase in flood risk is predicted.

14.8.5 The overall effect of the Scheme on aquatic biodiversity is considered in Chapter 8: Nature Conservation.

14.8.6 Mitigation recommended for construction and operation (including maintenance works), to reduce the overall effect of the Scheme, is set out in Volume 2, Chapter 21: FRA, Section B and section 21.6 of this chapter. The recommendations will be incorporated into the CEMP and Norfolk's Transport Asset Management Plan, with the Scheme being maintained by NCC.

14.8.7 With the appropriate mitigation measures for construction and operation (including maintenance) discussed in this chapter, there are a limited number of slight adverse effects and slight beneficial effects (i.e. not significant effects). As all the other effects are considered neutral, the overall effect of the Scheme on water resources and flood risk is concluded to be not significant.

15. Cumulative Impacts

15.1 Summary

- 15.1.1 The assessment of combined and cumulative effects of the Scheme bring together the principal findings of each of the previous topics of the Environmental Statement in order to identify and assess the combined effects of the Scheme and the cumulative effects of the Scheme in association with other existing or future significant development projects within the study area.
- 15.1.2 Combined effects can be defined as effects which can result from multiple actions on receptors and resources over time and are generally additive or interactive in nature.
- 15.1.3 The assessment methodology for combined effects involves the identification of impact interactions associated with the Scheme upon separate environmental resources or receptors. The significance of construction and operational phase environmental impacts are taken from the preceding chapters of the Environmental Statement into matrices providing a clear summary of potential impacts. The significance of combined effects upon each environmental resource is then made based upon the balance of significance scores.
- 15.1.4 Cumulative impacts can also be considered as impacts resulting from incremental changes caused by other past developments that are reasonably foreseeable as occurring at a similar time to the construction of the Scheme.
- 15.1.5 The assessment of cumulative effects is not intended to provide a detailed assessment of the effects of future developments. In many instances the layout and design of future projects have not been developed to the same level of detail as that for the Scheme, they may be phased in over years and their construction timetable as yet unconfirmed. As such, assessments have been undertaken at a relatively high level in the context of broad development parameters sufficient to provide an understanding of the likely environmental effects of future developments and to enable adequate consideration of cumulative effects.
- 15.1.6 The Scheme will have an overall moderate adverse and significant environmental effect during the construction phase. The adverse effects come from construction noise and visual intrusion from the lighting of construction compounds and after dark construction activities in the winter. These

combined noise and visual effects will adversely impact on bats and birds but these effects will be temporary.

15.1.7 There are significant benefits to non-motorised and motorised users from the NDR during operation with reduced severance and increased connectivity. There are environmental benefits to residents from the removal of vehicles from unsuitable suburban roads. However there will be adverse impacts to wildlife due to land-take, traffic noise and tree removal.

15.1.8 There are anticipated to be significant adverse cumulative impacts during the construction phase. These effects will mostly impact on road users and biodiversity, however it is unlikely that construction will occur simultaneously so this represents a worst case scenario.

15.1.9 During the first year of operation impacts on protected species are moderate adverse due to land-take and severance, however maintaining commuting and foraging routes for bats during construction reduces some of the effects that may occur during the first years of operation.

15.1.10 By design year all the adverse impacts will have reduced in significance and the benefits to motorised and motorised users will still be significantly beneficial as the other development phases in. The adverse impacts on biodiversity will reduce as the landscaping and habitat creation matures.

15.2 Introduction

15.2.1 This chapter brings together the principal findings of each of the topic chapters of the Environmental Statement (ES) in order to identify and assess the Combined effects of the Scheme and the cumulative effects of the Scheme in association with other existing or future significant development projects within the study area.

15.2.2 Cumulative effects can be defined as effects which can result from multiple actions on receptors and resources over time and are generally additive or interactive in nature.

15.2.3 Cumulative impacts can also be considered as impacts resulting from incremental changes caused by other past, present or reasonably foreseeable actions together with the NDR.

15.2.4 DMRB Volume 11, Section 2, Part 6 suggests that the reporting of cumulative assessments should be included towards the end of the ES as it is easier to

sum up the cumulative effects after the consideration of the effects on the respective subject areas.

15.3 Methodology

15.3.1 The DMRB (HD 205/08) recommends that the significance criteria for cumulative effects is standardised into five categories. The following tables taken from DMRB (HD 205/08) sets out a framework for determining significance of cumulative effects, which has been used in this assessment.

15.3.2 The assessment of the significance of both the combined effects of the Scheme and the cumulative effects of the Scheme with other major developments has been based upon the definitions within Tables 15.1 to 15.3.

Table 15.1: Sensitivity of Receptor Group

Value (Sensitivity)	Typical Descriptors
Very High	Very high importance and rarity, international scale and very limited potential for substitution.
High	High importance and rarity, national scale, and limited potential for substitution.
Medium	High or medium importance and rarity, regional scale, limited potential for substitution.
Low (or Lower)	Low or medium importance and rarity, local scale.
Negligible	Very low importance and rarity, local scale.

Source: DMRB (HD 205/08)

Table 15.2: Magnitude of Impact

Impact	Definition
Major (Adverse or Beneficial)	Where the balance of the impacts of the Scheme or combined effects of the Scheme in association with other existing or more than likely/near certain future major developments upon an individual

	or collection of environmental receptors would be highly significant (positive or negative).
Moderate (Adverse or Beneficial)	Where the balance of the impacts of the Scheme or combined effects of the Scheme in association with other existing or more than likely/near certain future major developments upon an individual or collection of environmental receptors would be significant (positive or negative)
Minor (Adverse or Beneficial)	Where the balance of the impacts of the Scheme or combined effects of the Scheme in association with other existing or more than likely/near certain future major developments upon an individual or collection of environmental receptors would be noteworthy but not significant (positive or negative).
Negligible	Where the balance of the impacts of the Scheme or combined effects of the Scheme in association with other existing or more than likely/near certain future major developments upon an individual or collection of environmental receptors would be negligible (positive or negative).
Neutral	Where the positive and negative impacts of the Scheme or the combined effects of the Scheme in association with other existing or more than likely/near certain future major developments would balance

Source: DMRB (HD 205/08)

Table 15.3: Significance of Effect

		Magnitude of Impact or Degree of Change (Beneficial or Adverse)				
		no change	negligible	minor	moderate	major
(sensitivity)	Very High	Neutral	Slight	Moderate or Large	Large or Very Large	Very Large
	High	Neutral	Slight	Slight or Moderate	Moderate or Large	Large or Very Large
	Medium	Neutral	Neutral or Slight	Slight	Moderate	Moderate or Large
	Low	Neutral	Neutral or Slight	Neutral or Slight	Slight	Slight or Moderate
	Negligible	Neutral	Neutral	Neutral or Slight	Neutral or Slight	Slight

Source: DMRB (HD 205/08)

Combined Effects

15.3.3 The assessment methodology for combined effects involves the identification of impact interactions associated with the Scheme upon separate environmental resources. The significance of construction and operational phase environmental impacts are brought forward from the preceding chapters of the ES into matrices providing a clear summary of potential impacts. The significance of combined effects upon each environmental resource is then made based upon the balance of significance scores.

15.3.4 For the purposes of this assessment combined effects of moderate adverse or beneficial and above are considered significant, although minor effects are still worthy of note. Weighting of impacts has not been applied to the matrices as such an approach is considered subjective and would make interpretation of the results difficult.

Cumulative Effects

15.3.5 This cumulative effects assessment involves the identification of incremental changes likely to be caused by other future developments together with the proposed Scheme. The identification of which potential significant transport related schemes and other major developments will be included within the cumulative effects assessment was based upon the scoping criteria given in Table 15.4.

Limitations to the assessment

15.3.6 The assessment of cumulative effects is not intended to provide a detailed assessment of the effects of future developments. In many instances the layout and design of future projects have not been developed to the same level of detail as that for the proposed Scheme, they may be phased in over years and their construction timetable as yet unconfirmed. As such, assessments have been undertaken at a relatively high level in the context of broad development parameters sufficient to provide an understanding of the likely environmental effects of future developments and to enable adequate consideration of cumulative effects.

15.4 Context

Technical

- 15.4.1 The study area for the assessment of the combined effects of the Scheme reflects the study areas identified within the relevant topic chapters of the ES.
- 15.4.2 The cumulative effects of the Scheme are assessed in the context of other potential significant transport related schemes and major developments up to the Design Year (2032) which fall within the 'more than likely' and 'near certain' categories as defined in the Highways Agency Interim Advice Note 81/06, Assessment and Management of Environmental Effects see Table 15.4.

Planning and Legislative

- 15.4.3 The European Community Directive 85/337/EEC as amended by the Directive 97/11/EC on "The assessment of certain public and private projects on the environment" requires consideration of the direct, indirect, secondary and cumulative impacts of a project. The EIA Directive also requires consideration of the interactions between potential environmental impacts.
- 15.4.4 Schedule 4 of the Infrastructure Planning (Environmental Impact Assessment) (England and Wales) Regulations 2009 also requires a description of the likely significant effects of a development, which specifically includes the assessment of cumulative effects.
- 15.4.5 The assessment of the combined and cumulative effects of the Scheme draws upon the following sources of guidance:
- 15.4.6 Highways Agency Interim Advice Note 81/06, DMRB Volume 11 Section 2 Part 5: Assessment and Management of Environmental Effects. DMRB Volume 11, Section 2, Part 6 and DMRB (HD 205/08)
- 15.4.7 Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions, Hyder May 1999, commissioned by the European Commission: Directorate-General XI (Environmental, Nuclear Safety and Civil Protection).
- 15.4.8 Institute of Environmental Management & Assessment: Guidelines for Environmental Impact Assessment, IEMA 2004.

15.5 Baseline

15.5.1 The baseline conditions and key receptors for each environmental topic are presented in the topic Chapters 4 -14 of Volume 1 of the ES..

15.5.2 The identified receptor groups for combined and cumulative effects taken from the topic chapters of the ES are:

- Residential properties, schools and health care facilities
- Protected Species and Designated Sites
- Amenity and Non-Motorised Users including Cultural Heritage
- Ground and surface water
- Land Use
- Motorised Users
- Climate Change with regard to Carbon
- Cultural Heritage

15.5.3 The identification of which potential significant transport related schemes and other major developments will be included within the cumulative effects assessment was based upon the scoping criteria given in Table 15.4 . Generally developments were included if they were generally likely to come forward.

Table 15.4 Criteria for Inclusion or exclusion into the assessment

Certainty of Outcome	Development Status
Near Certain: The outcome will happen or there is a high probability of it occurring	Intent announced by proponent to regulatory agencies. Approved development proposals.

Certainty of Outcome	Development Status
	Projects under construction.
<p>More than likely: The outcome is likely to happen but some uncertainty</p>	<p>Development application within the consent process and in accordance with development plan.</p> <p>Development conditional upon the transport strategy/project proceeding.</p>
<p>Reasonably foreseeable: The outcome may happen but significant uncertainty</p>	<p>Identified within a development plan and, although not directly associated with the transport project, may occur if the project is implemented.</p>
<p>Hypothetical: There is considerable uncertainty whether the outcome would ever happen</p>	<p>Conjecture based upon currently available information.</p> <p>Discussed on a conceptual basis.</p> <p>One of a number of possible inputs in an initial consultation process.</p>

Source: Highways Agency Interim Advice Note 81/06, Assessment and Management of Environmental Effects

15.5.4 The following developments have been identified for inclusion within the cumulative effects assessment, they are developments that either have planning permission or partial planning permission or are locations for housing and commercial properties allocated for some years.

Table 15.4: Developments assessed with the NDR for the Cumulative Effects Chapter

Development/Strategy	Certain	More than likely	Reasonably foreseeable /hypothetical
Beyond Green Incorporates 3,520 houses, 1,000 jobs and local shops and services at North Sprowston and Old Catton (NS&OC)	X		
Rackheath Eco Community Mixed-use community offering employment, day-to-day services, and public transport in addition to the 4,150 houses.		X	
Broadland Gate Mixed- use houses and commercial development.	X		
Norwich Airport Engine testing centre	X		
Norwich Airport Aviation Business Park 850,000 sq ft	Partial	X	
Laurel Farm and Brook Farm 600 homes and commercial development	X		
Blue Boar Lane Lane (White House Farm) 1233 houses	X		
Norwich Area Transport Strategy (NATS)	X		
Proposed JCS housing allocation for 4000			X

Development/Strategy	Certain	More than likely	Reasonably foreseeable /hypothetical
homes to the north west of Norwich (at present exact location unknown).			

15.5.5 As the locations of the proposed JCS housing allocations to the north west of Norwich are currently unknown and as the delivery date is also unknown it has been excluded from this assessment.

Beyond Green

15.5.6 The Beyond Green Development at North Sprowston and Old Catton incorporates up to 3,520 homes of mixed size, tenure and type including up to 33% affordable homes, up to 16,800m² of business and employment space creating 1,000 local jobs by the time the development is completed (with another 200 created during construction);

15.5.7 It is proposed to produce up to 8,800m² of retail and service development providing for shops, banks, cafés, restaurants, pubs and other local services to meet local people’s daily needs in a traditional high street setting.

15.5.8 There will be provision for two new primary schools and up to 2,000m² of community space including two community halls, a health centre and library.

15.5.9 In addition there will be up to 1,000m² of hotel or guesthouse accommodation and access to public transport and streets designed to make walking and cycling the most convenient modes of transport.

15.5.10 The development provides over 80 hectares of green space including a major new public park at Beeston Park, three recreation grounds, allotments and community gardens, with 40% of the site, not including private gardens, becoming accessible green space.

15.5.11 A low-carbon decentralised energy network, plus infrastructure to manage water resources sustainably is proposed.

Rackheath Eco Community

- 15.5.12 Rackheath has been short listed for development of an Eco Community comprising of approximately 3,400 houses. It is the only site of 12, short listed by the government, to score an 'A' rating for suitability.
- 15.5.13 The Eco-Community Rackheath will incorporate a facility for renewable on-site energy production; public transport systems, encouraging people to use cycles and walkways recycling and waste management; amenities, including shops, schools and sports facilities and a network of green open spaces, parks and gardens.

BroadLand Gate

- 15.5.14 BroadLand Gate Business Park will be located in an already established business area, it is intended to provide a range of potential employment opportunities. It will contain restaurants, cafés, a hotel, conference centre and spa, local retail and leisure facilities.
- 15.5.15 The community zone consists of the business accommodation to the north and east of the site. It will provide business space designed to meet the needs of potential employers. Uses could range from small serviced offices through to large scale enterprises, along with the scope for the provision of small warehouse units. It is anticipated that buildings will be no higher than three-storeys clearly identified and set within their own landscaped areas. With a Gross External Area (GEA) of 42,000m²
- 15.5.16 The community zoned comprises serviced apartments specifically for the existing and proposed business community, a medical centre, and facilities such as a crèche the GEA will be up to 7,500m²
- 15.5.17 The business village will be situated in the northwest corner of the site, this zone will be designed to create a service hub for both the BroadLand Gate Business Park and is positioned to enable the established BroadLand Business Area to access its amenities, which will include shops, financial and professional services, restaurants, cafes and pubs/restaurants with a GEA of up to 4,650m².
- 15.5.18 The hotel & leisure zone, sitting alongside the community zone in the southwest corner of the development, will comprise a hotel, spa, conference and associated leisure facilities with a GEA of up to 9,100m² there is also a car showroom – consisting of a car dealership, with highway frontage to the south-west corner of the development GEA of 1,200m².

Norwich Airport Engine Testing Centre

15.5.19 The proposed Development comprises the construction of 2,557m² of new concrete to supplement the existing concrete of the Bravo-November Interchange (taxiway), the assembly of a 10m high pre-fabricated Ground Run Enclosure (GRE) and movable jet blast deflector with the open side facing towards the south west and the installation of foundations to support the GRE. The aircraft must face into the wind during testing to avoid the engines potentially becoming severely damaged by tailwinds. The GRE has been oriented to take account of the prevailing wind direction (which is from the west / southwest). Aircraft can be accommodated within the GRE nose in i.e. facing towards the north east or nose out i.e. facing towards the south west and at varying angles due to the moveable blast deflection system (aircraft can be rotated approximately 30° either side of the centreline, depending on the aircraft type and wind velocity). It is unlikely to be operational for more than 100 days throughout the year.

Norwich Airport – Norwich Aviation Business Park

15.5.20 Norwich International Airport and Wrenbridge, a Cambridge based property company, developed outline plans for the development of an 850,000 sq ft (c 80,000 sq m) aviation related business park at Norwich International Airport. A 160,000 sq ft area has been pre-let to Air Livery, the aircraft painting company, for an aircraft painting facility which will accommodate planned expansion at the airport and provide 120 jobs.

15.5.21 The park will be developed on 100 acres of land to the north east of the main runway and sits inside the operational boundary of the airport offering direct access to the airport's infrastructure. The land is currently jointly owned by Norwich City and Norfolk County Councils. As part of their long term commitment to the airport and to encourage the creation of new jobs, both Councils have agreed to release land to enable this development proposal to come to fruition. The site is capable of accommodating up to 850,000 sq ft of hangar and ancillary office space and will focus primarily on businesses associated with the maintenance, repair and overhaul of aircraft.

Laurel Farm and Brook Farm

15.5.22 This development will provide 600 dwellings with a local centre incorporating 1,035m² of A1 retail and a community hall on the Brook Farm side of the development. Approximately 57,480sqm of B1, B2 or B8 (office, industrial, storage) employment land is proposed on the Laurel Farm part of the site. In addition this development is proposing a link road through the whole development connecting Peachman Way at the northernmost part of the existing Broadland Business Park with Plumstead Road East. It is proposed that this would join onto Middle Road and cross the railway line at this existing point. This proposal would also lead to Green Lane being cut off to vehicles and becoming a pedestrian/cycle route. The proposal also identifies land to the immediate north of the existing Green Lane vehicular crossing of the railway line for a rail halt.

Blue Boar Lane – White House Farm

15.5.23 This application seeks outline planning permission for the erection of up to 1,233 dwellings at White House Farm in Sprowston in two main phases. The first phase comprising the western part of the site would consist of up to 450 dwellings. The second phase for the remainder of the site would be reserved for development beyond 2011. Although the application is in outline, full details are for a proposed road linking from the Park and Ride roundabout on Wroxham Road to a new roundabout junction on Salhouse Road.

15.5.24 Of the proposed dwellings 40% 1,233 dwellings, would be affordable, a primary school site of 1.5 hectares, vehicular access from the new Link Road, extension of the existing bus service to be routed through the site from Linacre Avenue, pedestrian and cycle network within the site linking to existing routes and developments, public open space and public recreation access to Boar Plantation, Harrison's Plantation and The Breck.

Norwich Area Transport Strategy (NATS)

15.5.25 The Strategy aims to provide high-quality alternatives to the car including public transport, cycling and walking and to reduce carbon emissions and the impact of transport on the environment and our communities. However, the plan also allows that for many people the car will remain essential, particularly for those who live in more rural areas and that through-traffic to and from the north of Norwich adds to congestion in and around the city.

15.5.26 The Northern Distributor Road (NDR) is designed to provide an alternative route for traffic to and from the north of Norwich, widening the scope for major improvements and enabling promotion of more sustainable modes of transport in and around the city. It will also ensure that new housing areas to the north-east of Norwich are properly served by transport links and do not simply add to congestion. It should be noted that the NDR is integrated within NATS.

Mitigation

15.5.27 Mitigation for combined effects are incorporated into the individual assessments contained in Volume 1 of the ES (chapters 4 -14) and in the Volume 1 of the ES: Appendix 3 Mitigation Schedule.

15.5.28 Mitigation for effects is incorporated into both the individual designs for the developments and in the NDR. Moreover, mitigation is now inherent within the planning process, for example the upcoming Local Authority SuDs Approvals Process potentially due for implementation in 2014, will ensure that flood risk is minimal and water is conserved prior to construction of any new large scale developments. In addition the construction of sustainable homes and communities seeks to incorporate low carbon technologies and the use of sustainable building materials, while providing for ecology and landscaping. There is a requirement for new developments to provide sustainable transport infrastructure.

15.6 Assessment of Effects

15.6.1 The data for the assessments below has been taken from the individual specialist chapters (4-14) of the ES. The first assessment within this section will examine the combined effects arising from the interactions of impacts from the Scheme as a result of construction activities on the previously identified receptor group in (Table 15.6).

Construction

15.6.2 The following table (15.6) addresses the combined effects that may arise as a result of construction activities. Table 15.6 Combined effects resulting from construction activities.

Table 15.6 Combined effects resulting from construction activities.

Receptor Group	Sensitivity	Identified Impacts	Mitigation	Impacts	Effect Significance
Residences Schools and Health Care facilities	High	Changes in noise levels	Bunding put in place before construction starts. Haul routes avoiding unsuitable roads.	There will be intermittent noise effects from construction activities and temporary visual effects from lighting of road works and construction compounds including the housing and hygiene facilities for workers. Severance as a result of construction activities will be minimised by the provision of safe crossing points . Air quality	Effects during construction are likely to be significant although temporary.
		Changes to Air Quality	Dust management and suppression during construction.		
		Socio-economic impacts	Provision of housing and hygiene facilities for construction workers. Traffic plan for workers and construction vehicles.		
	Visual Impacts	Landscaping, bunding and habitat			

Receptor Group	Sensitivity	Identified Impacts	Mitigation	Impacts	Effect Significance
			<p>creation implemented prior to pavement construction</p> <p>Lighting scheme at compounds designed to be as non- intrusive as possible at site compounds.</p> <p>Maintenance of safe crossing points for pedestrians and vehicle users.</p>	<p>management will ensure that dust generation will not contribute to the effects above.</p> <p>Overall impacts are likely to be moderate adverse</p>	
Protected Species and Designated Sites	High	Changes in noise levels	<p>Landscaping, bunding and habitat creation implemented prior to pavement construction.</p>	<p>There will be moderate adverse impacts on protected species from noise and the visual</p>	Effects will be significant but temporary

Receptor Group	Sensitivity	Identified Impacts	Mitigation	Impacts	Effect Significance
		<p>Visual Impacts</p> <p>Changes to air quality</p> <p>Landtake.</p>	<p>Landscaping, bunding and habitat creation implemented prior to pavement construction.</p> <p>Lighting scheme at compounds designed to be as non-intrusive as possible at site compounds.</p> <p>Dust management and suppression during construction.</p> <p>Substantial habitat creation put in place before construction.</p>	<p>impacts from lighting. The initial land-take will also have an effect. Air quality and water quality will be unaffected.</p> <p>Overall impacts during construction will be moderate adverse.</p>	

Receptor Group	Sensitivity	Identified Impacts	Mitigation	Impacts	Effect Significance
Amenity and Non-Motorised Users	Medium	Severance of foraging habitat	Substantial habitat creation and crossing points in place before construction.	There will be adverse noise impacts from construction and visual impacts from lighting due to night time construction activities. Impacts are considered to be minor adverse.	Effects are temporary and not significant.
		Water quality	Water treatment before discharge into either surface or groundwater		
		Changes in noise levels	Traffic plan to ensure minimal disturbance on residential roads.		
		Visual impacts	Landscaping and habitat creation implemented before carriageway construction.		
		Severance	Provision of safe crossing points for non-motorised users		

Receptor Group	Sensitivity	Identified Impacts	Mitigation	Impacts	Effect Significance
Surface and Groundwater	High	Visual impacts	<p>will be provided throughout the construction period.</p> <p>Landscaping and habitat creation implemented before carriageway construction.</p>		
		<p>Deterioration in water Quality</p> <p>Flooding</p>	<p>Water treatment before discharge into either surface or groundwater. The Scheme will prevent the potential for silt to enter the Wensum.</p> <p>Surface water management plan within the CEMP.</p>	<p>There are no anticipated major or moderate adverse impacts on flooding or groundwater and therefore the Designated Sites and Species will be unaffected.</p> <p>Overall impacts are negligible.</p>	<p>Effects will be temporary and not significant.</p>

Receptor Group	Sensitivity	Identified Impacts	Mitigation	Impacts	Effect Significance
Land Use		Impacts on protected species and Designated sites			
	Medium	Land-take	Financial compensation for loss of revenue.	All access and irrigation systems will be maintained where possible. Compensation will be paid to farms for loss of revenue. The land-take will result in initial habitat loss and may have a moderate adverse impact on biodiversity.	Effects are significant but temporary
		Severance	Maintenance of field access and irrigation systems where possible and financial compensation for loss of revenue where appropriate.		
		Impacts on biodiversity	Intensively farmed land has low biodiversity value, however tree removal will adversely impact on		

Receptor Group	Sensitivity	Identified Impacts	Mitigation	Impacts	Effect Significance
Motorised Users			Bats. Mitigation will be in place at the start of construction.		
	High Medium	Impacts on journey times Road safety	Construction traffic scheduling and the provision of dedicated haul routes. Traffic management to ensure that roads are not used for construction traffic during school pick up and drop down times. Wheel cleaning facilities will	There will be some minor adverse impacts on motorised users however these will relate mostly to traffic Management resulting in potential delays.	Effects are significant but temporary

Receptor Group	Sensitivity	Identified Impacts	Mitigation	Impacts	Effect Significance
Climate change with regard to Carbon			prevent mud and soil on the road.		
		Visual impacts	Impacts from lighting of road works and site compounds.		
		Construction traffic and plant operation Lighting and heating of construction compounds Sourcing of materials	Traffic planning to ensure minimal haul routes and use efficient plant. Use lighting only when and where necessary Use local resources and recycled local materials.	The Scheme construction carbon assessment has assessed for all carbon generated during construction and that embedded within the Scheme itself.	With regard to national or regional emissions this is not considered significant.
Cultural Heritage	Medium	Visual impacts accessibility of heritage assets.	Sensitive appropriate landscaping prior to construction.	The overall impacts on cultural heritage are moderate to slight	The effects are significant but temporary.

Receptor Group	Sensitivity	Identified Impacts	Mitigation	Impacts	Effect Significance
		Severance and loss of amenity.	Improvement of City centre through enabled measures and traffic management.	adverse.	
		Damage to heritage assets through demolition.	Preservation by record of derelict buildings		

Summary of Combined Effects from Construction

15.6.3 Overall there is likely to be significant effects as a result of construction of the NDR but they will be temporary.

Table 15.6 Combined effects resulting from operation of the NDR at Opening Year (2017) and Design Year (2032).

Receptor Group	Sensitivity	Identified Impacts	Mitigation	Impacts	Effect Significance	
					In 2017	In 2032
Residences Schools and Health Care facilities	High	Changes in noise levels	Bunding and noise fencing, traffic measures to avoid the use of unsuitable roads.	Noise and air quality will improve on suburban roads in the north of Norwich, there will also be improvements arising in the city centre as a result of the implementation of NATS. Bunding will reduce noise levels adjacent to the Scheme. There will be a reduction in air	Overall the effects are significant and beneficial	Overall the effects are significant and beneficial
		Changes to Air Quality	Traffic measures to decrease the traffic levels on city and suburban residential roads			
		Socio-economic impacts	Benefits to journey times and access to public transport			

Receptor Group	Sensitivity	Identified Impacts	Mitigation	Impacts	Effect Significance	
					In 2017	In 2032
			increased provision segregated cycleways and footpaths.	quality and increases of noise levels adjacent to the new road. Improvements to accessibility and journey times and safe cycling provision will be a benefit. this will be associated with the landscaping and habitat creation. The segregation of the cyclepaths from the NDR by landscaping features will improve the journey experience for non-motorised users. Overall the impacts		
		Visual Impacts	Semi established landscaping, bunding and habitat creation.			
		severance	Increased provision of segregated cycleways and footpaths. Transport benefits across the north of Norwich.			

Receptor Group	Sensitivity	Identified Impacts	Mitigation	Impacts	Effect Significance	
					In 2017	In 2032
Protected Species and Designated Sites	High	Changes in noise levels	Bunding and noise fencing	Although there is loss of existing habitat which is mostly intensively farmed land and areas of woodland there is significant habitat creation and therefore biodiversity benefits. Connectivity of habitat is maintained for significant wildlife corridors and new ones are being created. Impacts from landtake and severance occur in the early stages of	Combined effects are significant in the early stages of operation.	Gradually reduce to not significant as the landscaping and habitat creation matures
		Changes to air quality	Decrease in traffic levels on city and suburban residential roads will improve local air quality			
		Landtake.	216.7ha habitat creation, including broadleaved woodland, grasslands Creation of new pond.			

Receptor Group	Sensitivity	Identified Impacts	Mitigation	Impacts	Effect Significance	
					In 2017	In 2032
		Severance of foraging habitat	9093m of new hedgerows and the creation of linear and block habitat creation (see above).	Scheme operation. surface water management will prevent siltation and Surface water quality will not be adversely affected at the Springs and flows on the Wensum will remain unchanged. Overall impacts are predicted to be moderate adverse to slight adverse		
		Water quality	Bat gantries and an underpass to enable bats to cross the NDR Water treatment before discharge incorporated into infiltration lagoons Scheme design minimises silt transference.			
Amenity and	Medium	Changes in	Decrease in traffic	There are anticipated	The benefits	The benefits

Receptor Group	Sensitivity	Identified Impacts	Mitigation	Impacts	Effect Significance	
					In 2017	In 2032
Non-Motorised Users		noise levels	levels on city and suburban residential roads. Bunding and noise fencing.	improvements to the city centre and the creation of new safe cycling and walking routes will improve overall amenity. Less traffic within the city will improve access to sites of amenity and cultural heritage interest. The benefits are Large/moderate beneficial.	are significant	are significant
		Visual impacts	Landscaping and habitat creation.			
		Severance	Creation of 25km of new footpaths, bridleways and cycle routes linking existing PROW provision.			
Surface and Groundwater	High	Flooding	SuDS drainage scheme, flood storage areas	After mitigation there will be no impacts on either water quality or	No anticipated significant	No anticipated significant

Receptor Group	Sensitivity	Identified Impacts	Mitigation	Impacts	Effect Significance	
					In 2017	In 2032
			<p>maintained and dry watercourses culverted.</p> <p>Drainage has been designed in consultation with the Environment Agency and is designed for a minimum 1-100 storm event plus 1-10 year storm event.</p> <p>Water treatment before discharge incorporated into infiltration lagoons</p> <p>All water is treated</p>	<p>flood risk. Surface water quality will not be adversely affected and flows on the Wensum will remain unchanged. Silt can have effects on water quality and ecology – the mitigation will ensure that sediment transfer as a result of flooding or poor surface water management will not occur.</p> <p>Overall impacts are negligible.</p>	effects	effects
		Deterioration in water Quality				
		Impacts on				

Receptor Group	Sensitivity	Identified Impacts	Mitigation	Impacts	Effect Significance	
					In 2017	In 2032
		protected species and Designated sites	before discharge.			
Land Use	Medium	Landtake	Mitigation for farm viability is given in the form of compensatory land or financial compensation for loss of revenue. There is no mitigation for loss of agricultural land as a resource.	With mitigation in place there will be no significant impacts on farm viability. Intensively farmed land will be lost to the Scheme. However farmland will be improved by increasing biodiversity through habitat creation and the maintenance and provision of wildlife	There are significant effects associated with loss agricultural land in 2017.	By 2032 effects will not be significant as agricultural activity settles in after the opening year.
		Severance	Maintenance of field access and irrigation systems			

Receptor Group	Sensitivity	Identified Impacts	Mitigation	Impacts	Effect Significance	
					In 2017	In 2032
			where possible and financial compensation for loss of revenue or land where appropriate.	corridors. Due to the loss of agricultural land the impacts are moderate adverse		
Motorised Users	High	Protected Species and Designated sites	Replacement of intensively farmed land with woodland and grassland habitats will provide biodiversity benefits			
		Impacts on journey times and accessibility	Provision of dual carriageway	The impacts arising from the NDR are a major beneficial for both private and commercial traffic and residents around	The NDR will provide for an overall significant benefit.	The NDR will provide for an overall significant benefit.
		Impacts on	Suburban			

Receptor Group	Sensitivity	Identified Impacts	Mitigation	Impacts	Effect Significance	
					In 2017	In 2032
		communities	communities will gain a reduction of traffic rat running	Norwich.		
Climate change with regard to Carbon	Medium	Journey times	Shorter journeys	The Scheme has been designed to minimise Carbon emissions. There will be carbon sequestration from the tree planting and landscaping. There will be an increase in carbon emissions from faster journey speeds. Water and drainage will minimise the impact from flood	Overall the effects are not significant.	Overall the effects are not significant.
		Protected Species and Designated Sites	Planting of 37,000 trees at ratio of 4.7 trees to every 1 tree lost to the Scheme			

Receptor Group	Sensitivity	Identified Impacts	Mitigation	Impacts	Effect Significance	
					In 2017	In 2032
Cultural Heritage	Medium	<p>Visual impacts accessibility of heritage assets.</p> <p>Severance and loss of amenity.</p>	<p>Sensitive, appropriate landscaping.</p> <p>Improvement of City centre through enabled measures and traffic management.</p>	<p>events.</p> <p>The overall impacts on cultural heritage are moderate to slight adverse.</p>	<p>The effects are significant in the early stages of Scheme operation. Particularly on historic parklands used for farming.</p>	<p>The effects are reduced to not significant as the landscaping matures.</p>

15.7 Summary

15.7.1 The combined effects are generally most significant during construction, however these effects are temporary. During the first year of operation the effects are still significant, as the landscaping and habitat creation matures these become less significant, there are large beneficial impacts to both non-motorised and motorised users from opening year (2017).

Cumulative Effects

15.7.2 The following tables provide a matrix to examine how the NDR will interact with other potential large scale developments in the area and determine if there is the potential for cumulative environmental effects. The following matrices demonstrate the potential interactions during construction and opening year (2017) and design year (2032).

15.7.3 The impacts during construction represent a worst case scenario as it assumes that all construction will be occurring simultaneously unless otherwise indicated.

Table 15.8: Cumulative Effects During Construction (Worst Case Scenario assuming all construction occurring within a similar timeframe).

Receiving Baseline	Beyond Green	Rackheath Eco Community	Broadland Gate Business Park	Norwich Airport Engine Testing Centre	Norwich Airport Aviation Park	Heading Laurel and Brook Farm	Blue Boar Lane	NATS	NDR	Significance
Residences, Schools and Health Care facilities	Moderate adverse	Slight Adverse	Negligible	Slight Adverse	Slight Adverse	Slight Adverse	Slight Adverse	Neutral	Moderate Adverse	Significant Adverse
Protected Species and Designated Sites	Moderate Adverse	Moderate Adverse	Slight Adverse	Slight Adverse	Slight Adverse	Slight Adverse	Negligible	Slight Adverse	Moderate Adverse	Significant Adverse
Amenity and Non-Motorised Users	Neutral	Slight Adverse	Slight Adverse	Neutral	Neutral	Slight Adverse	Slight Adverse	Slight Adverse	Slight Adverse	Not Significant
Surface and	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Not

Receiving Baseline	Beyond Green	Rackheath Eco Community	Broadland Gate Business Park	Norwich Airport Engine Testing Centre	Norwich Airport Aviation Park	Heading Laurel and Brook Farm	Blue Boar Lane	NATS	NDR	Significance
Groundwater										Significant
Land Use	Moderate Adverse	Moderate Adverse	Slight Adverse	Moderate Adverse	Slight Adverse	Slight Adverse	Slight Adverse	Negligible	Moderate Adverse	Significant - Adverse
Motorised Users	Moderate Adverse	Moderate Adverse	Moderate Adverse	Slight Adverse	Slight Adverse	Slight Adverse	Slight Adverse	Slight Adverse	Moderate Adverse	Significant Adverse
Climate Change with Relation to carbon	Slight Adverse	Slight Adverse	Slight Adverse	Slight Adverse	Slight Adverse	Slight Adverse	Slight Adverse	Slight Adverse	Slight Adverse	Not Significant
Cultural Heritage	Slight Adverse	Slight Adverse	Slight Adverse	Slight Adverse	Slight Adverse	Slight Adverse	Slight Adverse	Slight Adverse	Slight Adverse	Not Significant

15.7.4 Overall there will be significant adverse effects arising from land-take, impacts on road users, nature conservation and local residents and facilities during construction. However this represents a worst case scenario and assumes construction will occur simultaneously. It is most likely that this construction programme of development will be gradually phased in over some years.

Table 15.9 Cumulative Effects During Operation at Opening Year (2017)

Receiving Baseline	Beyond Green	Rackheath Eco Community	Broadland Gate Business Parks	Norwich Airport Engine Testing Centre	Norwich Airport Aviation Park	Heading Laurel and Brook Farm	Blue Boar Lane	NATS	NDR	Significance
Residence s, Schools and Health Care facilities	Moderate Beneficial	Neutral	Slight Beneficial	Moderate Adverse	Neutral	Slight Beneficial	Slight Beneficial	Moderate Beneficial	Moderate Beneficial	Significant Beneficial
Protected Species and Designated Sites	Moderate Adverse	Neutral	Slight Adverse	Slight Adverse	Slight Adverse	Slight Adverse	Slight Adverse	Neutral	Moderate Adverse	Significant Adverse
Amenity and Non-Motorised Users	Moderate Beneficial	Neutral	Negligible	Neutral	Negligible	Moderate Beneficial	Moderate Beneficial	Moderate Beneficial	Moderate Beneficial	Moderate Beneficial

Surface and Groundwater	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Not Significant
Land Use	Moderate Adverse	Moderate Adverse	Slight Adverse	Moderate Adverse	Slight Adverse	Slight Adverse	Slight Adverse	Slight Adverse	Neutral	Moderate Adverse	Significant - adverse
Motorised Users	Moderate Beneficial	Neutral	Slight Adverse	Neutral	Negligible	Slight Beneficial	Slight Beneficial	Slight Beneficial	Moderate Beneficial	Major Beneficial	Significant Beneficial
Climate Change with regard to Carbon	Slight Adverse	Slight Adverse	Slight Adverse	Slight Adverse	Slight Adverse	Slight Adverse	Slight Adverse	Slight Adverse	Slight Adverse	Slight Adverse	Not Significant
Cultural Heritage	Moderate/Slight Adverse	Slight Adverse	Slight Adverse	Slight Adverse	Slight Adverse	Slight Adverse	Slight Adverse	Slight Adverse	Slight Adverse	Moderate/Slight Adverse	Not Significant

15.7.5 During the first year of operation (2017) impacts on protected species are moderate adverse due to land-take and severance, however maintaining commuting and foraging routes for bats during construction reduces some of the effects that may occur during the first years of operation. There will be significant benefits to motorised and non-motorised users.

Table 15.10

Receiving Baseline	Beyond Green	Rackheath Eco Community	Broadland Gate Business Park	Norwich Airport Engine Testing Centre	Norwich Airport Aviation Park	Heading Laurel and Brook Farm	Blue Boar Lane	NATS	NDR	Significance
Residences, Schools and Health Care facilities	Moderate Beneficial	Moderate Beneficial	Slight Beneficial	Moderate Adverse	Neutral	Moderate Beneficial	Moderate Beneficial	Moderate Beneficial	Moderate Beneficial	Moderate Beneficial
Protected Species and Designated Sites	Slight Adverse	Slight Adverse	Negligible	Slight Adverse	Negligible	Slight Adverse	Slight Adverse	Neutral	Slight Adverse	Not Significant
Amenity and Non-Motorised Users	Moderate Beneficial	Moderate Beneficial	Negligible	Neutral	Negligible	Slight Beneficial	Slight Beneficial	Moderate Beneficial	Moderate Beneficial	Significant Beneficial

Receiving Baseline	Beyond Green	Rackheath Eco Community	Broadland Gate Business Park	Norwich Airport Engine Testing Centre	Norwich Airport Aviation Park	Heading Laurel and Brook Farm	Blue Boar Lane	NATS	NDR	Significance
Surface and Groundwater	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Not Significant
Land Use	Slight Adverse	Slight Adverse	Slight Adverse	Negligible	Negligible	Slight Adverse	Slight Adverse	Neutral	Slight Adverse	Not Significant
Motorised Users	Moderate Beneficial	Moderate Beneficial	Slight Adverse	Neutral	Negligible	Slight Beneficial	Slight Beneficial	Moderate Beneficial	Major Beneficial	Significant Beneficial
Climate Change with regard to Carbon	Slight Adverse	Slight Adverse	Slight Adverse	Slight Adverse	Slight Adverse	Slight Adverse	Slight Adverse	Slight Adverse	Slight Adverse	Not Significant
Cultural	Slight	Slight	Negligible	Negligible	Negligible	Slight	Slight Adverse	Neutral	Slight Adverse	Not Significant

Receiving Baseline	Beyond Green	Rackheath Eco Community	Broadland Gate Business Park	Norwich Airport Engine Testing Centre	Norwich Airport Aviation Park	Heading Laurel and Brook Farm	Blue Boar Lane	NATS	NDR	Significance
Heritage	Adverse	Adverse				Adverse	e		se	Significant

15.7.6 By 2032 all the adverse impacts will have reduced in significance and the benefits to motorised and motorised users will still be significantly beneficial as the other development phases in. The adverse impacts on biodiversity will reduce as the landscaping and habitat creation matures. The benefits to non-motorised and motorised users are significant. Also the job creation and increased housing will have significant benefits.

16. Conclusion

16.1.1 This chapter draws out and combines the overarching conclusions from each of the technical chapters of the ES, for both the construction and operational phases of the proposed Scheme.

16.2 Air Quality

16.2.1 A qualitative assessment of potential construction phase effects has been undertaken. Mitigation measures have been identified for incorporation within the CEMP commensurate with the risk of dust effects identified and in line with best practice. Potential impacts are concluded to be Negligible to Slight Adverse, at worst and therefore not Significant.

16.2.2 Operation phase effects have been assessed using an advanced dispersion model. Concentrations of key traffic-related pollutants have been predicted at sensitive human health and ecological receptors and the change as a result of the Scheme has been quantified. Existing concentrations of nitrogen dioxide (NO₂) are of concern in Norwich, particularly in the city where an 'Air Quality Management Area' (AQMA) has been declared. The Scheme is predicted to cause a Slight Beneficial effect on NO₂ concentrations, including within the AQMA, and negligible effects on fine particulate concentrations. Overall, operational phase air quality effects are concluded to be not significant.

16.3 Carbon

16.3.1 This assessment has considered the impact of the Scheme on carbon emissions, and involved the consideration of emissions in the construction phase and operational phase, including the effects on the wider transport network of which the Scheme is part.

16.3.2 The construction phase will lead to a one-off emission of 57.8ktCO₂ from the use of construction materials, plant and transport. Mitigation measures have been included in the Scheme design, which reduce emissions by 13.8ktCO₂ and are detailed in the Construction Environmental Management Plan (CEMP) (See Volume 2, Chapter 24).

16.3.3 During the operational phase there will be an increase in carbon emissions by 13.4ktCO₂ in the opening year (2017) due to an increase in vehicular travel. Changes in absolute emissions represent around 1% of the total emissions from all sources within the relevant Local Authorities in the assessment years. There are no targets in place to reduce emissions at the local or regional

level, however, the Scheme is part of NATS, which will enable other sustainable and lower carbon travel modes to be introduced in the area.

16.4 Cultural Heritage

Archaeology

16.4.1 The Scheme will have a Moderate Adverse and significant effect during construction on the archaeological resource along the line of the route. Aerial survey, combined with fieldwalking, metal-detector survey and geophysics has provided a good appreciation of the local archaeology, but further surveys are required to ascertain the location and nature of archaeological remains across the proposed Scheme.

16.4.2 There are no scheduled monuments, or undesignated remains of equal value, that are likely to be affected by the Scheme, and as such preservation in situ is not required. A detailed archaeological mitigation strategy agreed with the County Archaeologist will be produced setting out the requirements for further site evaluation and the recording of below-ground archaeological deposits which will be impacted by the Scheme.

Historic Buildings

16.4.3 A total of 61 historic buildings were identified for assessment. The only direct impacts upon historic buildings will be the demolition of some undesignated WWII structures at Rackheath, which are currently in a poor condition. The scheme will have a Major Adverse impact on the structures. These above-ground structures will be recorded prior to their demolition.

16.4.4 The main statutory listed historic buildings which will have their setting significantly affected by the Scheme are Rackheath Hall (including its bridge and gateway) and Horsford Hall. It is anticipated that the Scheme will result in Moderate Adverse visual and audible impacts upon these historic assets during both construction and operation.

Historic Landscapes

16.4.5 To the north-east of Norwich, the proposed route will pass through an area characterised by a cluster of historic parks and series of blocks of ancient woodland. The parkland is generally of medium value reflecting averagely well-preserved historic landscapes with reasonable coherence.

16.4.6 The Scheme will result in a Major Adverse and significant effect degree on Beeston historic park associated with severance impacts. The scheme will have Moderate Adverse impacts on a second park at Rackheath. In view of the difficulty of avoiding severance impacts, it will not be possible to reduce the magnitude of impact through mitigation.

16.4.7 Catton Hall Grade II* Registered Park and Garden is located approximately 2 km to the south of proposed Scheme, within the urban area of Norwich. No adverse effects are anticipated due to the distance of the designated site from the Scheme.

16.5 Landscape

16.5.1 The predominant landscape character along the NDR is generally one of fairly open arable farmland with many small hamlets and isolated properties spread throughout the area. There are clear urban fringe influences, from features such as housing development, Norwich Airport and the Broadland Business Park. However, a higher quality area is centred around the former parklands of Beeston and Rackheath Halls, where the landscape is characterised by a larger woodland component on more undulating topography.

16.5.2 Extensive mitigation planting and screen mounding is proposed along the route which would help to integrate the Scheme into the landscape and to provide screening for affected properties.

16.5.3 Landscape effects will generally be Moderately Adverse and significant during the Construction period and in the first year of opening (2017), reducing to Slight Adverse by the design year (2032) once mitigation planting has matured. Night time impacts will be Slight Adverse and not significant, largely associated with car headlights and road lighting towards Postwick Junction.

16.5.4 Visual Intrusion has been assessed for a variety of receptors; including residential properties, commercial properties, users of public rights of way and transport routes (road and rail). Overall the Scheme will result in a Moderate to Large Adverse and therefore significant effect upon visual receptors during construction and in the first year of opening (2017), reducing to Moderate to Slight adverse by the design year (2032) once mitigation planting establishes to form a more effective visual screen.

16.6 Nature Conservation

16.6.1 Several species of bat use areas likely to be affected by the Scheme. Great crested newts are known to exist at three locations, although just one

breeding pond will be directly affected. A number of badger populations are also known to exist within the vicinity of the Scheme. Breeding bird populations are ubiquitous throughout the landscape, including barn owls, a particularly sensitive bird species. Aquatic invertebrates have been identified at Ladies Wood, Church Carr & Springs County Wildlife Site, as well as those sensitive habitats suitable for terrestrial invertebrates.

16.6.2 Construction phase impacts on designated sites, protected species and habitats will include the permanent and temporary loss and severance of habitats, and disturbance due to the presence of plant machinery, people, and general construction activity. Operational phase impacts will include the presence of traffic using the proposed Scheme, with the associated disturbance in terms of noise. Mitigation measures have been included in both the CEMP and the Scheme design to reduce and where possible avoid these impacts during the construction and operational phases of the Scheme respectively.

16.6.3 During construction, the proposed Scheme will result in significant adverse effects on:

- Fakenham Road RNR;
- Important Hedgerows (under the Hedgerow Regulations 1997);
- Bats, or more specifically directly affected roosts in buildings and trees and important flight paths and areas of activity; and,
- Breeding bird species of both High and Medium conservation value.

16.6.4 During the operational phase of the Scheme, significant adverse effects are predicted to remain only for the bats using the flight paths along Marriott's Way during the opening year (year 1). By the design year (year 15), the effects on this flight path would no longer be significant. No other significant adverse nature conservation effects are predicted during the operational phase, however. Significant beneficial effects are predicted on terrestrial invertebrate habitats at The Springs.

16.7 Geology and Soils

16.7.1 Impacts upon geology and soils will predominately occur during the construction phase of the Scheme. However, there will be no significant residual effects with the implementation of the mitigation measures identified in the CEMP.

16.7.2 Impacts during the operational phase of the Scheme will be limited to the potential continued consolidation of soils over time which may adversely affect fauna and flora. However, these effects will not be significant due to the implementation of mitigation through the Soil Handling and Management Plan element of the CEMP during construction.

16.8 Materials

16.8.1 The Scheme has the potential to use large amounts of raw materials and generate quantities of waste. The bulk of the material requirements will be for the earthworks, comprising an estimated 1,814,555m³ of soil, sub-soil, sub base and granular capping material. The Scheme will generate an estimated 1,873,668m³ of excavated material, which will be close to a cut and fill balance after wastage has been taken into consideration. However, 10,599m³ of excavated material will need to be disposed of in landfill, the majority of which will be excess soil material. An estimated 1,421,926m² of vegetation will be removed from site during construction, all of which will be disposed off to the landfill or as green waste.

16.8.2 A considerable quantity of raw or virgin materials will be required, predominantly for surfacing, concrete and precast concrete, sub-base and bitumen macadam. However, some materials, including concrete and bitumen macadam, will be sourced from a decommissioned site, thereby reducing the reliance on raw materials. Other materials will be used for new signage, fences and barriers. These will have a smaller recycled component and will have to be sourced off site from a supplier.

16.8.3 It is anticipated that there would not be a significant effect resulting from the materials likely to be used and the waste produced from the Scheme due to the cut and fill balance achieved through design and the implementation of a Site Waste Management Plan by the Contractor as part of the CEMP.

16.9 Noise and Vibration

16.9.1 A noise and vibration assessment has been undertaken to establish significant effects associated with construction and operation of the Scheme. Mitigation measures incorporated into the Scheme include a thin surface course, three lengths of acoustic barrier and extensive bunding and false cuttings. Temporary barriers will also be required during construction at some sensitive locations.

16.9.2 Construction noise has been predicted to generate temporary significant effects at a limited number of locations prior to mitigation. Further construction

noise calculations will be undertaken as more detailed construction-related information becomes available, and the Contractor will be required to apply for Section 61 consent under the Control of Pollution Act 1974 which will minimise construction related noise.

16.9.3 Traffic using the completed Scheme will generate noise related effects. At Year 1 the proposed Scheme is predicted to significantly adversely affect 2658 residential and 24 non-residential receptors, and to significantly beneficially affect 718 residential and 15 non-residential receptors.

16.9.4 By the design year (year 15) the Scheme is predicted to significantly adversely affect 1984 residential and 25 non-residential receptors, and to significantly beneficially affect 494 residential and 14 non-residential receptors.

16.10 Effects on All Travellers

16.10.1 The proposed Scheme will result in an overall long term benefit for Non-Motorised Users, through the provision of a network of approximately 25km of new or improved routes, and for vehicular travellers by relieving some communities of high volumes of traffic which would transfer to the proposed Scheme. However, some adverse impacts have been identified at certain locations and for some user groups.

16.10.2 Overall a Slight Adverse but not significant effect is anticipated for All Travellers during construction for a temporary period, as a result of construction delays, route diversions and the presence of construction plant. However, once the Scheme is operational, it is considered that there would be a Moderate Beneficial and therefore significant impact for All Travellers. This is as a result of reduced traffic and congestion on the majority of radial routes, improved amenity for NMUs and relief from existing severance within and between communities caused by existing high traffic levels.

16.11 Community and Private Assets

16.11.1 Impacts on agriculture during the construction and operational phases of the Scheme will be similar. However, impacts during construction will be marginally worse than those during Operation as they take into account both the temporary and permanent loss of agricultural land. There will be no significant effects on farm viability as a result of either temporary or permanent land-take arising from construction of the NDR.

16.11.2 An Ecosystem Services Assessment was undertaken with regard to land use changes to enable the Scheme, and assessed the land lost to agriculture when balanced against habitat creation within the landscaping scheme. This assessment concluded that there is the potential for long term environmental benefits associated with the Scheme with regard to agriculture. The land taken from intensive agriculture that will be used for landscaping, lagoons and habitat compensation may have the effect of assisting the resilience of farming practices by enhancing biodiversity.

16.11.3 The construction phase of the Scheme is likely to deliver some temporary beneficial effects, including the creation of a number of fixed term construction jobs, the creation of new jobs for some local agency workers in Norwich, and some minor increased economic activity associated with the influx of construction workers. Some minor adverse effects are also likely to occur, including unavoidable disruption to businesses close to the route throughout the construction process. However, these effects are not considered to be significant.

16.11.4 The operational phase of the Scheme is likely to deliver beneficial and significant effects including:

- Improved access to business centres providing jobs and economic output across the sub-region;
- Improved access to strategically important new housing developments as set out in the JCS;
- Support growth, job creation and GVA uplift in the WAI and beyond;
- Supporting the development of and unlocking potential in a range of wider sites considered strategically important for the continued prosperity of Norwich, Broadland and Norfolk as a whole; and
- Support for sectors such as tourism

16.11.5 Although there will be some adverse effects of the Scheme, the majority of the effects upon community and private assets will be beneficial, particularly during the operational phase.

16.12 Road Drainage and the Water Environment

16.12.1 The overall effect of the Scheme during construction on surface water quality is predicted to be Slight Adverse at worst. During a major storm event there is the potential for sediment laden runoff to overwhelm site protective

measures at locations protecting nearby watercourses and to alter overland flows however, this impact would be temporary and localised.

- 16.12.2 During the operational phase of the Scheme the overall effect on surface water quality is considered to be Neutral to Slight Beneficial. A beneficial effect will result from the improvement of treatment to existing runoff from the A1151 into The Springs and subsequently Dobbs Beck, a tributary of the River Bure. Runoff from the A1151 currently discharges into The Springs without any form of treatment.
- 16.12.3 There may be a Slight Adverse effect on groundwater quality for some private water supplies which are located down-gradient of infiltration ponds. During construction and operation, the overall effect of the Scheme on groundwater quality and flow after mitigation is predicted to be Neutral.
- 16.12.4 The overall effect of the Scheme on flood risk is predicted to be Neutral to Slight Beneficial. The Scheme will provide a new flow path between the NDR and Dobbs Beck, along the dry valley, to convey flood flows. With the mitigation measures in place, no increase in flood risk is predicted.
- 16.12.5 With the implementation of mitigation measures for both construction and operation phases of the Scheme, effects upon water resources will not be significant.

16.13 Cumulative Effects

- 16.13.1 The Scheme would have an overall Moderate Adverse and significant combined environmental effect during the construction phase. The adverse effects will arise from construction noise and visual intrusion from the lighting of construction compounds and after dark construction activities in the winter. These combined noise and visual effects will adversely impact on bats and birds but will be temporary.
- 16.13.2 There will be significant benefits to non-motorised and motorised users during the operational phase of the Scheme, with reduced severance and increased connectivity. Environmental benefits to residents will arise from the removal of vehicles from unsuitable suburban roads. However, a number of Slight adverse effects will remain.
- 16.13.3 Significant adverse cumulative effects will occur during construction of the Scheme. These will mostly impact upon road users and biodiversity, however it is unlikely that construction of all the major developments identified

in the assessment will occur simultaneously so this represents a worst case scenario.

16.13.4 During the first year of operation, effects on protected species will be Moderate Adverse due to land-take and severance. However, maintaining commuting and foraging routes for bats during construction will reduce the effects that may occur during the first years of operation.

16.13.5 By the design year (year 715) all the adverse impacts will have reduced in significance and the benefits to motorised and motorised users will still significantly beneficial as the other development phases in. The adverse impacts on biodiversity will reduce as the landscaping and habitat creation matures.

17. Glossary

Word/Acronym	Definition
A	
AADT	Annual Average Daily Traffic
AADTF	Annual Average Day Time Flow (24 hourly traffic)
ADWT	Annual Average Week-day traffic
Air Quality Action Plans	Local Authorities are required to develop Air Quality Action Plans to improve pollutant concentrations in Air Quality Management Areas.
Air Quality Management Areas.	An Air Quality Management Area is declared by a Local Authority where the air quality objective for one or more of nine specified pollutants is unlikely to be met.
Ambient Noise	Totally encompassing sound in a given situation at a given time usually composite of sounds from many sources near and far.
Ancient Woodland	An area of woodland which has had a continuous history of tree cover since at least 1600.
AOD	Above Ordnance Datum, the standard denomination of ground level.
AONB	Area of Outstanding Natural Beauty
Appropriate Assessment.	Directive 92/43/EEC (The Habitats Directive) on the Conservation of Natural Habitats and Wild Fauna and Flora requires an Appropriate Assessment to be undertaken to assess the impacts of a land-use plan against the conservation objectives of a European Site, and to ascertain whether it would adversely affect the integrity of that site.
Aquifer	A water-bearing geological stratum or layer.
A-weighting	The human ear also has a non-linear frequency response,

Word/Acronym	Definition
	being most sensitive in the frequency range 1 kHz to 4 kHz and is less sensitive at higher and lower frequencies. The A-weighting is a frequency response function commonly applied to the linear output of a microphone to simulate the subjective response of the ear. All noise levels described in this report are A-weighted. Such levels are usually indicated by a subscript A or postscript (A).
B	
Background noise level LA90 T	The A-weighted sound pressure level of non-specific noise in decibels exceeding for 90% of the given time, T. [BS4142].
Baseline Studies	The systematic collation of data on the existing environmental conditions (i.e. baseline information) to enable possible environmental changes to be predicted and assessed as part of an environmental impact assessment.
Basic Noise Level	The level calculated from traffic data and road characteristics at a distance of 10m from the nearside carriageway edge using CRTN without before corrections for attenuation due to distance, absorption etc. (Department of Transport Welsh Office, 1988).
Bat Bridge	Wire construction enabling bat species to safely cross roads
Benefit Cost Ratio (BCR)	Outcome measure of a Cost-Benefit Analysis.
Best Practicable Means	The principle for selecting the best pollution control technique, recognising effectiveness, technical constraints, costs and other factors.
Biodiversity	The number and variety of organisms found in a specified area – an important measure of health and vitality of an area's ecology.
Biodiversity Action Plan	A framework for conserving, enhancing and restoring biological diversity.

Word/Acronym	Definition
Bridleway	A highway over which the public have a right of way on foot and a right of way on horseback or leading a horse, but with or without the right to drive animals of any description along a highway. Bicycles may also be ridden on bridleways.
Bund	Impermeable surround for storage areas, preventing leakage of fuels, oils or chemicals into local water resources.
C	
Carbon Footprint	A carbon footprint is a calculation of the amount of carbon dioxide (CO ₂) emitted by someone or something during their construction and normal operation.
Carbon Dioxide (CO ₂)	A naturally occurring greenhouse gas that is the product of combustion activities, such as in vehicle engines
Carbon Monoxide (CO)	Colourless, tasteless, poisonous gas produced when fuels containing carbon are burned where there is too little oxygen, and is present in vehicle emissions.
Catchment area	Area from which ground and surface water's drain into a particular watercourse.
Chainage	Distance along the proposed road route from west to east, and is measured in meters.
CIA: Cumulative Impact Assessment	Cumulative Impact Assessment
CLEA	Contaminated Land Exposure Assessment Model.
Climate Change	A change to the climate caused by the greenhouse gas pollutants effect whereby pollutants, predominantly carbon dioxide, but also methane and others, re-radiate heat in the atmosphere. Human activity is now thought to be accelerating the climate change in addition to the natural climate change variations.
Compensation	A form of mitigation in situations where the significant adverse effect cannot be avoided through the implementation of mitigation measures, therefore

Word/Acronym	Definition
	compensation is provided. Any example would be the provision of habitat creation areas at an alternative site.
Community Strategy or Sustainable Community Strategy	Wide ranging strategy for a geographical area (e.g. Norfolk) introduced by the Local Government Act 2000. Aim is to improve social, economic and environmental wellbeing. Focuses on the needs and aspirations of the area's community and is developed, adopted, and delivered by a range of agencies and organisations (in the public, private and voluntary sectors) in a partnership approach, with a view to achieving synergistic working towards common goals. The partnership is formally known as the Local Strategic Partnership. Modified in the 2006 Government White Paper to focus on "sustainability". Development Plans should aim to give a special expression to the strategy. Local Area Agreements compromise the action plan for the strategy. Overseen by the Local Strategy Partnership, or, in the case of Norfolk Ambition, the County Strategic Partnership.
Conservation Area	An area designated by a local authority under the Town and Country Planning (Listed Buildings and Conservation Areas) Act 1990 as possessing special architectural or historical interest.
Construction Environmental Management Plan (CEMP)	A systematic management plan to reduce the impact of the construction phase of the development on the surrounding environment.
Contaminated Land	Land that may retain residual polluting substances by virtue of its previous usage, and presents a potential risk to the water environment, especially if redevelopment takes place.
Cumulative effects	The summation of effects that result from changes caused by a development in conjunction with other past, present or reasonably foreseeable actions.
CWS	County Wildlife Site. Designated by local authorities, due to their local wildlife importance.

Word/Acronym	Definition
D	
Decibel	Sound and noise are commonly described using the decibel (dB) scale, which is logarithmic in nature to relate to the response of the human ear. The range of human hearing commonly varies from the threshold of audibility (0 dB) to the threshold of pain (120 dB). Such limits are seldom experienced in practice and typical levels might vary between 30 dB in a quiet bedroom at night to 90 dB at the kerbside of a busy road.
DEFRA	Department for the Environment, Food, and Rural Affairs
Development	Development is defined under the Town and Country Planning Act 1990 as “the carrying out of building, engineering, mining, or other operations, in, on, over or under land, or the making of any material change in the use of any building or other land.
Development Consent Order (DCO)	The Planning Act 2008 (Act) system for approving nationally significant infrastructure projects (NSIPs) in England and Wales. The Development Consent Order (DCO) made by the Planning Inspectorate authorising NSIPs, replaces the consents required for major infrastructure projects.
Development Control	The process through which a local authority determines whether a proposal for development should be granted planning permission, taking into account the development plan and any other material considerations.
Diversity	Where a variety of qualities or characteristics occurs.
DMRB	Design Manual for Roads and Bridges
E	
EA	The Environment Agency
East of England Plan	The East of England Plan describes the Regional Spatial Strategy, prepared and delivered by the East of England

Word/Acronym	Definition
	Regional Assembly. Provides regional spatial planning framework and policies, and constitutes a part of the development plan. The Local Development Plan documents need to be in conformity with it. For this “Minerals and Waste Development Plan: Core Strategy and Development Control Issues and Options”, the version of the East of England Plan used was “The Secretary of State’s Proposed Changes to the Draft Revision to the Regional Spatial Strategy for the East of England” published in December 2006 for consultation. Revoked in January 2013.
Ecological Network	Areas of semi-natural habitat that are linked by corridors or stepping stones, and thus enable wildlife to move through the wider landscape.
Ecological Resource	A species, species assemblage, habitat or designated site which would receive an impact from the scheme.
Ecology	The relationship between humans, animal life and plant life and the environment in which they live.
Ecosystems	A functional ecological unit in which biological, physical and chemical components of the environment interact.
Ecosystems Services	The benefits people obtain from ecosystems.
Effects	Change in the elements, characteristics, character and qualities of the landscape or townscape as a result of development. These effects can be both positive and negative.
Element	A component of the townscape or landscape (i.e. woods, roads, fences etc).
Enhancement	Improvements through restoration, reconstruction, or creation.
Environment	Our physical surroundings including air, water and land.
Environmental Appraisal	Generic term for the evaluation of the environmental

Word/Acronym	Definition
	implications of proposals.
Environmental Impact Assessment (EIA)	The process by which information about the likely significant environmental effects of a major project is gathered, evaluated, and taken into account by the local authority when considering whether or not planning permission should be granted.
Environmental Statement (ES)	Report summarising the findings of an Environmental Impact Assessment.
Environmental Stewardship Scheme.	A scheme promoted by DEFRA, by which farmers receive incentives to manage areas of their farmland in a more environmentally sustainable manner, reducing the intensity of their practices.. E.g. this could be by preserving set aside land and reducing maintenance cutting on hedgerows to encourage wildlife, or preserving ancient woodlands and other landscape features.
Equivalent continuous sound level, LAeq	Time-varying noise such as that from industrial or construction operations may not best be described using the statistical approach described above. The equivalent continuous noise level, LAeq , may be used, which is the notional level of a steady sound which, at a given position and over the same period of time, would deliver the same sound energy as the fluctuating one.
(EU) Directive	An international, legally binding instruction, outlining the legislative changes that must be made on a particular subject and the timescales for their implementation. The precise methods of implementation are normally left to individual national Governments.
F	
Façade noise level	A façade noise level the noise level 1m in front of the most exposed window or door in a building façade. The effect of reflection, is to produce a slightly higher (+2.5dB) sound level than it would be if the building was not there. [Noise Insulation Regulations]

Word/Acronym	Definition
Factor	A circumstance or influence contributing to the impression of a landscape or townscape (e.g. scale, enclosure, elevation etc.)
Feature	A prominent eye-catching element (e.g. a church spire or wooded hilltop).
Field pattern	The pattern of hedges and fences and walls that define fields in farmed landscapes.
Footpath	See Public Footpath
Free-field level	The level of a sound measured in the open and unaffected by reflection from nearby surfaces.
G	
Geodiversity	The variety of rocks, minerals, fossils, soils and landforms, together with the natural processes which shape the landform.
Geographical Information Systems (GIS)	Computerised database of geographical information that can easily be undated or manipulated.
Greenhouse Gas	Naturally occurring atmospheric gasses, such as carbon dioxide (CO ₂) and methane (CH ₄), which absorb outgoing infrared radiation and re-radiate it in all directions, including back to the Earth's surface
H	
Habitat	The locality, site, and particular type of environment inhabited by animals and plants.
Hectare	10,000 square meters or 2,771 acres.
Heritage	Historical or cultural associations.
HDV	Heavy Duty Vehicle
HGV	Heavy Goods Vehicle (weighing > 3.5tonnes)

Word/Acronym	Definition
Hertz (Hz)	This is the unit of frequency representing the number of times a periodic wave repeats itself per second.
Heterogeneous	A condition in which a material (e.g. an aquifer) has different characteristics at different locations (spatially or with depth).
Highways Agency (HA)	The Highways agency is an Executive Agency for the Department for Transport. The Agency manages, maintains, and improves the network of trunk roads and motorways in England on behalf of the Secretary of State. The Agency works closely with other transport operators and with local authorities to integrate the trunk road network with the rest of the England's Roads and other forms of transport. Their aim is to secure the delivery of an efficient, reliable, safe, and environmentally acceptable motorway and trunk road network.
Homogenous	A condition in which a material (e.g. an aquifer) has the same characteristics at different locations.
Hydrology	The study of surface waters (rivers, lakes and streams)
Hydrogeology	The study of groundwater (water that is held in geological formations or issues as springs).
I	
Improved Grassland	Grassland which shows clear signs of agricultural improvement (e.g. by drainage, applications of fertilisers, herbicides etc). Generally lacking in biodiversity.
Indirect Impacts	Impacts on the environment, which are not a direct result of the development, but are often produced away from it, or as a result of a complex pathway.
Infiltration Pond	A depression constructed to enable runoff to be stored until it infiltrates into the ground. Not intended to provide permanent standing water, but to be dry most of the time.
Informative	When granting planning permissions a local authority may impose conditions on the approval notice which must be complied with. A local authority may also attach

Word/Acronym	Definition
	<p>informatives, which seek to guide the applicant or other consents that may be necessary or confirm drawing numbers that the decision notice is based on. Unlike conditions, they are not statutory parts of the decision notice, but the applicant is recommended to study them closely as they may assist in ensuring the development is properly carried out.</p>
<p>The Infrastructure Planning (Applications: Prescribed Forms And Procedures) Regulations 2009 as amended by the Consequential Amendments Regulations 2012(Came into force 1st October 2009)</p>	<p>Sets out the detailed procedures which must be followed for submitting and publicising applications for Nationally Significant Infrastructure Projects.</p>
<p>The Infrastructure Planning (Environmental Impact Assessment) Regulations 2009 as amended by the Infrastructure Planning (Environmental Impact Assessment) (Amendment) Regulations 2012 and the Consequential Amendments Regulations 2012</p>	<p>Sets out the procedures that must be followed so that the consideration of applications for Nationally Significant Infrastructure Projects fully reflect the requirements of European Council Directive 85/337/EEC – as amended – on the assessment of the effects of certain private and public projects on the environment (The ‘EIA Directive’).</p>
J	
No entries	
K	

Word/Acronym	Definition
Key Centres for Development and Change	Those parts of the East of England that will need to accommodate and plan for significant jobs and housing growth between 2001 and 2021, the period of the East of England Plan.
L	
LA10 (18-hour) level	LA10 (18-hour) level: The LA10 (18-hour) level has been adopted as the standard descriptor for traffic noise in the UK. It is the arithmetic average of the one-hour values of LA10 for each of the 18 one-hour periods between 06.00 and midnight (Department of Transport Welsh Office, 1988).
LA90	The LA90 is the level exceeded for 90% of the measurement period. It is a measure of the lower levels in the absence of higher level transient events and is commonly used to describe the ambient or background noise.
Landform	Combinations of land use and vegetation that cover the surface.
Landmarks	A building which has become a point of reference because its height, siting, distinctive design or use sets it apart from surrounding buildings. Examples may include churches and other important civic buildings.
Landscape	Human perception of the land conditioned by knowledge and identity with a place.
Landscape Character	A distinct and consistent pattern of elements in the landscape which makes one landscape look different from another, creating 'Character Areas'. These effect how this is perceived by people and creates a sense of place in different areas of the landscape or built environment.
Landscape/Townscape Character Areas	Single, unique landscape or townscape areas with their own distinctive individual character and identity.
Land Uses.	The primary use of the land, including both rural and urban activities.

Word/Acronym	Definition
Layout (Townscape)	The way in which buildings, routes, and open spaces are placed in relation to each other.
L.B.A.P	Local Biodiversity Action Plan
Light Industry	An industrial use falling within Class B1 (c) of the Town and Country Planning (Use Classes) Order 1987, and which can be carried out in any residential area without detriment to the amenity of that area by reason of noise, vibration, smell, fumes, soot, ash, dust or grit.
Listed Buildings	The Secretary of State compiles a list of buildings of special architectural or historic interest for the guidance of local planning authorities in the exercise of their planning functions under the Planning (Listed Buildings and Conservation Areas) Act 1990 and the Town and Country Planning Act 1990. Buildings are graded as follows:
Local Access Road	Road with the purpose to provide for local traffic and to provide access to land and buildings in the immediate vicinity of the roads.
Local Development Framework	A portfolio of documents. Collective term for the Development Plan Documents, the Local Development Scheme, the Statement of Community Involvement, Annual Monitoring Report, and any supplementary planning documents.
Local Planning Authority	An organisation with statutory planning powers, in most areas the relevant County, District or Unitary Council.
Local Transport Plan	A document produced by Local Highway Authorities that describes its transport policies and its broad implementation programme.
Localism Act 2011	The Act abolishes the Infrastructure Planning Commission and transfers the decision making powers of the Commission to the Secretary of State. The Act also makes a number of amendments to the Planning Act 2008 which have the effect of altering some aspects of the procedure for seeking development consent for nationally significant

Word/Acronym	Definition
	infrastructure projects.
M	
Magnitude	A combination of scale, extent, and duration of effect.
Manufacturing Industry/sector.	Industries whose activities are primarily concerned with the making and processing of goods.
µg/m ³	Microgrammes per cubic meter
Mitigation	Measures to avoid, reduce, and possibly remedy significant adverse effects.
Mixed Use Areas	Provision of a mix of complementary uses, such as residential, community and leisure uses, on a site or within a particular area.
N	
NATS	The current Norwich Area Transport Strategy
NPPF	National Planning Policy Framework
National Planning Policy Framework	The National Planning Policy Framework sets out the Government's planning policies for England and how these are expected to be applied.
Natural England (NE)	Statutory Body incorporating the former English Nature.
Nitrogen Dioxide (NO ₂)	Formed when nitric oxide, which is emitted from vehicles, is oxidised in air (including during the combustion process).
Nitrogen oxide (N ₂ O)	A greenhouse gas that may be formed in the combustion process.
Nitrogen oxides (NO _x)	Generic term for a group of highly reactive gases, all of which contain at least one nitrogen and oxygen atom.
Noise Index	A measure of noise over a period of time which takes account of the disturbing qualities of noise, and correlates well with average subjective response.

Word/Acronym	Definition
Non-motorised Users	Pedestrians, equestrians, cyclists etc
Non-technical Summary (NTS)	The purpose of an NTS is to provide an accurate and balanced statement of key information contained within an environmental statement (ES) including the findings of the studies and the mitigation measures.
Norfolk Ambition	The Community Strategy for Norfolk (see community strategy).
Norfolk Biodiversity Action Plan	The Norfolk BAP is the county's response to the UK Biodiversity Action Plan. It currently contains over 60 habitats and species action plans, and seeks to conserve and enhance biodiversity or national importance found in Norfolk.
O No entries	
P	
Particles (PM10)	Mixture of organic and inorganic substances, as both solids and liquids. Particles from vehicles are often described as PM10 which are particles with an aerodynamic diameter of 10 microns or less.
Parks and Gardens of Special Historic Interest (GSHI)s.	Parks and gardens containing historic features dating from 1930s or earlier. These may be of local or national interest. Sites of national interest are registered by English Heritage. These parks and gardens are graded I, II* or II in the same way as listed buildings.
Percentile Level (statistical sound level indices LAN LA90)	LAN is the dBA level exceeded N% of the time measured on a sound level meter with a Fast (F) time weighting, e.g. LA90 the dBA level exceeded for 90% of the time, is commonly used to estimate background noise level. LA10, the level exceeded for 10% if the time, is commonly used in the assessment of road traffic noise.
Perched water table	A discontinuous saturated layer with unsaturated conditions existing both above and below.

Word/Acronym	Definition
Perception	The psychology of seeing and possibly attaching value and/or meaning to the landscape or townscape.
Permeability	A measure of how well a geological formation can transmit water (the higher the permeability, the more water can be transmitted through the formation.)
Permissive Paths (sometimes called Concessionary Paths)	A path which the landowner permits the public to use, with the intention that it should not become a public right of way. Often notices will be erected that that effect.
Permitted Development	Minor types of development and certain changes between use classes which are automatically granted planning permission under the General Permitted Development Order, and for which no planning application needs to be submitted.
Piezometer	A tubular device used for measuring the elevation of the water table in aquifers.
Planning Act	The Planning Act 2008 process was introduced to streamline the decision-making process for nationally significant infrastructure projects.
Planning Advantage	The provision of some elements of public benefit, in association with a new development, such as open space, housing or leisure facilities, at little or no cost to the community.
Planning Brief	A statement regarding a local authority views on the opportunities and constraints for the development of a particular site, intended to guide potential developers.
Planning Obligations.	An agreement under section 106 of the Town and Country Planning Act 1990 regarding the use or development of land. An obligation can either be made by agreement between the local planning authority and a developer or by a unilateral undertaking by the developer. Obligations may also be used to enhance development proposals. (See definition of section 106 agreement).

Word/Acronym	Definition
Planning Permission	Formal approval by a local authority, often with conditions, allowing a proposed development to proceed. Full permissions are usually valid for five years; outline permissions, where details are reserved for subsequent approval, are valid for three years.
Planning Policy Guidance (PPG)/Planning Policy Statements (PPS)	These are a series of guidance notes and statements covering various aspects of the planning system prepared by Central Government and due weight must be given to them when considering individual planning applications as they are material factors in their determination. They are listed on the Communities and Local Government website. Planning Policy Statements will replace the guidance notes with time.
Population:	
	1: A group of organisms of one species occupying a defined area.
	2: The total number of individuals of a species in a defined area.
Population Density	The numbers in a population per unit area.
Population Dynamics	The variations in time and space in the size and densities of a population.
Porosity	The pore space in a rock or soil formation. The total porosity is greater or equal to the effective porosity. The effective porosity is determined by the connectivity of pores in the rock/medium.
Prevailing Noise Level.	The prevailing noise level is a term defined by the Noise Insulation Regulations as the façade noise level caused, as expected to be caused, by road traffic immediately prior to the commencement of the relevant work improvement. It is quoted in dB, using the LA10(18hour) index.
Private Open Space	Open space which is usually privately owned and is not usually accessible by members of the public. Some private

Word/Acronym	Definition
	spaces are subject to access agreements allowing some form of access.
Public Open Space	Open space, designated by the local authority, defined where public access is generally not formally established, but which fulfils or is capable of fulfilling a recreational and/or non-recreational role (for example, amenity, ecological, educational, social or cultural). Includes most nature reserves, city farms, cemeteries, reservoirs (including covered reservoirs), and some private institutional and housing estate grounds which are not considered suitable for built development. Public Open Space does not include school playing fields, nor the amenity areas associated with the development of homes or flats, or pedestrian precincts (Local Government Act 1966, Section 8).
Public Right of Way (PROWs)	A right of passage by the public over the surface of the land without impediment. Includes public footpaths, bridleways and byways open to all traffic.
Public Transport Accessibility	An assessment of proximity to, and frequency of public transport services, giving relative accessibility on a scale of one to six, where one is the lowest provision and six is the highest.
Q No entries	
R	
Ramsar site	An area designated under the Ramsar convention (1971) and protected as a Wetland of International Importance.
Receptor	An element in the environment which will experience an effect of the development. This may be a physical landscape or townscape, flora, fauna, and human populations.
Regionally Important Geological Sites (RIGS)	These are geological or geomorphological sites (excluding SSSIs) that are considered worthy of protection for the educational, research, historical or aesthetic importance.
Regional Policy	The primary purpose of regional Planning Guidance is to

Word/Acronym	Definition
Guidance (RPG)	provide a regional framework for the preparation of local authority development plans. In addition, RPG provides the spatial framework for other strategies and programmes, including the preparation of local transport plan by local authorities and the regional strategies of the various development agencies such as the East of England Development Agency (EEDA).
Relevant noise level	The maximum façade noise level expected to be caused by road traffic within the 15 year period after scheme opening. It is quoted in dB using the LA10 (18hour) index.
Resource	The combination of the elements that contribute to the landscape or townscape context, character or value.
Review and Assessment (R&A)	Four-stage process involving assessment of local levels of air pollutants and estimation and assessment of likely future levels undertaken by Local Authorities in the UK.
S	
SAC	SAC: Special Area of Conservation, designated under the EC Directive on the conservation of Natural Habitats and Wild Flora and Fauna (92/43/EEC) (The Habitats Directive). SACs and SPAs contribute to the Natura 2000 network of sites contributing to the preservation of the natural heritage.
Scale	The size of buildings, structures or other features within a landscape or townscape, in terms of their height and mass.
Scheduled Ancient Monument	A set of archaeological remains included in the Schedule of Monuments, compiled under Section 1 of the Ancient Monuments and Archaeological Area Act 1979. Schedule monuments have statutory protection under this Act (Section 2) and an application for schedule monument consent must be made to the Secretary of State for the Environment if work to a schedule monument is proposed. The Secretary of State for the Environment is responsible for the scheduling under the provisions of the Ancient Monuments and Archaeological Area Act 1979. Scheduled ancient

Word/Acronym	Definition
	monuments are excluded from listed building control procedures, Prior notice of works to schedule ancient monuments must be given to the Secretary of State.
Scoping	The process seeks to identify those impacts that are critical, significant issues that should be addressed by the EIA process
Screening	Consideration of whether an Environmental Impact Assessment (EIA) is required for a project due to its potential to give rise to significant environmental effects
Section 106 Agreement	A binding agreement between a local authority and a developer, or his successors in title, on the occasion of a granting of planning permission regarding matters linked to the proposed development (see definition of planning obligations).
Semi-improved grassland	Grassland which is intermediate in quality, between improved and unimproved grassland.
Sense of place: The essential character and spirit of an area (genius loci).	The essential character and spirit of an area (genius loci).
Sensitivity	The extent to which the landscape or townscape can accept change of a particular type and scale without unacceptable adverse effects on its character.
Site noise	The component of the ambient noise in the neighbourhood of a site that originates from the site [BS5228].
Site of Special Scientific Interest (SSSI)	Nationally designated sites that are of particular interest because of the wildlife they support, or because of the geological features that are found there.
SPA: Special Protection Area	Special Protection Area. Designated under the EU Directive on the Conservation of Wild Birds (1979).
Sound level	Sound level, in decibels, is the weighted sound pressure level obtained by use of a sound level meter. The reference

Word/Acronym	Definition
	pressure is 20 μ Pa, unless stated otherwise.
Source Protection Zone (SPZ)	Areas around groundwater sources used for public water supplies. Three levels of SPZ exist (I, II and III) with increasing control being implemented from SPZ III to I. The size of SPZs is determined by the size of abstraction and aquifer conditions in the area.
Soakaway	A covered hole in the ground or trench designed specifically to store water until it infiltrates into the ground.
Spring: The point at which groundwater is discharged at the ground surface.	The point at which groundwater is discharged at the ground surface.
Statistical sound level, LAN	Noise which fluctuates with time may be described using a statistical approach. The statistical level LN is the level in dB exceeded for N% of the overall measurement period. The A-weighted L10, designated LA10, has been adopted as the standard descriptor for road traffic noise in the UK. Being the level exceeded for 10% of the measurement period, it is a measure of the higher levels experienced.
Statutory Undertaker	Persons authorised to carry out any railway, light railway, tram way, road transport, water transport etc. undertaking. Any public gas supplier, water or sewerage undertaker, the Environment Agency, the Post office, and the Civil Aviation Authority are deemed to be Statutory Undertakers (Town and Country Planning Act 1990).
Storage, specific storage, storativity	Measures of the amount of water that might be stored in a geological formation – the terms in used depends on the confined nature of the formation. Specific storage is a measure of the volume of water that a unit volume of unconfined aquifer releases from the storage under a unit decline in hydraulic head. Storativity is a measure of the volume of water that a unit surface area if a confined aquifer releases from storage per unit of storage area of an aquifer per unit decline in hydraulic head.

Word/Acronym	Definition
Strategic Environmental Assessment (SEA)	The formalised, systematic and comprehensive process of evaluating the environmental impacts of a policy, plan or programme, and its alternatives, the preparation of a written report on the findings, and the use of the findings in the decision making process.
Statement of Community Involvement.	A document that sets of an LPAs intended consultation strategy for different elements of the planning process. This is a requirement brought in by the Planning and Compulsory Purchase Act 2004.
SUDS.	A technique of treating runoff which mimics natural drainage and filtration methods, such as grass swales and small settlement and infiltration lagoons.
Sulphur Dioxide (SO ₂)	Colourless, non-flammable gas which is a by-product in the combustion process. At elevated concentrations can lead to acute respiratory effects.
Sustainable Development/Sustainability	Defined by the Bruntland Commission (1987) as: “development which meets present needs, without compromising the ability of future generations to achieve their own needs and aspirations”. The World Conservation Union (1991) definition is also useful – “improving the quality of life while living within the carrying capacity of supporting ecosystems”.
Swale	A gentle depression in the ground, constructed with the purpose of transferring rainfall runoff to a specific point. The swale is often grassed to encourage the removal of contaminants in normal runoff by the vegetation. In higher risk areas, swales are generally lined to stop accidental spillages infiltrating into the ground, and thus preventing pollution of groundwater
T	
Threshold	A specific level of grading effects, for example, of magnitude, sensitivity or significance.

Word/Acronym	Definition
Townscape	Physical and social characteristics of the built and unbuilt urban environment and the way in which those characteristics are perceived. The physical characteristics are expressed by the development form of buildings, structures and space, whilst the social characteristics are determined by how the physical characteristics are used and managed.
Traffic calming	Traffic management measures specifically designed to reduce vehicular speed along route or through areas. Usually associated with improving the local environment and reducing road accidents.
Traffic management	The process of adjusting of adapting the use of a highway to meeting specific objectives without resorting to substantial road construction.
Traffic restraint	Controlling traffic volumes by bans, parking restrictions, implementing tolls, electronic road pricing or other means, usually applied in a town or city.
Translocation	The removal of their organisms from their existing habitat to a new site. Often part of a mitigation programme.
Transport Policies and Programmes (TPP)	A five year rolling programme submitted annually to the department for Environment, Transport and the regions by each Local Highway Authority. The TPP contains transport proposals (which should be in lie with the policies of the Unitary Development Plan) for which Central Government funding is sought. The TPP process has however, be rescinded in favour of Local Transport Plans
Tree Preservation Order (TPO)	Made under the Town and Country Planning Act 1990 by the local planning authority, to protect trees of importance for amenity, landscape and nature conservation.
U	
UKBAP	UK Biodiversity Action Plan, the response tit e United Nations Convention on Biological Diversity. The BAP includes a description of the UK's biological resources and a

Word/Acronym	Definition
	suite of habitat and species action plans.
Unimproved grassland	Grassland showing no obvious signs of management activities intended to improve the agricultural utility of the land.
Urban Grain (Townscape)	The pattern of the arrangement and area of buildings and their plots in a settlement and the degree to which an area's pattern of streets are small and frequent (fine grained) or large and infrequent (coarse grain).
V	
Value	The relative value or importance attached to a landscape or townscape (often as a base for designation or recognition), which expresses national or local consensus, because of its quality, special attributes, including perceptual aspects, such as scenic beauty, tranquillity or wilderness, cultural and historical associations and other conservation issues.
Valued Ecological Resource	An ecological resource considered to have a value of parish level or higher.
Vah/hr	Vehicles per hour
VER	Valued Ecological Resource
Visual Amenity	The value of a particular area or view in terms of what is seen.
Visual Envelope	Extent of potential visibility to or from a specific area or feature.
W	
Water table	The continuous surface in saturated formations where fluid pressure in pores is exactly equal to atmospheric pressure.
WebTag	A methodology website (http://www.webtag.org.uk) which originally bought together the Department of Transport's existing guidance, and is particularly useful for the guidance it gives on determining environmental capital and

Word/Acronym	Definition
	environmental significance criteria.
Wildlife Tunnel	A tunnel under the road of sufficient diameter to allow wildlife, including deer and bats to cross the proposed road scheme. These are used in conjunction with fencing to guide wildlife to the tunnel, aiming to minimise road mortalities.
X and Y No entries	
Z	
Zone of Influence (Zoi)	Area that is affected by the proposed development, for example impacts on local ecology.
Zone of Visual Influence (ZVI)	Area within which a proposed development may have an influence or effect on visual amenity.

The Norfolk County Council (Norwich Northern Distributor Road (A1067 to A47(T))) Order

6.3 Environmental Statement Non-Technical Summary

Planning Act 2008

Infrastructure Planning

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009


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This document is submitted in relation to the application for a proposed development by Norfolk County Council to the Planning Inspectorate, under the Planning Act 2008.

The application is for the Norfolk County Council (Norwich Northern Distributor Road (A1067 to A47(T))) Order, to grant development consent for the construction of a new highway running west-east between the A1067 Fakenham Road and the A47 Trunk Road at Postwick, including improvements to the existing highway network to the north and north east of Norwich.

This document comprises part of the application documents and relates to Regulation 5(2)(a) of the Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009.

NDR Environmental Statement Non-Technical Summary

www.norfolk.gov.uk/transportfor Norwich

January | 2014

Norwich Northern Distributor Road

Introduction

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Environmental Assessment...

An Environmental Statement has been prepared by Mott MacDonald on behalf of Norfolk County Council (NCC), in support of an application, by NCC, for a Development Consent Order to construct a dual carriageway all-purpose strategic distributor road. This road will link the A1067 Fakenham Road, near Attlebridge to the A47 Trunk Road (T) at Postwick and is known as the Norwich Northern Distributor Road or NDR.

This document provides a Non-Technical Summary of the Environmental Statement and contains information necessary to understand and report the effects of the NDR on the environment and provides a background to the evolution of the Scheme.

Specialisms have been divided into topic specific chapters, and assessments have been made for each topic during the construction phase, at opening year (year 1, 2017), and at the design year (year 15, 2032).



Queuing on Drayton High Road

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Scheme Description and Mitigation...

From west to east, the Scheme will start with the realignment of the A1067 Fakenham Road and provision of a new roundabout. The NDR will continue eastwards to its new roundabout with the C262 Fir Covert Road. From this roundabout, the NDR will then cross Marriott's Way which will be taken across the Scheme via a new bridge, then on to a new roundabout with the C261 Reepham Road.

The NDR will then continue south eastwards, crossing Bell Farm Track which will be taken over the NDR via a new bridge before connecting with a roundabout west of the C282 Drayton Lane. From here, the NDR will continue south eastwards to a new junction with the A140 Cromer Road, located north west of Norwich International Airport.

East of the A140, the NDR will continue north eastwards around the northern boundary of the airport to a further new roundabout at the northern tip of the airport. From this roundabout, the NDR will continue south eastwards, before turning eastwards and passing under the new highway for the C246 Buxton Road. The route of the NDR will then continue eastwards through the north of Beeston Park. It will then connect with the B1150 North Walsham

Road and the A1151 Wroxham Road via new roundabouts, before turning south eastwards and entering the north eastern section of Rackheath Park.

The NDR will then continue south eastwards, passing under a new bridleway and access bridge across the NDR south west of the junction of Newman Road (U57490). The NDR will then connect with the C283 Salhouse Road via a new roundabout, then crosses both the Norwich to Cromer & Sheringham rail line and the C874 Plumstead Road on individual bridges, prior to a new roundabout on the NDR, which will connect it via a new link road to a further roundabout on the C874 Plumstead Road.

The NDR route will then continue southwards, crossing under the C442 Middle Road which will be raised to pass over the NDR via a new bridge before connecting with a new roundabout known as the Business Park Roundabout. A single carriageway will then link to the existing C829/C830 Broadland Way/C831 Peachman Way roundabout and includes a roundabout on the link road to the proposed Broadland Gate Business Park.

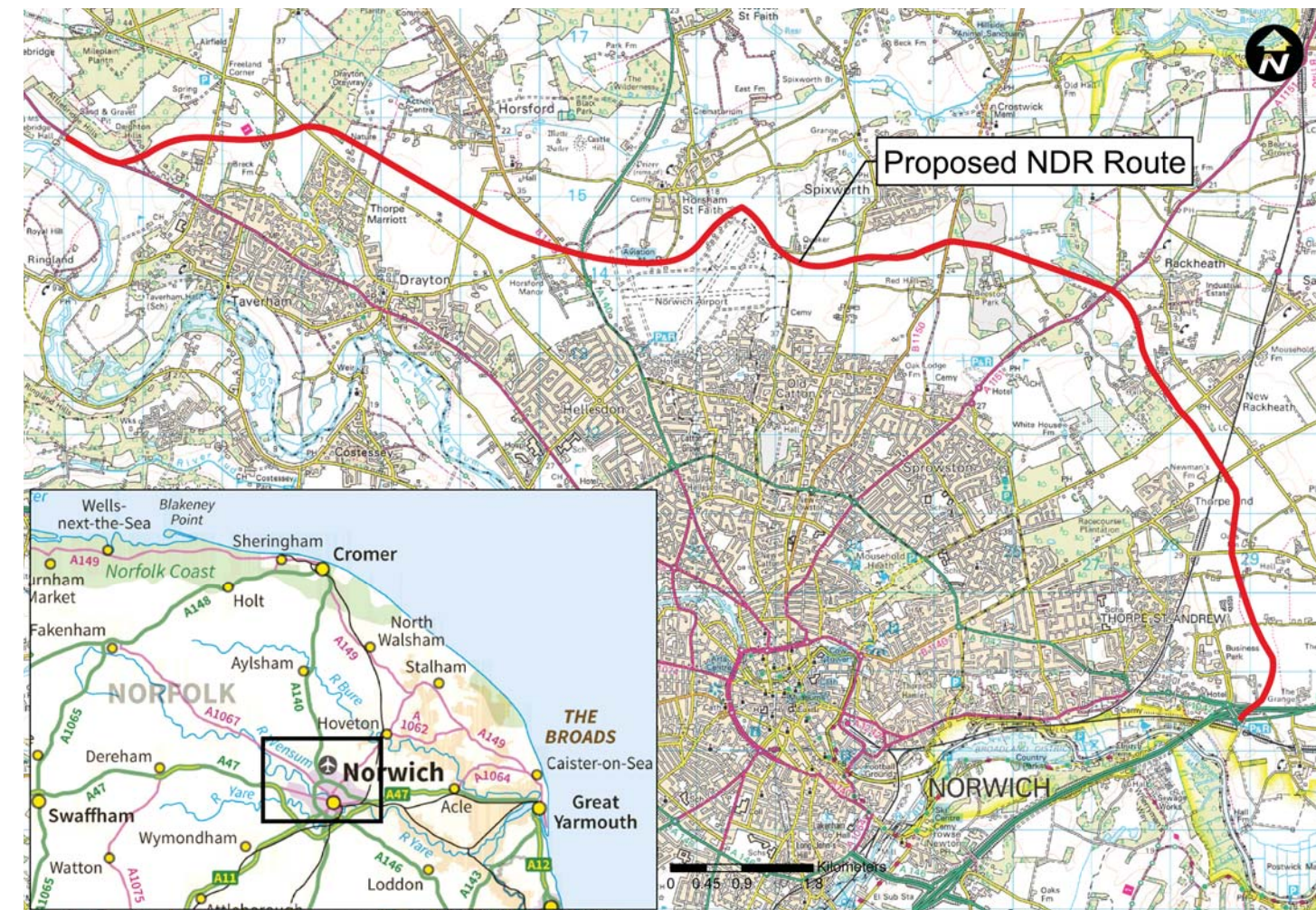
From the Business Park roundabout the NDR will proceed southwards to a new Postwick north east roundabout immediately north of the A47(T)

Norwich Southern Bypass. This roundabout will have links from a new A47(T) eastbound slip road and a new A47(T) eastbound merge slip road. The NDR will continue over the A47(T) on a new bridge and will terminate at its southernmost point at a signalised junction, which will replace the existing Park and Ride roundabout with the A1042 Yarmouth Road.

Mitigation

The Scheme has been designed with a host of mitigation measures incorporated, to reduce or minimise impacts on people and the environment. Designing the road in cutting, with adjacent bunding, will reduce the visual impact and traffic noise. The extensive landscaping scheme will, once established, allow the proposed Scheme to become incorporated within the existing landscape, with habitats that marry up with those surrounding areas. The landscaping scheme has been formulated in conjunction with Ecologists, to ensure that the proposals benefit protected and other species that exist locally.

Where major corridors of movement of protected species will be affected, measures will be installed to reduce the impacts. For



example Marriott's Way bridge will be a 'green bridge', with hedgerows up to and over the bridge itself, to allow bats and other animals to continue to use this route. Other measures to achieve similar results include wire gantries, adapted highway bridges and an underpass, each to allow bats to continue to navigate along their existing routes. Other new habitats and ponds will be created to rehome newts.

The drainage of the proposed Scheme will use Sustainable Drainage Systems for the majority of locations, where

conditions allow. This will mitigate for any potential impact on water quality and flooding issues, to ensure that flood risk is minimised and that the quality of discharged water to watercourses and groundwater will match or improve on the existing quality.

Construction Environmental Management Plan (CEMP)

The CEMP is the document that brings together all the construction phase mitigation measures proposed for the Scheme. It covers the management of a Contractor's

activities and those of any Sub-Contractor, and defines the minimum requirements that have to be met. It identifies the procedures required to minimise the impact of noise, vibration, dust and waste disposal resulting from the construction phase of the Scheme. It includes details of measures to be employed to ensure that no pollution incidents occur, that impacts on protected species are minimised as far as possible, that archaeological features are identified and recorded, and that impacts on nearby residents are kept to an absolute minimum.

The Best Solution...



Queuing on Riverside Road

The NDR is needed to improve connectivity and accessibility across both the northern part of the Norwich urban area and areas of the county in an arc from the north west to the east of this main urban area. Such improvement will ease the relative disadvantage of the peripheral location of these areas and provide the basis of the transport infrastructure required to address existing and future problems and achieve the growth objectives which have been identified for Norwich and its surrounding area.

The requirement to improve connectivity and accessibility arises out of the analysis that

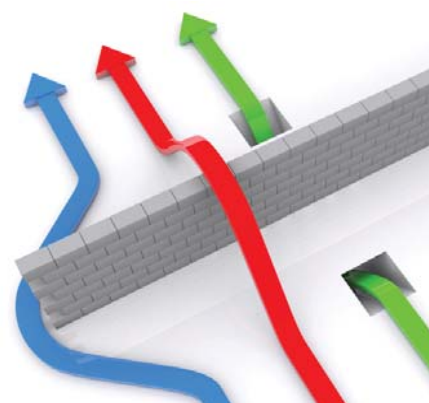
led to the production of the Norwich Area Transportation Strategy (NATS) and the conclusions reached. This strategy sets out NCC's and Norwich City Council's agreed approach to the delivery of sustainable transport in and around Norwich.

The overall strategy set out in NATS is that a package of transport improvements, interventions and measures, which includes the NDR Scheme, needs to be implemented. Together these improvements, interventions and measures will (amongst other things) deliver a reliable, efficient and long-term sustainable transport network which will improve accessibility and connectivity and which will support the continued economic and physical growth of the Norwich area. In setting out the Authority's approach to current and future needs, NATS seeks to improve the overall economic competitiveness of Norwich as a focus for inward investment, create conditions in which sustainable forms of transport can be promoted and improve the quality of life.

The possibility that the need could be met in some other way, for example by a different standard NDR, by an NDR following a different route, or without road construction has been addressed in principle and detail over a lengthy period. The

necessary environmental, traffic and economic studies and analyses have been progressed as a central component of the development of NATS in the context of the evolution of planning and economic policies for Norwich and the surrounding area.

The studies confirm that the NDR is an essential component of the NATS package of measures to address existing and likely future issues of congestion, connectivity and economic and urban growth. Analysis of other approaches have confirmed that it is not possible to meet the need without the NDR and that the role of the NDR cannot be replicated by improving the existing road network or public transport. Examination of alternative standards and alignments has confirmed that the application proposals are the most appropriate response to the need, taking account of the results of the Environmental Impact Assessment (EIA).



Assessment of alternative routes

The Scheme has the potential to cause air quality effects during the construction and operational phases. During the construction phase, the Scheme will introduce new emission sources in the form of traffic and plant at some locations, and involve potentially dust generating activities. A qualitative assessment of potential construction phase effects has been undertaken. Mitigation measures have been identified for incorporation within the CEMP, commensurate with the risk of dust effects identified and in line with best practice. Potential impacts are concluded to be negligible to slight adverse, at worst, and therefore not significant.

Operation of the proposed Scheme in the opening year will change traffic flows within Norwich and could affect



ambient air quality. The opening operational phase effects have been assessed using an advanced dispersion model. Concentrations of key traffic related pollutants have been predicted at sensitive human health and ecological receptors and the change as a result of the Scheme has been quantified. Existing concentra-

tions of nitrogen dioxide (NO₂) are of concern in Norwich, particularly in the city where an Air Quality Management Area (AQMA) has been declared. The Scheme is predicted to cause a Slight Beneficial effect on NO₂ concentrations, including within the AQMA, and Negligible effects on fine particulate concentrations overall. Operational phase air quality effects are concluded to be not significant.



In conclusion, effects on air quality during construction are considered to be **negligible to slight adverse** and not significant. Effects at the opening year are also considered not to be significant. The opening year of the proposed Scheme is expected to present the worst case within the first 15 years of opening and therefore, no other future year has been assessed.



The changes in carbon emissions during the construction and operation of the proposed Scheme have been calculated. These changes are expressed as emissions of carbon dioxide over a given time period.

During the construction phase, the proposed Scheme will lead to emissions of carbon from construction traffic and plant, as well as from carbon embodied in the materials that will be used to construct the Scheme. These emissions have been calculated to be 52ktCO₂. This includes mitigation measures included in the design which reduce the impact by 14ktCO₂. There are also measures in the CEMP which aim to make the construction process as efficient as possible.

Traffic flows will change during the operational phase affecting distances travelled,

and congestion across the network. These changes will affect emissions of carbon. The overall effect of the Scheme will be to increase emissions by around 13ktCO₂ in 2017, due largely to an increase in vehicle kilometers travelled.



This increase is around 0.6% compared to all emissions in the local authority areas around the Scheme. In 2032, the increase will be 18ktCO₂ representing 1.1% of all emissions in the local authority areas. The assessment has not considered the wider influence of the package of measures within the NATS of which the Scheme forms part.

There are currently no local or regional emission reduction targets in place for carbon reductions. At the national level, the increase in emissions associated with the Scheme is unlikely to materially affect the ability of local authorities to contribute to national level emission reduction targets.

The cultural heritage assessment draws upon information gained from desk-based sources, a search of archaeological records from the Norfolk Historic Environment Record (NHER) database, site inspections and archaeological field surveys, including fieldwalking, metal detecting, geophysical surveys and trial trenching. A diverse range of heritage features have been identified, including prehistoric archaeological remains, deserted medieval villages, historic buildings and parklands. The Scheme will also pass between two areas of ancient woodland.

The majority of significant cultural heritage effects will occur during construction. These will comprise the removal of archaeological remains, including a possible Neolithic mortuary enclosure, Bronze Age and Iron Age settlements at the western end of the route; elements of two deserted medieval villages at Rackheath; and further prehistoric enclosures around the Postwick Hub at the eastern end of the Scheme. Additionally a number of un-designated WWII structures at Rackheath will be demolished during construction, and there will be changes to the setting of several historic buildings including Horsford Hall, Rackheath Hall and the bridge at Rackheath, all of

which are Grade II listed. Two locally important parklands will be crossed by the Scheme, namely Beeston Park, where the northern third of the park will be severed, and Rackheath Park where the eastern boundary will be removed. No impact is predicted for the Grade II* listed Catton Hall Park, located 2km to the south of the Scheme.

Measures incorporated into the Scheme to mitigate impacts include the use of appropriate construction methods to avoid or limit damage to heritage assets; and landscape bunding and planting to integrate the proposed Scheme into the historic landscape and screen historic buildings. An archaeological mitigation strategy will be produced and will set out the detailed requirements for recording below-ground archaeological deposits which will be impacted by the Scheme. This will record the locally important archaeological sites, which have been

identified during fieldwalking, geophysical survey and trial trenching. A photographic survey of historic buildings and important elements of the historic landscape is also proposed.

Significant cultural heritage effects during operation will be through visual and noise impacts on Listed Buildings, including Horsford Hall, Rackheath Hall and the bridge at Rackheath. Beeston Park and Rackheath Park will also experience significant effects during operation. However, these effects will lessen as planting matures over time.

In conclusion, the overall effects upon cultural heritage are considered to be **moderate adverse** during construction. Effects during operation will be **slight adverse** during both the opening year (2017) and the design year (2032), although effects will reduce to some degree as mitigation planting matures.



Extant remains of Horsham St Faith Priory

The route of the NDR will pass through a predominantly arable landscape of largely rural character, but with some urban fringe influences such as housing development, Norwich Airport and the Broadland Business Park. The landscape generally comprises fairly commonplace rural farmland along much of the route, but with a higher quality area centred around the former parklands of Beeston and Rackheath Halls where the landscape is characterised by a larger woodland component on more undulating topography.

The route of the NDR has been optimised to avoid impacts on property and the wider landscape as far as possible. With this in mind, the design of the Scheme includes the following measures:

- The creation of 'naturalistic' landforms associated with embankments, cutting slopes and other areas of topography;
- Extensive new planting to

screen views of the road from houses and to develop habitat links between the NDR planting and the surrounding woodland and hedges; and,

- Ensuring that the landscape planting is in keeping with that which is found in the local area.

The following is a summary of the overall landscape and visual effects along the route that will occur for the construction period, for opening year and for design year. Night time effects will only be slight adverse throughout the Scheme (arising from vehicle headlights) since, with the exception of the Postwick Hub which is already well lit, the Scheme will not be lit.

Between the A1067 and Reepham Road landscape effects are regarded as being moderate adverse for construction and the opening year (2017) over this stretch of the route on account of the relatively high quality of the

landscape, particularly at the western end of the Scheme, combined with the addition of new infrastructure elements (such as the Marriott's Way bridge) into the landscape. However, by the design year (2032) these effects will have reduced to slight adverse due to the screening effect of the mitigation planting. There are relatively few properties in the vicinity of the route, although a number will experience moderate adverse visual impacts in design year, even after mitigation planting has matured.

Between Reepham Road and A140 the route will clip the south west corner of the existing Drayton Drewray woodland, resulting in the loss of a small part of a coniferous plantation. Higher quality woodland further north will, however, be avoided. The route will then traverse a wide open landscape close to, and roughly parallel with, the existing Reepham Road. Over this section of the Scheme, landscape effects

will be slight adverse during construction and in the opening and design years. Only relatively few properties lie in the vicinity of this section of the Scheme, a number of which will experience moderate adverse visual effects at the design year due to their close proximity to the new road.

Between the A140 and the B1150, the route will cross an area of low landscape quality adjacent to the airport, before passing through an area of higher quality to the south of Spixworth. Opportunities for linking mounding and mitigation planting into an existing shelter-belt near Spixworth have been taken. The landscape effects in this section of the Scheme are likely to be moderate adverse for construction and the opening year, reducing to slight adverse by the design year. A fairly large number of properties will be affected by visual impacts, particularly on the edges of Horsham St. Faith and Spixworth. Visual effects on

properties in Spixworth will reduce from moderate adverse during construction and the opening year to slight adverse by the design year as mitigation planting matures. However, visual effects on some properties in Horsham St. Faith will remain moderate adverse in the design year as the close proximity to the airport precludes extensive mitigation planting.

Between the B1150 and Salhouse Road this section of the route will pass through an area of high landscape value centred on the remains of historic parklands. Mitigation, using a combination of mounding and planting to tie into existing woodland blocks and blend the new road into the landscape, will help to reduce overall landscape effects to slight adverse along this section by the design year. A relatively large number of properties will be affected by visual impacts as the route will pass close to the southern boundary of Rackheath. However, the

majority of these will only experience slight adverse effects by the design year once the NDR planting has matured, helped by the screening effects of existing intervening vegetation.

Between Salhouse Road and the A47, the route will rise to cross the Norwich to Sheringham railway line, resulting in moderate adverse landscape and visual effects. These effects will remain in the design year at this location due to the prominence of this structure in this flat landscape, before passing through a more wooded arable landscape through to the southern end of the Scheme. Beyond the railway crossing the mitigation planting will be effective, reducing landscape effects to slight adverse by the design year as the mitigation planting matures.

In conclusion, the overall balance of landscape effects will be **moderate adverse** as a result of the Scheme during the construction period and in the opening year, reducing to **slight adverse** by the design year as mitigation planting matures. For visual effects, the balance will lie between **large and moderate adverse** during construction and in the opening year, reducing to **moderate to slight adverse** by the design year as the planting scheme matures.



Photomontage looking North East from Low Road towards the proposed Middle Road Overbridge at opening year (2017)

The proposed Scheme has the potential to cause nature conservation effects during the construction and operational phases.

Desk-based studies into Statutory Designated Sites and protected areas have been carried out alongside extensive field surveys of species and habitats, most of which are protected by UK and EU laws. These surveys have taken place over several seasons in many cases, and have enabled a detailed understanding of the populations within the Zone of Influence (the area in which the proposed Scheme could potentially impact on ecological features).

The assessment of ecological effects in the Environmental



Statement considers those ecological receptors that are of sufficient conservation value and potentially vulnerable to significant effects arising from the proposed Scheme. These are termed Valued Ecological Receptors.

Valued Ecological Receptors that have been assessed include Statutory Designated Sites such as Special Areas for Conservation (SAC) and Sites of Special Scientific Interest (SSSI), and other Designated Sites such as County Wildlife Sites (CWS) and Roadside Nature Reserves (RNR). Some of these sites will be directly affected, some indirectly affected, and some unaffected by the Scheme.

Several species of bat are known to use areas likely to be affected by the proposed Scheme, such as roosts in buildings and trees. Bats and

their roosts are protected by UK and EU law. Great crested newts are known to exist at three locations, although just one breeding pond will be directly affected by the Scheme. Great crested newts are also protected under UK and EU law.

A number of badger populations are known to exist around the proposed Scheme. Breeding bird populations are ubiquitous throughout the local landscape, their population densities and mixes varying with habitat type and quality. Barn owls, a particularly sensitive bird species are also found within the study area. Aquatic invertebrates exist at Ladies Wood, Church Carr & Springs CWS.

Mitigation measures have been incorporated into the proposed Scheme design to eliminate or reduce impacts on Valued Ecological Resources as far as

possible. A landscaping scheme has been designed to provide as much benefit to Valued Ecological Receptors as possible, in terms of species mix, form and layout, and timing of planting. A number of crossings for bats are proposed comprising wire gantries across the carriageway, two bridges that will incorporate hedgerows, an underpass, and modified standard bridge designs to include dark corridors to encourage use by bats.

New bat roosts will be provided where existing roosts will be lost. Great crested newts that use the one pond to be lost to the proposed Scheme will be relocated to new ponds nearby, and temporary fencing will be erected to ensure that they do not re-enter the construction area.

Badger fencing will be installed where necessary, to ensure that badgers do not enter onto the carriageway. All habitat clearance will be carried out at such a time, and in such a manner as to ensure that impacts upon breeding birds and other species are minimised.

Assessments of the overall effects on Valued Ecological Receptors have been carried out for the construction phase, and for the operational phase, which includes the opening year and the design year of the

Scheme. Construction phase impacts will include permanent and temporary habitat loss and severance, and disturbance due to the presence of plant machinery, people, and construction activity. Operational phase impacts will include the presence of traffic using the Scheme, with the associated disturbance in terms of noise.

During the Construction phase, the Scheme is predicted to have **significant adverse** effects on:

- Fakenham Road RNR;
- Important Hedgerows (under the Hedgerow Regulations 1997);
- Bats, and more specifically directly affected roosts in buildings and trees, and

important flight paths and areas of activity; and,

- Breeding bird species of both high and medium conservation value.

During the operational phase of the Scheme, the adverse nature conservation effects will lessen. At the opening year **significant adverse** effects are predicted to remain in place only for the bats using the important flight paths along Marriott's Way. By the design year the effects on this flight path will no longer be significant. No other significant adverse effects are predicted by the design year. However, **significant beneficial** effects are predicted for terrestrial invertebrate habitats at the Springs.



Proposed Bat House at Gazebo Farm





The Scheme has the potential to affect the geology and the soils along the route and as a result constraints could be imposed on the construction of the Scheme due to the existing ground conditions.

The construction phase will involve shallow excavation works, earthworks, potential piling, rock-cutting and retaining walls, and general construction works involving the movement of soil materials and storage of hazardous chemicals. All have the potential to impact on the geology and soils underlying the Scheme.

Appropriate mitigation measures that have been identified include the implementation of a Materials Management Plan and Construction Environmental Management Plan and use of appropriate guidelines, including the DEFRA 2009

Code of Practice for Sustainable Use of Soils and best practice guidance on the prevention and control of pollution on site.

With the implementation of these mitigation measures, it is considered that there will be no significant effects relating to geology and soils during



the construction phase of the Scheme.

Impacts during the operational phase of the Scheme will be limited to those associated with surface water runoff from hard surfaces and the potential continued consolidation of soils over time. However, the highways drainage scheme, and associated pollution control measures, coupled with the implementation of the Materials Management Plan and geotechnical design for the Scheme during the construction phase will mitigate against these longer term effects.

In conclusion, there will be **no significant** effects relating to geology and soils as a result of the Scheme during the construction phase and at the opening and design years.

The materials assessment quantifies the resources required for the construction of the Scheme. Through this process the waste and surplus materials likely to be produced by the Scheme have been identified, leading to the assessment of material re-use on site, recycling and disposal of waste off site. This assessment was achieved using National and Local planning and legislative framework as guidance and studying the baseline conditions for Norfolk, with regards to mineral availability and waste disposal availability and capacity.

The potential main environmental impacts associated with construction of the Scheme are the extraction and transportation of minerals and aggregates, and the manufacturing and transport of new materials for construction. The potential main environmental impacts associated with waste arising from the Scheme are likely to be a surplus of materials from excavation, and materials brought onto site that were not available for use due to damage, off-cuts and surplus. Further impact from waste will be associated with its movement, transport, processing and eventual disposal.

The assessment of materials to be used in the Scheme was carried out with reference to

the Bill of Quantities drawn up for the Scheme. Materials from this schedule were assessed on their initial recycled/re-used content, their source of origin and their potential for recycling upon decommission. The anticipated waste arisings of the Scheme were assessed based on the excavations programmed to take place.

Quantities of material excavated, less materials calculated to be re-used in earthworks of the Scheme, will result in close to a cut and fill balance. However, an estimated 10,599m³ of excavated material will remain for disposal off-site upon completion of the Scheme. The earthworks strategy will mean that the Scheme will be self-sufficient with regards to soils and aggregate, reducing the impact of extracting and then transporting minerals from

another external site.

Other mitigation measures include; maximisation of the usage of materials sourced within the Scheme footprint; maximisation of the recycled content of materials sourced from outside the Scheme boundary; segregation of waste within the Scheme to maximise recycling; sourcing of materials locally and disposal in available disposal sites in close proximity to the Scheme. These measures will be achieved by constantly evolving the Schemes Materials Management Plan and Site Waste Management Plan.

In conclusion the Scheme will not have a **significant adverse** effect in relation to the use of materials and production of waste during construction and operation.

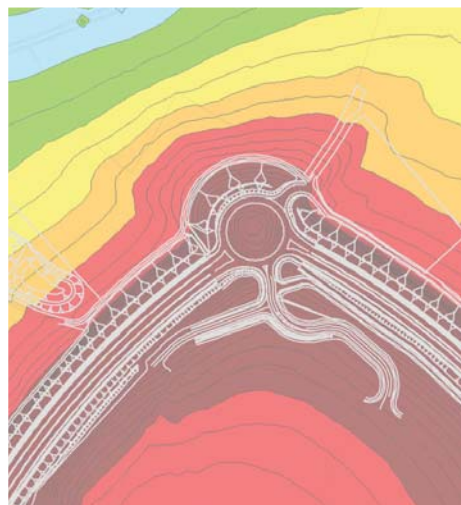


A noise and vibration assessment has been undertaken to establish significant effects associated with construction and operation of the proposed Scheme.

Two phases of the development have been considered: temporary impacts resulting from the construction activities and permanent impacts due to noise and vibration from road traffic using the Scheme and the local highway network.

The methodology adopted for traffic noise and vibration was the Highways Agency's Design Manual for Roads and Bridges. For construction, the noise and vibration methodology was BS 5228 'Code of practice for noise and vibration control on construction and open sites'. In both cases, the approach was:

- Identification of potential sources and prediction of noise and vibration impacts likely to be received at



Typical noise contours at Norwich International Airport

nearby sensitive receptors including dwellings;

- Comparison of the predicted impacts with the baseline conditions;
- Evaluation of the receptor sensitivity and the significance of effects; and,
- The consideration of noise mitigation measures incorporated within the design and an assessment of any remaining effects.

Prior to the assessment, baseline noise monitoring was undertaken across the area.

Noise levels from construction activities have been predicted at the façades of representative sensitive receptors along the NDR route. Various operations have been considered, such as; whole route linear works, including earthworks, drainage and paving; bridge construction sites; construction traffic; and construction compounds. Significant effects are predicted at the nearest receptors to the Scheme which will be mitigated through the formal consent process, whereby working methods, durations and operating times are agreed with the Local Authority prior to works commencing. Construction mitigation measures will include enclosure of plant; temporary noise barriers; restrictions on delivery times; and appropriate location of

ingress and egress points. Temporary barriers will be required during construction at some locations.

Construction noise has been predicted to generate temporary significant effects at some locations. Further construction noise calculations will be undertaken as sufficient construction-related information becomes available, and the Contractor will apply for Section 61 consent under the Control of Pollution Act 1974. Following mitigation, it is anticipated that construction noise effects will not be significant.

Mitigation measures incorporated into the design of the Scheme include a thin surface course for the carriageway, three lengths of acoustic barrier and extensive bunding and false cuttings. Noise levels during operation will have a significant adverse effect at 2393 residential and 17 non-residential receptors on opening. By the design year, significant adverse effects are predicted to occur at 1936 residential and 14 non-residential receptors.

In conclusion, noise effects are considered to be **slight adverse** during construction. During operation, **moderate or large adverse** effects are predicted on opening, although the number of receptors affected will reduce by the design year.

The assessment of the effects of the Scheme for All Travellers addresses the impact on vehicle travellers in terms of the change in the view from the road, and the impact of the Scheme on Driver Stress. The assessment also addresses the impacts for non-motorised users (NMUs), which includes pedestrians, equestrians and cyclists, as a result of changes to the network of Public Rights of Way (PRoW) and minor roads. It also considers changes in journey length and times, the provision of amenities such as PRoW, and connectivity between communities and community facilities.

Overall, it is expected that there will be a temporary adverse impact during construction on the view from the road for motorised users passing along routes that intersect with the NDR, as a result of changes from a rural, high quality outlook to that of a temporary construction site. This will result in a temporary slight adverse impact for views from the road for vehicle travellers. The need to travel through road-works for some motorised users, particularly at these intersections, is also likely to result in temporary short-term delays which could lead to some level of driver frustration. However, measures to minimise impacts, such as the phasing of works, will be included in the construction programme, and



the majority of the route will be constructed off-line. Impacts are therefore not considered to be significant.

Once the Scheme is operational, it is anticipated that where the existing routes will intersect with the NDR, the view from the road for motorised users is likely to be restricted, changing from a rural setting to one of a dual carriageway corridor with associated landscape planting. Once screening vegetation that is included as part of the landscape design and mitigation for the Scheme has matured, it is considered that views from the road will be neutral for those travelling on affected routes within the zone of visual influence, and for those travelling on the proposed NDR itself. Driver stress is generally considered to reduce as a result of the NDR, due to reduced congestion and improved journey time reliability for radial and secondary routes where traffic will transfer to the Scheme. As a result, a long term significant beneficial effect on driver stress for users of those radial and secondary routes is anticipated.

For NMUs, the construction stage is predicted to result in short term slight adverse impacts as a result of the temporary closure or diversion of Public Rights of Way, resulting in an increase in journey times for some NMUs in a small number of locations. In addition, some NMUs may be deterred from making certain journeys during construction due to the presence of construction plant and increased traffic on alternative routes due to diversions. However, once the Scheme is open, the NDR will provide additional amenities for NMUs such as approximately 25km of bridleways, cycle tracks and footpaths, and all PRoW will be maintained or reinstated. Changes to traffic levels on routes currently used by NMUs will also result in a positive benefit on the whole for communities. This is because it is expected that there will be a decrease in traffic on a number of radial roads within the parishes that will be affected by the NDR, resulting in some relief from existing community severance for NMUs accessing key services. A long term significant beneficial effect for NMUs is therefore predicted.

In conclusion, the effects on all travellers are considered to be **slight adverse** during the construction phase and **moderate beneficial** at the opening and design year.

The community and private assets assessment identifies impacts associated with the demolition of property, the loss of land used by the community, and impacts on development and agricultural land. The assessment also examines the impacts the Scheme will have on the social and economic environment of Norwich.

One residential property will be demolished to accommodate the Scheme. This property is currently derelict, and other outbuildings attached to another property which are also dilapidated will be demolished. Fifteen properties will lose some land to the Scheme, however development land will not be adversely affected. In order to maintain the amenity and ecological value of Marriott's Way, a green bridge will be constructed. The small amount of land that will be taken at Great Plumstead Fuel allotments will be replaced with a larger adjacent allotment area.

The Scheme will result in the permanent loss of 307.57ha of agricultural land, however 45.64ha will be returned to agricultural use after construction. During construction, access to farmland and water supplies to fields will be maintained where possible. Where this is not possible, compensation for loss of revenue will be provided to the farm owner.



Irrigation systems will be maintained during operation and farms will be compensated for permanent land loss.

The socio-economic impacts on the local community from construction will be short-term job creation and an increase in local economic activity. There will also be temporary disruption to economic activity and land-take during the construction phase.

The effects on soils as a national resource are considered significant adverse. However, this must be considered within the context of agricultural activity in Norfolk and current agricultural practice generally. It is considered that the increasing efficiency of agricultural producers and changes in agricultural policy mean that retaining as much

land as possible in agricultural use is no longer a top priority. In addition farmers will be compensated for loss of revenue.

Upon completion of the Scheme, socio-economic effects will be major beneficial resulting from improved access to employment and tourist areas, job creation, housing and development growth.

In conclusion, the effects on community and private assets are considered to be **slight adverse** during construction. Following completion of the Scheme, effects during the opening year will be **slight beneficial** rising to **moderate to large beneficial** and significant by the design year.

The water environment encompasses surface water in rivers, streams and ponds, and groundwater within underground strata. The government is committed to maintaining and improving the quality of surface water and groundwater environments, and the drinking water supplies they support.

Historically, roads have not been considered a major source of pollution and rainfall has been allowed to run off and discharge with little or no treatment. In recent years, diffuse pollution from road drainage has been identified, in some circumstances, as contributing to poor water quality. Pollution can arise from a variety of sources including accidents, general vehicle and road degradation, and vehicle related fuel leaks. Mitigation techniques are now used to control this pollution and the impact on the natural environment.

Groundwater levels within 50m of the proposed Scheme have been monitored intermittently since 2006 and range between approximately 2m and 20m below ground level. The proposed Scheme is not foreseen to intersect the chalk water table at any point. There is one principal area of groundwater discharge along the proposed route located at 'The Springs' County Wildlife Site (CWS). Dobb's Beck and Spixworth Beck pass within 'The Springs'



CWS and form a tributary of the River Bure. The proposed Scheme crosses the catchment of Dobb's Beck. Water quality monitoring has been carried out intermittently at 'The Springs' since September 2006 and has shown moderate to good biological water quality.

Drainage discharge into 'The Springs' is proposed from Lagoons 17 and 18 as part of the proposed Scheme. The drainage design incorporates Sustainable Drainage Systems (SuDS) surface water treatment mechanisms and is planned to include reed bed treatment. The reed bed treatment will ensure that a higher level of water quality is discharged into 'The Springs' than is currently found in the area.

For the first few hundred metres at the western end the route will pass within 300m of the River Wensum Special Area of Con-

servation (SAC), at Attlebridge. At the eastern end of the proposed Scheme the route will pass within 600m of the River Yare.

The underlying chalk is a major aquifer used to supply much of the drinking water to the Norwich area. There is one licensed public water supply within the study area, located approximately 500m south-east of the Scheme, near Postwick. The Environment Agency (EA) has advised that a temporary 750m radius source protection zone, SPZ1 should be allowed for surrounding the supply. The SPZ1 represents the area that is most sensitive and requires the highest level of protection around a public or private potable abstraction. The route will pass through the more extensive total contributing catchment SPZ3, associated with groundwater supplies, in some areas. However, the Scheme will not represent a significant concern regarding impacts to the groundwater in the SPZ3.

A Flood Risk Assessment (FRA) has been carried out for the Scheme. The FRA shows the Scheme is located in Flood Zone 1 where there is little or no likelihood of fluvial or tidal flooding. However, the road alignment will cross the catchment of Dobb's Beck near Rackheath where available surface water mapping indicates some flood risk from rainfall runoff (over-

land flow). The depth, extent and duration of any flooding in this area is currently minimal, and the road will be built above the maximum flood levels and therefore removed from flood risk. In compliance with best practice, the highway drainage for the Scheme has been designed in line with SuDS principles to restrict runoff to greenfield discharge rates. Therefore flood risk due to surface water runoff will be mitigated to acceptable levels.

The overall effect of the Scheme on flood risk is predicted to be neutral to slight beneficial. The Scheme will provide a new flow path between the new road and Dobb's Beck, along the dry valley, to convey flood flows. With the mitigation measures in place, no increase in flood risk is predicted.

The drainage design has been subject to risk assessments required under best practice guidance, to inform the Scheme design and identify any embedded mitigation measures required. These embedded mitigation measures increase beneficial effects, or prevent or reduce negative effects.

During construction, the overall effect of the Scheme on surface water quality is predicted to have no significant adverse effects.

During operation the overall

effect on surface water quality is considered to be neutral to slight beneficial. A slight beneficial effect will result from the improvement of treatment to existing runoff from the A1151, which currently discharges into the CWS without any form of treatment.

The Scheme will cross areas of high leaching potential soils and unconfined principal aquifers, and is in reasonably close proximity to some private abstraction sites and a public water supply source. There may be a slight adverse effect on groundwater quality for some private water supplies which are located down-gradient of infiltration ponds. However, all infiltration ponds are outside the default 50m radius SPZ1 under EA guidance, applied to all potable groundwater abstraction sites (unlicensed). Otherwise, during construction and operation, the overall effect of the Scheme on groundwater quality and flow is predicted to be neutral.

Mitigation for construction and operation (including maintenance works) has been embedded in the Scheme design to reduce the overall effect of the Scheme. This mitigation will be incorporated into the CEMP and Norfolk's Transport Asset Management Plan, with the Scheme being maintained by NCC.



With the appropriate mitigation measures for construction and operation, the Scheme will result in a limited number of slight adverse and slight beneficial effects. All other effects are considered neutral.

In conclusion, the road drainage and water effects of the Scheme will **not be significant** during construction. Similarly, effects at the opening and design years are also considered to be **not significant**.

The assessment of combined and cumulative effects of the Scheme bring together the principal findings of each of the previous topics of the Environmental Statement in order to identify and assess the combined effects of the Scheme and the cumulative effects of the Scheme in association with other existing or future significant development projects within the study area.

Combined effects can be defined as effects which can result from multiple actions on receptors and resources over time and are generally additive or interactive in nature.

The assessment methodology for combined effects involves the identification of impact interactions associated with the Scheme upon separate environmental resources or receptors. The significance of construction and operational phase environmental impacts are taken from the preceding chapters of the Environmental Statement into matrices providing a clear summary of potential impacts. The significance of combined effects upon each environmental resource is then made based upon the balance of significance scores.

Cumulative impacts can also be considered as impacts resulting from incremental

changes caused by other past developments that are reasonably foreseeable as occurring at a similar time to the construction of the Scheme.

The assessment of cumulative effects is not intended to provide a detailed assessment of the effects of future developments. In many instances the layout and design of future projects have not been developed to the same level of detail as that for the Scheme, they may be phased in over years and their construction timetable as yet unconfirmed. As such, assessments have been undertaken at a relatively high level in the context of broad development parameters sufficient to provide an understanding of the likely environmental effects of future developments and to enable adequate consideration of cumulative effects.

The Scheme will have an overall moderate adverse and significant environmental effect during the construction phase. The adverse effects come from construction noise and visual intrusion from the lighting of construction compounds and after dark construction activities in the winter. These combined noise and visual effects will adversely impact on bats and birds but these effects will be temporary.

There are significant benefits to

non-motorised and motorised users from the NDR during operation with reduced severance and increased connectivity. There are environmental benefits to residents from the removal of vehicles from unsuitable suburban roads. However there will be adverse impacts to wildlife due to land-take, traffic noise and tree removal.

There are anticipated to be **significant adverse** cumulative impacts during the construction phase. These effects will mostly impact on road users and biodiversity, however it is unlikely that construction will occur simultaneously so this represents a worst case scenario.

During the first year of operation impacts on protected species are **moderate adverse** due to land-take and severance, however maintaining commuting and foraging routes for bats during construction reduces some of the effects that may occur during the first years of operation.

By design year all the adverse impacts will have reduced in significance and the benefits to motorised and motorised users will still be **significantly beneficial** as the other development phases in. The adverse impacts on biodiversity will reduce as the landscaping and habitat creation matures.

Summary of Effects

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Specialism	Effects during Construction	Effects at Opening Year	Effects at Design Year	Mitigation
Air Quality	Slight Adverse to Neutral	Neutral	Neutral	<ul style="list-style-type: none"> Best practice mitigation measures contained in the Construction Environmental Management Plan
Cultural Heritage	Moderate Adverse	Slight Adverse	Slight Adverse	<ul style="list-style-type: none"> Archeological Mitigation Strategy during construction Landscaping bunding and planting to integrate into historic landscape
Landscape	Moderate Adverse	Moderate Adverse	Slight Adverse	<ul style="list-style-type: none"> Creation of naturalistic landforms associated with embankments and cutting slopes Extensive planting to help integrate the scheme into the receiving landscape
Visual Effects	Large to Moderate Adverse	Large to Moderate Adverse	Moderate to Slight Adverse	<ul style="list-style-type: none"> Extensive new planting to help screen the road and associated traffic Lighting provided at the Postwick junction end of the Scheme only
Nature Conservation	Large to Moderate Adverse at some locations	Large to Moderate Adverse at some locations	Neutral	<ul style="list-style-type: none"> New roosts for Bats and ponds for Great Crested Newts Badger fencing Landscaping scheme incorporating habitat creation.
Geology and Soils	Neutral	Neutral	Neutral	<ul style="list-style-type: none"> Implementation of Materials Management Plan Implementation of Construction Environmental Management Plan
Materials	Neutral	Neutral	Neutral	<ul style="list-style-type: none"> Maximise use of materials sourced from the Scheme footprint Maximise recycled content of materials through Materials Management Plan Implementation of Site Waste Management Plan
Noise	Slight Adverse	Large to Moderate Adverse	Large to Moderate Adverse	<ul style="list-style-type: none"> Thin surface course for the proposed carriageway Acoustic barrier at appropriate locations Extensive bunding and false cuttings
Effects on All Travellers	Slight Adverse	Moderate Beneficial	Moderate Beneficial	<ul style="list-style-type: none"> Phasing of works to minimise disruption upon non-motorised users and vehicular travellers 25km of bridleways, cycle tracks and footpaths
Community and Private Assets	Slight Adverse	Slight Beneficial	Large to Moderate Beneficial	<ul style="list-style-type: none"> Restoration of temporary agricultural landtake Compensation for the loss of agricultural land and decrease in farm viability
Road Drainage and Water Environment	Neutral	Neutral	Neutral	<ul style="list-style-type: none"> Polution control measures within the Construction Environmental Management Plan Use of Sustainable Drainage Systems (SuDS) Attenuation features to mitigate against flooding

Viewing the Full Environmental Statement

The full Environmental Statement can be viewed at:

The Archive Centre
County Hall
Martineau Lane
Norwich
Norfolk
NR1 2DH

The full Environmental Statement can also be viewed on the County Council's web site:

www.norfolk.gov.uk/transportfornorwich

Free internet is available at all libraries.

If you need to view the documents in another format, please call 0344 800 8020

Email enquiries:
information@norfolk.gov.uk

The Norfolk County Council (Norwich Northern Distributor Road (A1067 to A47(T))) Order

10.1 Road Safety Audits and Briefs

Planning Act 2008

Infrastructure Planning

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

PINS Reference Number: TR010015

Document Reference: 10.1

Regulation Number: 5(2)(q)

Author: Norfolk County Council

Revision	Date	Description
0	8 th January 2014	Revision For Submission

INTRODUCTION

This document is submitted in relation to the application for a Development Consent Order by Norfolk County Council (NCC) to the Secretary of State, under the Planning Act 2008.

The application is for the Norfolk County Council (Norwich Northern Distributor Road (A1067 to A47(T))) Order, to grant development consent for the construction of a new highway running west to east, to south, between the A1067 Fakenham Road and the A47 Trunk Road at Postwick, including improvements to the existing highway network to the north and north east of Norwich.

This document comprises part of the application documents and relates to Regulation 5(2)(q) of the Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009.

The scheme has been the subject of a number of road safety audits carried out by NCC's independent audit teams in accordance with DMRB HD 19/03: Road Safety Audit throughout the development of the scheme.

The NDR Stage 1 Safety Audit was carried out in November 2013. The brief submitted to the road safety audit team, the Safety Audit Report and the response of NCC's highway design team (the Designer's response) are included in Appendix A of this document.

Separate Stage 1 Safety Audits for the three 'off-line schemes', namely Crostwick Junction, Rackheath Junction and Thorpe End Improvements were carried out in September 2013. The brief submitted to the road safety audit team, the Safety Audit Report and the Designer's response are included in Appendix B of this document, which is in three parts: Part 1 – Crostwick Junction; Part 2 – Rackheath Junction; and Part 3 – Thorpe End Improvements.

The Postwick Junction Stage 2 Safety Audit was undertaken in April 2013. The brief submitted to the road safety audit team, the Safety Audit Report and the Designer's response are included in Appendix C of this document.

The road safety audit team at Norfolk County Council has confirmed that the Designer's response for the NDR Stage 1 Safety Audit, Postwick Junction Stage 2 Safety Audit, Crostwick Junction Stage 1 Safety Audit, Rackheath Junction Stage 1 Safety Audit and Thorpe End Improvements Stage 1 Safety Audit are satisfactory and there are no outstanding issues.

SCHEDULE OF APPENDICES AND REPORTS INCLUDED IN THIS DOCUMENT

Document Title	Date
Appendix A comprising:	
Norwich Northern Distributor Road – Stage 1 Safety Audit submission	November 2013
NDR Stage 1 Safety Audit Report	November 2013
Norwich Northern Distributor Road – Stage 1 Safety Audit Designer's Response	November 2013
Appendix B comprising:	
Part 1	
Crostwick Junction Improvements Preliminary Design Stage 1 Safety Audit Submission	September 2013
B1150 Crostwick: Junction Improvement Stage 1 Safety Audit	25 September 2013
Stage 1 Safety Audit, NDR Off Line Improvements – Crostwick Junction Response Sheet	29 September 2013

Part 2	
Rackheath Junction Preliminary Design Stage 1 Safety Audit Submission	September 2013
A1151 Rackheath: Green Lane Junction Improvement Stage 1 Safety Audit	26 September 2013
Stage 1 Safety Audit, NDR Off Line Improvements – Rackheath Junction, Response Sheet	29 November 2013
Part 3	
Thorpe End Highway Improvements Preliminary Design Stage 1 Safety Audit Submission	September 2013
C874 Plumstead Road Thorpe End: Highway Improvement Stage 1 Safety Audit	25 September 2013
Stage 1 Safety Audit, NDR Off Line Improvements – Thorpe End, Response Sheet	29 November 2013
Appendix C comprising:	
A47/A1042 Postwick Hub Junction Stage 2 Safety Audit Submission	April 2013
Postwick Hub Junction Stage 2 Safety Audit	10 April 2013
Postwick Hub Junction Stage 2 Safety Audit, Response Sheet	24 May 2013

Abbreviations

BGBP	Broadland Gate Business Park
DfT	Department for Transport
DMRB	Design Manual for Roads and Bridges
EA	Environment Agency
ECI	Early Contractor Involvement
HA	Highways Agency
ICD	Inscribed Circle Diameter
kph	kilometres per hour
mph	miles per hour
NCC	Norfolk County Council
NDR	Norwich Northern Distributor Road
NMU	Non-Motorised User
TUBA	Transport Users Benefit Appraisal
SUDS	Sustainable Urban Drainage Systems
vph	vehicles per hour

Glossary

accommodation works	works to private properties affected by the scheme
connector road	a collective term for interchange links, link roads, slip roads and loops
crest curve	a vertical curve that rises to a high point
cycle track	a track separated from the main carriageway for use by cyclists
footway	the pedestrian-only area normally adjacent to a road and often separated from it by means of a kerb
ghost island	an area of carriageway suitably marked to separate lanes of traffic travelling in the same direction on both merge and diverge layouts
grade separated junction	a road junction where roads cross at different levels
hardstrip	a surfaced strip that abuts the carriageway edge
infiltration	the act of storm water slowly filtering into the ground
lane drop	a layout where a lane or lanes of the upstream carriageway becomes the diverging connector
mainline	the carriageway carrying the main flow of traffic (generally passing straight through a junction or interchange)
merge/diverge	a layout where merging or diverging traffic joins or leaves the mainline carriageway
non-motorised user	pedestrian, cyclists and equestrians (sometimes abbreviated to NMU)
overbridge	a bridge that carries a side road over the main road
pavement	the part of the road on which vehicles travel; the construction make-up of the road carriageway

APPENDIX A

APPENDIX A

Norwich Northern Distributor Road –
Stage 1 Safety Audit submission

November 2013



Norfolk County Council

NORWICH NORTHERN DISTRIBUTOR ROAD

Stage 1 Safety Audit

2013

Prepared by Norfolk County Council

November 2013

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NORWICH NORTHERN DISTRIBUTOR ROAD

Stage 1 Safety Audit

2013

November 2013

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Norwich Northern Distributor Road

Stage 1 Safety Audit


2013

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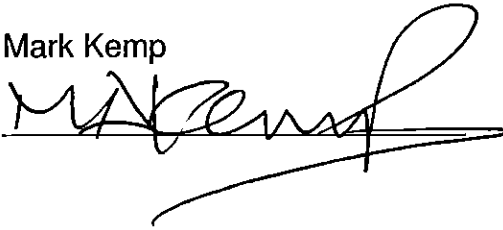


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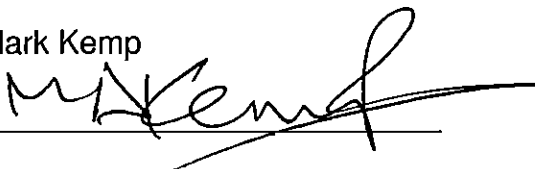


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Issue Status: Final

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Appendices - Stage 1 Safety Audit Report 2013

- A NDR Layout – Design Speeds (Drawing No R1C093-R1-4342)
- B Junction Layouts (Drawing No R1C093-R1-4068C to 4080C, 4297C, 4302A & 4303A)
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- D Engineering Layout Sheets 1-12 (Drawing No R1C093-R1-4003E to 4014E)
- E Typical Cross Sections Sheets 1-16 (Drawing No R1C093-R1-5115 to 5130)
- F Non-Motorised User Links Drawing R1C093-R1-4053A

1. BACKGROUND

- 1.1. The aim of this Safety Audit is to bring together all the elements of the Norwich Northern Distributor Road (NDR) and its associated works into one audit prior to submitting an application for development consent under the Planning Act 2008.
- 1.2. The audit will present some modifications to the scheme that have not previously been formally part of the earlier reports. These modifications are in part, the result of a recent round of formal Public Consultation and previous comments received from the audit team in 2012. The significant modifications have been highlighted in section 1.3 and 1.4 below.
- 1.3. The modifications referred to above comprise:
 - Provision of dual carriageway between A1067 and A140
 - Provision of a new Roundabout at western end of NDR – close to A1067
 - Removal of closure on Fir Covert Road with junction of Reepham Road
 - Provision of new bridge carrying Bell Farm Track over the NDR.
 - Closure of Drayton Lane to the south of the Reepham Road.
 - Removal of at grade roundabout at junction with A140 and provision of grade separated junction.
 - Closure of Broad Lane north of Plumstead Road.
 - Removal of pedestrian/cycle/agricultural vehicle bridge at Low Road, Gt Plumstead and provide all vehicle bridge at Middle Road instead.

- 1.4. In addition to the above; a number of off-line improvements are also being undertaken at the same time as the main scheme these are as follows:
- Improvements to A1151/Green Lane West Junction.
 - Highway improvements on Plumstead Road, Thorpe End.
 - Improvements to Crostwick Lane/North Walsham Road junction including closure of Rackheath Lane.

2. PREVIOUS SAFETY AUDITS

2.1. The following historical Safety Audits have been undertaken:

- Stage 0 was carried out in March 2007
- Stage 1 was carried out in December 2008
- Stage 1 was carried out in February 2012
- Stage 2 was carried out in April 2013 (Postwick Hub Junction only)
- Stage 1 was carried out in September 2013 (off-line improvements only)

2.2. As set out in 2.1 above the last full audit was undertaken in February 2012.

2.3. The Safety Audit submissions listed in 2.1 above have not been included in the appendices of this report, but can be made available if required.

3. OUTCOME OF CONSULTATIONS

3.1. A series of exhibitions were undertaken on the NDR (including the Postwick Hub Junction) in July/August/September 2013 as part of the statutory process prior to submitting an application for development consent. The results of these consultations have been considered and where appropriate are reflected in the drawings contained within this safety audit.

4. TRAFFIC MODELLING

- 4.1. The standard of the NDR has been determined so that the Scheme will meet its key objectives whilst balancing the provision against the Scheme cost and its environmental impact.
- 4.2. Throughout development of the scheme modelling work has demonstrated that improving the level of provision at junctions leads to greater attractiveness to drivers of the new route as an alternative to existing roads and diverts residual traffic away from inappropriate parts of the network. There is potential demand in the network that may only be alleviated by larger or split level junctions. However, Norfolk County Council is looking to provide an optimum and a decision has to be made between the ever increasing costs of larger junctions and their environmental impacts, compared to benefits accruing on the rest of the network. It becomes uneconomic and is likely to impose unacceptable impacts to design for free flow conditions on the NDR at all times, and the additional costs for greater capacity provision for NDR would be at the expense of other improvements in the city and county given the limitations on the Council's transport budget. Hence, accepting some level of congestion on the scheme at peak times, as we already do at other locations on the existing highway network, in order to maintain the cost of the scheme within an affordable budget, makes the best use of Council resources.
- 4.3. The current strategic transport model used to assess the impact of the NDR for the NSIP Development Consent Order (DCO) application is based largely on new origin destination surveys and extensive traffic counts carried out in autumn 2012.

5. ROAD DESIGN STANDARDS AND DESIGN SPEEDS

- 5.1. All main line links will be designed to the Design Manual for Roads and Bridges (DMRB):

- TD 9/93: (Highway Link Design)
- TD 27/05: (Cross-Sections and Headrooms)
- TD 22/06: (Layout of Grade Separated Junctions)
- TD 51/03: (Segregated Left Turn Lanes and Subsidiary Deflection Islands at Roundabouts)

Roundabouts are designed in accordance with the DMRB

- TD 16/07: (Geometric design of roundabouts).

5.2. Refer to drawing in Appendix A which sets out the design speeds used. Junction Details are contained within in Appendix B and Junction Geometry Details in Appendix C.

6. DEPARTURES AND RELAXATIONS FROM STANDARDS

6.1. The NDR is designed in accordance with the Design Manual for Roads and Bridges (DMRB). Where it has not been possible to comply with the DMRB a Departure from Standards will be sort. These are categorized as follows, those on the Trunk Road network and those on a County Road network.

6.2. The NDR alignment has been designed using the design speeds shown in Appendix C. Based on these design speeds section 5.2 and 5.3 sets out the Departures from Standards that are required

6.3. Trunk Road Network – Highways Agency

6.3.1. Eastbound Diverge Slip Road - layout was submitted to the HA as a Departure from Standard and approved in 2012.

6.3.2. Eastbound Merge Slip Road - layout was submitted to the HA and approved as a Departure from Standard in 2008.

6.3.3. Westbound Merge Slip Road - Departure from Standard to retain the existing two-lane taper merge was submitted to the HA and approved in 2013.

6.3.4. New Postwick Bridge - Departure from Standard for the omission of Abutment Galleries was submitted to the HA and approved in 2010.

6.3.5. The Departure from Standards submissions and approvals listed in 5.2.1 to 5.2.4 above have not been included in the appendices of this report, but can be made available if required.

6.4. **County Road Network – Norfolk County Council**

6.4.1. Cross Sections: The proposed cross section along the length of the mainline design is in accordance with TD27/05 for carriageway, hardstrip and central reserve widths, in some cases verge width provision is 1.5m rather than the required 2.5m. In these situations the verge is reduced due to the need for a shallow drainage swale. The swales are generally 3.0m wide with 1 in 5 side slopes and 200mm depth

6.4.2. NDR/A140 Grade Separated Junction: Based on the vph traffic flows for the eastbound and westbound merge slip roads the ideal layout is a Type E lane gain layout in accordance with TD22/06 Figure 2/3. A Type E layout would provide a single lane merge slip road joining a one lane NDR mainline carriageway to form a two lane downstream mainline carriageway. However, for reasons of route continuity, the NDR mainline has been designed with two lanes throughout. Therefore the nearest compliant layout is a Type A single lane taper merge. A Type A layout has therefore been adopted.

6.4.3. NDR/A140 Grade Separated Junction: The westbound merge slip road has a two way section near the A140 Cromer Road Roundabout South. This is to allow access to a property and for maintenance vehicles to access the lagoon. Therefore the eastbound flow on the slip road will be extremely low. Paragraph 5.27 in TD22/06 states that two way slip roads must be dual carriageway with opposing traffic separated by a physical central reserve with vehicle restraint system. Due to the low opposing flow it is considered that a physical separation would result in an overdesigned layout. Therefore the two-way section of the slip road is a departure from standards and has been designed as a 7.3m wide two way carriageway. Signing will be provided to

inform drivers of the layout ahead.

- 6.4.4. The NDR passes under Middle Road bridge between Plumstead Road Roundabout (South) and the Business Park Roundabout. At this location the Stopping Sight Distance (SSD) is restricted to 2 steps below standard due to the presence of the required Vehicle Restraint System (VRS) and the bridge pier within the central reservation. Two steps below desirable minimum would normally be considered a relaxation. The horizontal radius under the bridge is also 1 step below standard and therefore this combination of relaxations is a departure from standards.

The departure is considered acceptable by the design team as reduction in SSD will be momentary visibility impairment only. Increased visibility will be achievable over the VRS and behind the bridge pier.

- 6.4.5. At-Grade NMU Crossings: Uncontrolled crossings via refuge islands are provided for cyclists/pedestrians at or close to roundabouts on the NDR. This is considered an acceptable approach given the low crossing flows of pedestrians in particular). DMRB TD16/07 Table 6/1 shows normal provision for pedestrians and cyclists at or near roundabouts where there is significant demand to justify them. However the crossing flows do not support the provision of signalised facilities and their introduction, as suggested in LTN 1/95 paragraph 4.2.4, may actually be detrimental to safety with drivers becoming habituated in to not seeing a red signal. Grade separation of these low flow routes would not be cost effective.

- 6.4.6. At-Grade NMU Equestrian Crossings: Three equestrian crossings are proposed near to roundabouts on the NDR. Holding areas will be provided for equestrians either side of the minor road where equestrians will cross. Due to equestrians taking longer to make a decision to enter the carriageway and the need to manoeuvre from holding areas, these crossing points need to be set further back from the roundabout junctions, using the visibility requirements in TA90/05 Table 3.4. Traffic speeds will be considerably less than the speed limit when leaving the roundabout, therefore it is considered that a 'y' distance of 135m is appropriate for the visibility splay towards the roundabout. For

traffic approaching the roundabouts the 'y' distance should be appropriate to the actual approach speed and visibility splays will be provided in accordance with TA90/05 Table 3.4. Refuse islands will not be provided at equestrian crossing points.

- 6.4.7. With regards to the equestrian crossing point on Wroxham Road, a slightly less 'y' distance of 120m northwards towards the roundabout will be provided.

7. SCHEME DESCRIPTION

- 7.1. The Scheme (the Norwich Northern Distributor Road, known as the NDR) is a dual carriageway all-purpose strategic distributor road, which would link the A1067 Fakenham Road, near Attlebridge to the A47 Trunk Road (T) at Postwick. This will be over a length of approximately 20.4km
- 7.2. From west to east, the NDR is proposed to start at a new at-grade roundabout junction with the A1067 Fakenham Road, located to the west of Taverham. This would then continue eastwards as a dual carriageway to a new at-grade roundabout junction with the C262 Fir Covert Road. From this roundabout, the NDR would then cross the Marriott's Way (a permissive path providing a pedestrian, cycling and horse riding facility along the route of a disused railway; which will cross over the NDR via a new bridge), to a new at-grade roundabout junction with the C261 Reepham Road. This would then continue south eastwards, crossing Bell Farm Track/Horsford Restricted Byway No. 5 (which will be taken up over the NDR via a new Restricted Byway and private access accommodation bridge) before connecting with the C282 Drayton Lane via a new at-grade roundabout junction. Sections of the C282 Drayton Lane either side of its junction with the NDR will be re-aligned.
- 7.3. The NDR would then continue south eastwards from its junction with C282 Drayton Lane to a new grade separated junction (provision of a bridge over the NDR with slip roads to/from the NDR) with the A140 Cromer Road, located close to and just North-West of Norwich International Airport. The provision of this grade separated junction will require the stopping up of

lengths of the B1149 Holt Road and U57142 Holly Lane and the re-alignment westwards of parts of the A140 Cromer Road to take it over the NDR. East of the A140, the NDR would continue as a dual carriageway, turning north eastwards around the northern boundary of the airport to a further new at-grade roundabout junction at the northern tip of the airport. The primary purpose of this roundabout is to allow the NDR to undertake a roughly 90 degree change of direction. From this roundabout, the NDR would continue to follow around the north east part of the airport boundary before turning eastwards and passing under the C246 Buxton Road; which would be re-aligned eastwards and cross over the NDR on a new bridge. The route of the dual carriageway NDR would then continue eastwards through the north of Beeston Park. This would then connect with both the B1150 North Walsham Road and the A1151 Wroxham Road via a new at-grade roundabout at each location, before entering the north eastern section of Rackheath Park approximately 250m from the western end of Sir Edward Stracey Road. The NDR would then turn toward the south-east, passing under re-aligned Newman Road, which will run over the NDR via a new Bridleway/Private Access accommodation bridge.

- 7.4. The NDR would then connect with the C283 Salhouse Road via a new at-grade roundabout, before rising up on an embankment (maximum height approximately 8.5m) to cross both the Norwich to Sheringham rail line and the C874 Plumstead Road on individual bridges in close proximity, prior to a new roundabout on the NDR, which would connect it via new local connections and a further small at-grade roundabout to the C874 Plumstead Road.
- 7.5. The NDR route would then continue southwards, crossing the C442 Middle Road (which would pass over the NDR via a new bridge) before connecting with a new at grade roundabout known as the Business Park Roundabout.
- 7.6. At this point a single carriageway link is provided west to the existing Broadland Way/Peachman Way roundabout and includes an at-grade roundabout on the link road to the proposed Broadland Gate Business Park.

7.7. From the Business Park roundabout the NDR proceeds southwards as a dual carriageway to a new Postwick North East at-grade roundabout immediately north of the A47(T). This roundabout has links from a modified A47(T) eastbound diverge slip road and a new A47(T) eastbound merge slip road. The NDR continues over the A47(T) as a four lane carriageway one lane north and three South; on a new bridge and terminates at its southernmost point at a signalised junction, which replaces the existing Park and Ride roundabout with the A1042 Yarmouth Road.

7.8. This signalised junction provides further links:

- Directly to and from the park and ride site for buses;
- West to the existing Postwick North West roundabout, via the existing Postwick bridge over the A47(T);
- East to the proposed park and ride site entrance at the proposed Oak's Lane roundabout and further East to the Brundall Low Road junction with the A1042 Yarmouth Road to Postwick village; and
- West to the A47(T) via an existing westbound merge slip road.

7.9. The works at the A47 (T) Postwick Junction, will include modifications to the existing Postwick North West roundabout (as a result of closing the existing eastbound diverge slip road) and to the existing A1042 Yarmouth Road overbridge of the A47(T) to provide revised traffic lanes and the provision of a shared use cycle/footway.

8. **JUNCTIONS**

8.1. Grade separated junctions will be required in the following locations:

- A140 Cromer Road (to include eastbound and westbound merge and diverge slip roads) (Chainage 6800)
- A47 Postwick (to include new roundabout east of the existing roundabout with provision of new eastbound diverge and eastbound merge slip roads)

to/from the A47(T)) (Chainage 19450 – 20400)

8.2. At-grade junctions will be required in the following locations:

- A1047 Fakenham Road (Chainage 510)
- C262 Fir Covert Road (Chainage 1750)
- C621 Reepham Road (Chainage 2910)
- C282 Drayton Lane (Chainage 5330)
- B1150 North Walsham Road (Chainage 12100)
- A1151 Wroxham Road (Chainage 14240)
- C283 Salhouse Road (Chainage 16100)
- 874 Plumstead Road (South) (Chainage 17300)

8.3. On-line access roundabouts will be required in the following locations:

- Northernmost point of Norwich Airport to include a new access to the Petans offshore training facilities and secure access to Norwich International Airport. (Chainage 9120)
- At the proposed Broadland Gate Business Park location to link the NDR new road to the proposed Broadland Gate link road. (Chainage 19450 – 20400)

8.4. Off-line roundabouts will be required in the following locations:

- C282 Drayton Lane/B1149 Holt Road junction
- C874 Plumstead Road (North)
- Proposed site of the Broadland Gate Business Park

8.5. Major/minor priority junction will be required in the following location:

- C282 Drayton Lane/C621 Reepham Road

9. STRUCTURES

9.1. Structures will be required in the following locations:

9.1.1. New Overbridges

- Marriott's Way – permissive path providing a pedestrian, cycling and horse riding facility along the route of disused railway. (Chainage 2390)
- Bell Farm Track – Horsford Restricted Byway No. 5 and private means of access. (Chainage 3980)
- A140 Cromer Road (Chainage 6800)
- C246 Buxton Road (Chainage 10940)
- Private means of access leading from Newman Road (Chainage 15500)
- C442 Middle Road (Chainage 18060)

9.1.2. New Underbridges

- Norwich to Sheringham railway line (Chainage 16920)
- C874 Plumstead Road (Chainage 17010)
- New flood culvert/bat underpass which will be located to the West of Rackheath (Chainage 14810)
- A47 Trunk Road at Postwick (Chainage 2022)

10. WILDLIFE STRUCTURES

10.1. In addition to the above, structures would be provided to facilitate the movement of wildlife across the road and also confinement of some species.

These comprise:

- Badger fencing to confine badger movement and prevent access to carriageway at Deighton Hills, Drayton Drewray, Marriott's Way and Sprowston Wood.
- Seven high level bat bridges at Chainage's 760, 5780, 10020, 12650, 13140, 17730 and 19000 linking to tree canopies, to facilitate the movement of bats across the NDR. These would comprise poles with a horizontal steel structure covered with netting approximately three metres wide between the tree canopies and supported on poles placed so the ends are close to tree branches.
- Deer reflectors to discourage deer from the carriageway.

11. DRAINAGE

11.1. Highway drainage has been designed, in consultation with the Environment Agency, using the principles of sustainable drainage in accordance with government guidance set out in Planning Policy Statement (PPS) 25 and the DMRB and the Construction Industry Research and Information Association (CIRIA) Report C697. Various legislative controls and guidance on ground

and surface water quality will also be followed, and assessments made using guidance within the DMRB.

- 11.2. The majority of the scheme will be drained using a system of grass swales, which will convey water from the carriageway into 30 infiltration basins eventually resulting in the runoff discharging into the ground.

12. PUBLIC UTILITIES

- 12.1. Various utility services are present along the NDR route, mainly on arterial roads crossing the NDR where plant will be protected or diverted. The affected utilities are:

- Anglian Sewage
- Anglian Water
- UK Power Networks
- National grid Gas mains
- Vodafone
- Virgin Media
- High Pressure Gas (GPSS)
- BT

13. LANDSCAPING

- 13.1. Landscaping is shown on the Engineering Layout Drawings Appendix D and is proposed beyond areas where sight-lines are required, the principal measures being:

- Planting of side slopes
- Provision of boundary hedges
- Combined ecological and landscape mitigation areas to link existing woodland areas, comprising a mixture of woodland, scrub and grassland.
- Additional planting by agreement with adjacent landowners to augment the

roadside planting.

- Larger blocks of planting proposed at adjacent fields in conjunction with earth mounding at specific locations where screening is required for affected properties.

14. NON MOTORISED USERS (NMU)

- 14.1. Public rights of way and private access track proposals are on the Engineering Layout Drawings Appendix D. The NDR should bring benefits for NMUs in conjunction with the aim of the NDR scheme to reduce traffic levels on local roads. This should provide a more conducive environment for pedestrians and cyclists and encourage a greater number of journeys by these modes. Wider NMU links are shown on the drawing in Appendix F.
- 14.2. PROW proposals have been consulted on with relevant user groups (Ramblers, Cyclists, Sustrans, British Horse Society) and the Local Access Forum (set up under the Countryside and Rights of Way Act to represent users of soft roads and public rights of way).
- 14.3. An NMU Audit is currently being undertaken and will be submitted as part of the Stage 2 Safety Audit.

15. SIGNAGE

- 15.1. The NDR will be signed in accordance with The Traffic Signs Regulations and General Directions 2002 including the Traffic Signs Manual, and other relevant standards. This will include all relevant warning and regulatory signs, direction signs to provide route information and other information signs that are considered necessary. Signing will be required on the NDR and the side roads which join it. Other signs on the existing road network may need to be

modified to take account of the introduction of the NDR, to be compatible with both the Highway Agency and the County Councils routing strategies. Signs will be unlit where Regulations permit; those that will require illumination will be within 50 yards of a street lighting system.

16. LIGHTING

16.1. The majority of the proposed scheme will not be lit. The exception to this is the Postwick area of the scheme which will provide lighting as follows:

- From the Business Park roundabout West to the Peachman Way roundabout on 10m high columns. (Chainage 19450 – 20400)
- South to and including the Postwick North East roundabout on 12m high columns. (Chainage 19450 – 20400)
- South from the Postwick North East roundabout across the new overbridge to the signalised junction on 12m high columns. (Chainage 19450 – 20400)
- The signalised junction on 12m high columns. (Chainage 19450 – 20400)
- On the modified A47(T) bridge on 10m columns. (Chainage 19450 – 20400)
- From the modified A47(T) bridge to and including Postwick North West roundabout on 12m high columns. (Chainage 19450 – 20400)

17. VEHICLE RESTRAINT SYSTEMS

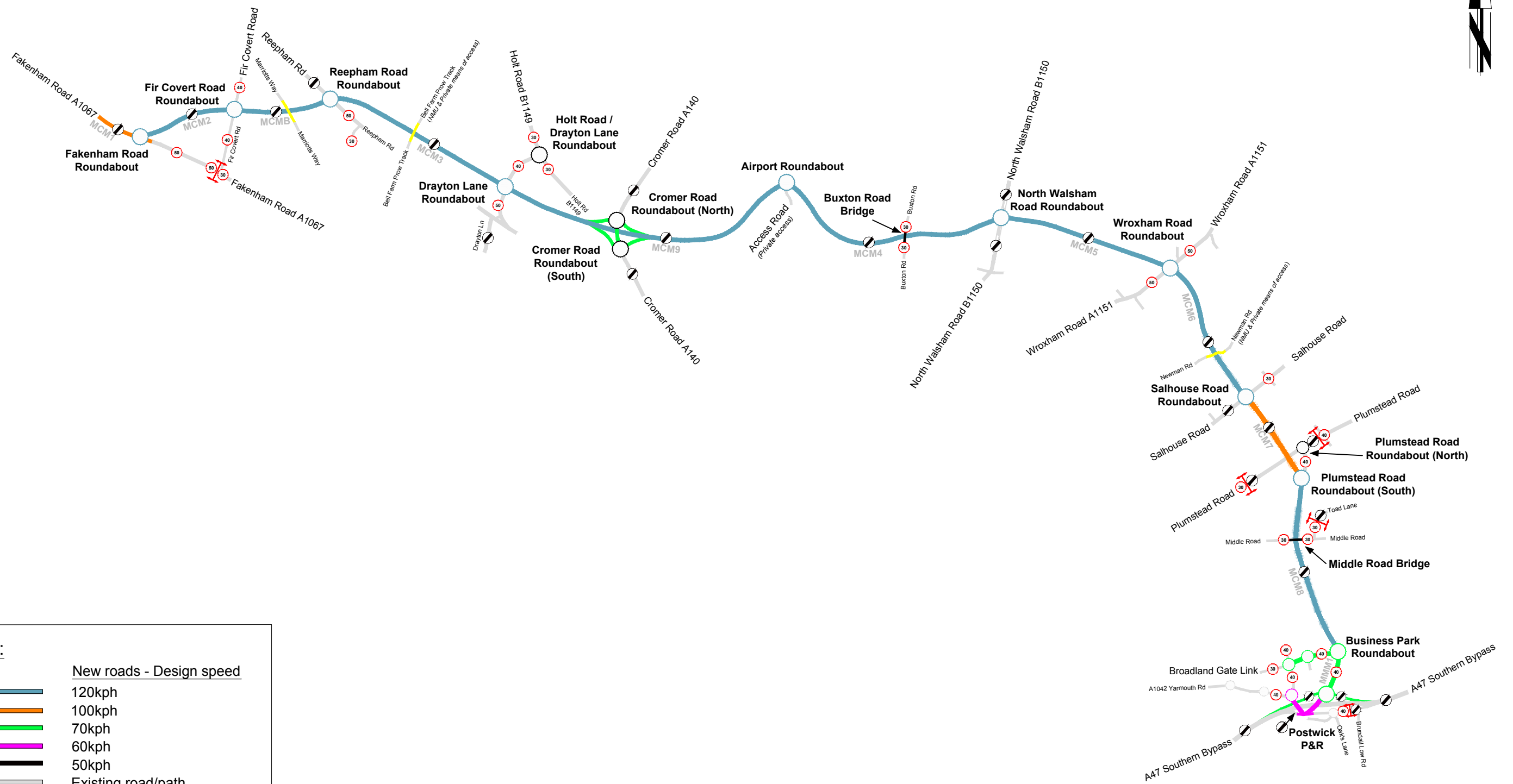
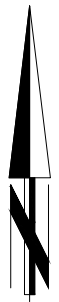
- 17.1. The development of the proposals for vehicle restraint systems (VRS) have been assessed and designed dependent on whether the section of the scheme forms part of the Trunk Road Network or the Local County Highway Network.
- 17.2. On the Trunk Road sections of the scheme, the provision of VRS has been assessed and designed in accordance with the DMRB TD19/06 and the Road Restraint Risk Assessment Process (RRRAP)
- 17.3. A Speed limit of 40mph is proposed for the Postwick Junction links, which form part of the local County Highway network. Consequently, the provision of VRS has been assessed using the emerging "The Use of Vehicle Restraint Systems in Norfolk" guidance on County Roads developed by Norfolk County Council.
- 17.4. The NDR from Business Park roundabout north-westwards is subject to national speed limit, therefore it is considered more appropriate for VRS to be assessed in accordance with the DMRB TD19/06 and the Road Restraint Risk Assessment Process (RRRAP), and will be submitted as part of the Stage 2 Safety Audit.

18. DRAWINGS

- 18.1. Relevant drawings are provided in the Appendices as follows:
 - The NDR Layout – Design Speeds drawing number R1C093-R1-4342, Appendix A (Naming conventions, design speeds and speed limits are shown on this drawing)
 - The Engineering Layout Sheets 1 - 12, drawings numbers R1C093-R1-4003E to 4014E in Appendix D (Public rights of way and private access tracks are shown on these drawings)
 - Typical cross-sections drawings numbers R1C093-R1-5115 to 5130 in Appendix E

- Individual Junctions drawings numbers R1C093-R1-4068C to 4080C, 4297C, 4302A & 4303A in Appendix B
- Non-Motorised User Links drawing number R1C093-R1-4053A in Appendix F

Appendix A
NDR Layout – Design Speeds
(Drawing No R1C093-R1-4342)



Key:

- New roads - Design speed 120kph
- 100kph
- 70kph
- 60kph
- 50kph
- Existing road/path
- Non motorised user (NMU) crossing
- 50 Speed limit MPH/National
- MCM9 Link road reference number

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Birse Civils

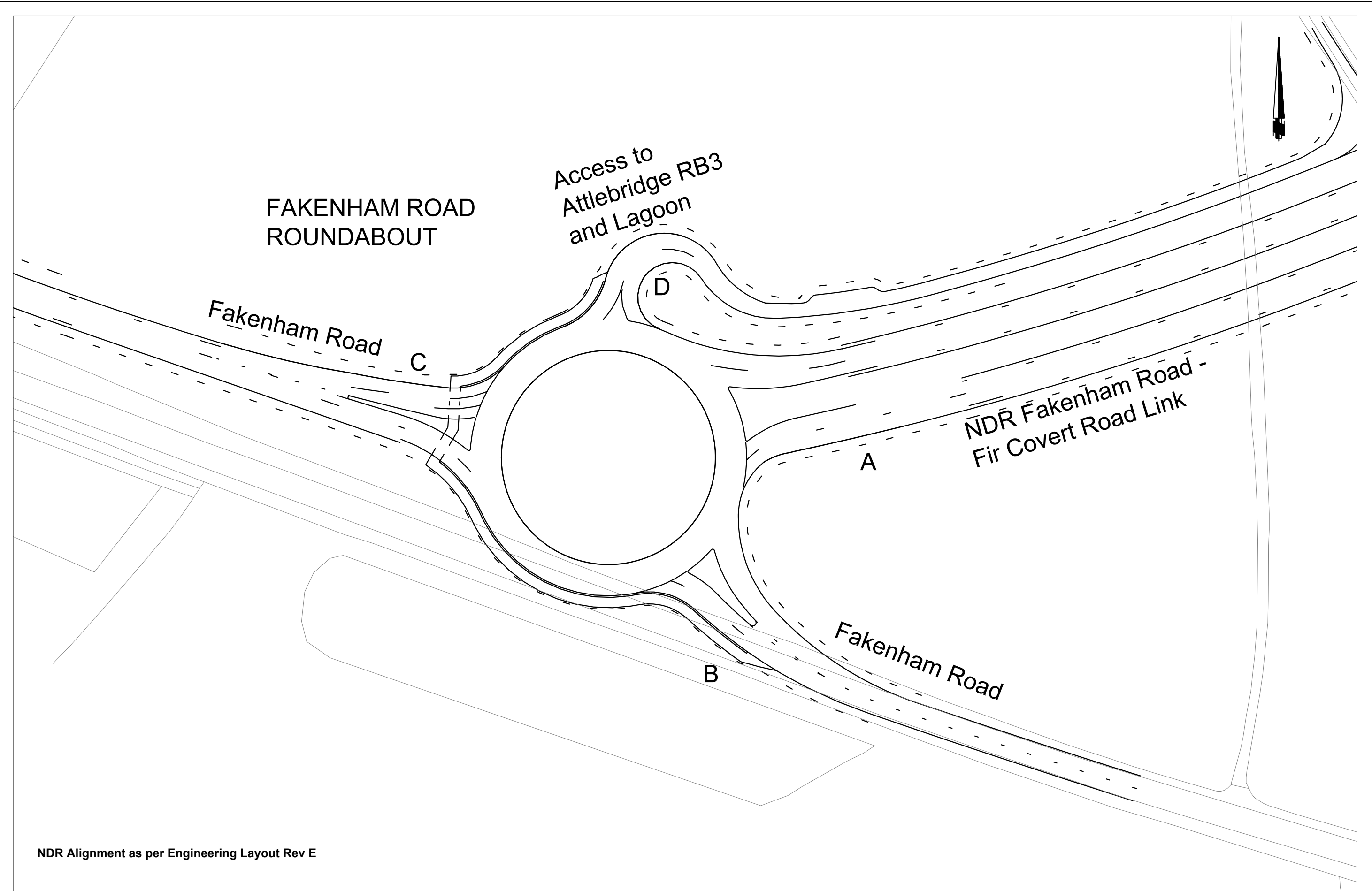
Tom McCabe
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 County Hall, Martineau Lane
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DRAWING TITLE
 NORWICH NORTHERN DISTRIBUTOR ROAD (NDR)
 NDR LAYOUT - DESIGN SPEEDS

REV.	DESCRIPTION	CHECKED	DATE

SURVEYED BY	INITIALS	DATE	DRAWING No.
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DESIGNED BY	AC-J	10/13	PROJECT TITLE
DRAWN BY	AC-J	10/13	Norwich Northern Distributor Road
CHECKED BY	SWC	11/13	SCALE
			1:50000 at A3
			FILE No.
			R1C093

Appendix B
Junction Layouts
(Drawing No R1C093-R1-4068C to
4080C, 4297C, 4302A & 4303A)



NDR Alignment as per Engineering Layout Rev E



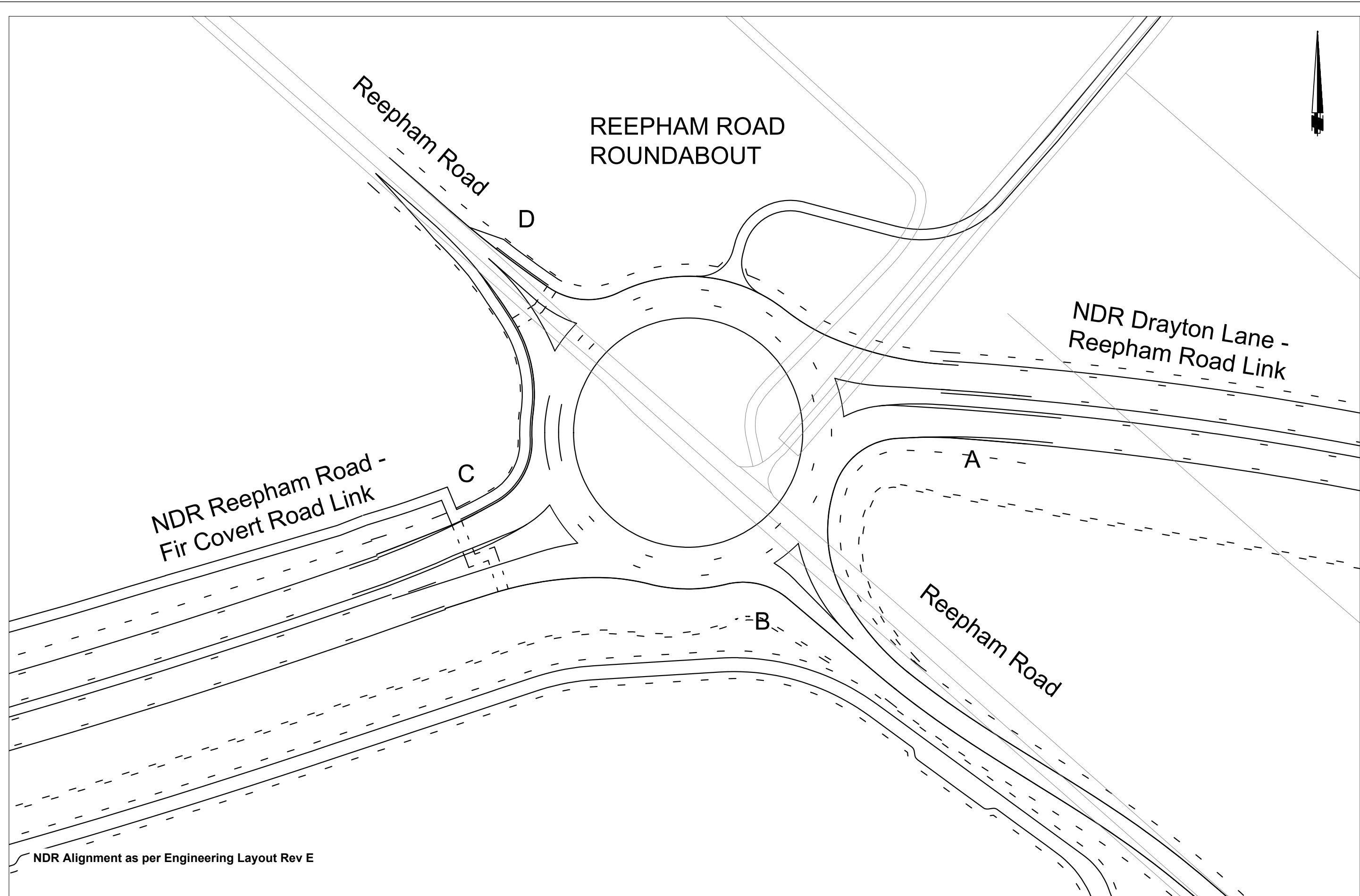


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DRAWING TITLE
 NORWICH NORTHERN DISTRIBUTOR ROAD
 ROUNDABOUT GEOMETRY - SHEET 1 OF 14
 FAKENHAM ROAD ROUNDABOUT

REV.	DESCRIPTION	CHECKED	DATE
A	Geometry check revised using Design Rev B model	MKu	04/13
B	Geometry check revised using Design Rev D model	MKu	07/13
C	Engineering layout Rev E attached, geometry unchanged from Rev D	MKu	10/13

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SURVEYED BY	-	-	PROJECT TITLE Norwich Northern Distributor Road
DESIGNED BY	DG	11/12	
DRAWN BY	DG	11/12	
CHECKED BY	MKu	11/12	
SCALE 1:1000 A3			FILE No. R1C093



NDR Alignment as per Engineering Layout Rev E



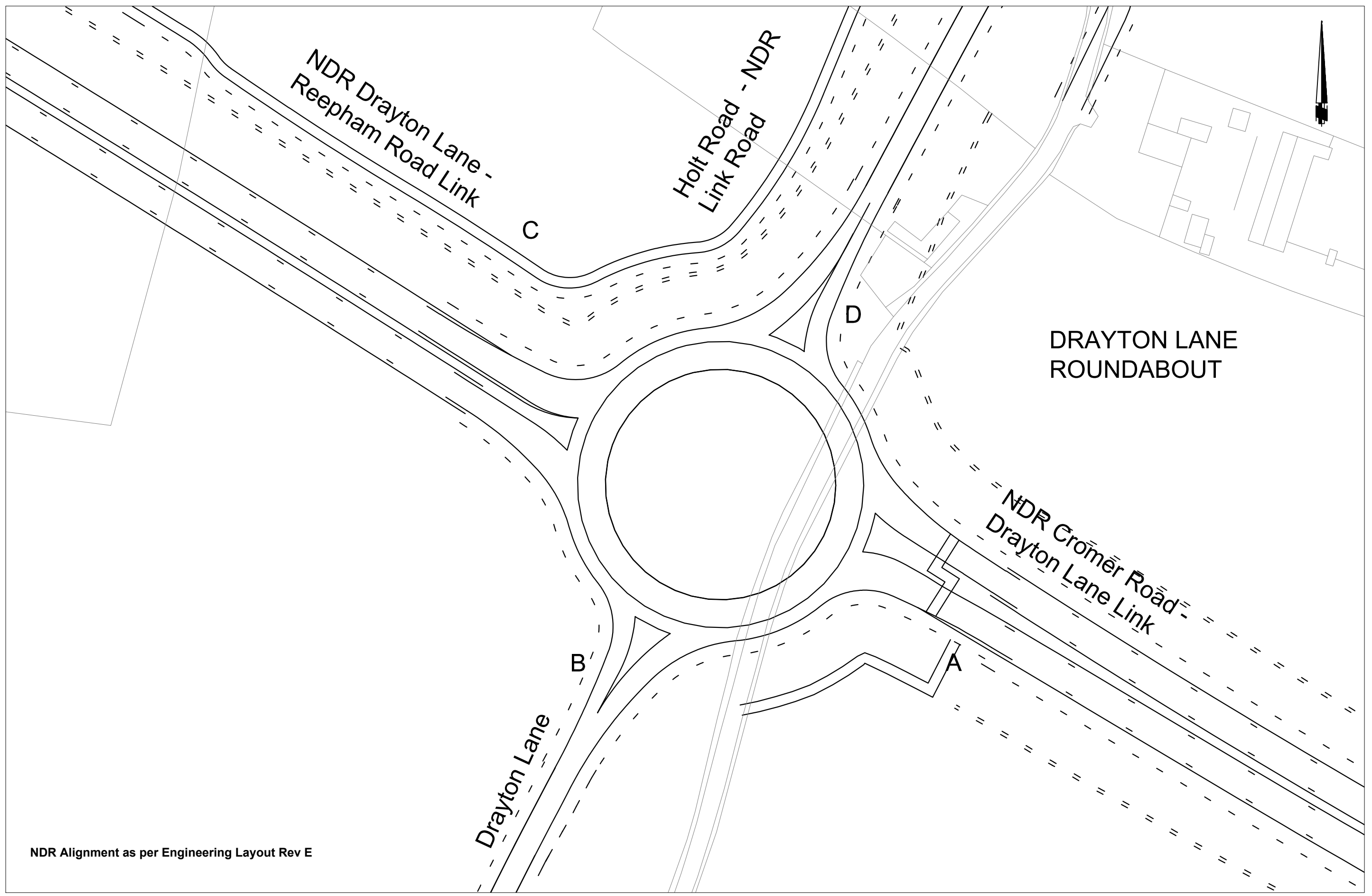


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DRAWING TITLE
 NORWICH NORTHERN DISTRIBUTOR ROAD
 ROUNDABOUT GEOMETRY - SHEET 2 OF 14
 REEPHAM ROAD ROUNDABOUT

REV.	DESCRIPTION	CHECKED	DATE
A	Geometry check revised using Design Rev B model	MKu	04/13
B	Geometry check revised using Design Rev D model	MKu	07/13
C	Engineering layout Rev E attached, geometry unchanged from Rev D	MKu	10/13

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SURVEYED BY	-	-	PROJECT TITLE Norwich Northern Distributor Road
DESIGNED BY	DG	11/12	
DRAWN BY	DG	11/12	SCALE 1:1000 A3
CHECKED BY	MKu	11/12	



**DRAYTON LANE
ROUNABOUT**

NDR Alignment as per Engineering Layout Rev E



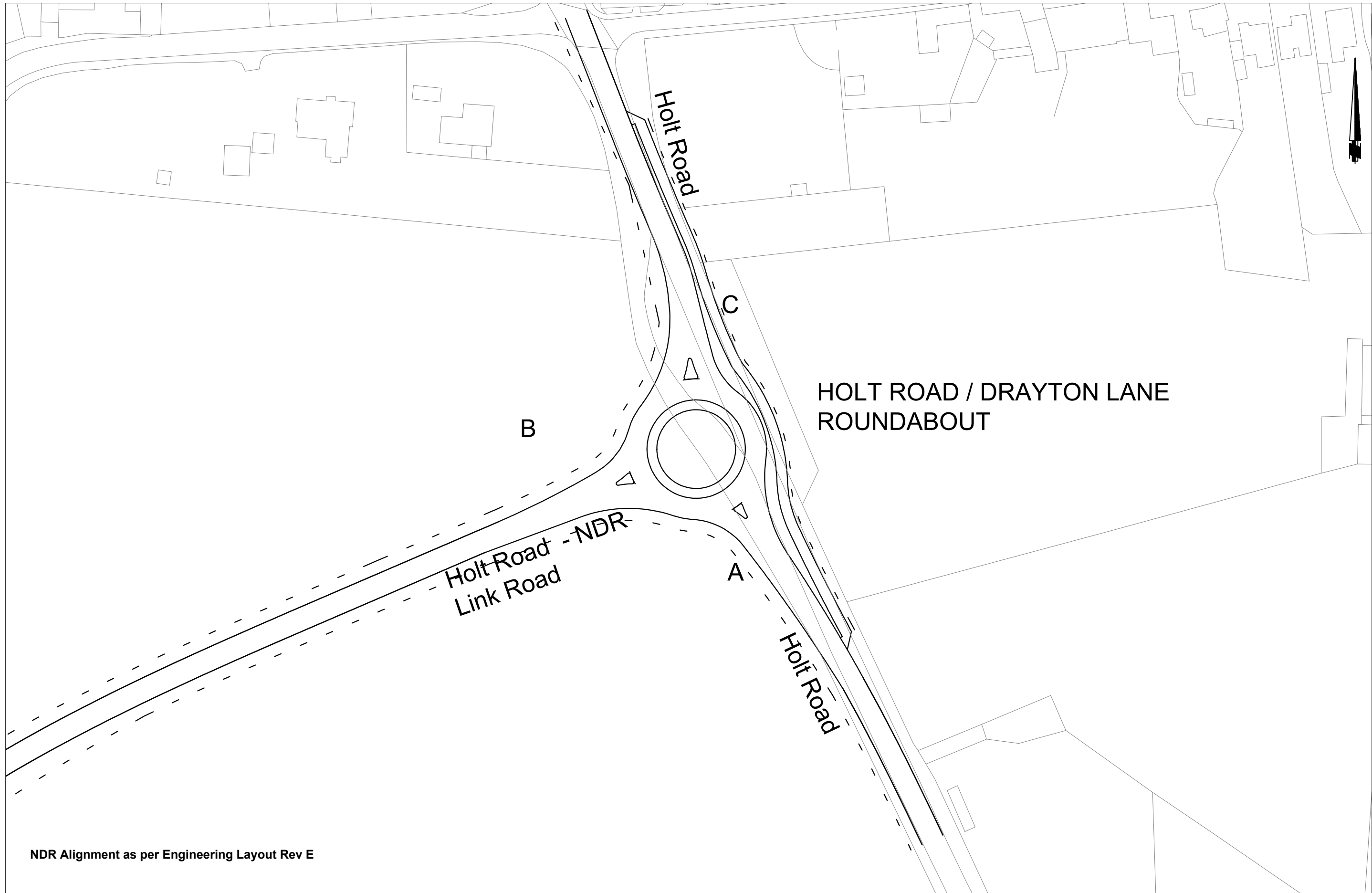


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DRAWING TITLE
 NORWICH NOTHERN DISTRIBUTOR ROAD
 ROUNABOUT GEOMETRY - SHEET 3 OF 14
 DRAYTON LANE ROUNABOUT

REV.	DESCRIPTION	CHECKED	DATE
A	Geometry check revised using Design Rev B model	MKu	04/13
B	Geometry check revised using Design Rev D model	MKu	07/13
C	Engineering layout Rev E attached geometry unchanged from rev D	MKu	10/13

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DESIGNED BY	DG	11/12	
DRAWN BY	DG	11/12	SCALE 1:1000 A3
CHECKED BY	MKu	11/12	



**HOLT ROAD / DRAYTON LANE
ROUNDAABOUT**

Holt Road - NDR
Link Road

NDR Alignment as per Engineering Layout Rev E



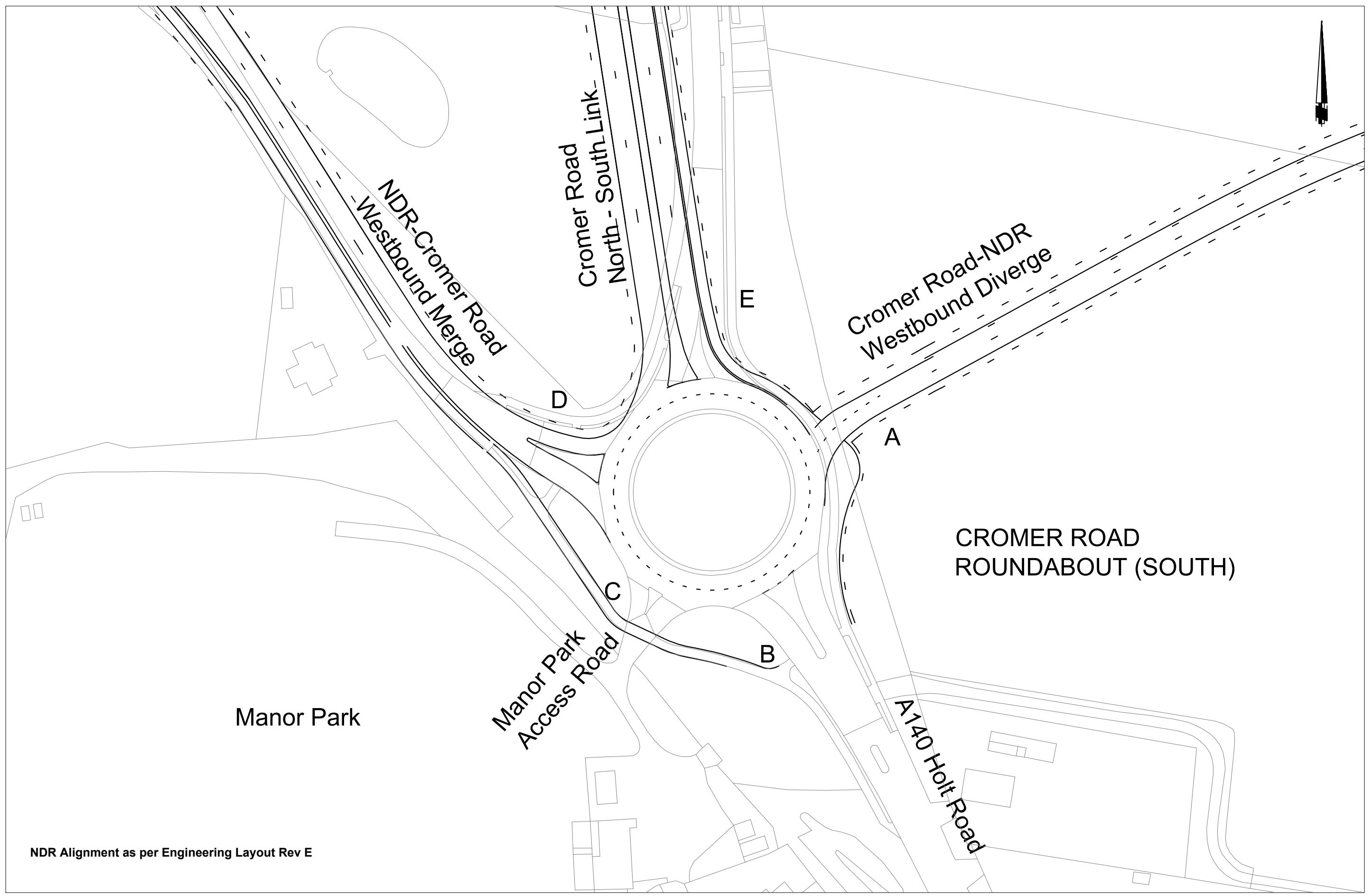


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DRAWING TITLE
 NORWICH NORTHERN DISTRIBUTOR ROAD
 ROUNDAABOUT GEOMETRY - SHEET 4 OF 14
 HOLT ROAD / DRAYTON LANE ROUNDAABOUT

REV.	DESCRIPTION	CHECKED	DATE
A	Geometry check revised using Design Rev B model	MKu	04/13
B	Geometry check revised using Design Rev D model	MKu	07/13
C	Engineering layout Rev E attached: geometry unchanged from Rev D	MKu	10/13

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SURVEYED BY	-	-	PROJECT TITLE Norwich Northern Distributor Road
DESIGNED BY	DG	11/12	
DRAWN BY	DG	11/12	SCALE 1:1000 A3
CHECKED BY	MKu	11/12	



NDR Alignment as per Engineering Layout Rev E





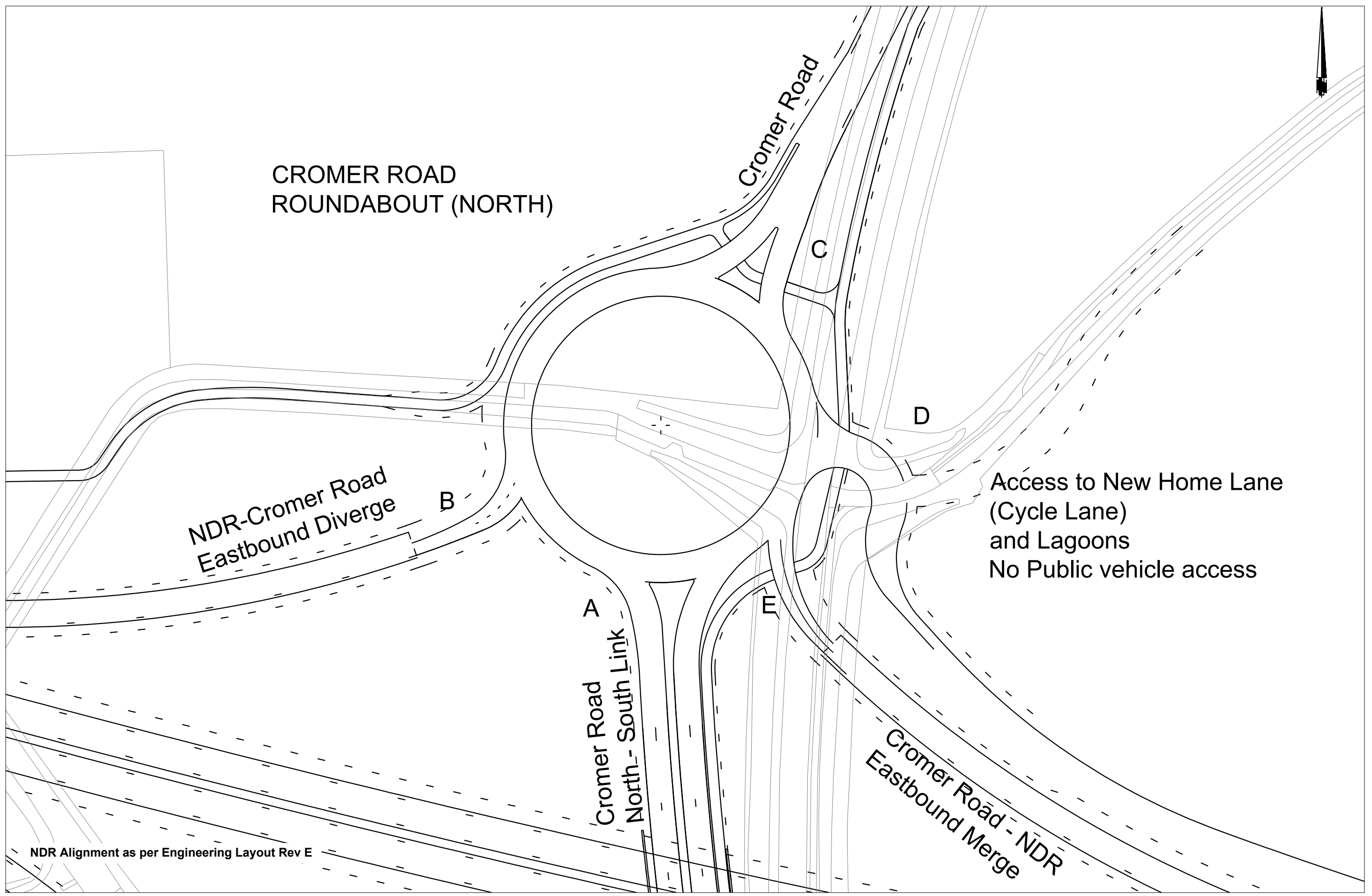
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DRAWING TITLE
 NORWICH NORTHERN DISTRIBUTOR ROAD
 ROUNDABOUT GEOMETRY - SHEET 5 OF 14
 CROMER ROAD ROUNDABOUT (SOUTH)

REV.	DESCRIPTION	CHECKED	DATE
A	Geometry check revised using Design Rev B model	MKu	04/13
B	Geometry check revised using Design Rev D model	MKu	07/13
C	Engineering layout Rev E attached, geometry unchanged from Rev D	MKu	10/13

	INITIALS	DATE	DRAWING No.
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DESIGNED BY	DG	11/12	PROJECT TITLE Norwich Northern Distributor Road
DRAWN BY	DG	11/12	
CHECKED BY	MKu	11/12	SCALE 1:1000 A3 FILE No. R1C093

CROMER ROAD ROUNABOUT (NORTH)



NDR Alignment as per Engineering Layout Rev E

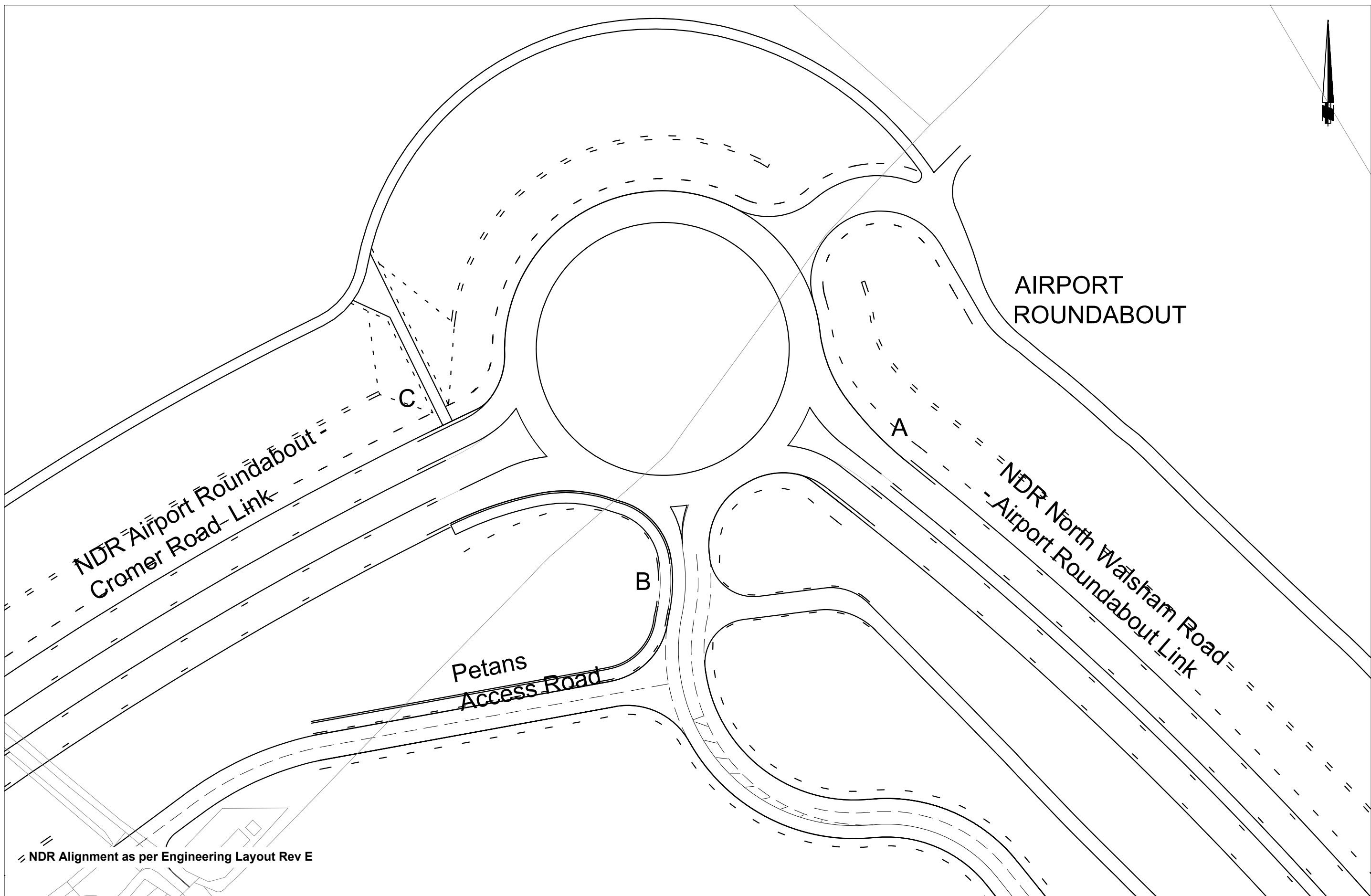


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DRAWING TITLE
 NORWICH NORTHERN DISTRIBUTOR ROAD
 ROUNDABOUT GEOMETRY - SHEET 6 OF 14
 CROMER ROAD ROUNDABOUT (NORTH)

REV.	DESCRIPTION	CHECKED	DATE
A	Geometry check revised using Design Rev B model	MKu	04/13
B	Geometry check revised using Design Rev D model	MKu	07/13
C	Engineering layout Rev E attached geometry unchanged from Rev D	MKu	10/13

INITIALS	DATE	DRAWING No.
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DESIGNED BY	DG	PROJECT TITLE
DRAWN BY	DG	Norwich Northern Distributor Road
CHECKED BY	MKu	SCALE 1:1000 A3 FILE No. R1C093



NDR Alignment as per Engineering Layout Rev E



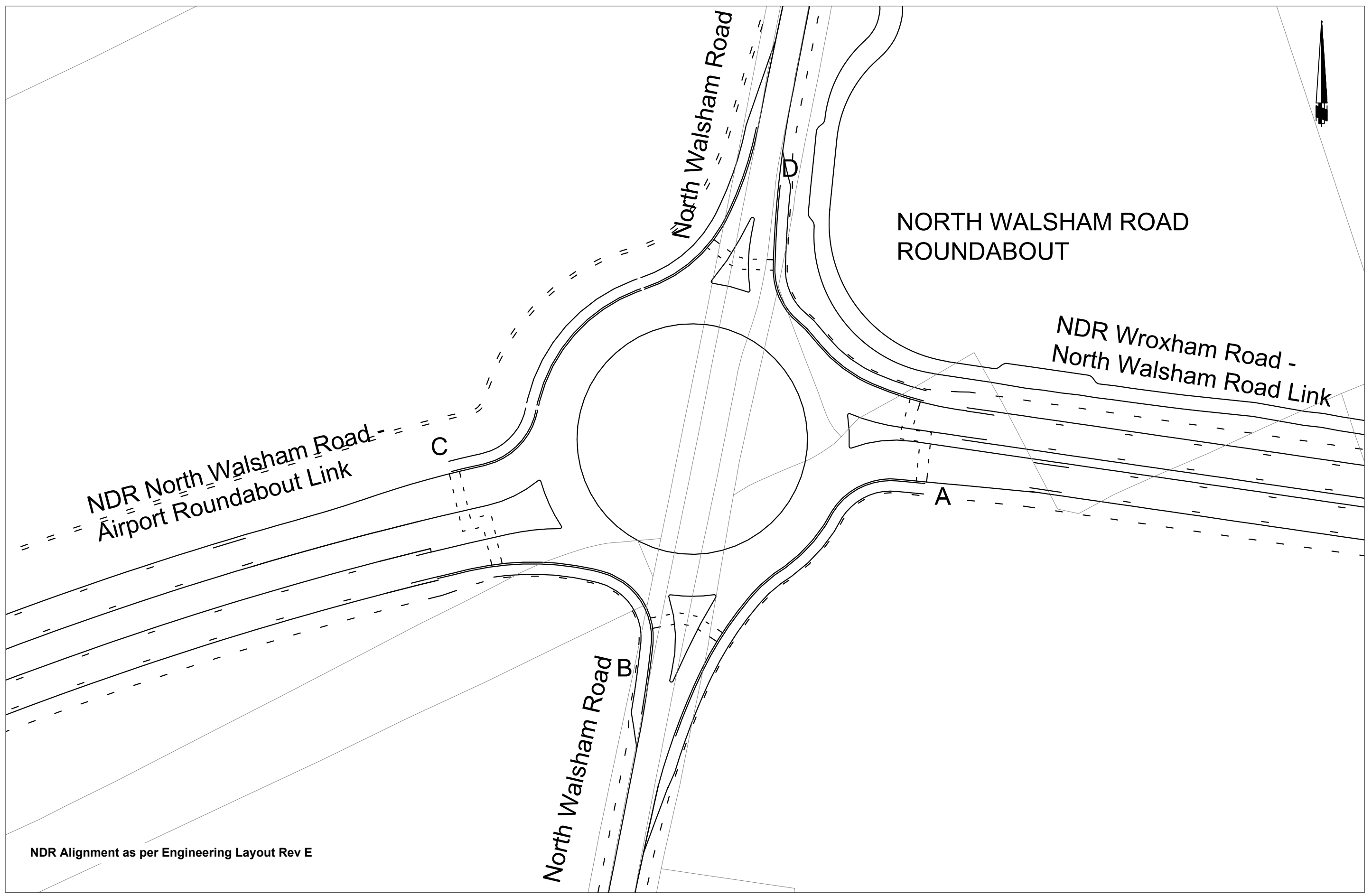


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DRAWING TITLE
 NORWICH NORTHERN DISTRIBUTOR ROAD
 ROUNDABOUT GEOMETRY - SHEET 7 OF 14
 AIRPORT ROUNDABOUT

REV.	DESCRIPTION	CHECKED	DATE
A	Geometry check revised using Design Rev B model	MKu	04/13
B	Geometry check revised using Design Rev D model	MKu	07/13
C	Engineering layout Rev E attached, geometry unchanged from Rev D	MKu	10/13

	INITIALS	DATE	DRAWING No. R1C093-R1-4074C
SURVEYED BY	-	-	PROJECT TITLE Norwich Northern Distributor Road
DESIGNED BY	DG	11/12	
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CHECKED BY	MKu	11/12	
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NDR Alignment as per Engineering Layout Rev E



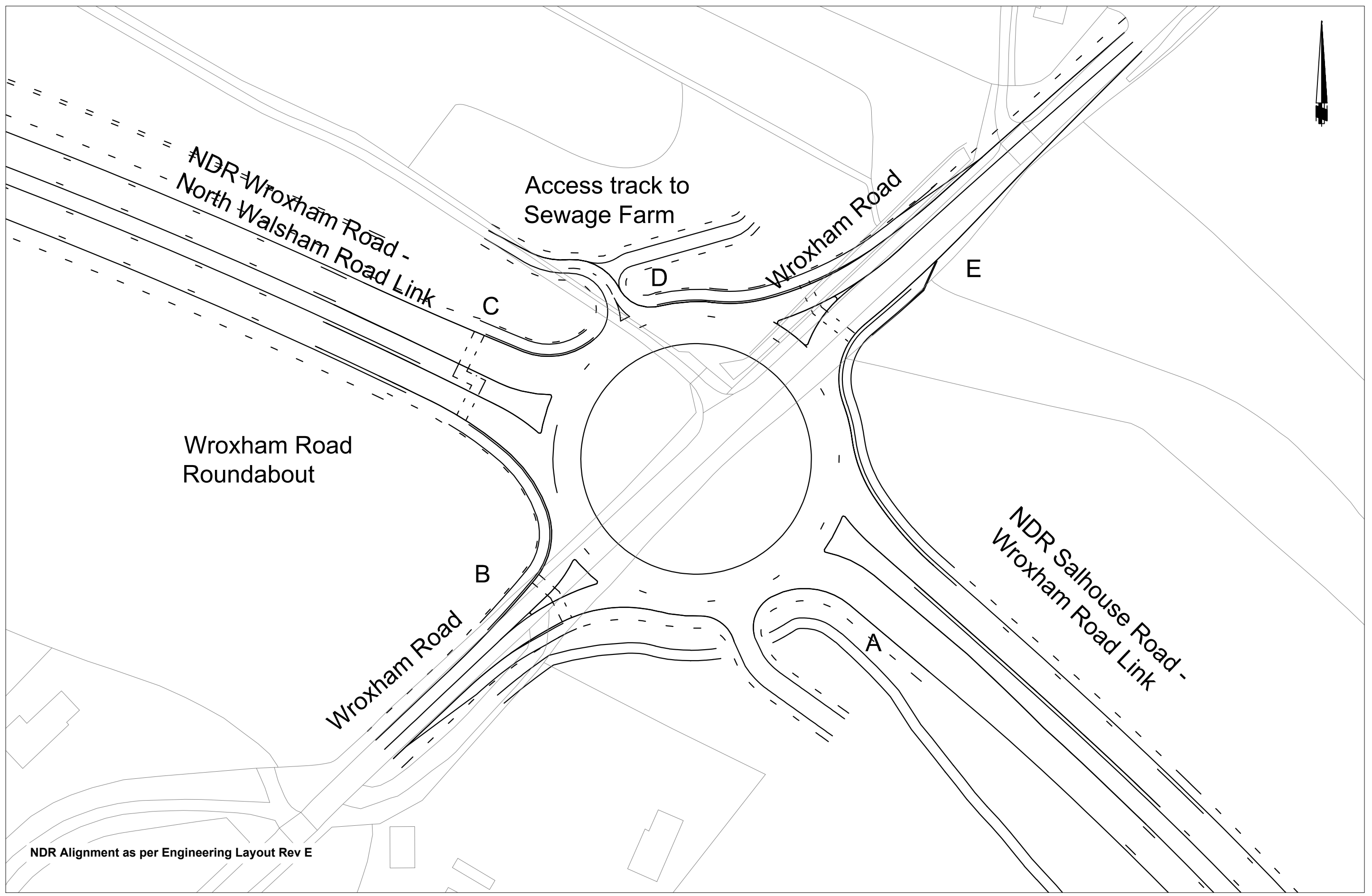


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DRAWING TITLE
 NORWICH NORTHERN DISTRIBUTOR ROAD
 ROUNDABOUT GEOMETRY - SHEET 1 OF 14
 NORTH WALSHAM ROAD ROUNDABOUT

REV.	DESCRIPTION	CHECKED	DATE
A	Geometry check revised using Design Rev B model	MKu	04/13
B	Geometry check revised using Design Rev D model	MKu	07/13
C	Engineering layout Rev E attached, geometry unchanged from Rev D	MKu	10/13

	INITIALS	DATE	DRAWING No. R1C093-R1-4075C
SURVEYED BY	-	-	PROJECT TITLE Norwich Northern Distributor Road
DESIGNED BY	DG	11/12	
DRAWN BY	DG	11/12	
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NDR Alignment as per Engineering Layout Rev E



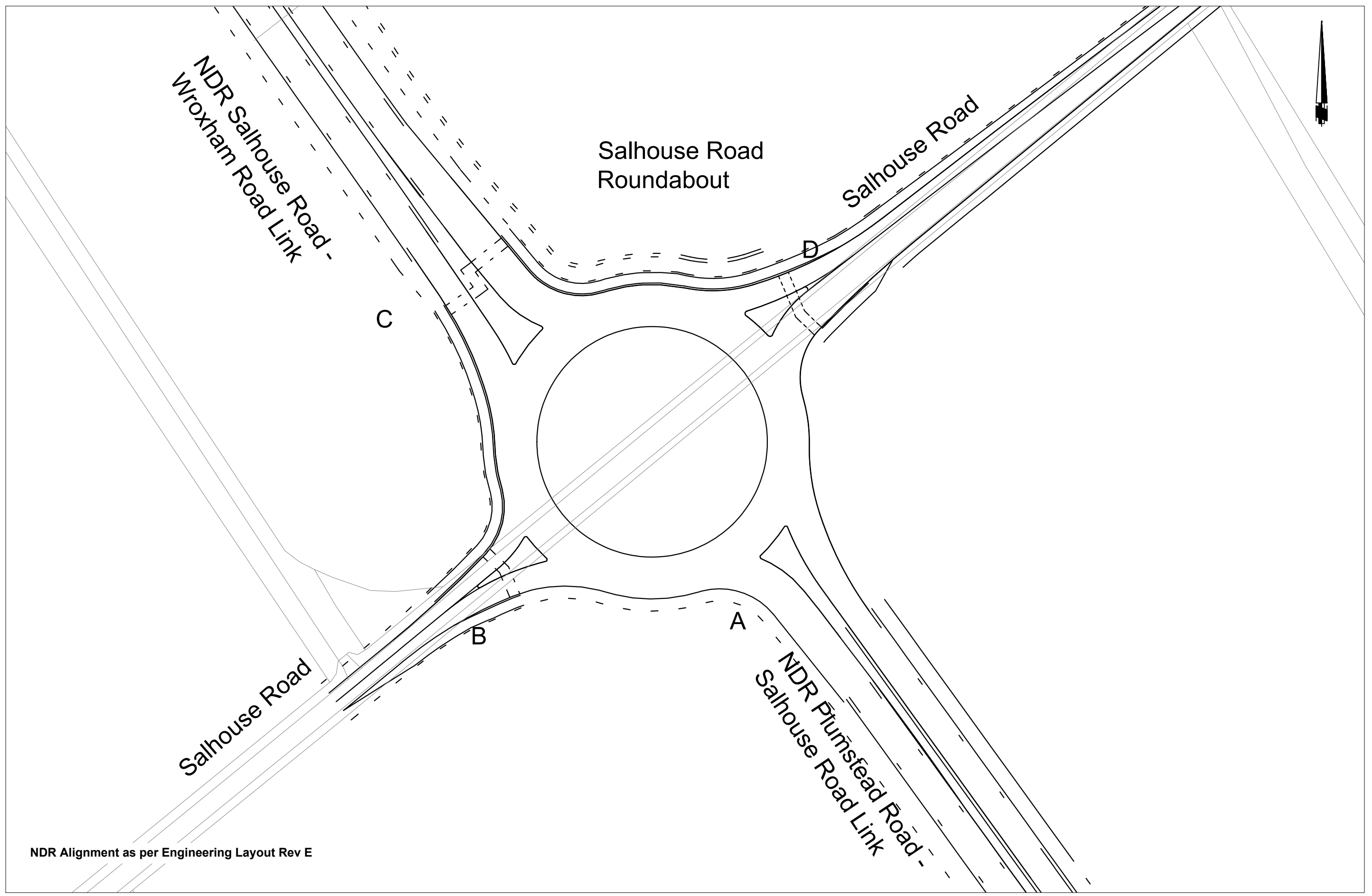


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DRAWING TITLE
 NORWICH NORTHERN DISTRIBUTOR ROAD
 ROUNDABOUT GEOMETRY - SHEET 9 OF 13
 WROXHAM ROAD ROUNDABOUT

REV.	DESCRIPTION	CHECKED	DATE
A	Geometry check revised using Design Rev B model	MKu	04/13
B	Geometry check revised using Design Rev D model	MKu	07/13
C	Engineering layout Rev E attached geometry changed from Rev D	SWC	10/13

	INITIALS	DATE	DRAWING No.
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DESIGNED BY	DG	11/12	PROJECT TITLE
DRAWN BY	DG	11/12	Norwich Northern Distributor Road
CHECKED BY	MKu	11/12	SCALE 1:1000 A3 FILE No. R1C093



NDR Alignment as per Engineering Layout Rev E

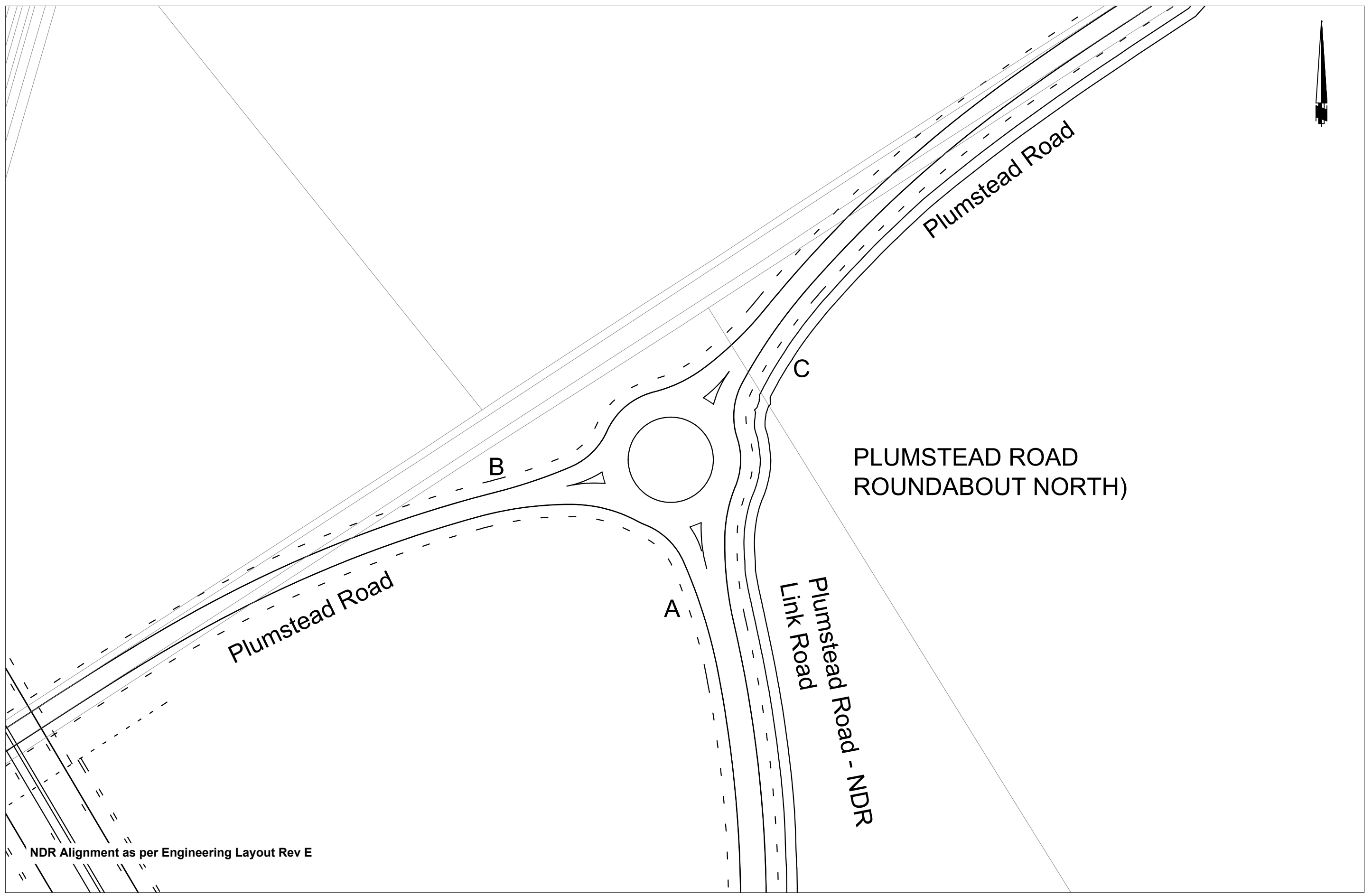



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DRAWING TITLE
 NORWICH NORTHERN DISTRIBUTOR ROAD
 ROUNDABOUT GEOMETRY - SHEET 10 OF 14
 SALHOUSE ROAD ROUNDABOUT

REV.	DESCRIPTION	CHECKED	DATE
A	Geometry check revised using Design Rev B model	MKu	04/13
B	Geometry check revised using Design Rev D model	MKu	07/13
C	Engineering layout Rev E attached geometry changed from Rev D	SWC	10/13

	INITIALS	DATE	DRAWING No.
SURVEYED BY	-	-	R1C093-R1-4077C
DESIGNED BY	DG	11/12	PROJECT TITLE
DRAWN BY	DG	11/12	Norwich Northern Distributor Road
CHECKED BY	MKu	02/12	SCALE 1:1000 A3 FILE No. R1C093



NDR Alignment as per Engineering Layout Rev E

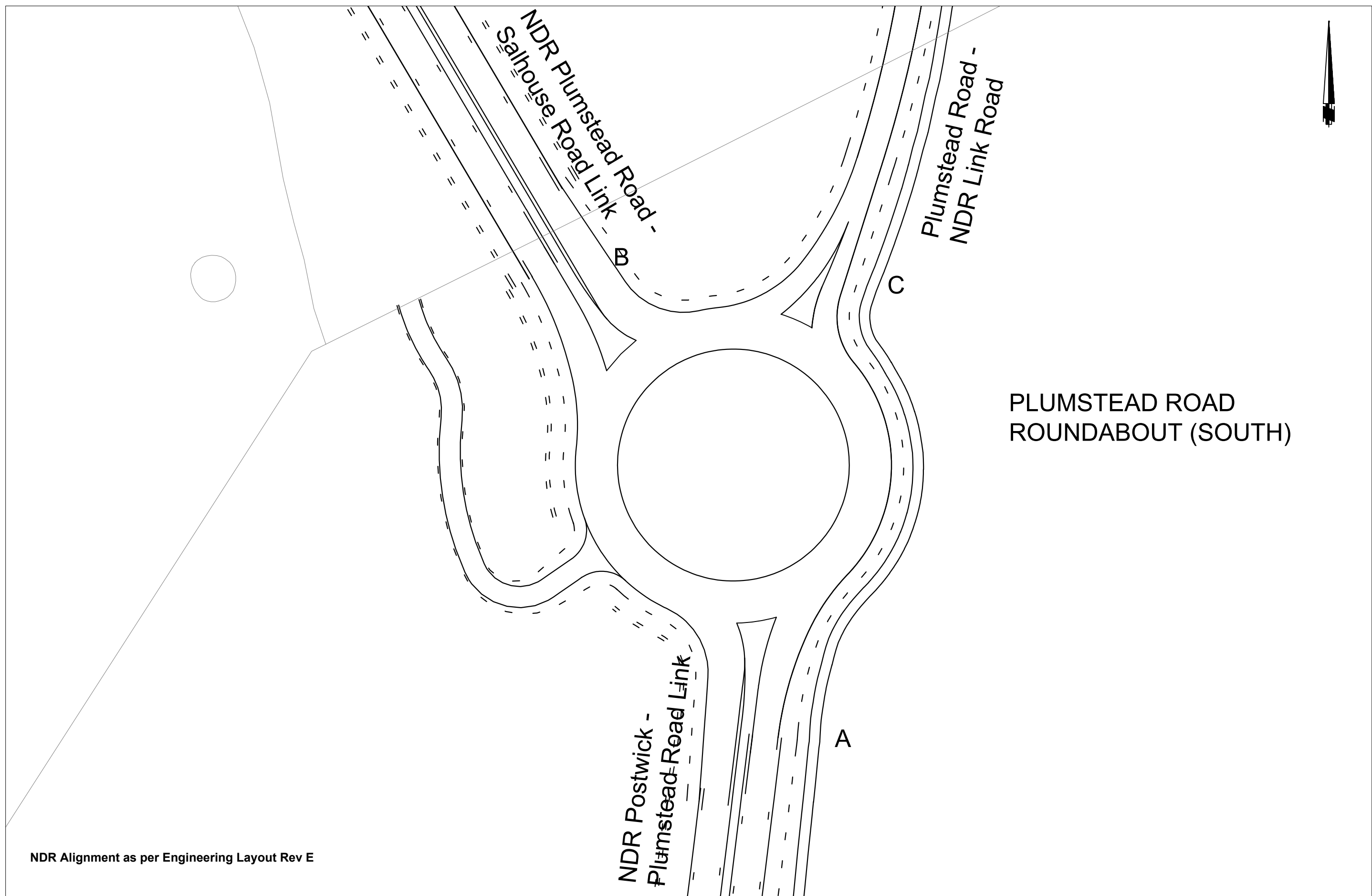


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DRAWING TITLE
 NORWICH NORTHERN DISTRIBUTOR ROAD
 ROUNDABOUT GEOMETRY - SHEET 11 OF 14
 PLUMSTEAD ROAD ROUNDABOUT (NORTH)

REV.	DESCRIPTION	CHECKED	DATE
A	Geometry check revised using Design Rev B model	MKu	04/13
B	Geometry check revised using Design Rev D model	MKu	07/13
C	Engineering layout Rev E attached: geometry unchanged from Rev D	MKu	10/13

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SURVEYED BY	-	-	PROJECT TITLE Norwich Northern Distributor Road
DESIGNED BY	DG	11/12	
DRAWN BY	DG	11/12	
CHECKED BY	MKu	11/12	SCALE 1:1000 A3
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NDR Alignment as per Engineering Layout Rev E

PLUMSTEAD ROAD
ROUNDABOUT (SOUTH)



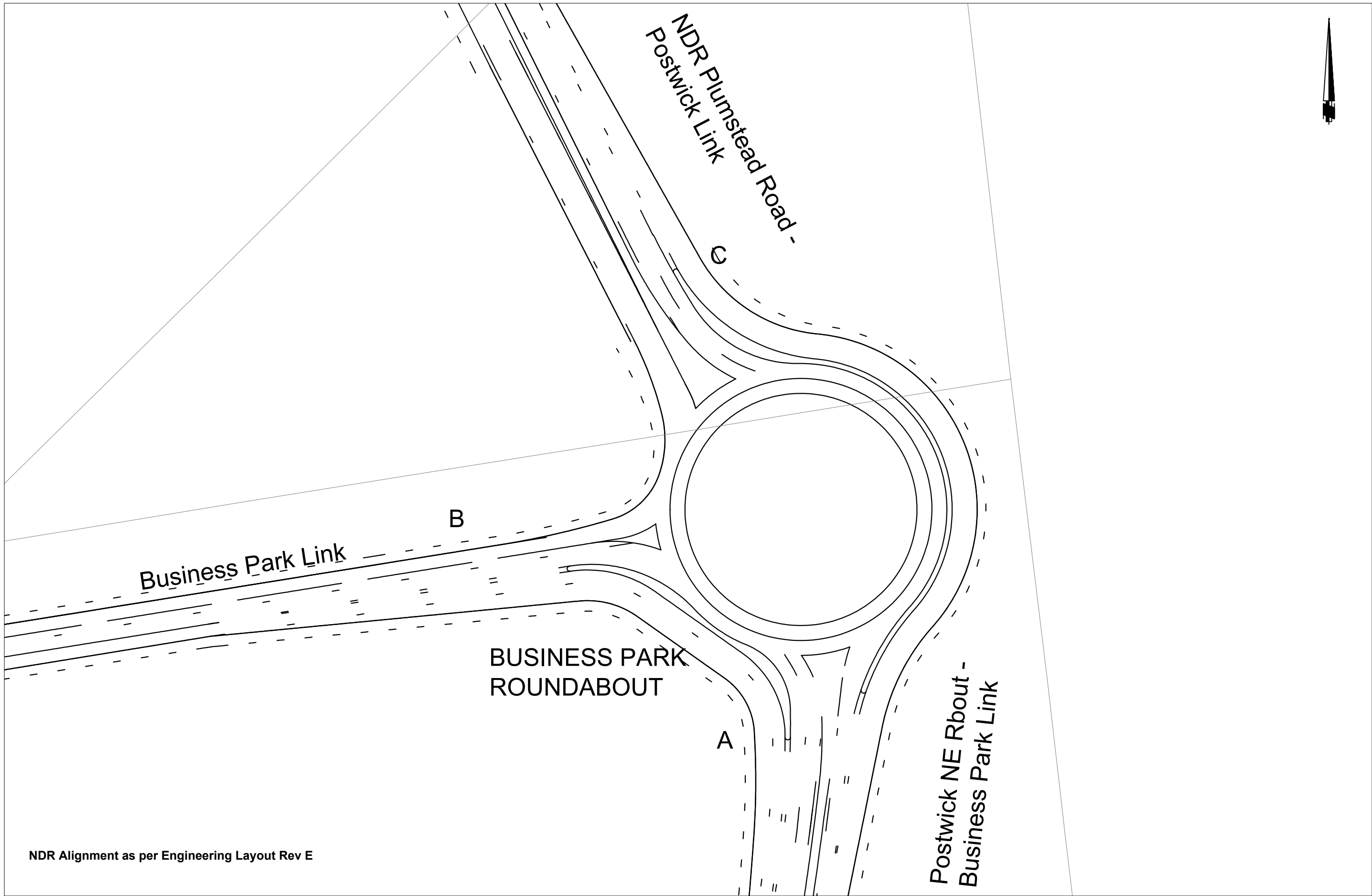


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DRAWING TITLE
 NORWICH NORTHERN DISTRIBUTOR ROAD
 ROUNDABOUT GEOMETRY - SHEET 12 OF 14
 PLUMSTEAD ROAD ROUNDABOUT (SOUTH)

REV.	DESCRIPTION	CHECKED	DATE
A	Geometry check revised using Design Rev B model	MKu	04/13
B	Geometry check revised using Design Rev D model	MKu	07/13
C	Engineering layout Rev E attached: geometry unchanged from rev D	MKu	10/13

	INITIALS	DATE	DRAWING No. R1C093-R1-4079C
SURVEYED BY	-	-	PROJECT TITLE Norwich Northern Distributor Road
DESIGNED BY	DG	11/12	
DRAWN BY	DG	11/12	
CHECKED BY	MKu	11/12	
SCALE 1:1000 A3			FILE No. R1C093



NDR Alignment as per Engineering Layout Rev E

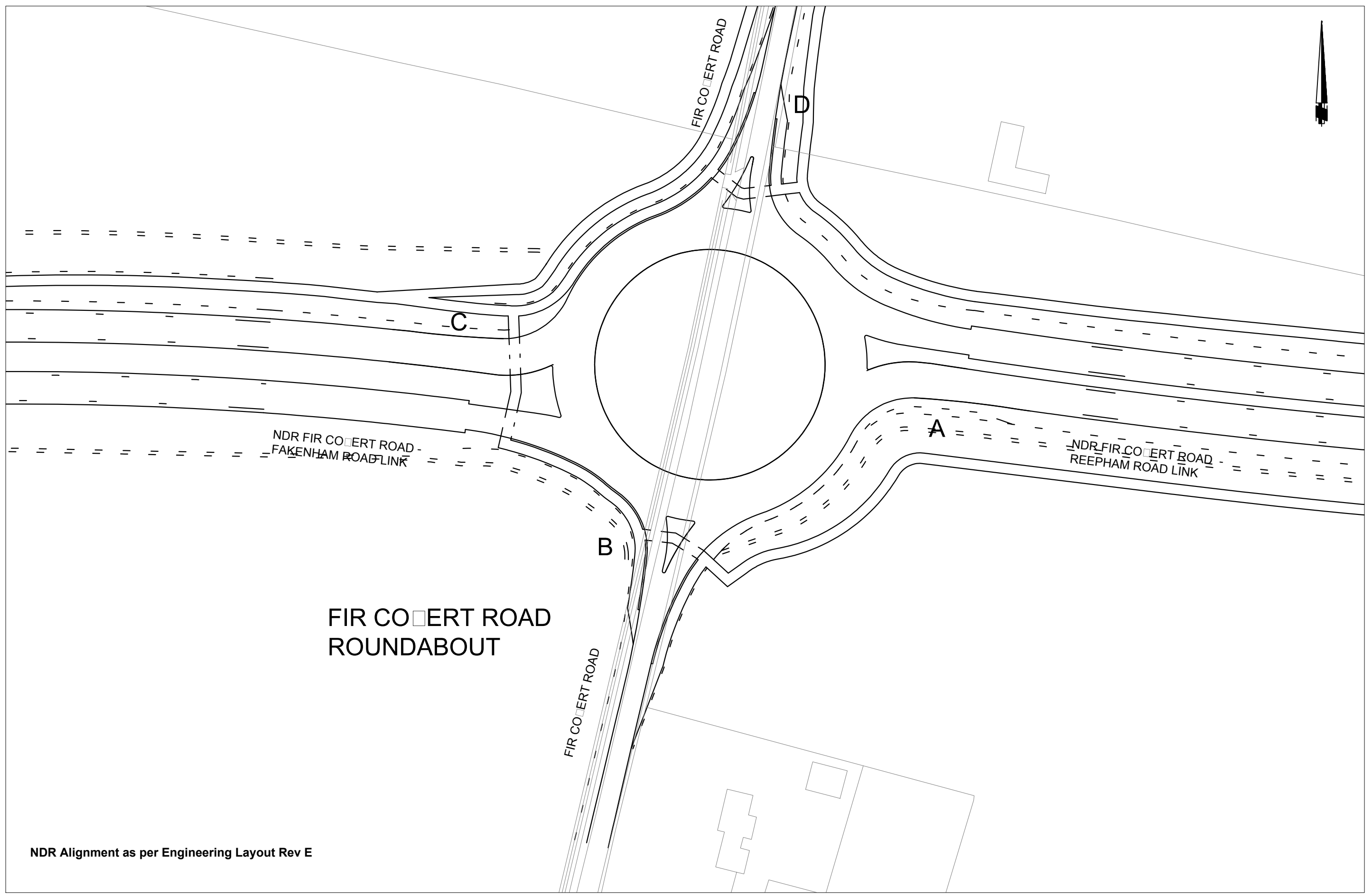


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DRAWING TITLE
 NORWICH NORTHERN DISTRIBUTOR ROAD
 ROUNDABOUT GEOMETRY - SHEET 13 OF 14
 BUSINESS PARK ROUNDABOUT JUNCTION

REV.	DESCRIPTION	CHECKED	DATE
A	Geometry check revised using Design Rev B model	MKu	04/13
B	Geometry check revised using Design Rev D model	MKu	07/13
C	Engineering layout Rev E attached geometry unchanged from Rev D	MKu	10/13

	INITIALS	DATE	DRAWING No. R1C093-R1-40-DC
SURVEYED BY	-	-	PROJECT TITLE Norwich Northern Distributor Road
DESIGNED BY	DG	11/12	
DRAWN BY	DG	11/12	SCALE 1:1000 A3
CHECKED BY	MKu	04/13	



NDR Alignment as per Engineering Layout Rev E

FIR COVERT ROAD
ROUNDABOUT



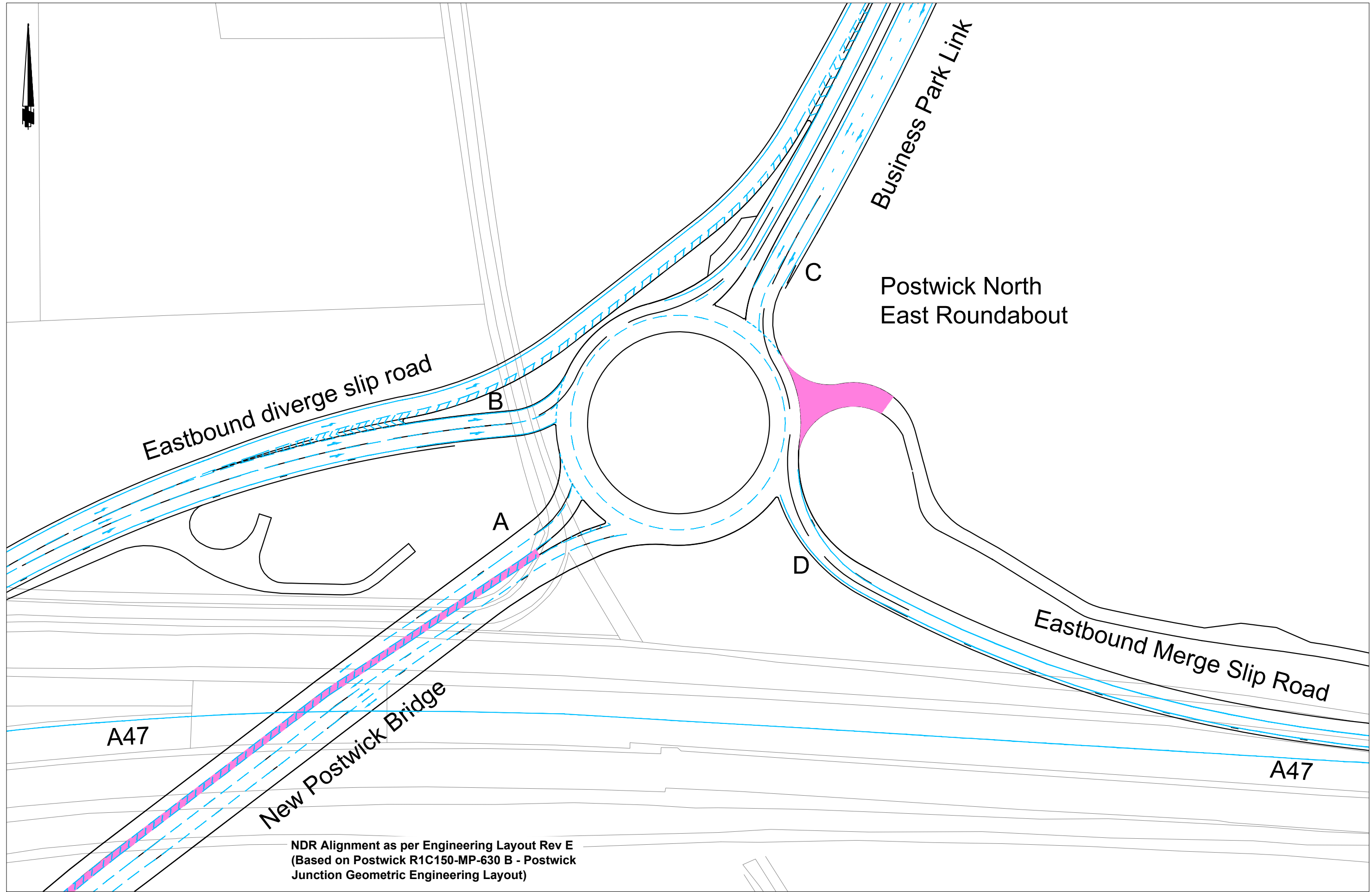


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DRAWING TITLE
 NORWICH NORTHERN DISTRIBUTOR ROAD
 ROUNDABOUT GEOMETRY - SHEET 14 OF 14
 FIR COVERT ROAD ROUNDABOUT JUNCTION

REV.	DESCRIPTION	CHECKED	DATE
A	There is no Rev A for this drawing		
B	Geometry check revised using Design Rev D model	MKu	07/13
C	Engineering layout Rev E attached geometry unchanged from Rev D	MKu	10/13

	INITIALS	DATE	DRAWING No.
SURVEYED BY	-	-	R1C093-R1-4297C
DESIGNED BY	DG	07/13	PROJECT TITLE
DRAWN BY	DG	07/13	Norwich Northern Distributor Road
CHECKED BY	MKu	07/13	SCALE 1:1000 A3
			FILE No. R1C093



NDR Alignment as per Engineering Layout Rev E
 (Based on Postwick R1C150-MP-630 B - Postwick
 Junction Geometric Engineering Layout)

Norfolk County Council

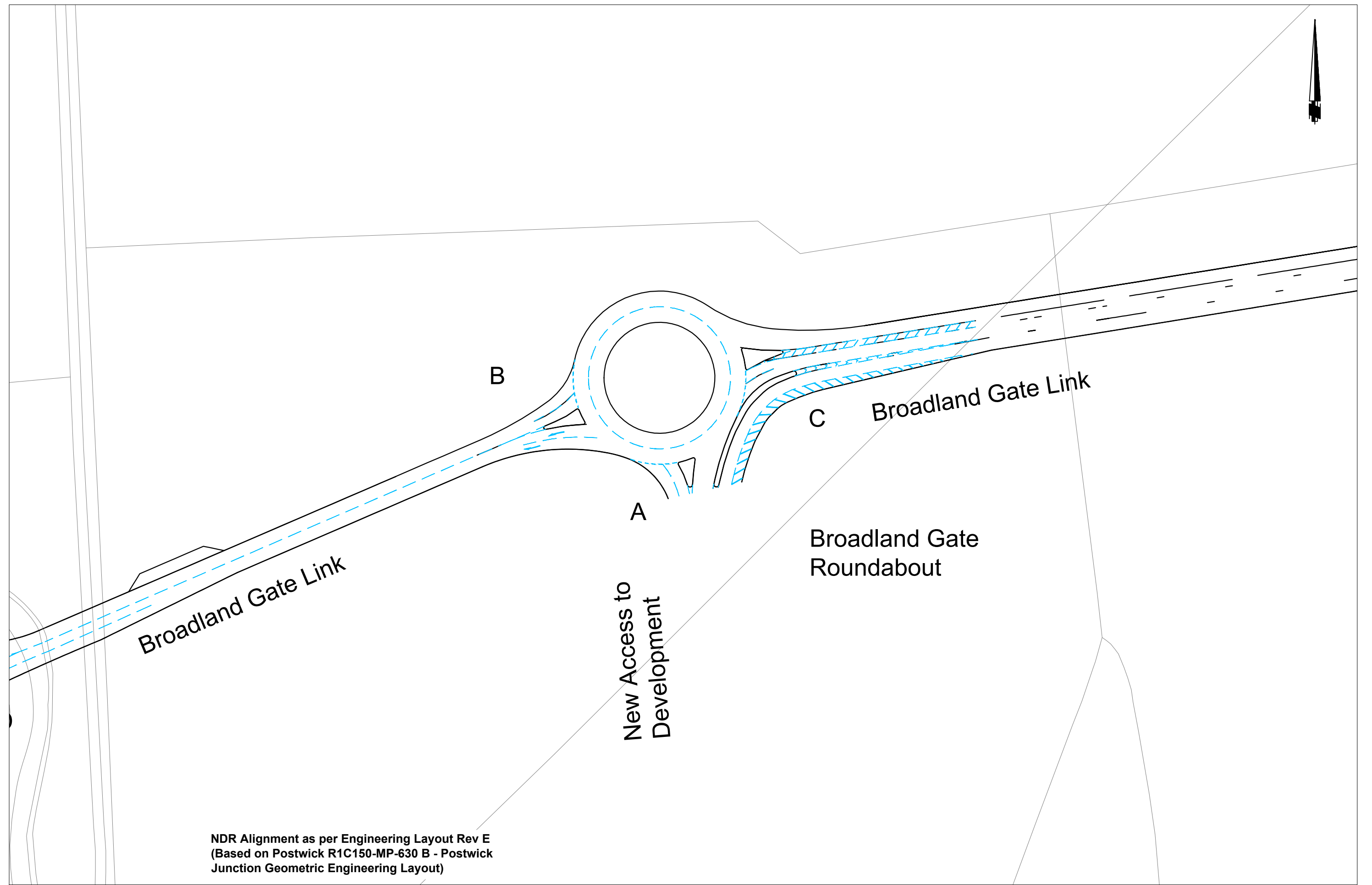
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DRAWING TITLE
 NORWICH NORTHERN DISTRIBUTOR ROAD
 ROUNDABOUT GEOMETRY - SHEET 1 OF 5
 NORTH EAST ROUNDABOUT

REV.	DESCRIPTION	CHECKED	DATE
A	ENGINEERING LAYOUT RE: E ATTACHED	SWC	10/13
	GEOMETRY UNCHANGED FROM RE: D		

INITIALS	DATE	DRAWING No.
SURVEYED BY	-	R1C093-R1-4302A
DESIGNED BY	DG	PROJECT TITLE
DRAWN BY	DG	Norwich Northern Distributor Road
CHECKED BY	MKu	SCALE 1:1000 A3
		FILE No. R1C093



NDR Alignment as per Engineering Layout Rev E
 (Based on Postwick R1C150-MP-630 B - Postwick
 Junction Geometric Engineering Layout)



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DRAWING TITLE
 NORWICH NORTHERN DISTRIBUTOR ROAD
 ROUNDABOUT GEOMETRY - SHEET 2 OF 5
 BROADLAND GATE ROUNDABOUT

REV.	DESCRIPTION	CHECKED	DATE
A	ENGINEERING LAYOUT REV E ATTACHED	SWC	10/13
	GEOMETRY UNCHANGED FROM REV D		

	INITIALS	DATE	DRAWING No.
SURVEYED BY	-	-	R1C093-R1-4303A
DESIGNED BY	DG	07/13	PROJECT TITLE
DRAWN BY	DG	07/13	Norwich Northern Distributor Road
CHECKED BY	MKu	07/13	SCALE 1:1000 A3
			FILE No. R1C093

Appendix C
Junctions Geometry Parameters
(Drawing R1C093-GP01 to GP15)

R1C093-GP01- Fakenham Road Roundabout		
Drawing No: R1C093-R1- 4068C		
Description	Measurement	Notes
D = inscribed circle diameter	80.0	
central island diameter	62.0	
Arm A:- NDR Fakenham Road - Fir Covert Road Link Westbound		
v = approach half width	7.3	
e = entry width	7.7	
l' = effective flare length	6.2	
r = kerb entry radius	20.0	
∅ = entry angle	35°	
Segregated left turn lane	No	
Arm B:- Fakenham Road Northbound		
v = approach half width	3.7	
e = entry width	8.0	
l' = effective flare length	36.8	
r = kerb entry radius	20.0	
∅ = entry angle	46°	
Segregated left turn lane	No	
Arm C:- Fakenham Road Eastbound		
v = approach half width	3.7	
e = entry width	9.0	
l' = effective flare length	26.8	
r = kerb entry radius	20.0	
∅ = entry angle	25°	
Segregated left turn lane	No	
Arm D:- Access to Attlebridge RB3 and Lagoon Southbound		
v = approach half width	3.0	
e = entry width	4.5	
l' = effective flare length	24.0	
r = kerb entry radius	10.0	
∅ = entry angle	42°	
Segregated left turn lane	No	
Originator: D Goutam	Date: 06/11/2012	
Revised: D Goutam	Date: 03/10/2013	
Checker: M KUREK	Date: 04/10/2013	

R1C093-GP02- Fir Covert Road Roundabout		
Drawing No: R1C093-R1- 4297C		
Description	Measurement	Notes
D = inscribed circle diameter	90.0	
central island diameter	66.0	
Arm A:- NDR Fir Covert Road - Reepham Road Link Westbound		
v = approach half width	7.3	
e = entry width	10.6	
l' = effective flare length	14.1	
r = kerb entry radius	20.0	
∅ = entry angle	45°	
Segregated left turn lane	No	
Arm B:- Fir Covert Road Northbound		
v = approach half width	3.1	
e = entry width	7.0	
l' = effective flare length	12.4	
r = kerb entry radius	20.0	
∅ = entry angle	40°	
Segregated left turn lane	No	
Arm C:- NDR Fir Covert Road - Fakenham Road Link Eastbound		
v = approach half width	7.3	
e = entry width	10.7	
l' = effective flare length	13.9	
r = kerb entry radius	20.0	
∅ = entry angle	27°	
Segregated left turn lane	No	
Arm D:- Fir Covert Road Southbound		
v = approach half width	2.9	
e = entry width	6.9	
l' = effective flare length	11.9	
r = kerb entry radius	20.0	
∅ = entry angle	40°	
Segregated left turn lane	No	
Originator: D Goutam	Date: 06/11/2012	
Revised: D Goutam	Date: 03/10/2013	
Checker: M KUREK	Date: 04/10/2013	

R1C093-GP02- Reepham Road Roundabout		
Drawing No: R1C093-R1- 4069C		
Description	Measurement	Notes
D = inscribed circle diameter	90.0	
central island diameter	66.0	
Arm A:- NDR Drayton Lane - Reepham Road Link Westbound		
v = approach half width	7.3	
e = entry width	11.0	
l' = effective flare length	13.8	
r = kerb entry radius	20.0	
Ø = entry angle	58°	
Segregated left turn lane	No	
Arm B:- Reepham Road Northbound		
v = approach half width	3.0	
e = entry width	7.0	
l' = effective flare length	9.2	
r = kerb entry radius	20.0	
Ø = entry angle	42°	
Segregated left turn lane	No	
Arm C:- NDR Reepham Road-Fir Covert Road Link Eastbound		
v = approach half width	7.3	
e = entry width	11.0	
l' = effective flare length	12.8	
r = kerb entry radius	20.0	
Ø = entry angle	46°	
Segregated left turn lane	No	
Arm D:- NDR Reepham Road Southbound		
v = approach half width	3.0	
e = entry width	7.0	
l' = effective flare length	11.7	
r = kerb entry radius	20.0	
Ø = entry angle	41°	
Segregated left turn lane	No	
Originator: D Goutam	Date: 06/11/2012	
Revised: D Goutam	Date: 03/10/2013	
Checker: M KUREK	Date: 04/10/2013	

R1C093-GP03- Drayton Lane Roundabout		
Drawing No: R1C093-R1- 4070C		
Description	Measurement	Notes
D = inscribed circle diameter	90.0	
central island diameter	66.0	
Arm A:- NDR Cromer Road - Drayton Lane Link Westbound		
v = approach half width	7.3	
e = entry width	11.0	
l' = effective flare length	12.4	
r = kerb entry radius	20.0	
∅ = entry angle	55°	
Segregated left turn lane	No	
Arm B:- Drayton Lane Northbound		
v = approach half width	3.3	
e = entry width	6.5	
l' = effective flare length	15.9	
r = kerb entry radius	20.0	
∅ = entry angle	46°	
Segregated left turn lane	NA	
Arm C:- NDR Drayton Lane - Reepham Road Link Eastbound		
v = approach half width	7.3	
e = entry width	11.0	
l' = effective flare length	12.5	
r = kerb entry radius	20.0	
∅ = entry angle	49°	
Segregated left turn lane	No	
Arm D:- Holt Road - NDR Link Road Southbound		
v = approach half width	3.3	
e = entry width	6.5	
l' = effective flare length	15.7	
r = kerb entry radius	20.0	
∅ = entry angle	41°	
Segregated left turn lane	No	
Originator: D Goutam	Date: 06/11/2012	
Revised: D Goutam	Date: 03/10/2013	
Checker: M KUREK	Date: 04/10/2013	

R1C093-GP04- Holt Road / Drayton Lane Roundabout		
Drawing No: R1C093-R-4071C		
Description	Measurement	Notes
D = inscribed circle diameter	40.0	
central island diameter	28.0	
Arm A:- Holt Road Northbound		
v = approach half width	3.3	
e = entry width	6.0	
l' = effective flare length	30.4	
r = kerb entry radius	20.0	
∅ = entry angle	44°	
Segregated left turn lane	No	
Arm B:- Holt Road - NDR Link Road Eastbound		
v = approach half width	3.3	
e = entry width	6.0	
l' = effective flare length	12.2	
r = kerb entry radius	20.0	
∅ = entry angle	43°	
Segregated left turn lane	No	
Arm C:- Holt Road Southbound		
v = approach half width	3.3	
e = entry width	6.0	
l' = effective flare length	14.4	
r = kerb entry radius	20.0	
∅ = entry angle	37°	
Segregated left turn lane	No	
Originator: D Goutam	Date: 06/11/2012	
Revised: D Goutam	Date: 03/10/2013	
Checker: M KUREK	Date: 04/10/2013	

R1C093-GP05- Cromer Road Roundabout (South)		
Drawing No: R1C093-R1-4072C		
Description	Measurement	Notes
D = inscribed circle diameter	65.0	
central island diameter	47.5	
Arm A:- Westbound Diverge		
v = approach half width	3.7	
e = entry width	8.8	
l' = effective flare length	14.5	
r = kerb entry radius	20.0	
∅ = entry angle	39°	
Segregated left turn lane	No	
Arm B:- A 140 Holt Road Northbound		Existing
v = approach half width	4.0	
e = entry width	7.4	
l' = effective flare length	27.3	
r = kerb entry radius	20.0	
∅ = entry angle	54°	
Segregated left turn lane	No	
Arm C:- Manor Park Access Road		Existing
v = approach half width	3.0	
e = entry width	4.5	
l' = effective flare length	12.3	
r = kerb entry radius	20.0	
∅ = entry angle	27°	
Segregated left turn lane	No	
Arm D:- Westbound Merge		
v = approach half width	3.7	
e = entry width	4.5	
l' = effective flare length	28.0	
r = kerb entry radius	12.0	
∅ = entry angle	37°	
Segregated left turn lane	No	
Arm E:- Cromer Road North-South Link Road Southbound		
v = approach half width	7.3	
e = entry width	7.6	
l' = effective flare length	2.7	
r = kerb entry radius	20.0	
∅ = entry angle	37°	
Segregated left turn lane	No	
Originator: D Goutam		
Date: 06/11/2012		
Revised: D Goutam		
Date: 03/10/2013		
Checker: M KUREK		
Date: 04/10/2013		

R1C093-GP06- Cromer Road Roundabout (North)			
Drawing No: R1C093-R1-4073C			
Description	Measurement	Notes	
D = inscribed circle diameter	90.0		
central island diameter	74.0		
Arm A:- Cromer Road North-South Link Road Northbound			
v = approach half width	7.3		
e = entry width	8.0		
l' = effective flare length	14.4		
r = kerb entry radius	20.0		
∅ = entry angle	34°		
Segregated left turn lane	No		
Arm B:- Eastbound Diverge			
v = approach half width	3.7		
e = entry width	7.3		
l' = effective flare length	9.9		
r = kerb entry radius	20.0		
∅ = entry angle	38°		
Segregated left turn lane	NA		
Arm C:- Cromer Road Southbound			
v = approach half width	3.7		
e = entry width	6.7		
l' = effective flare length	29.3		
r = kerb entry radius	20.0		
∅ = entry angle	32°		
Segregated left turn lane	No		
Arm D:- Private Means of Access			
v = approach half width	3.0		
e = entry width	5.0		
l' = effective flare length	39.4		
r = kerb entry radius	10.0		
∅ = entry angle	36°		
Segregated left turn lane	NA		
Arm E:- Eastbound Merge			Exit Only
v = approach half width	NA		
e = entry width	NA		
l' = effective flare length	NA		
r = kerb entry radius	NA		
∅ = entry angle	NA		
Segregated left turn lane	NA		
Originator: D Goutam	Date: 06/11/2012		
Revised: D Goutam	Date: 03/10/2013		
Checker: M KUREK	Date: 04/10/2013		

R1C093-GP07- Airport Roundabout		
Drawing No: R1C093-R1-4074C		
Description	Measurement	Notes
D = inscribed circle diameter	90.0	
central island diameter	72.0	
Arm A:- NDR North Walsham Road - Airport Roundabout Link Westbound		
v = approach half width	7.3	
e = entry width	7.8	
l' = effective flare length	3.6	
r = kerb entry radius	20.0	
∅ = entry angle	36°	
Segregated left turn lane	No	
Arm B:- Petan Access Road Northbound		
v = approach half width	3.7	
e = entry width	6.4	
l' = effective flare length	5.3	
r = kerb entry radius	20.0	
∅ = entry angle	40°	
Segregated left turn lane	No	
Arm C:- NDR Airport Roundabout - Cromer Road Link Eastbound		
v = approach half width	7.3	
e = entry width	7.7	
l' = effective flare length	3.4	
r = kerb entry radius	20.0	
∅ = entry angle	36°	
Segregated left turn lane	No	
Originator: D Goutam	Date: 06/11/2012	
Revised: D Goutam	Date: 03/10/2013	
Checker: M KUREK	Date: 04/10/2013	

R1C093-GP08- North Walsham Road Roundabout		
Drawing No: R1C093-R1- 4075C		
Description	Measurement	Notes
D = inscribed circle diameter	90.0	
central island diameter	66.0	
Arm A:- NDR Wroxham Road - North Walsham Road Link Westbound		
v = approach half width	7.3	
e = entry width	11.0	
l' = effective flare length	34.8	
r = kerb entry radius	20.0	
∅ = entry angle	45°	
Segregated left turn lane	No	
Arm B:- North Walsham Road Northbound		
v = approach half width	3.7	
e = entry width	7.3	
l' = effective flare length	27.4	
r = kerb entry radius	20.0	
∅ = entry angle	38°	
Segregated left turn lane	No	
Arm C:- NDR North Walsham Road - Airport Roundabout Link Eastbound		
v = approach half width	7.3	
e = entry width	11.0	
l' = effective flare length	44.5	
r = kerb entry radius	20.0	
∅ = entry angle	42°	
Segregated left turn lane	No	
Arm D:- North Walsham Road Southbound		
v = approach half width	3.7	
e = entry width	7.3	
l' = effective flare length	23.6	
r = kerb entry radius	20.0	
∅ = entry angle	37°	
Segregated left turn lane	No	
Originator: D Goutam		
Date: 06/11/2012		
Revised: D Goutam		
Date: 03/10/2013		
Checker: M KUREK		
Date: 04/10/2013		

R1C093-GP09- Wroxham Road Roundabout		
Drawing No: R1C093-R1-4076C		
Description	Measurement	Notes
D = inscribed circle diameter	90.0	
central island diameter	66.0	
Arm A:- NDR Salhouse Road - Wroxham Road Link Northbound		
v = approach half width	7.3	
e = entry width	11.0	
l' = effective flare length	47.3	
r = kerb entry radius	20.0	
∅ = entry angle	48°	
Segregated left turn lane	No	
Arm B:- Wroxham Road Eastbound		
v = approach half width	3.7	
e = entry width	7.3	
l' = effective flare length	12.7	
r = kerb entry radius	20.0	
∅ = entry angle	39°	
Segregated left turn lane	No	
Arm C:- NDR Wroxham Road - North Walsham Road Link Southbound		
v = approach half width	7.3	
e = entry width	11.0	
l' = effective flare length	26.3	
r = kerb entry radius	20.0	
∅ = entry angle	44°	
Segregated left turn lane	No	
Arm D:- Access Track to Sewage Farm Southbound		
v = approach half width	2.5	
e = entry width	4.0	
l' = effective flare length	2.7	
r = kerb entry radius	10.0	
∅ = entry angle	37°	
Segregated left turn lane	No	
Arm E:- Wroxham Road Westbound		
v = approach half width	3.7	
e = entry width	10.5	
l' = effective flare length	77.7	
r = kerb entry radius	20.0	
∅ = entry angle	59°	
Segregated left turn lane	No	
Originator: D Goutam	Date: 02/11/2012	
Revised : D Goutam	Date: 27/09/2013	
Checker: S. CLIFF	Date: 27/09/2013	

R1C093-GP10- Salhouse Road Roundabout		
Drawing No: R1C093-R1-4077C		
Description	Measurement	Notes
D = inscribed circle diameter	90.0	
central island diameter	66.0	
Arm A:- NDR Plumstead Road - Salhouse Road Link Northbound		
v = approach half width	7.3	
e = entry width	11.0	
l' = effective flare length	38.3	
r = kerb entry radius	20.0	
∅ = entry angle	62°	
Segregated left turn lane	No	
Arm B:- Salhouse Road Eastbound		
v = approach half width	3.3	
e = entry width	7.3	
l' = effective flare length	11.5	
r = kerb entry radius	20.0	
∅ = entry angle	40°	
Segregated left turn lane	No	
Arm C:- NDR Salhouse Road - Wroxham Road Link Southbound		
v = approach half width	7.3	
e = entry width	11.0	
l' = effective flare length	51.0	
r = kerb entry radius	20.0	
∅ = entry angle	52°	
Segregated left turn lane	No	
Arm D:- Salhouse Road Westbound		
v = approach half width	3.3	
e = entry width	10.5	
l' = effective flare length	71.0	
r = kerb entry radius	20.0	
∅ = entry angle	54°	
Segregated left turn lane	No	
Originator: D Goutam	Date: 02/11/2012	
Revised : D Goutam	Date: 27/09/2013	
Checker: S. CLIFF	Date: 27/09/2013	

(Based on NDR Alignment as per Engineering Layout Rev E)

Norwich Northern Distributor Road

R1C093-GP11- Plumstead Road Roundabout (North)		
Drawing No: R1C093-R1-4078C		
Description	Measurement	Notes
D = inscribed circle diameter	40.0	
central island diameter	24.4	
Arm A:- NDR Plumstead Road - NDR Link Road Northbound		
v = approach half width	3.7	
e = entry width	7.0	
l' = effective flare length	11.3	
r = kerb entry radius	20.0	
∅ = entry angle	39°	
Segregated left turn lane	No	
Arm B:- Plumstead Road Eastbound		
v = approach half width	2.8	
e = entry width	6.0	
l' = effective flare length	11.3	
r = kerb entry radius	20.0	
∅ = entry angle	52°	
Segregated left turn lane	No	
Arm C:- Plumstead Road Westbound		
v = approach half width	2.8	
e = entry width	6.0	
l' = effective flare length	12.8	
r = kerb entry radius	20.0	
∅ = entry angle	35°	
Segregated left turn lane	No	
Originator: D Goutam	Date: 06/11/2012	
Revised: D Goutam	Date: 03/10/2013	
Checker: M KUREK	Date: 04/10/2013	

(Based on NDR Alignment as per Engineering Layout Rev E)

Norwich Northern Distributor Road

R1C093-GP12- Plumstead Road Roundabout (South)		
Drawing No: R1C093-R1- 4079C		
Description	Measurement	Notes
D = inscribed circle diameter	90.0	
central island diameter	66.0	
<i>Arm A:- NDR Postwick - Plumstead Link Northbound</i>		
v = approach half width	7.3	
e = entry width	11.0	
l' = effective flare length	28.2	
r = kerb entry radius	20.0	
∅ = entry angle	41°	
Segregated left turn lane	No	
<i>Arm B:- NDR Plumstead - Salhouse Link Southbound</i>		
v = approach half width	7.3	
e = entry width	11.0	
l' = effective flare length	23.1	
r = kerb entry radius	20.0	
∅ = entry angle	42°	
Segregated left turn lane	No	
<i>Arm C:- Plumstead Road - NDR Link Road Southbound</i>		
v = approach half width	3.7	
e = entry width	7.3	
l' = effective flare length	12.3	
r = kerb entry radius	20.0	
∅ = entry angle	40°	
Segregated left turn lane	No	
Originator: D Goutam	Date: 06/11/2012	
Revised: D Goutam	Date: 03/10/2013	
Checker: M KUREK	Date: 04/10/2013	

Geometric Parameters
(Based on NDR Alignment as per Engineering Layout Rev E)
Norwich Northern Distributer Road

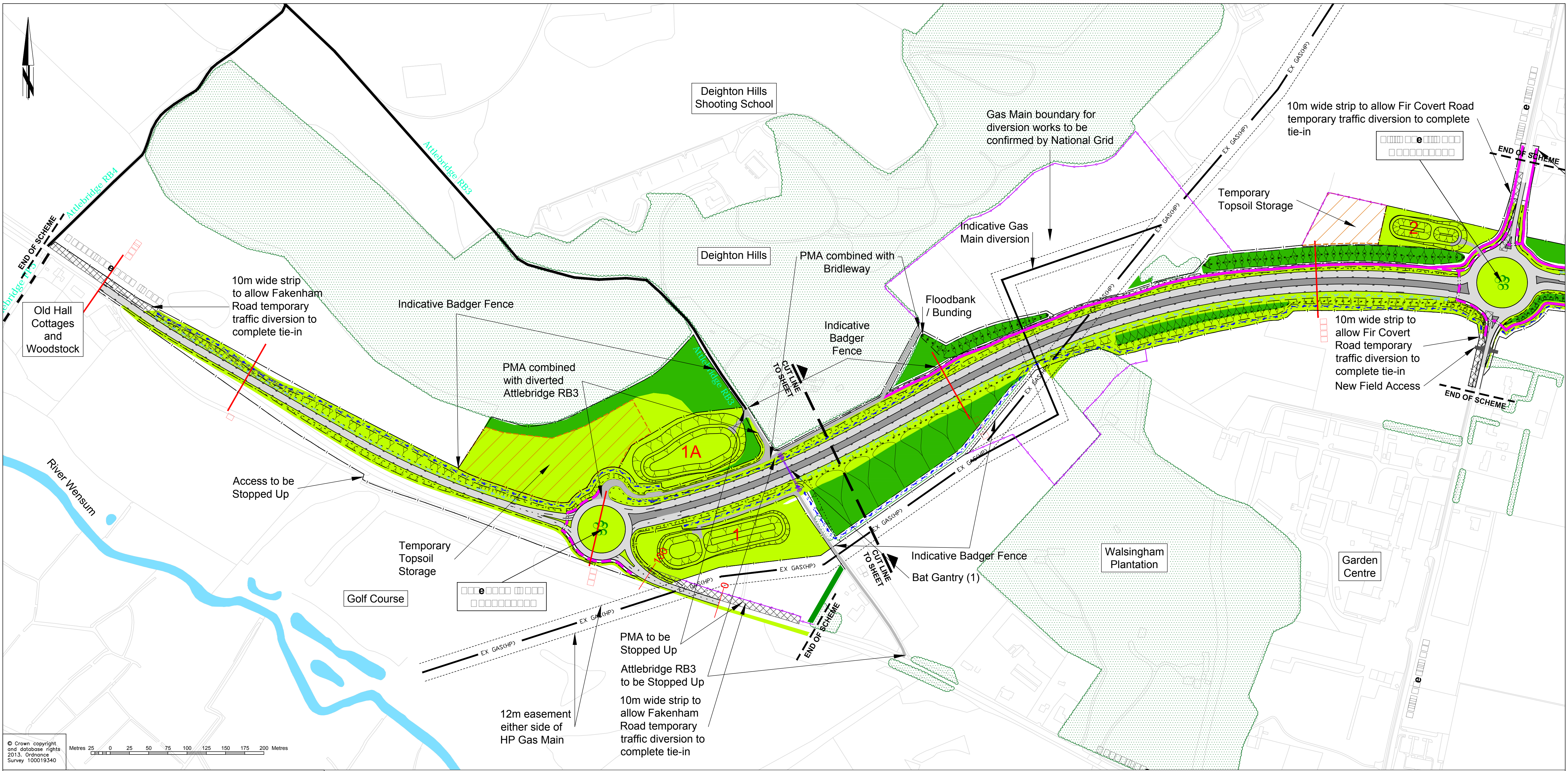
04 October 2013

R1C093-GP13 Geometric Parameters for Business Park RBT - Option 4 - With SLT		
Drawing No: R1C093-R1-4080C		
Description	Measurement	Notes
Business Park Roundabout		
D = inscribed circle diameter	83.0	
central island diameter	66.0	
Arm A:- Business Park Link Road		
v = approach half width	7.3	
e = entry width	7.9	
l' = effective flare length	35.0	
r = kerb entry radius	20.0	
∅ = entry angle	40°	
Segregated left turn lane	Yes	
Arm B:- Broadland Gate Link Road		
v = approach half width	3.7	
e = entry width	7.3	
l' = effective flare length	12.2	
r = kerb entry radius	20.0	
∅ = entry angle	49°	
Segregated left turn lane	No	
Arm C:- NDR Link Road		
v = approach half width	7.3	
e = entry width	8.1	
l' = effective flare length	11.4	
r = kerb entry radius	35.0	
∅ = entry angle	26°	
Segregated Southbound Filter Lane	Yes	
Originator: D Goutam	Date: 06/11/2012	
Revised: D Goutam	Date: 03/10/2013	
Checker: M KUREK	Date: 04/10/2013	

R1C150-GP14 Geometric Parameters for Postwick Junction		
Drawing No: R1C093-R1-4302A		
Description	Measurement	Notes
North East Roundabout		
D = inscribed circle diameter	70.0	
central island diameter	52.0	
Arm A:- New Postwick Bridge		
v = approach half width	3.7	
e = entry width	8.0	
l' = effective flare length	34.5	
r = kerb entry radius	20.0	
∅ = entry angle	41°	
Segregated left turn lane	No	
Arm B:- Eastbound diverge slip road		
v = approach half width	7.3	
e = entry width	7.7	
l' = effective flare length	4.5	
r = kerb entry radius	20.0	
∅ = entry angle	42°	
Segregated left turn lane	Yes	
Arm C:- Business Park Link Road		
v = approach half width	7.3	
e = entry width	7.9	
l' = effective flare length	5.4	
r = kerb entry radius	20.0	
∅ = entry angle	44°	
Segregated left turn lane	No	
Arm D:- Eastbound Merge Slip Road		
v = approach half width	N/A	Exit only
e = entry width	N/A	
l' = effective flare length	N/A	
r = kerb entry radius	N/A	
∅ = entry angle	N/A	
Segregated left turn lane	N/A	
Originator: D Goutam		
Date: 06/11/2012		
Revised: D Goutam		
Date: 03/10/2013		
Checker: S Cliff		
Date:		

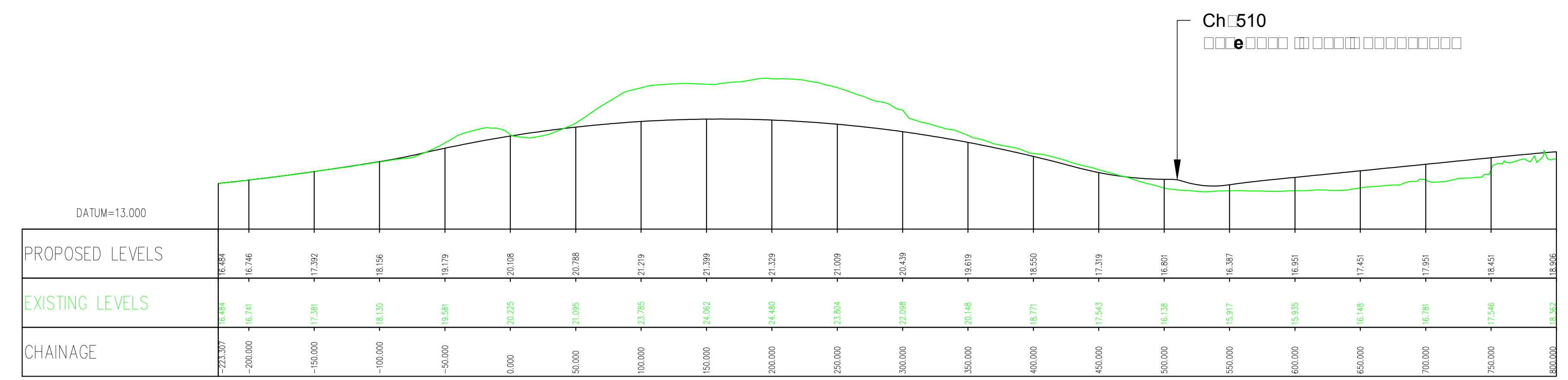
R1C150-GP15 Geometric Parameters for Postwick Junction		
Drawing No: R1C093-R1-4303A		
Description	Measurement	Notes
Broadland Gate Roundabout		
D = inscribed circle diameter	50.0	
central island diameter	32.0	
Arm A:- New Access to Development		
v = approach half width	3.7	
e = entry width	7.0	
l' = effective flare length	17.0	
r = kerb entry radius	20.0	
∅ = entry angle	39°	
Segregated left turn lane	No	
Arm B:- Eastbound Broadland Gate Link Road		
v = approach half width	3.7	Width excludes additional westbound lane for Segregated left turn
e = entry width	7.3	
l' = effective flare length	8.3	
r = kerb entry radius	20.0	
∅ = entry angle	41°	
Segregated left turn lane	No	
Arm C:- Westbound Broadland Gate Link Road		
v = approach half width	3.7	
e = entry width	6.0	
l' = effective flare length	7.5	
r = kerb entry radius	20.0	
∅ = entry angle	35°	
Segregated left turn lane	Yes	
Originator: D Goutam		
Date: 06/11/2012		
Revised: D Goutam		
Date: 03/10/2013		
Checker: S Cliff		
Date: 07/10/2013		

Appendix D
Engineering Layout Sheets 1-12
(Drawing No R1C093-R1-4003E to 4014E)



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Key	
	Northern Distributor Road
	Indicative Woodland creation
	Indicative Grassland creation
	Indicative Scrubland creation
	Existing Woodland
	Existing pond / lake or river
	Proposed Site Compound
	Proposed Temporary Topsoil Storage area
	Proposed Temporary Traffic Diversion (to complete tie-in)
	Proposed Culverts
	Proposed Drainage Lagoons
	Proposed Bat Gantry
	Existing Footpaths
	Existing Restricted Byways (RB) and Bridleways (BR)
	Proposed Cycle Tracks (with right of way on foot)
	Proposed Footways/Cycleways
	Proposed Bridleways
	Proposed Private Means of Access (PMA)
	Proposed Turning Heads (some with combined Field Access)
	Proposed Swales
	Proposed Ditches
	Chainage



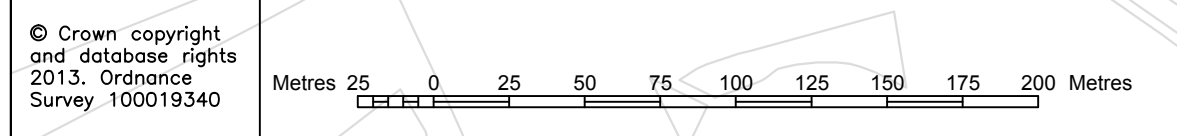
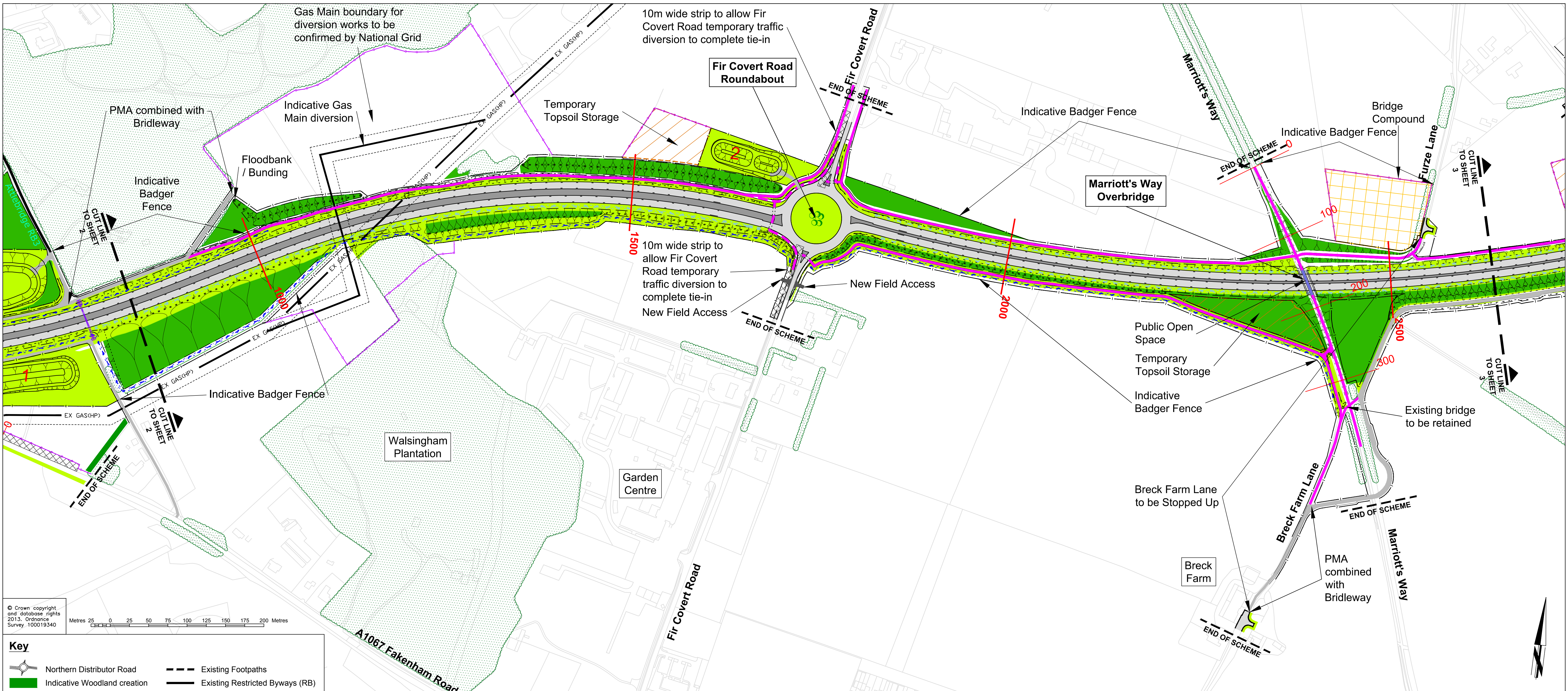
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DRAWING TITLE
 NORWICH NORTHERN DISTRIBUTOR ROAD
 ENGINEERING LAYOUT AND PROFILE - MAINLINE
 SHEET 1 OF 12

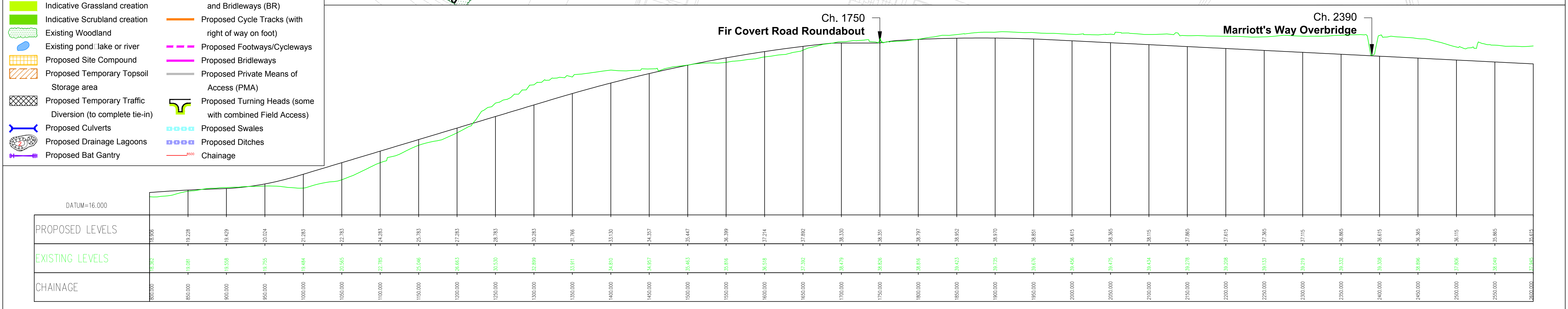
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B	See Revision Sheet for details	MKu	04/13
C	See Revision Sheet for details	MKu	07/13
D	See Revision Sheet for details	MKu	01/13
E	See Revision Sheet for details	JB	09/13

SURVEYED BY	INITIALS	DATE	DRAWING No
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DESIGNED BY	JT	05/12	PROJECT TITLE
DRAWN BY	JT	05/12	Norwich Northern Distributor Road
CHECKED BY	MKu	06/12	SCALE 1:2500/1:250
			FILE No R1C093



Key

	Northern Distributor Road		Existing Footpaths
	Indicative Woodland creation		Existing Restricted Byways (RB) and Bridleways (BR)
	Indicative Grassland creation		Proposed Cycle Tracks (with right of way on foot)
	Indicative Scrubland creation		Proposed Footways/Cycleways
	Existing Woodland		Proposed Bridleways
	Existing pond/lake or river		Proposed Private Means of Access (PMA)
	Proposed Site Compound		Proposed Turning Heads (some with combined Field Access)
	Proposed Temporary Topsoil Storage area		Proposed Swales
	Proposed Temporary Traffic Diversion (to complete tie-in)		Proposed Ditches
	Proposed Culverts		Chainage
	Proposed Drainage Lagoons		
	Proposed Bat Gantry		

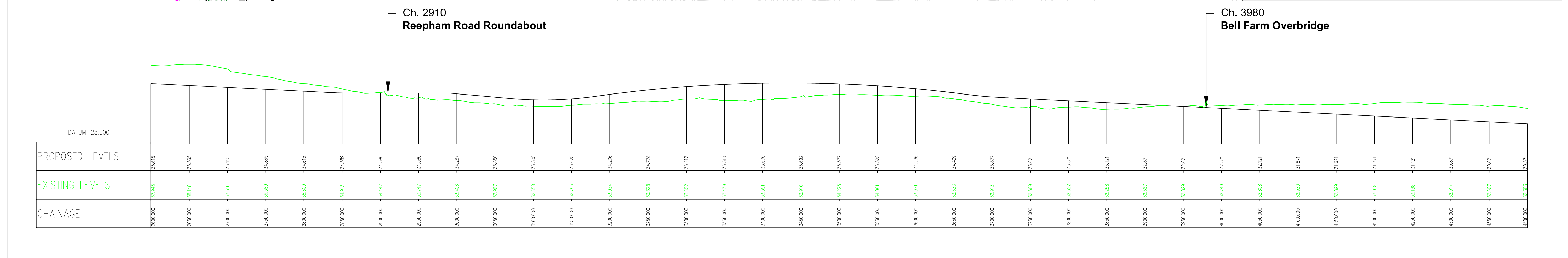


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 NORWICH NORTHERN DISTRIBUTOR ROAD
 ENGINEERING LAYOUT AND PROFILE - MAINLINE
 SHEET 2 OF 12

REVISION	DESCRIPTION	CHECKED	DATE
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B	See Revision Sheet for details	MKu	04/13
C	See Revision Sheet for details	MKu	07/13
D	See Revision Sheet for details	MKu	07/13
E	See Revision Sheet for details	JB	09/13

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DRAWN BY	JT	05/12	Norwich Northern Distributor Road
CHECKED BY	MKu	06/12	SCALE
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			FILE No
			R1C093



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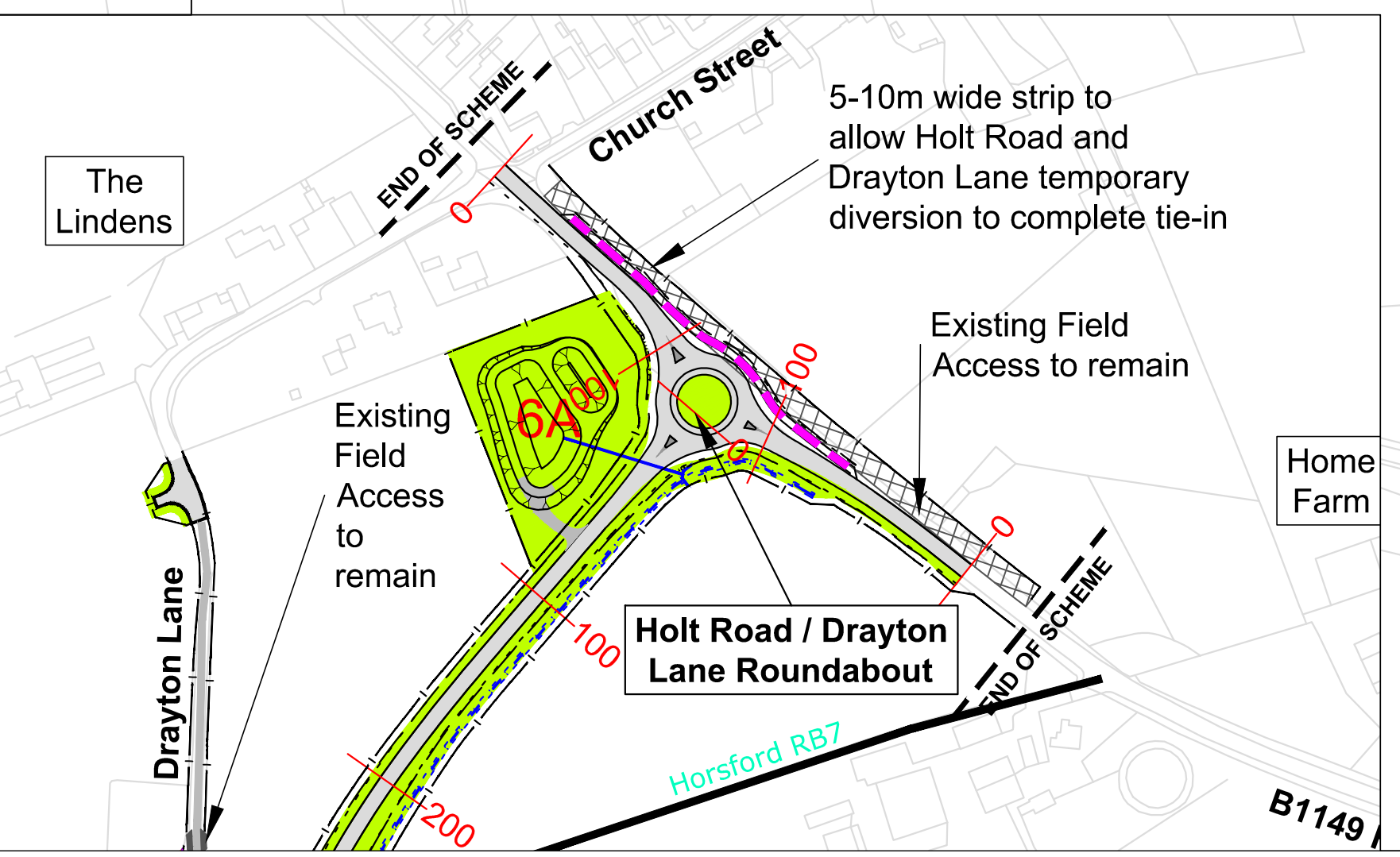
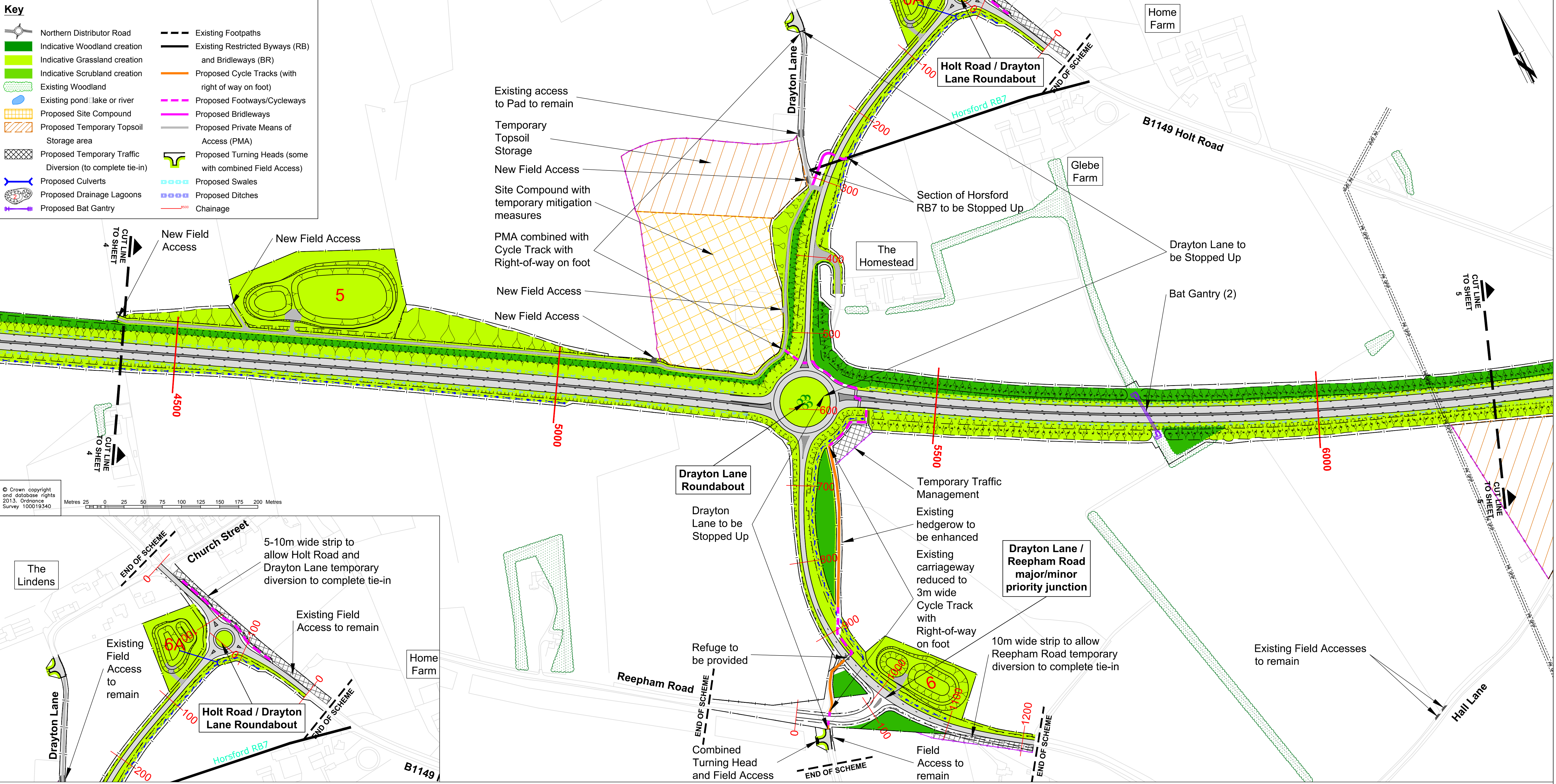
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 ENGINEERING LAYOUT AND PROFILE - MAINLINE
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C	See Revision Sheet for details	MKu	07/13
D	See Revision Sheet for details	MKu	01/13
E	See Revision Sheet for details	JB	09/13

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DRAWN BY	JT	05/12	Norwich Northern Distributor Road
CHECKED BY	MKu	06/12	SCALE 1:2500/1:250
			FILE No R1C093

Key

	Existing Footpaths
	Existing Restricted Byways (RB) and Bridleways (BR)
	Proposed Cycle Tracks (with right of way on foot)
	Proposed Footways/Cycleways
	Proposed Bridleways
	Proposed Private Means of Access (PMA)
	Proposed Turning Heads (some with combined Field Access)
	Proposed Swales
	Proposed Ditches
	Chainage



Drayton Lane Roundabout
 Ch. 5330

PROPOSED LEVELS	EXISTING LEVELS	CHAINAGE
30.371	32.363	4400.000
30.121	31.908	4450.000
29.871	30.920	4500.000
29.621	30.884	4550.000
29.374	30.045	4600.000
29.128	30.339	4650.000
28.878	30.581	4700.000
28.628	30.121	4750.000
28.378	30.631	4800.000
28.128	31.396	4850.000
27.878	32.150	4900.000
27.628	32.725	4950.000
27.378	33.219	5000.000
27.128	33.868	5050.000
26.878	34.637	5100.000
26.628	35.452	5150.000
26.378	36.431	5200.000
26.128	37.690	5250.000
25.878	39.067	5300.000
25.628	40.570	5350.000
25.378	42.208	5400.000
25.128	43.979	5450.000
24.878	45.889	5500.000
24.628	47.932	5550.000
24.378	49.100	5600.000
24.128	50.397	5650.000
23.878	51.828	5700.000
23.628	53.398	5750.000
23.378	55.100	5800.000
23.128	56.930	5850.000
22.878	58.884	5900.000
22.628	60.958	5950.000
22.378	63.158	6000.000
22.128	65.480	6050.000
21.878	67.921	6100.000
21.628	70.478	6150.000
21.378	73.158	6200.000
21.128	75.966	6250.000
20.878	78.899	6300.000
20.628	81.954	6350.000
20.378	85.128	6400.000
20.128	88.428	6450.000
19.878	91.851	6500.000
19.628	95.394	6550.000
19.378	99.054	6600.000
19.128	102.828	6650.000
18.878	106.714	6700.000
18.628	110.711	6750.000
18.378	114.816	6800.000
18.128	119.028	6850.000
17.878	123.344	6900.000
17.628	127.763	6950.000
17.378	132.283	7000.000
17.128	136.902	7050.000
16.878	141.618	7100.000
16.628	146.429	7150.000
16.378	151.334	7200.000
16.128	156.331	7250.000
15.878	161.418	7300.000
15.628	166.594	7350.000
15.378	171.858	7400.000
15.128	177.208	7450.000
14.878	182.642	7500.000
14.628	188.159	7550.000
14.378	193.758	7600.000
14.128	199.438	7650.000
13.878	205.197	7700.000
13.628	211.034	7750.000
13.378	216.948	7800.000
13.128	222.938	7850.000
12.878	228.999	7900.000
12.628	235.130	7950.000
12.378	241.330	8000.000
12.128	247.597	8050.000
11.878	253.929	8100.000
11.628	260.325	8150.000
11.378	266.784	8200.000
11.128	273.294	8250.000
10.878	279.854	8300.000
10.628	286.463	8350.000
10.378	293.119	8400.000
10.128	299.831	8450.000
9.878	306.597	8500.000
9.628	313.416	8550.000
9.378	320.286	8600.000
9.128	327.205	8650.000
8.878	334.172	8700.000
8.628	341.186	8750.000
8.378	348.245	8800.000
8.128	355.358	8850.000
7.878	362.523	8900.000
7.628	369.739	8950.000
7.378	377.004	9000.000
7.128	384.317	9050.000
6.878	391.677	9100.000
6.628	399.082	9150.000
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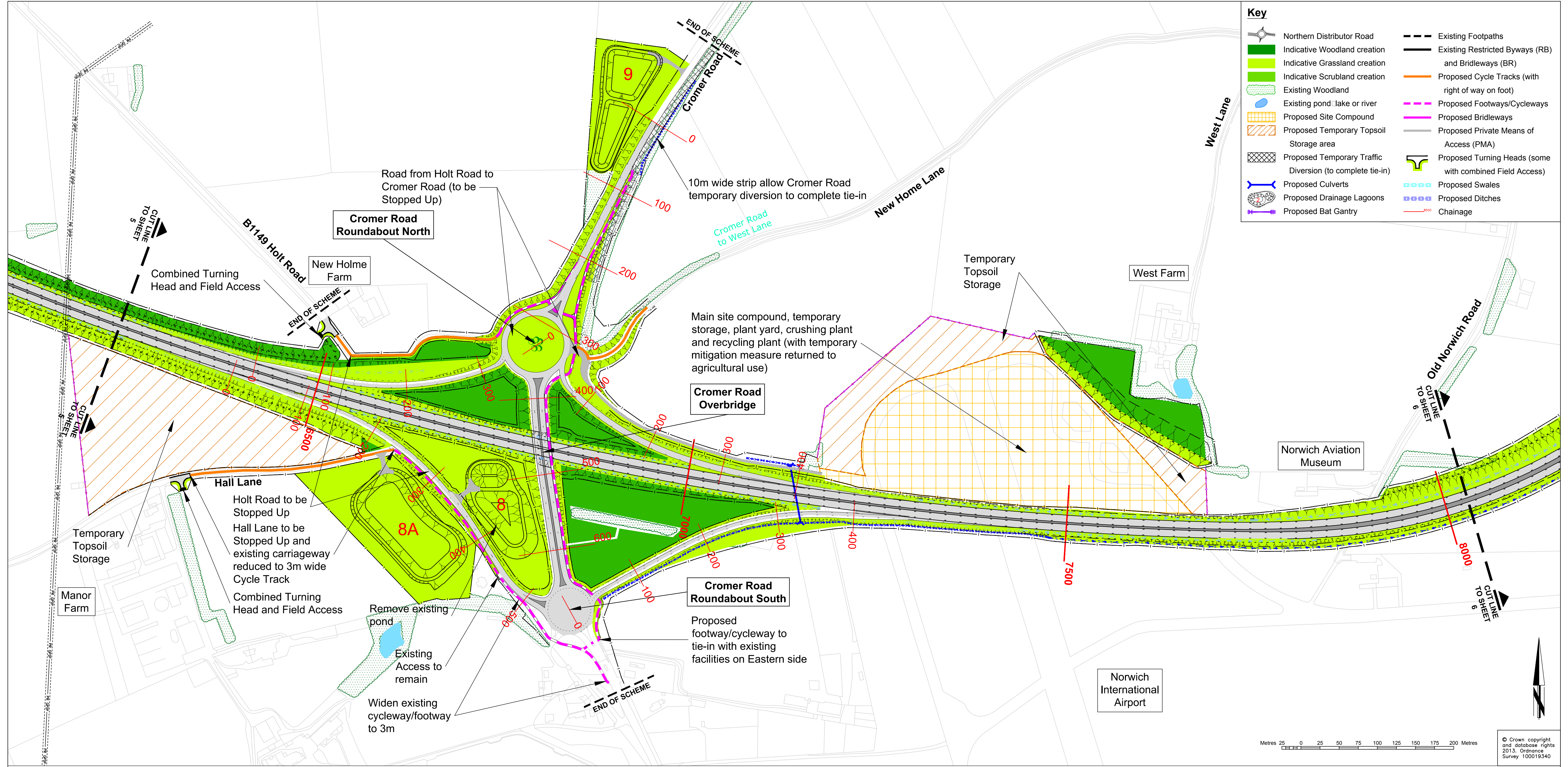


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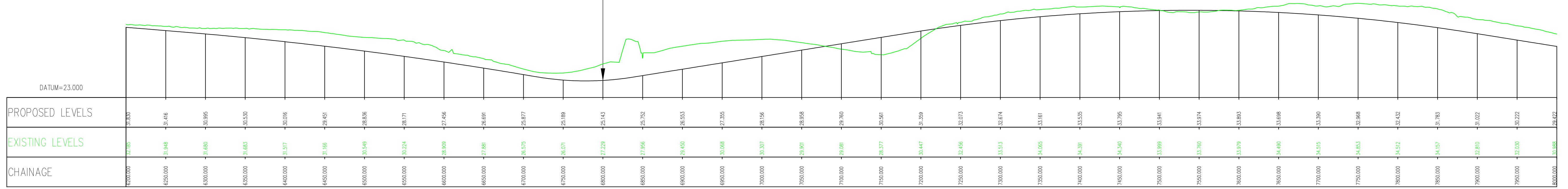
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E	See Revision Sheet for details	JB	09/13

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DRAWN BY	JT	05/12	Norwich Northern Distributor Road
CHECKED BY	MKu	06/12	SCALE 1:2500/1:250
			FILE No R1C093



Ch. 6800
Cromer Road Overbridge

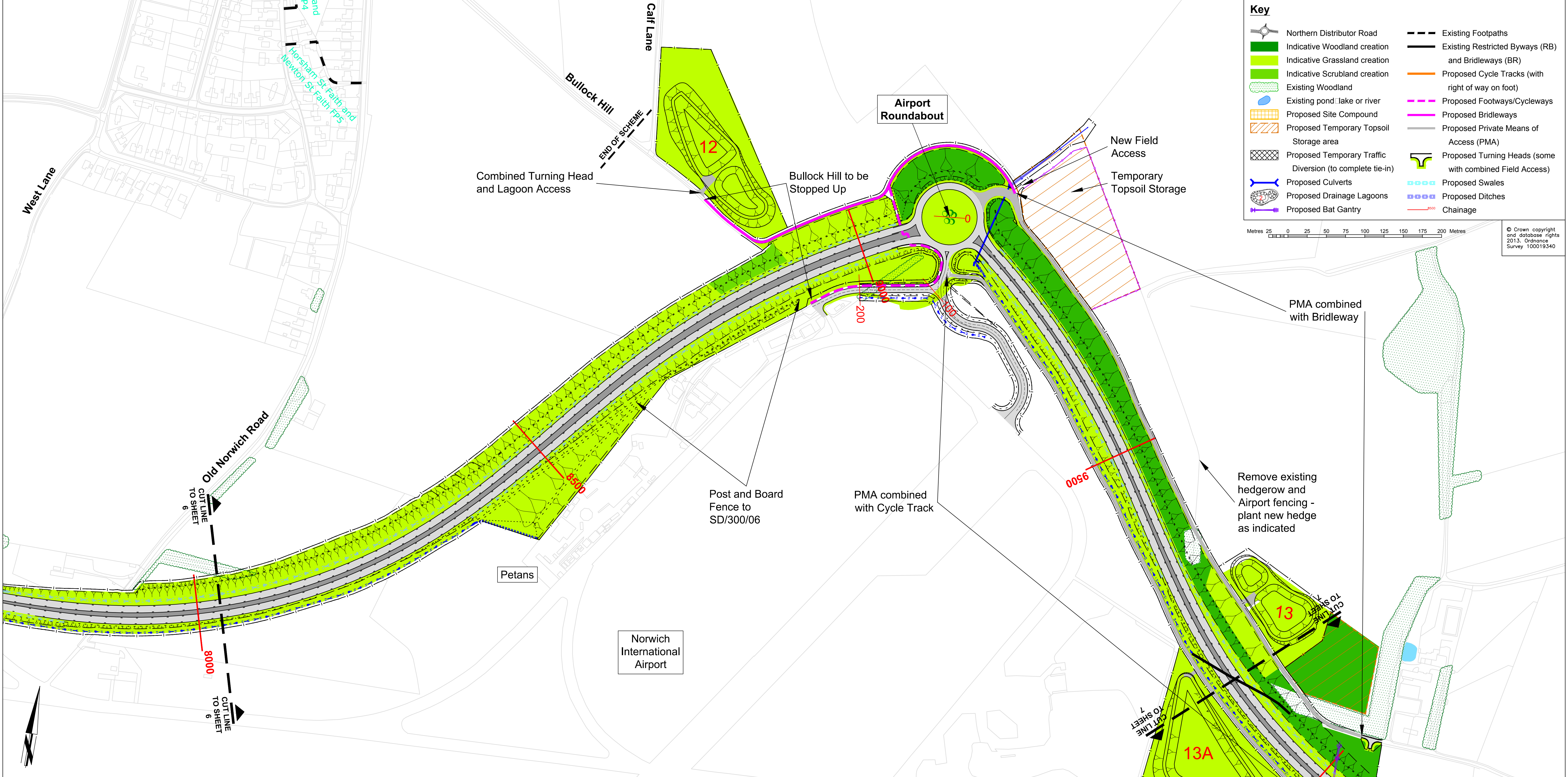


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NORWICH NORTHERN DISTRIBUTOR ROAD
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D	See Revision Sheet for details	MKu	07/13
E	See Revision Sheet for details	JB	09/13

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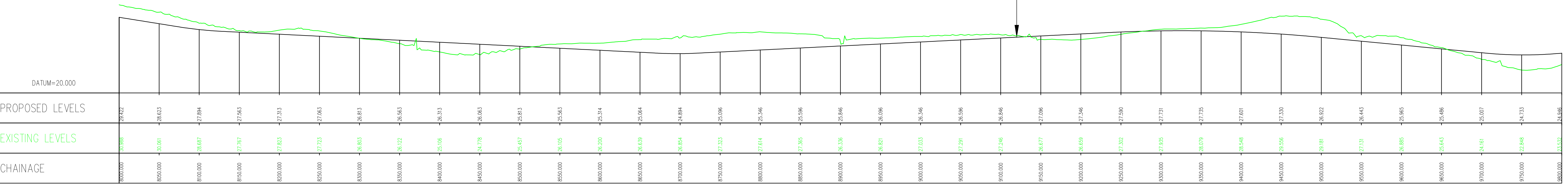


Key

- Northern Distributor Road
- Indicative Woodland creation
- Indicative Grassland creation
- Indicative Scrubland creation
- Existing Woodland
- Existing pond, lake or river
- Proposed Site Compound
- Proposed Temporary Topsoil
- Proposed Temporary Traffic Diversion (to complete tie-in)
- Proposed Culverts
- Proposed Drainage Lagoons
- Proposed Bat Gantry
- Existing Footpaths
- Existing Restricted Byways (RB) and Bridleways (BR)
- Proposed Cycle Tracks (with right of way on foot)
- Proposed Footways/Cycleways
- Proposed Bridleways
- Proposed Private Means of Access (PMA)
- Proposed Turning Heads (some with combined Field Access)
- Proposed Swales
- Proposed Ditches
- Chainage

Metres 25 0 25 50 75 100 125 150 175 200 Metres

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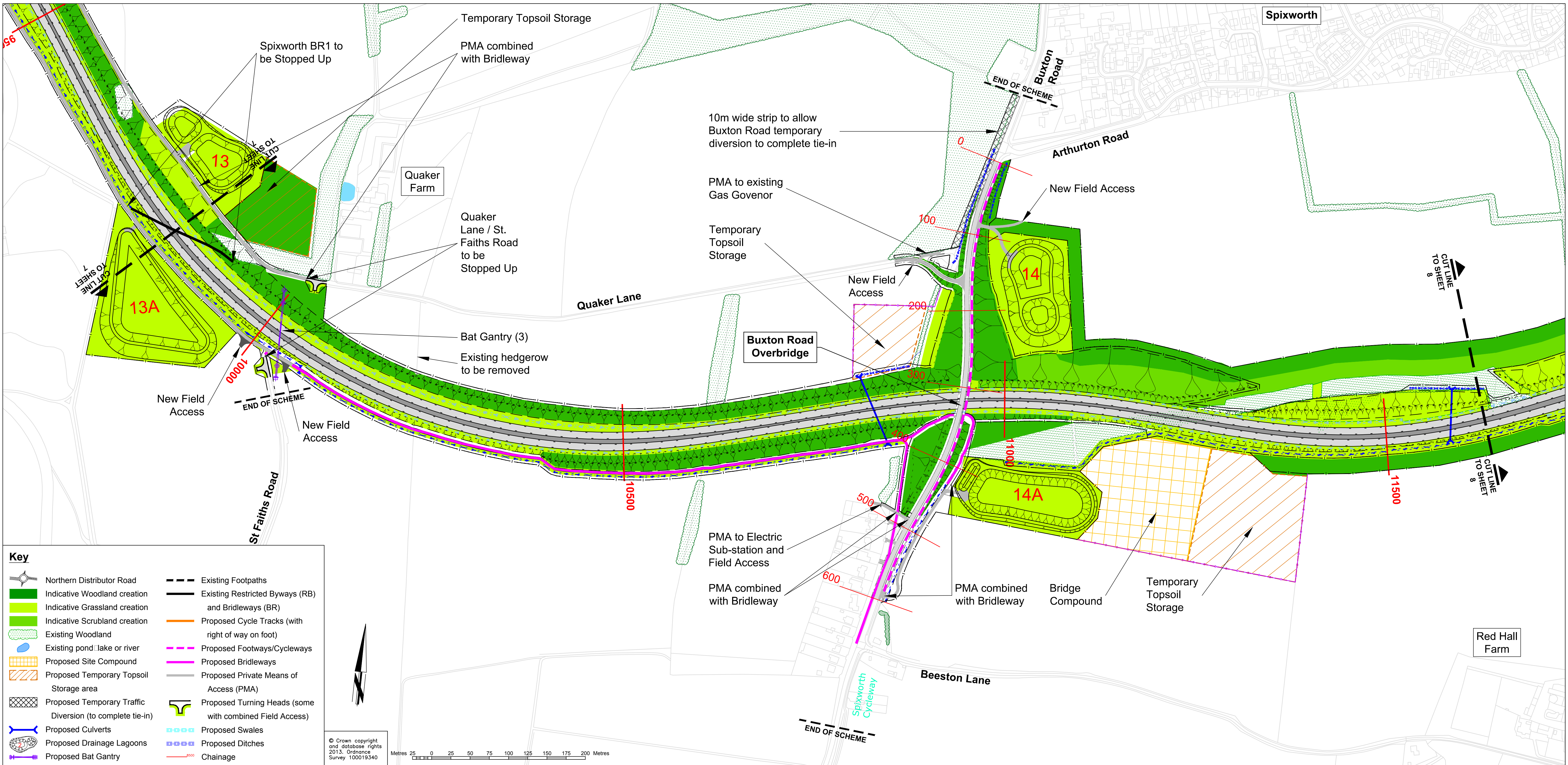


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NORWICH NORTHERN DISTRIBUTOR ROAD
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SHEET 6 OF 12

REVISION	DESCRIPTION	CHECKED	DATE
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D	See Revision Sheet for details	MKu	07/13
E	See Revision Sheet for details	JB	09/13

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DRAWN BY	JT	07/12	Norwich Northern Distributor Road
CHECKED BY	MKu	06/12	SCALE 1:2500/1:250
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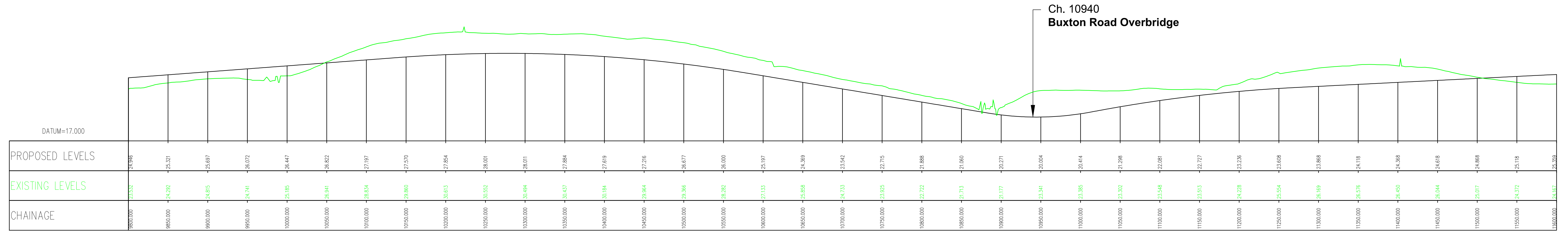


Key

- Northern Distributor Road
- Indicative Woodland creation
- Indicative Grassland creation
- Indicative Scrubland creation
- Existing Woodland
- Existing pond, lake or river
- Proposed Site Compound
- Proposed Temporary Topsoil Storage area
- Proposed Temporary Traffic Diversion (to complete tie-in)
- Proposed Culverts
- Proposed Drainage Lagoons
- Proposed Bat Gantry
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- Proposed Ditches
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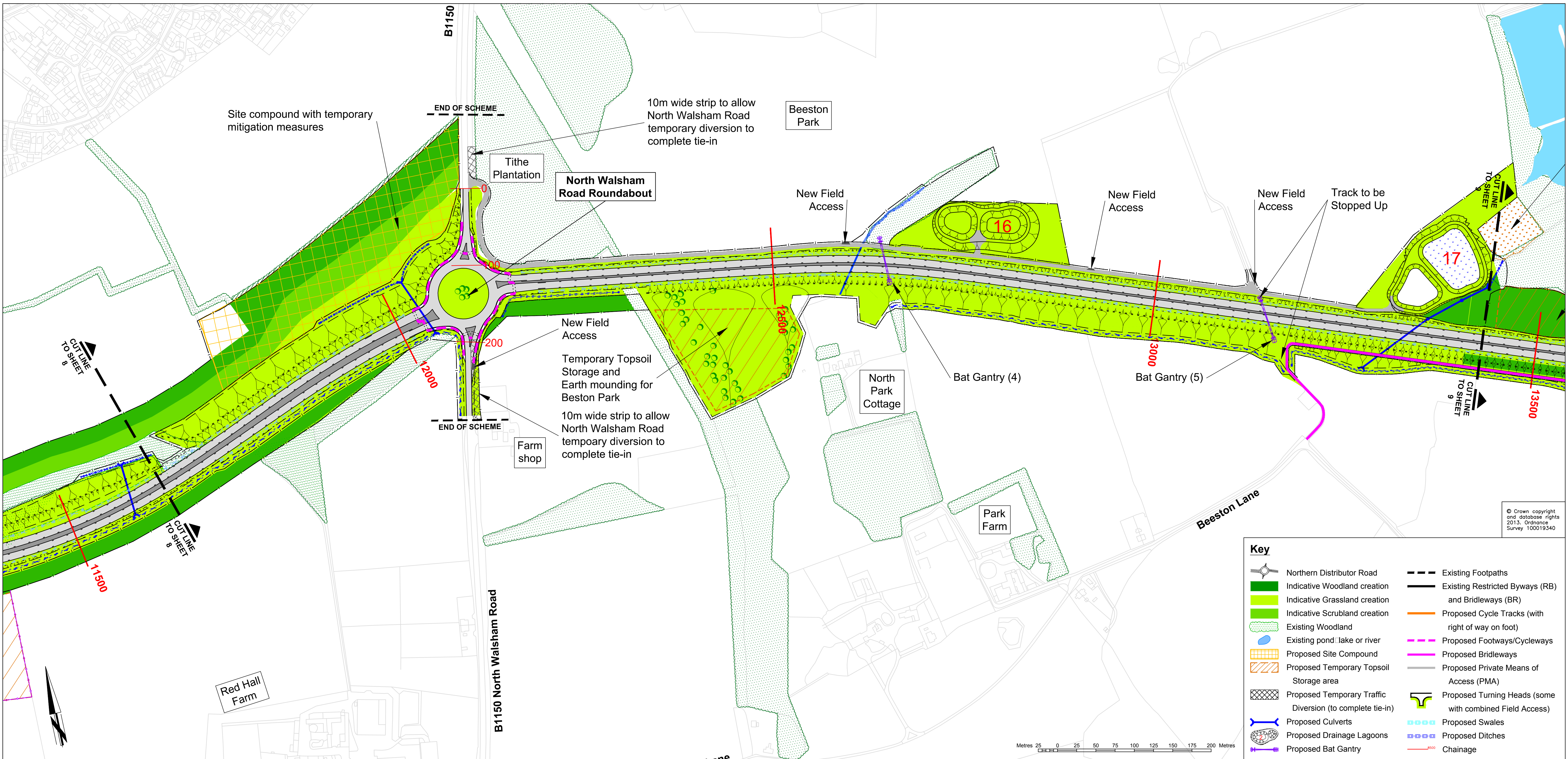


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SHEET 7 OF 12

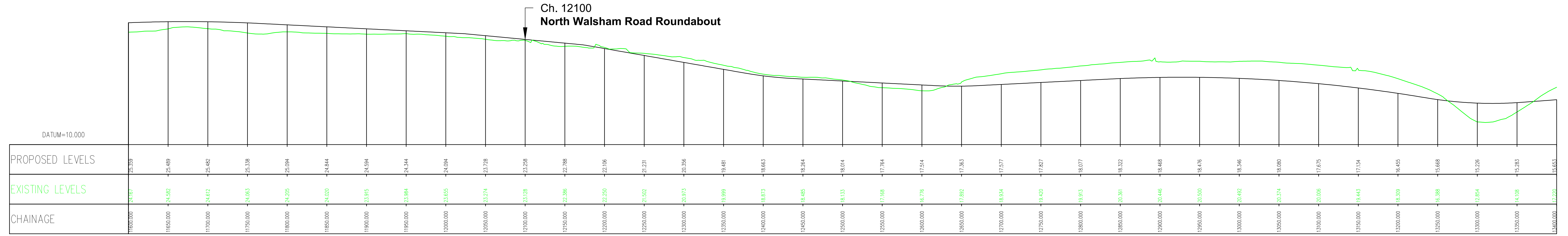
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D	See Revision Sheet for details	MKu	01/13
E	See Revision Sheet for details	JB	09/13

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DRAWN BY	JT	05/12	Norwich Northern Distributor Road
CHECKED BY	MKu	06/12	SCALE 1:2500/1:250
			FILE No R1C093



Key

	Northern Distributor Road		Existing Footpaths
	Indicative Woodland creation		Existing Restricted Byways (RB) and Bridleways (BR)
	Indicative Grassland creation		Proposed Cycle Tracks (with right of way on foot)
	Indicative Scrubland creation		Proposed Footways/Cycleways
	Existing Woodland		Proposed Bridleways
	Existing pond/lake/river		Proposed Private Means of Access (PMA)
	Proposed Site Compound		Proposed Turning Heads (some with combined Field Access)
	Proposed Temporary Topsoil Storage area		Proposed Swales
	Proposed Temporary Traffic Diversion (to complete tie-in)		Proposed Ditches
	Proposed Culverts		Chainage
	Proposed Drainage Lagoons		
	Proposed Bat Gantry		



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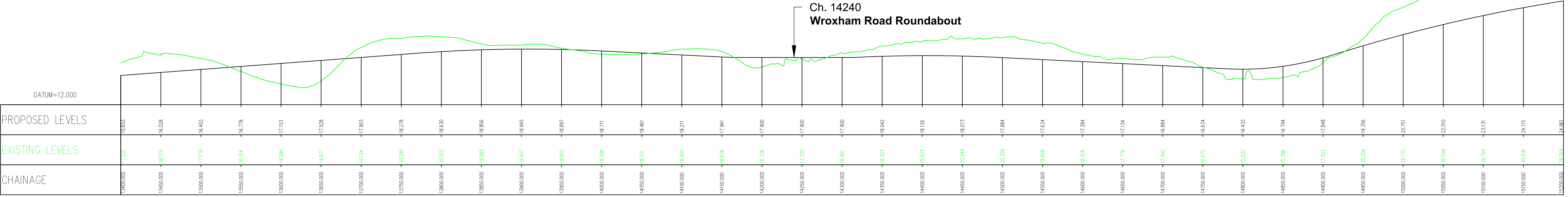
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 ENGINEERING LAYOUT AND PROFILE - MAINLINE
 SHEET 1 OF 12

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B	See Revision Sheet for details	MKu	04/13
C	See Revision Sheet for details	MKu	07/13
D	See Revision Sheet for details	MKu	01/13
E	See Revision Sheet for details	JB	09/13

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DRAWN BY	JT	05/12	Norwich Northern Distributor Road
CHECKED BY	MKu	06/12	SCALE 1:2500/1:250
			FILE No R1C093

Key

- Northern Distributor Road
- Indicative Woodland creation
- Indicative Grassland creation
- Indicative Scrubland creation
- Existing Woodland
- Existing pond, lake or river
- Proposed Site Compound
- Proposed Temporary Topsoil Storage area
- Proposed Temporary Traffic Diversion (to complete tie-in)
- Proposed Culverts
- Proposed Drainage Lagoons
- Proposed Bat Gantry
- Existing Footpaths
- Existing Restricted Byways (RB) and Bridleways (BR)
- Proposed Cycle Tracks (with right of way on foot)
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- Proposed Turning Heads (some with combined Field Access)
- Proposed Swales
- Proposed Ditches
- Chainage



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Birse Civils

Mott MacDonald

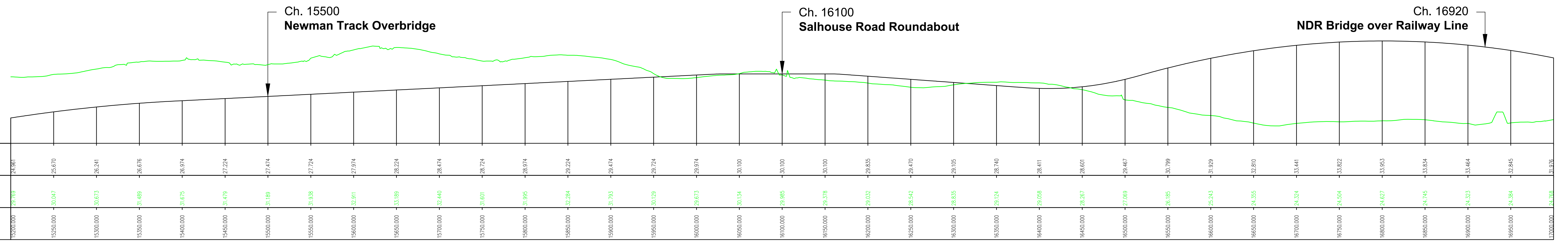
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DRAWING TITLE
 NORWICH NORTHERN DISTRIBUTOR ROAD
 ENGINEERING LAYOUT AND PROFILE - MAINLINE
 SHEET 9 OF 12

REVISION	DESCRIPTION	CHECKED	DATE
A	See Revision Sheet for details	MKu	01/13
B	See Revision Sheet for details	MKu	04/13
C	See Revision Sheet for details	MKu	07/13
D	See Revision Sheet for details	MKu	01/13
E	See Revision Sheet for details	JB	09/13

SURVEYED BY	INITIALS	DATE	DRAWING No
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DESIGNED BY	JT	05/12	PROJECT TITLE
DRAWN BY	JT	05/12	Norwich Northern Distributor Road
CHECKED BY	MKu	06/12	SCALE 1:2500/1:250
			FILE No R1C093

- Key**
- Northern Distributor Road
 - Indicative Woodland creation
 - Indicative Grassland creation
 - Indicative Scrubland creation
 - Existing Woodland
 - Existing pond, lake or river
 - Proposed Site Compound
 - Proposed Temporary Topsoil Storage area
 - Proposed Temporary Traffic Diversion (to complete tie-in)
 - Proposed Culverts
 - Proposed Drainage Lagoons
 - Proposed Bat Gantry
 - Existing Footpaths
 - Existing Restricted Byways (RB) and Bridleways (BR)
 - Proposed Cycle Tracks (with right of way on foot)
 - Proposed Footways/Cycleways
 - Proposed Bridleways
 - Proposed Private Means of Access (PMA)
 - Proposed Turning Heads (some with combined Field Access)
 - Proposed Swales
 - Proposed Ditches
 - Chainage



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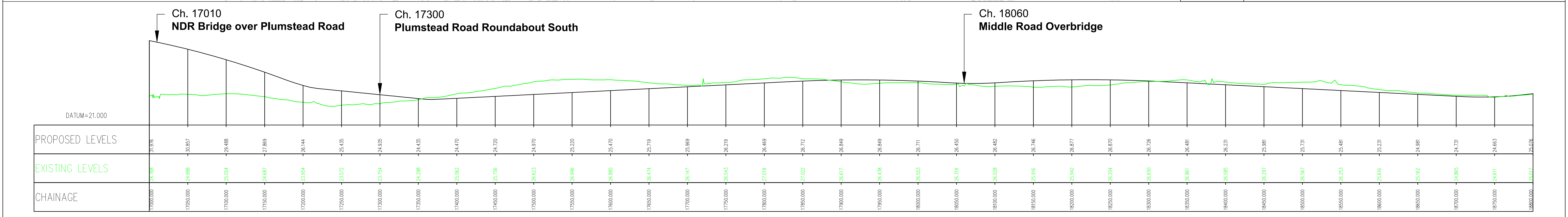
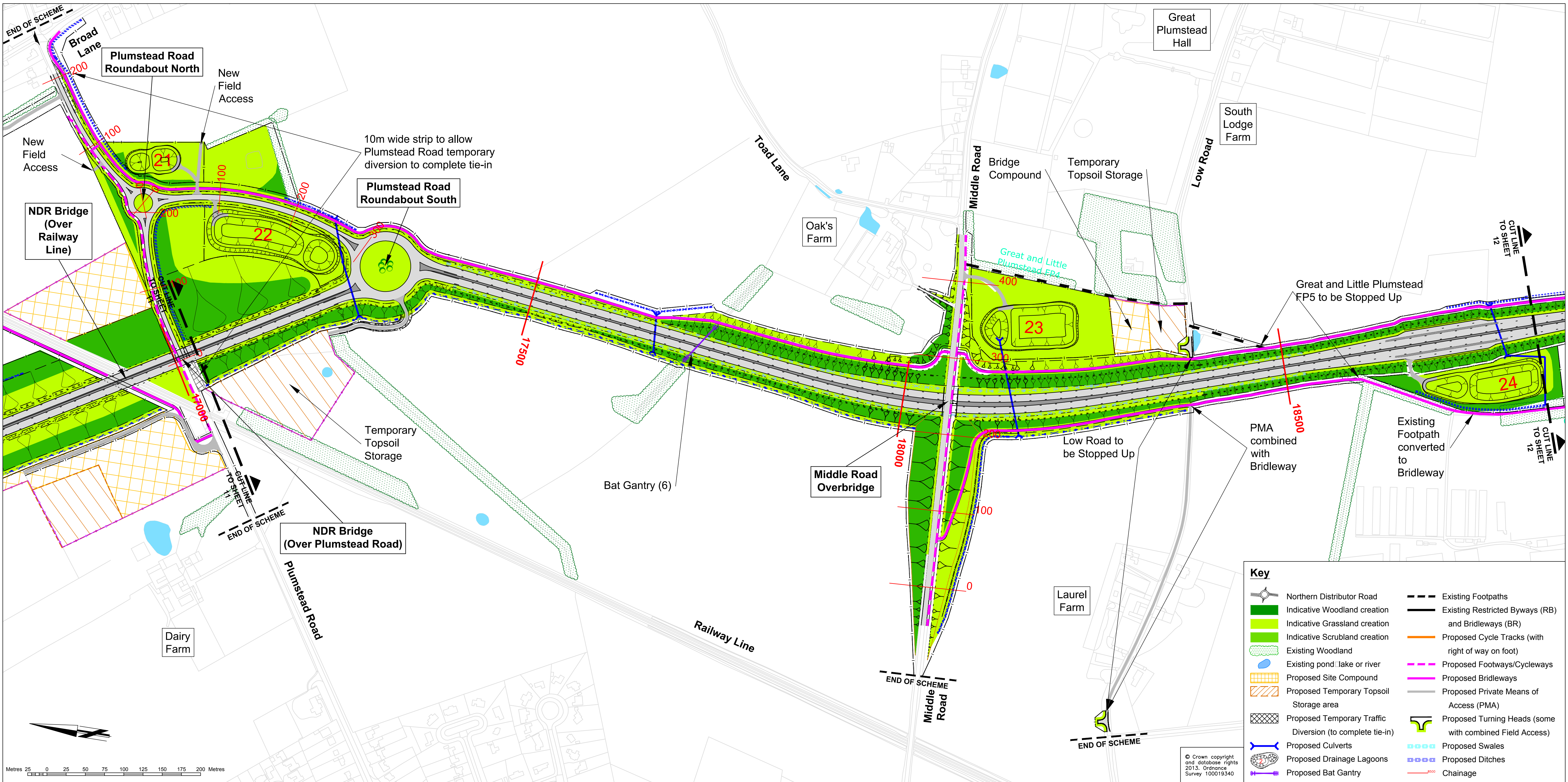
Mott MacDonald

Mike Jackson
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 Norfolk County Council
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DRAWING TITLE
 NORWICH NORTHERN DISTRIBUTOR ROAD
 ENGINEERING LAYOUT AND PROFILE - MAINLINE
 SHEET 10 OF 12

REVISION	DESCRIPTION	CHECKED	DATE
A	See Revision Sheet for details	MKu	01/13
B	See Revision Sheet for details	MKu	04/13
C	See Revision Sheet for details	MKu	07/13
D	See Revision Sheet for details	MKu	01/13
E	See Revision Sheet for details	JB	09/13

SURVEYED BY	INITIALS	DATE	DRAWING No
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DESIGNED BY	JT	05/12	PROJECT TITLE
DRAWN BY	JT	05/12	Norwich Northern Distributor Road
CHECKED BY	MKu	06/12	SCALE 1:2500/1:250
			FILE No R1C093

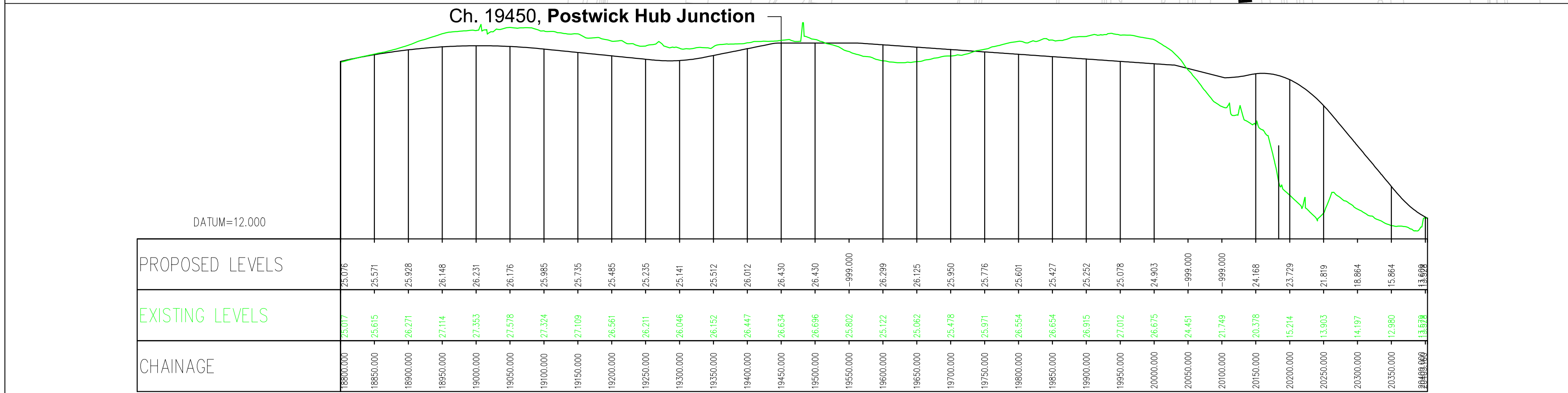


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DRAWING TITLE
 NORWICH NORTHERN DISTRIBUTOR ROAD
 ENGINEERING LAYOUT AND PROFILE - MAINLINE
 SHEET 11 OF 12

REV	DESCRIPTION	CHECKED	DATE
A	See Revision Sheet for details	MKu	01/13
B	See Revision Sheet for details	MKu	04/13
C	See Revision Sheet for details	MKu	07/13
D	See Revision Sheet for details	MKu	01/13
E	See Revision Sheet for details	JB	09/13

SUR. EYED BY	INITIALS	DATE	DRAWING No
SUR. EYED BY	OS	200	R1C093-R1-4013E
DESIGNED BY	JT	05/12	PROJECT TITLE
DRAWN BY	JT	05/12	Norwich Northern Distributor Road
CHECKED BY	MKu	06/12	SCALE 1:2500/1:250
			FILE No R1C093



Metres 25 0 25 50 75 100 125 150 175 200 Metres

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Key

- Northern Distributor Road
- Indicative Woodland creation
- Indicative Grassland creation
- Indicative Scrubland creation
- Existing Woodland
- Existing pond/lake or river
- Proposed Site Compound
- Proposed Temporary Topsoil Storage area
- Proposed Temporary Traffic Diversion (to complete tie-in)
- Proposed Culverts
- Proposed Drainage Lagoons
- Proposed Bat Gantry
- Existing Footpaths
- Existing Restricted Byways (RB) and Bridleways (BR)
- Proposed Cycle Tracks (with right of way on foot)
- Proposed Footways/Cycleways
- Proposed Bridleways
- Proposed Private Means of Access (PMA)
- Proposed Turning Heads (some with combined Field Access)
- Proposed Swales
- Proposed Ditches
- Chainage

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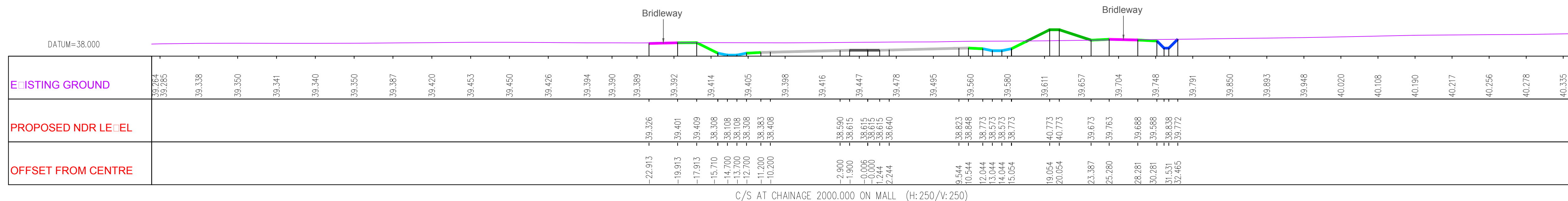
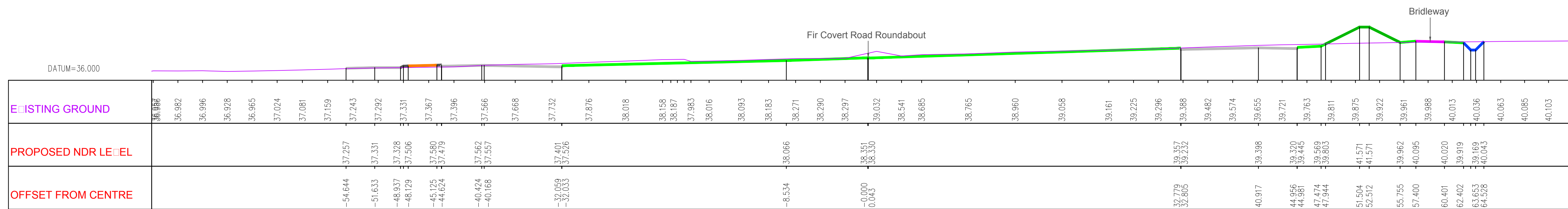
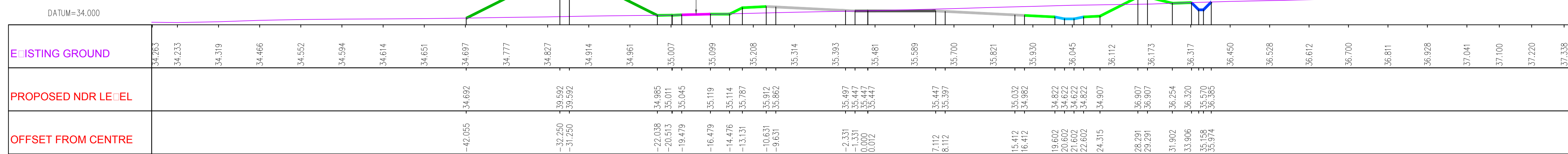
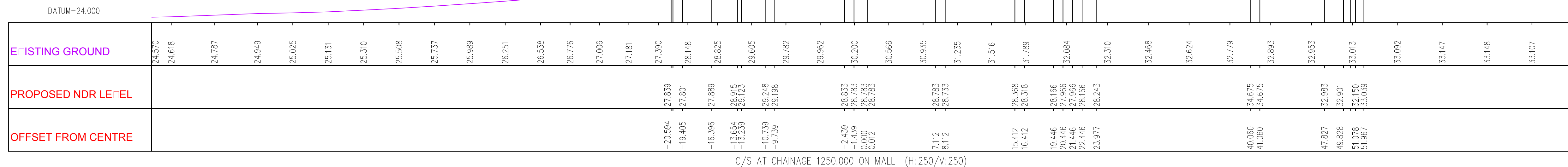
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 NORWICH NORTHERN DISTRIBUTOR ROAD
 ENGINEERING LAYOUT AND PROFILE - MAINLINE
 SHEET 12 OF 12

REVISION	DESCRIPTION	CHECKED	DATE
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B	See Revision Sheet for details	MKu	04/13
C	See Revision Sheet for details	MKu	07/13
D	See Revision Sheet for details	MKu	01/13
E	See Revision Sheet for details	JB	09/13

SURVEYED BY	INITIALS	DATE	DRAWING No
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DESIGNED BY	JT	05/12	PROJECT TITLE
DRAWN BY	JT	05/12	Norwich Northern Distributor Road
CHECKED BY	MKu	06/12	SCALE 1:2500/1:250
			FILE No R1C093

Appendix E
Typical Cross Sections Sheets 1-16
(Drawing No R1C093-R1-5115 to 5130)

- KEY**
- Carriageway
 - Central reservation
 - Grass / Scrubland
 - Woodland
 - Hedge
 - Swale
 - Ditch
 - Lagoon
 - PMA / Bridleway
 - Footway / Cycleway
 - Retaining Wall
 - Existing ground level



NDR ALIGNMENT AS PER ENGINEERING LAYOUT REV E

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Revision: 02
Date: 19/10/13



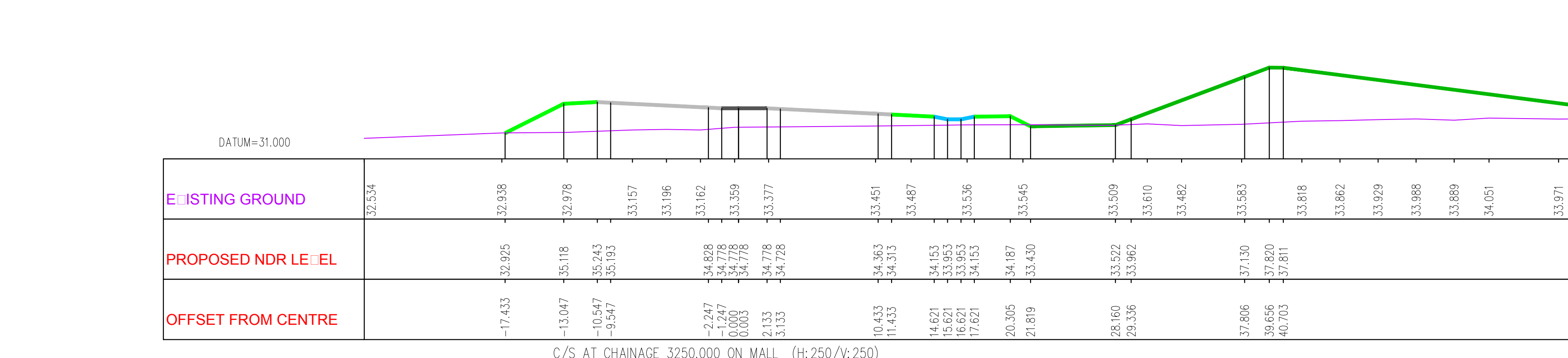
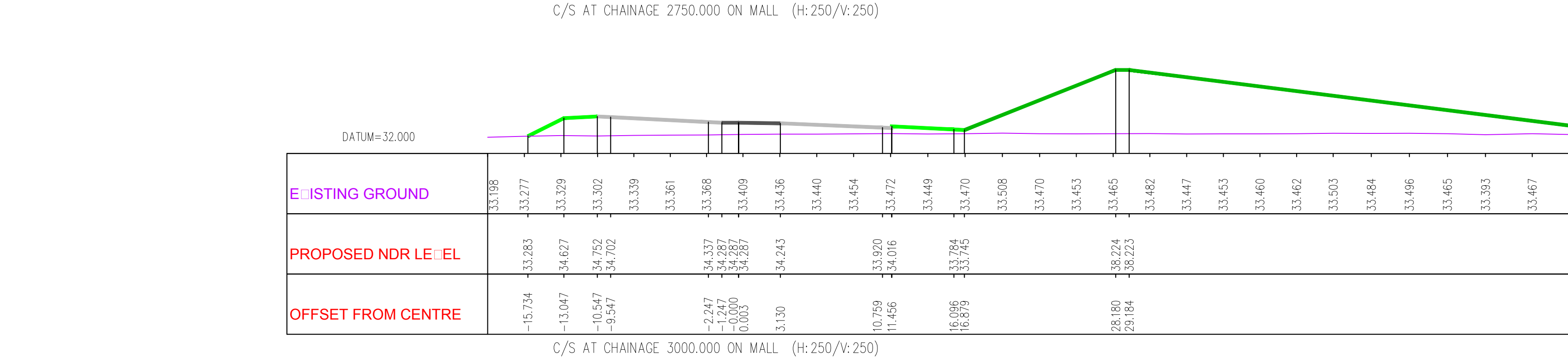
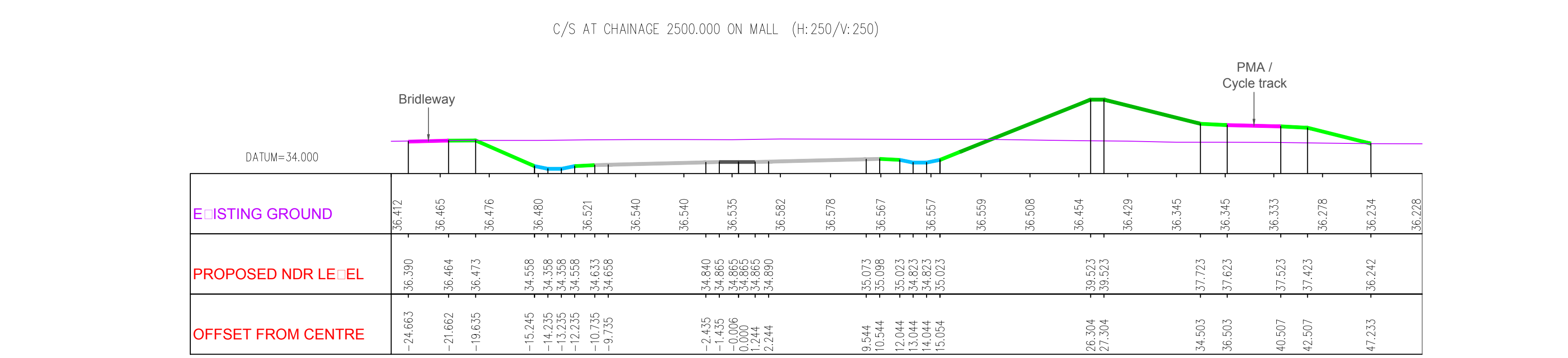
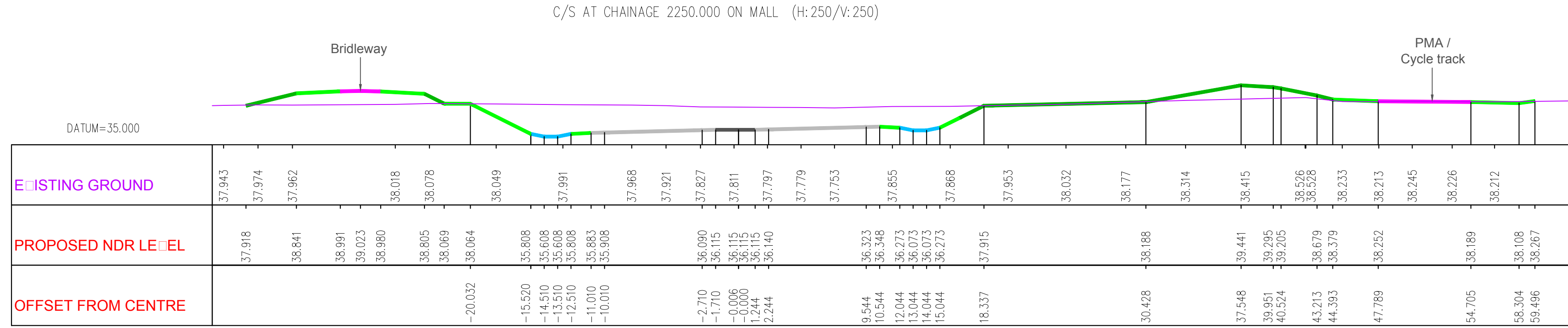
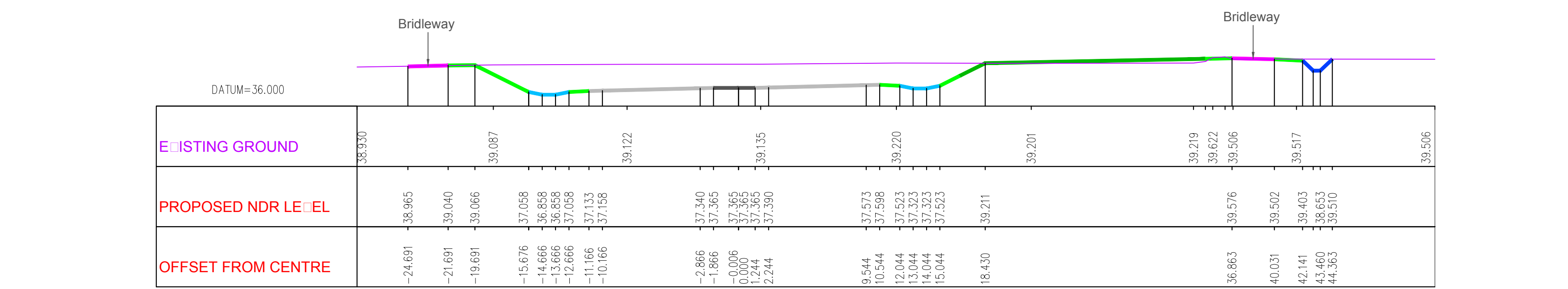
Mike Jackson
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DRAWING TITLE
Northern Distributor Road
Mainline Cross Sections - Chainage 1250 to 2000
(Sheet 2 of 16)

REVISION	DESCRIPTION	CHECKED	DATE

INITIALS	DATE	DRAWING No
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DESIGNED BY CR	10/13	PROJECT TITLE
DRAWN BY RH	10/13	Norwich Northern Distributor Road (NDR)
CHECKED BY		SCALE 1:250 A1 FILE No R1C093

- KEY**
- Carriageway
 - Central reservation
 - Grass / Scrubland
 - Woodland
 - Hedge
 - Swale
 - Ditch
 - Lagoon
 - PMA / Bridleway
 - Footway / Cycleway
 - Retaining Wall
 - Existing ground level



NDR ALIGNMENT AS PER ENGINEERING LAYOUT REV E

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Revision: 02
Date: 19/10/13



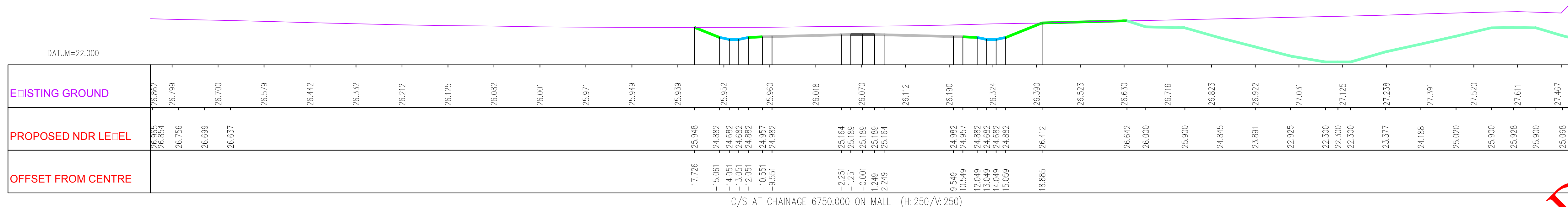
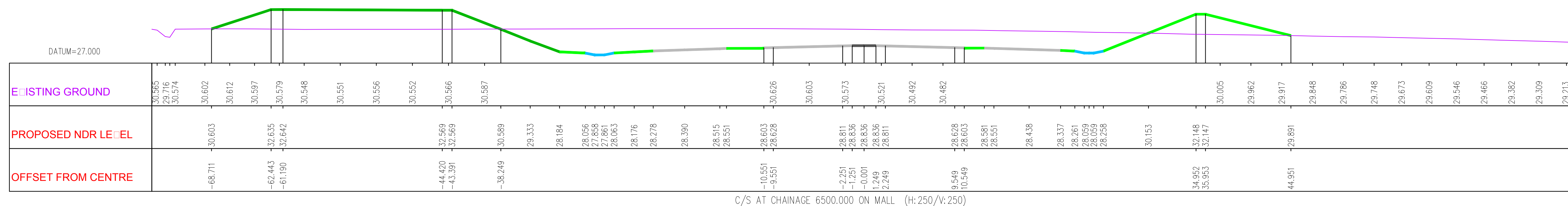
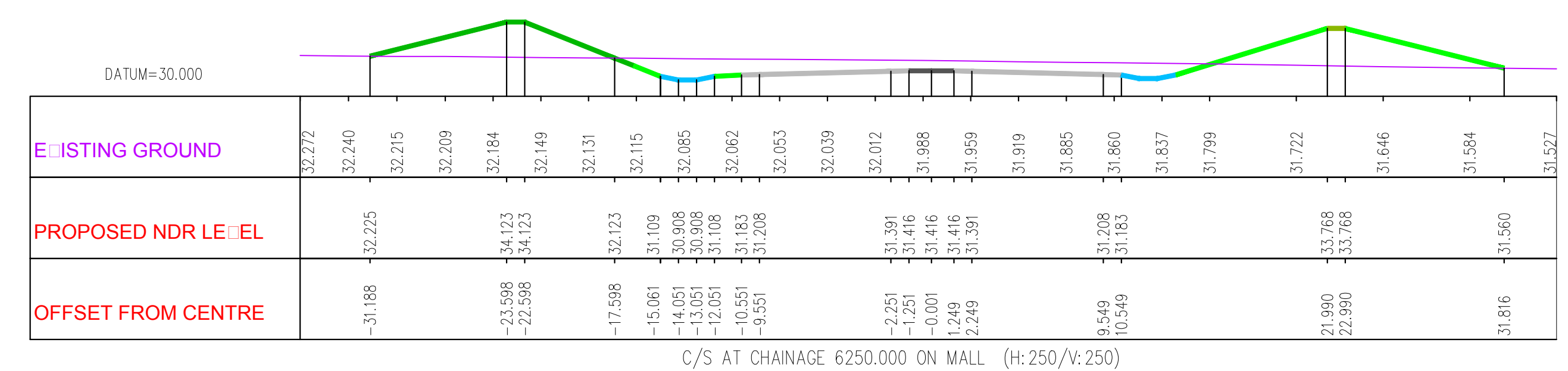
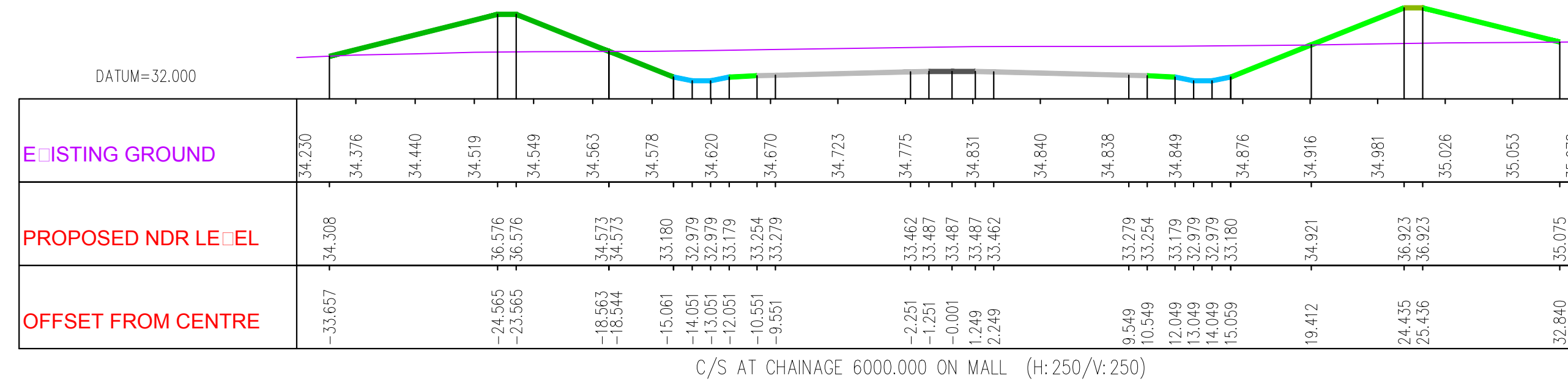
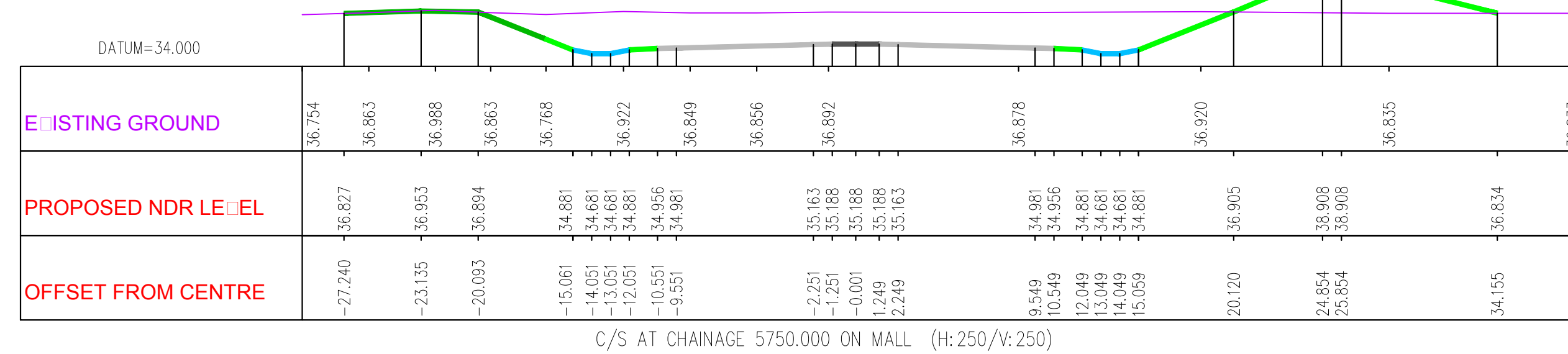
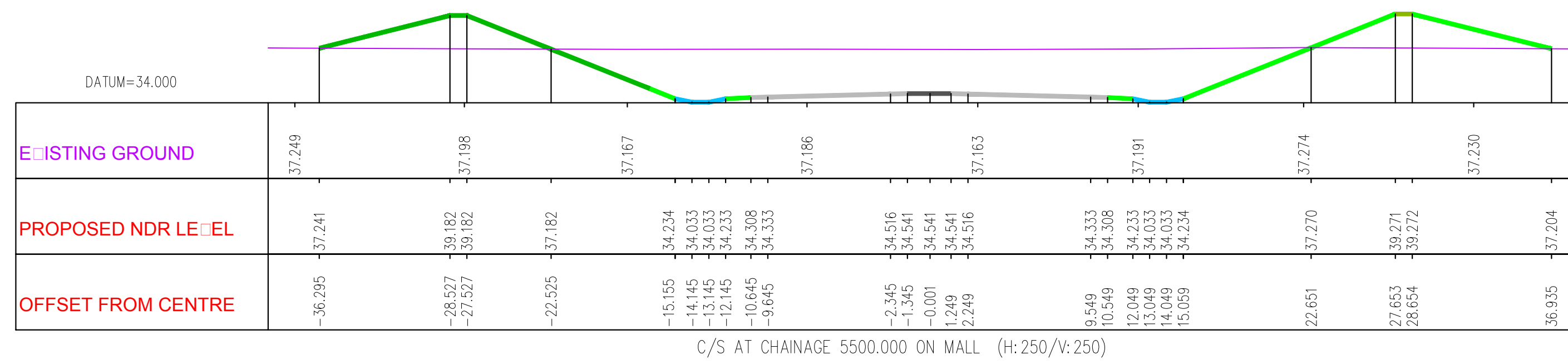
Mike Jackson
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Norwich NR1 2SG

DRAWING TITLE
Northern Distributor Road
Mainline Cross Sections - Chainage 2250 to 3250
(Sheet 3 of 16)

REVISION	DESCRIPTION	CHECKED	DATE

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DESIGNED BY	CR	02/13	PROJECT TITLE
DRAWN BY	RH	10/13	Norwich Northern Distributor Road (NDR)
CHECKED BY			SCALE 1:250 A1
			FILE No. R1C093

- KEY**
- Carriageway
 - Central reservation
 - Grass / Scrubland
 - Woodland
 - Hedge
 - Swale
 - Ditch
 - Lagoon
 - PMA / Bridleway
 - Footway / Cycleway
 - Retaining Wall
 - Existing ground level



NDR ALIGNMENT AS PER ENGINEERING LAYOUT REV E

DRAFT
 Revision: 02
 Date: 19/10/13



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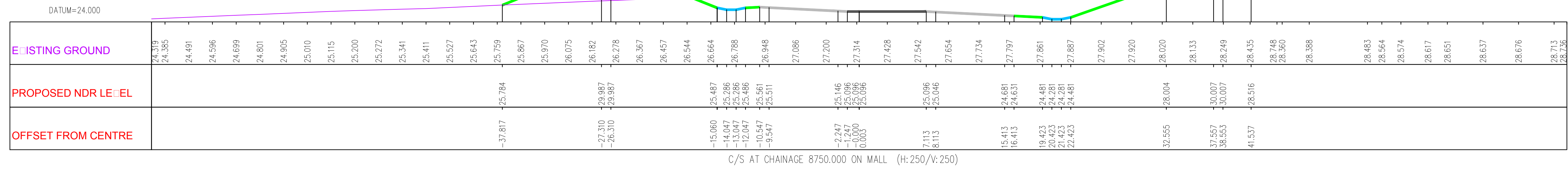
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 Mainline Cross Sections - Chainage 5500 to 6750
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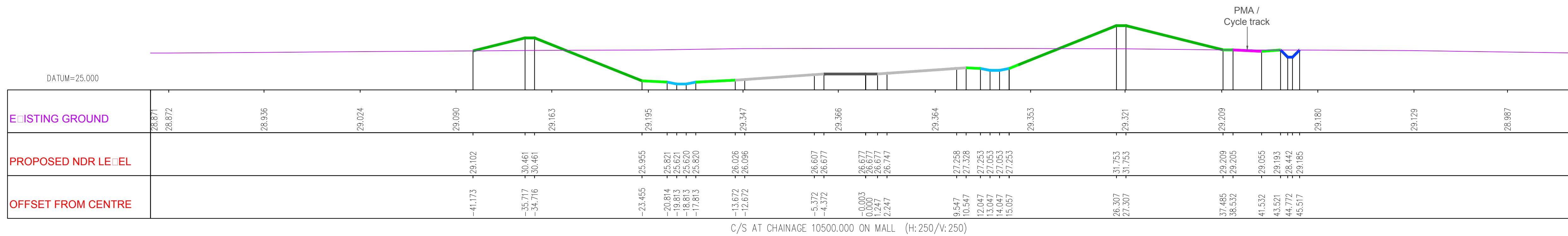
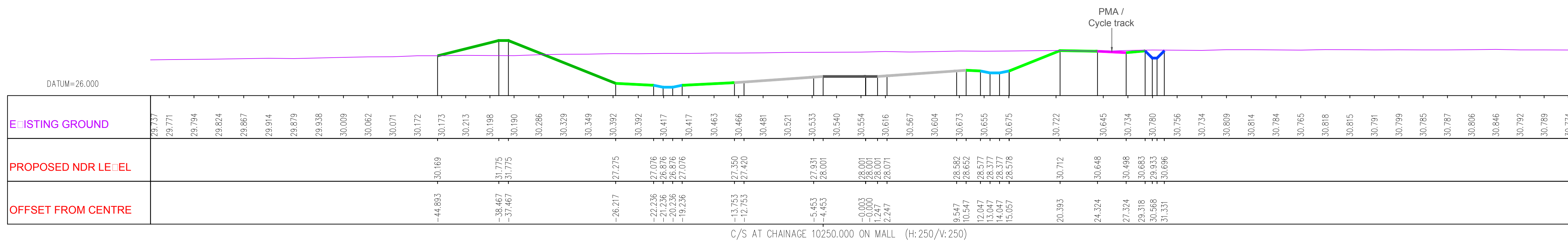
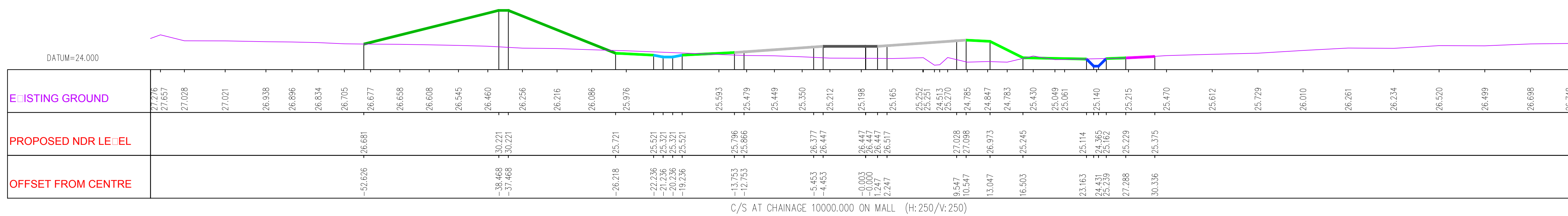
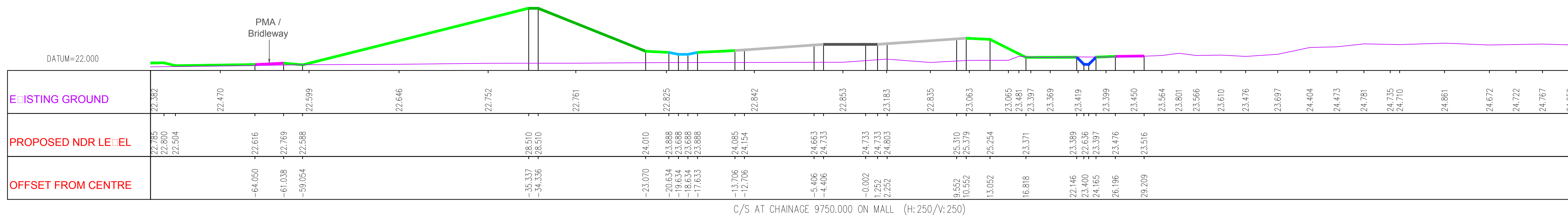
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DRAWN BY	RH	10/13	Norwich Northern Distributor Road (NDR)
CHECKED BY			SCALE 1:250 A1
			FILE No R1C093

KEY

- Carriageway
- Central reservation
- Grass / Scrubland
- Woodland
- Hedge
- Swale
- Ditch
- Lagoon
- PMA / Bridleway
- Footway / Cycleway
- Retaining Wall
- Existing ground level



- KEY**
- Carriageway
 - Central reservation
 - Grass / Scrubland
 - Woodland
 - Hedge
 - Swale
 - Ditch
 - Lagoon
 - PMA / Bridleway
 - Footway / Cycleway
 - Retaining Wall
 - Existing ground level



NDR ALIGNMENT AS PER ENGINEERING LAYOUT REV E

DRAFT
Revision: 02
Date: 19/10/13



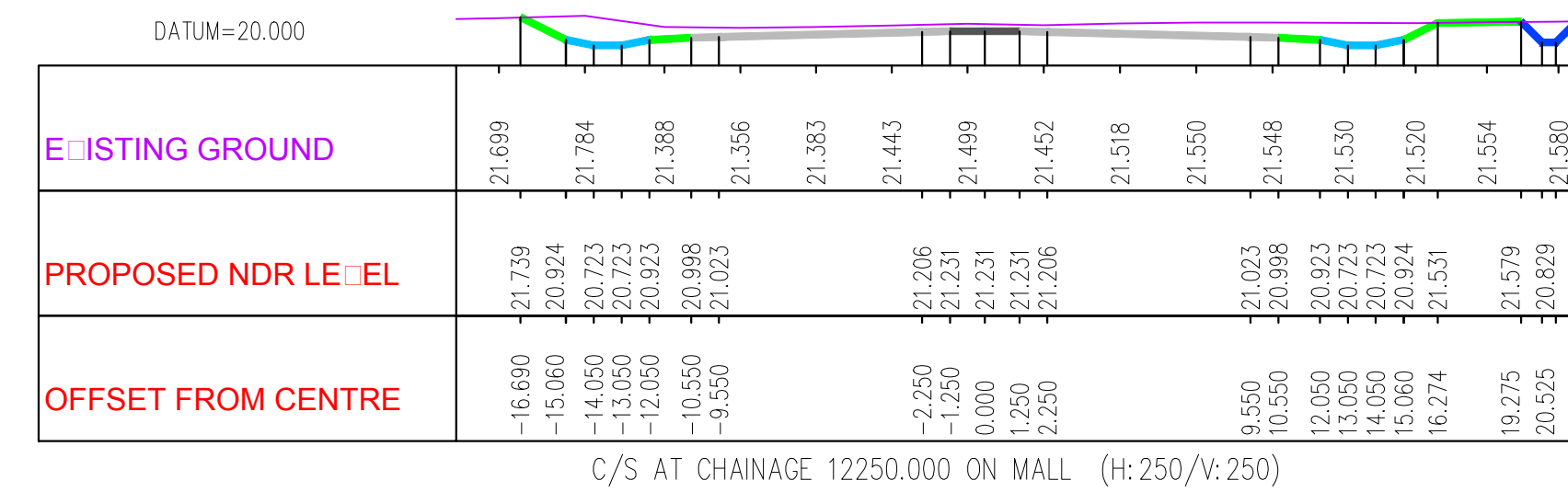
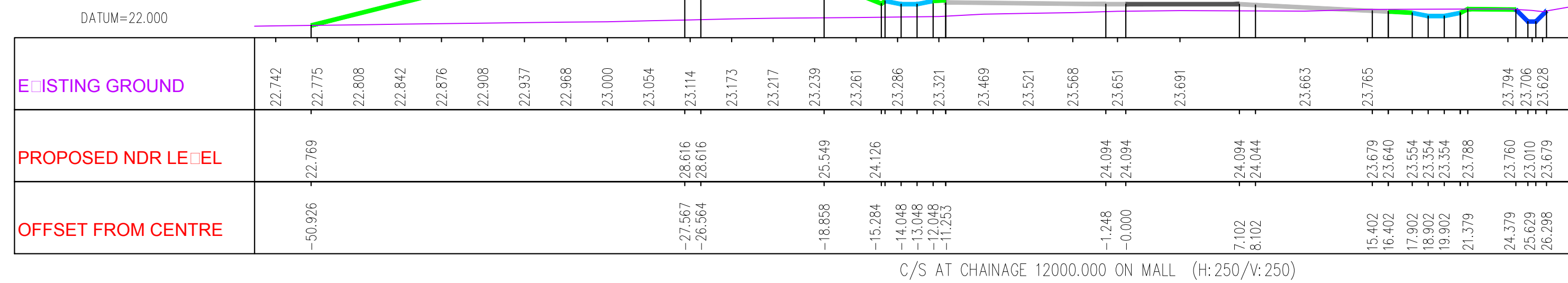
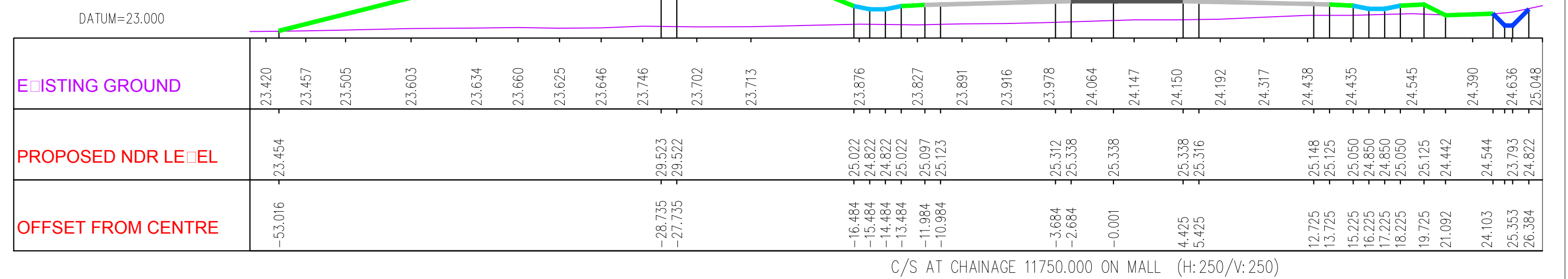
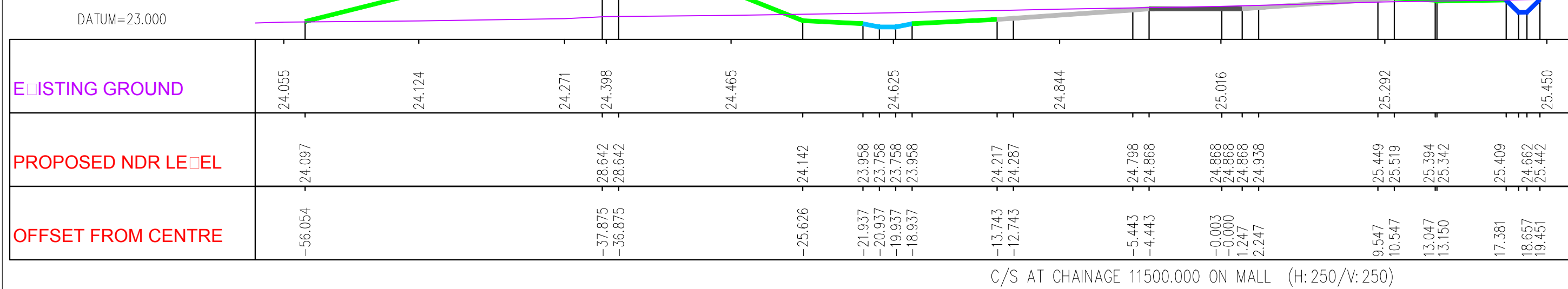
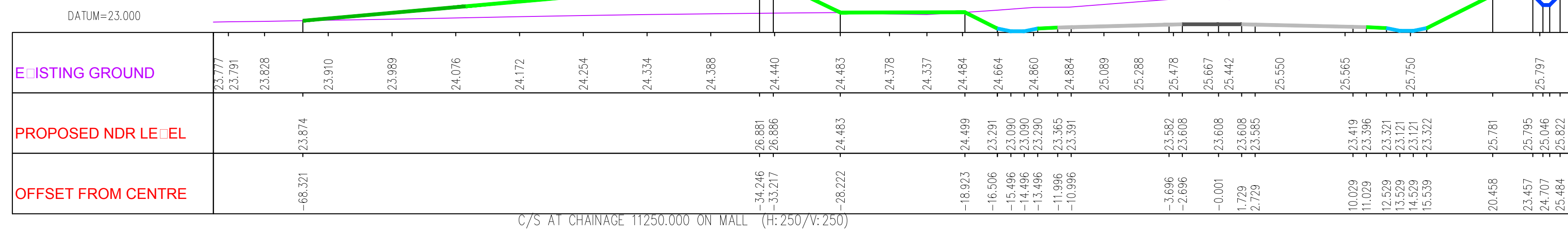
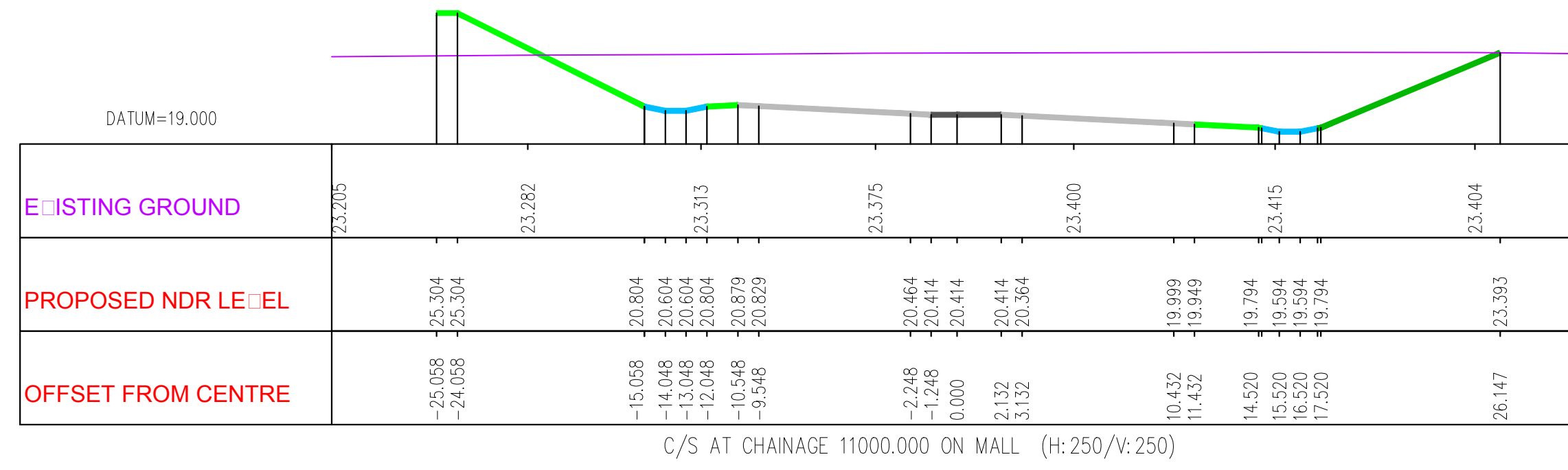
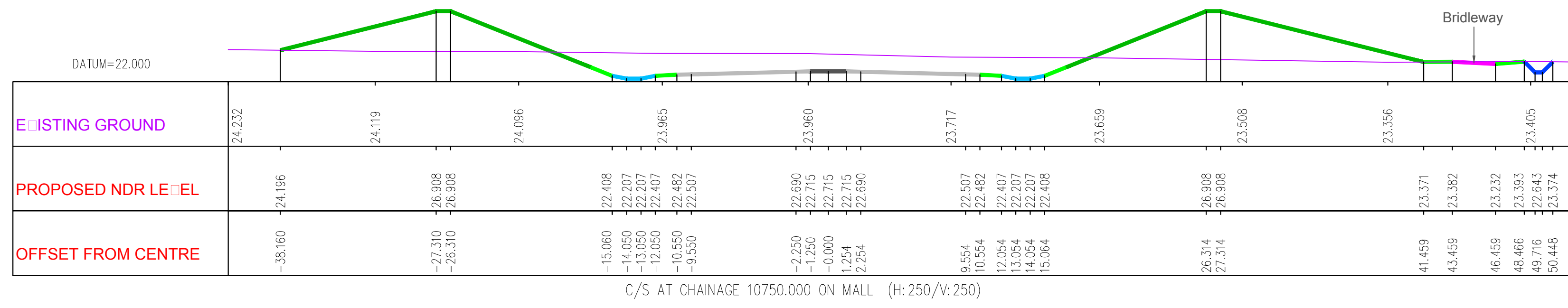
Mike Jackson
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Norfolk County Council
County Hall
Martineau Lane
Norwich NR1 2SG

DRAWING TITLE
Northern Distributor Road
Mainline Cross Sections - Chainage 9750 to 10500
(Sheet 9 of 16)

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DESIGNED BY	CR	10/13	PROJECT TITLE
DRAWN BY	RH	10/13	Norwich Northern Distributor Road (NDR)
CHECKED BY			SCALE 1:250 A1 FILE No R1C093

KEY	
	Carriageway
	Central reservation
	Grass / Scrubland
	Woodland
	Hedge
	Swale
	Ditch
	Lagoon
	PMA / Bridleway
	Footway / Cycleway
	Retaining Wall
	Existing ground level



NDR ALIGNMENT AS PER ENGINEERING LAYOUT REV E

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Revision: 02
Date: 19/10/13



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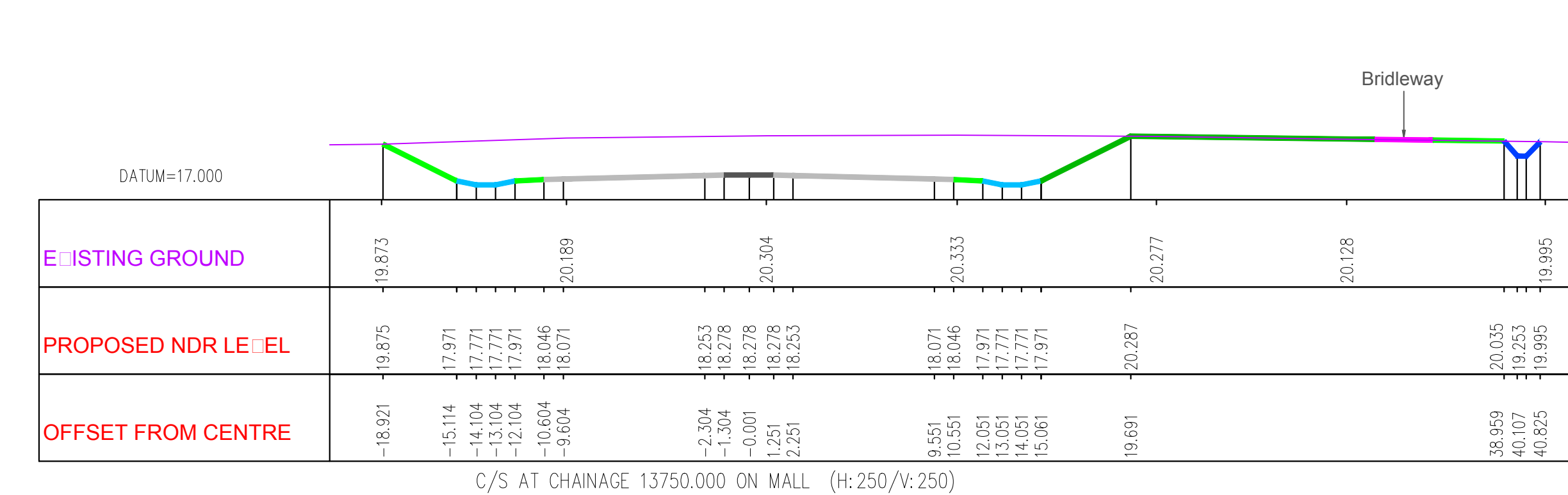
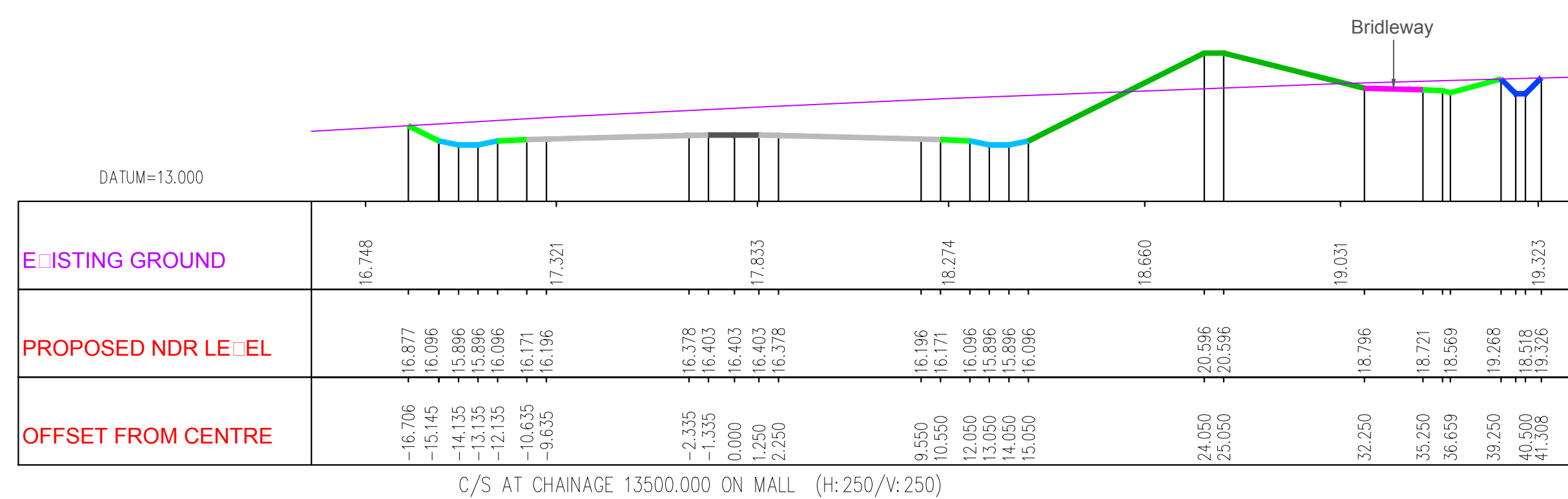
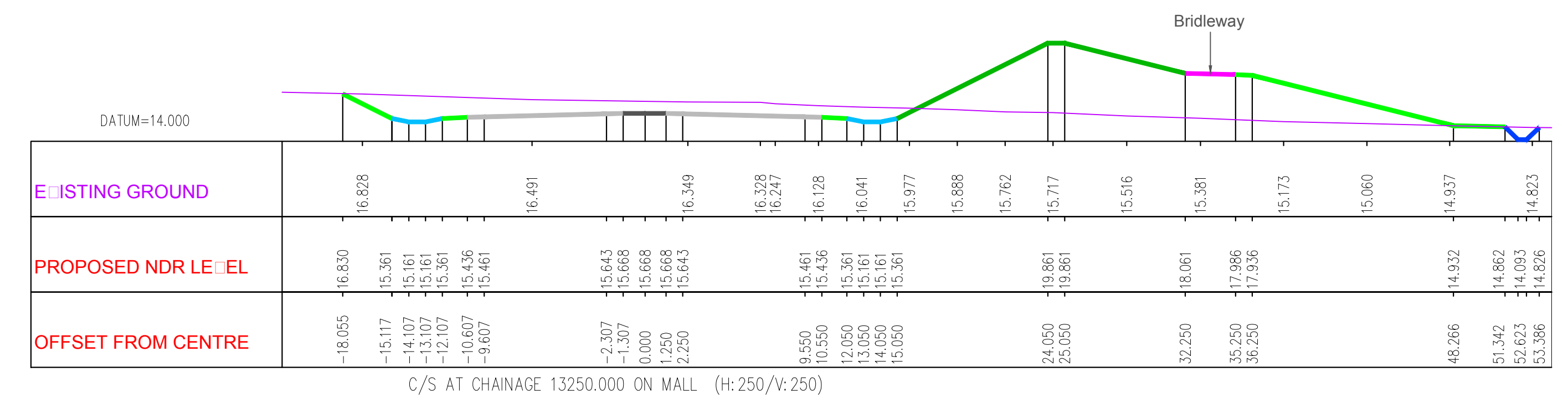
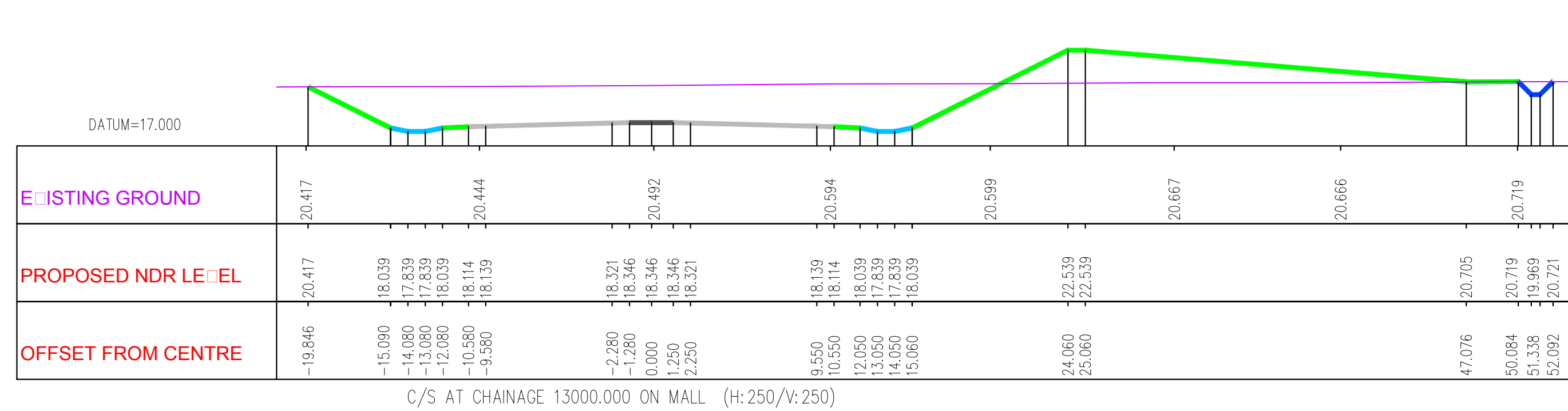
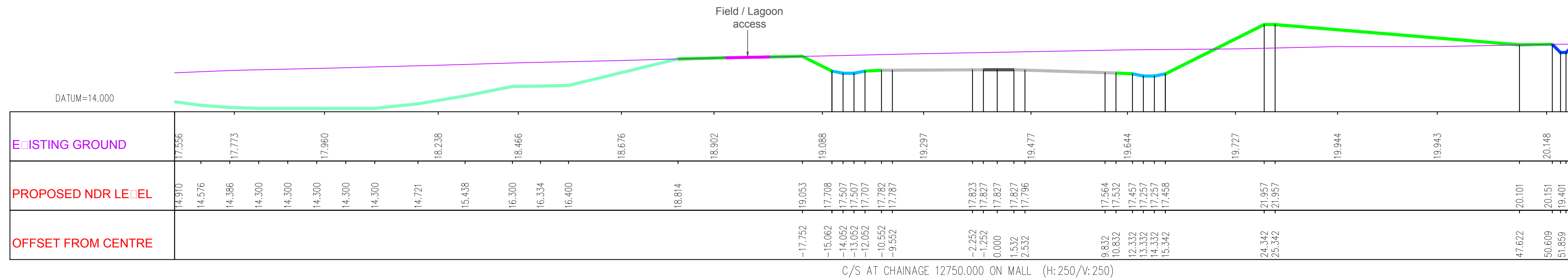
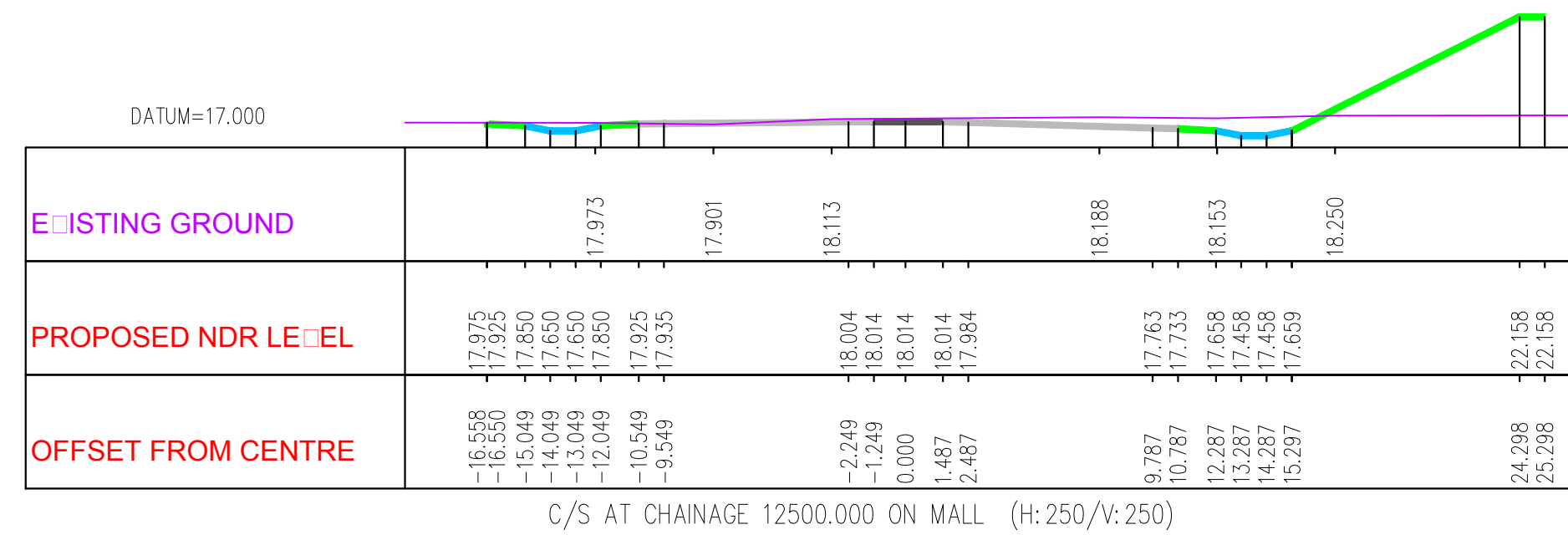
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Mainline Cross Sections - Chainage 10750 to 12250
(Sheet 10 of 16)

REVISION	DESCRIPTION	CHECKED	DATE

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DESIGNED BY	RC	10/13	PROJECT TITLE
DRAWN BY	RH	10/13	Norwich Northern Distributor Road (NDR)
CHECKED BY			SCALE 1:250 A1
			FILE No R1C093

KEY

- Carriageway
- Central reservation
- Grass / Scrubland
- Woodland
- Hedge
- Swale
- Ditch
- Lagoon
- PMA / Bridleway
- Footway / Cycleway
- Retaining Wall
- Existing ground level



NDR ALIGNMENT AS PER ENGINEERING LAYOUT REV E

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Revision: 02
Date: 19/10/13

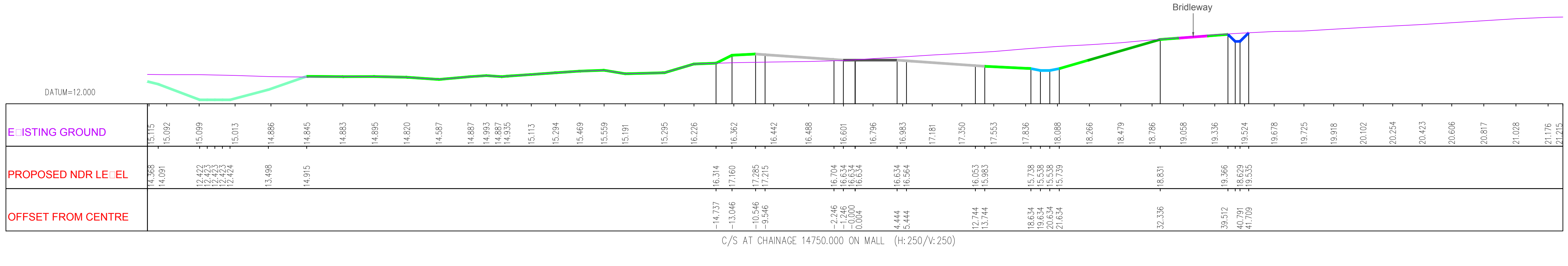
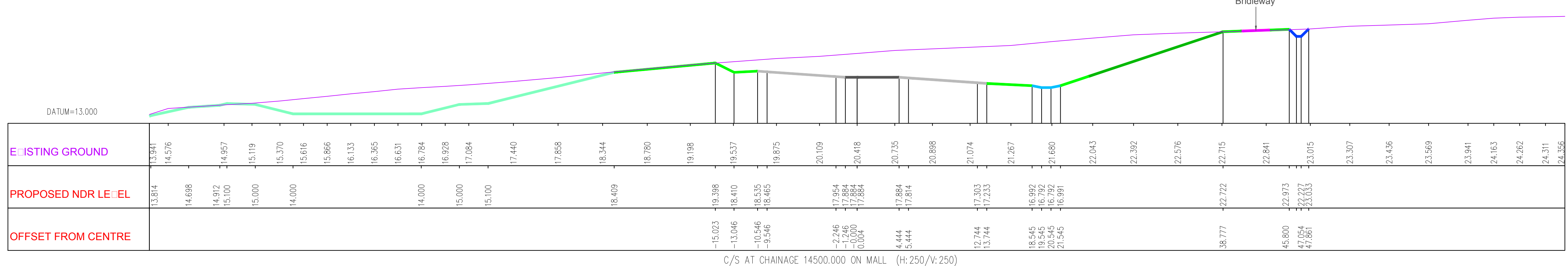
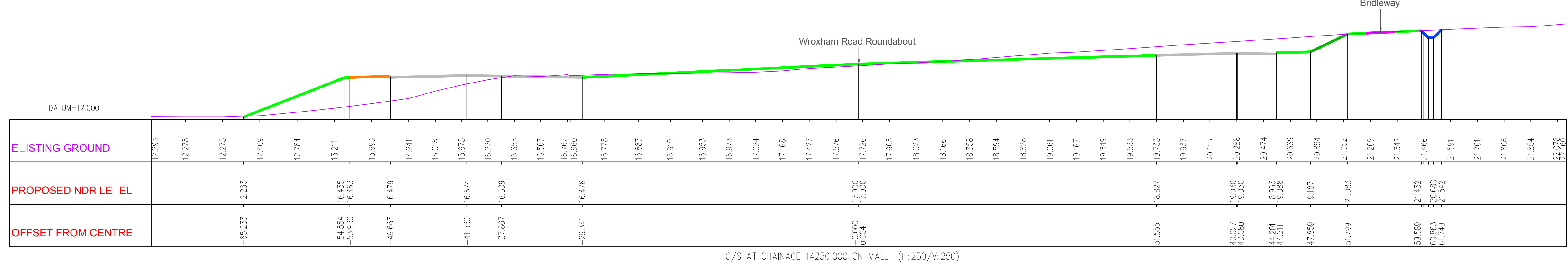
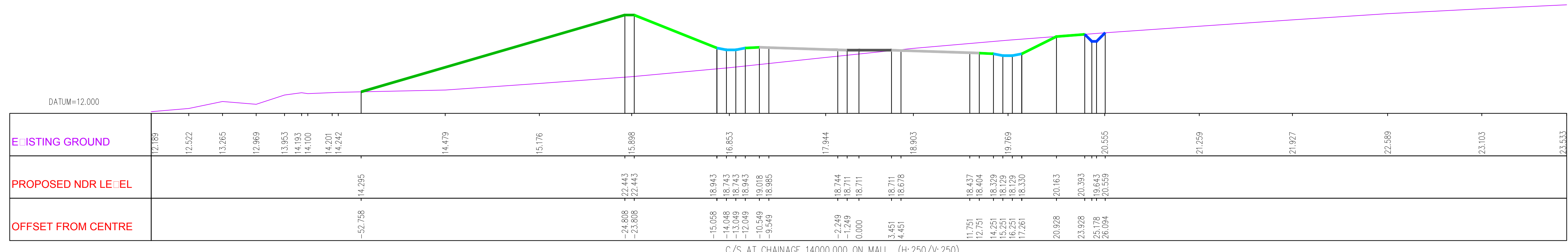


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Norwich NR1 2SG

DRAWING TITLE
Northern Distributor Road
Mainline Cross Sections - Chainage 12500 to 13750
(Sheet 11 of 16)

REVISION	DESCRIPTION	CHECKED	DATE

SURVEYED BY	INITIALS	DATE	DRAWING No
SURVEYED BY	OS	02/13	R1C093-R1-5125
DESIGNED BY	CR	10/13	PROJECT NAME
DRAWN BY	RH	10/13	Norwich
CHECKED BY			Northern Distributor Road (NDR)
			SCALE 1:250 A1
			FILE No R1C093



KEY

- Carriageway
- Central reservation
- Grass / Scrubland
- Woodland
- Hedge
- Swale
- Ditch
- Lagoon
- PMA / Bridleway
- Footway / Cycleway
- Retaining Wall
- Existing ground level

NDR ALIGNMENT AS PER ENGINEERING LAYOUT REV E



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 Director of Environment, Transport and Development
 Norfolk County Council
 County Hall
 Martineau Lane
 Norwich NR1 2SG

DRAWING TITLE
 Mainline Cross Sections - Chainage 14000 to 14750
 (Sheet 12 of 16)

REVISION	DESCRIPTION	CHECKED	DATE

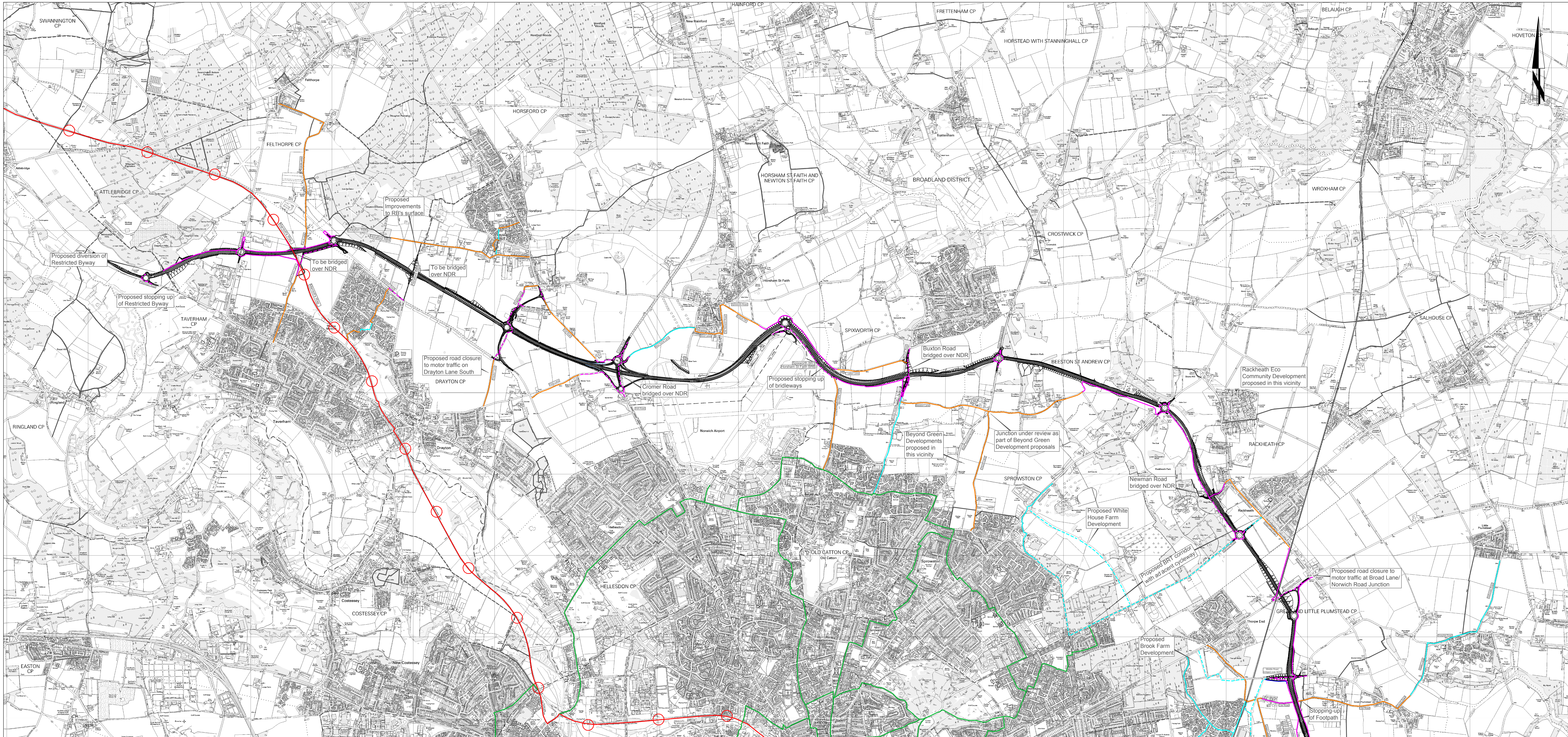
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DRAWN BY	RH	10/13		
CHECKED BY			SCALE: 1:250 A1	FILE NO: R1C093

DRAFT

Revision: 02

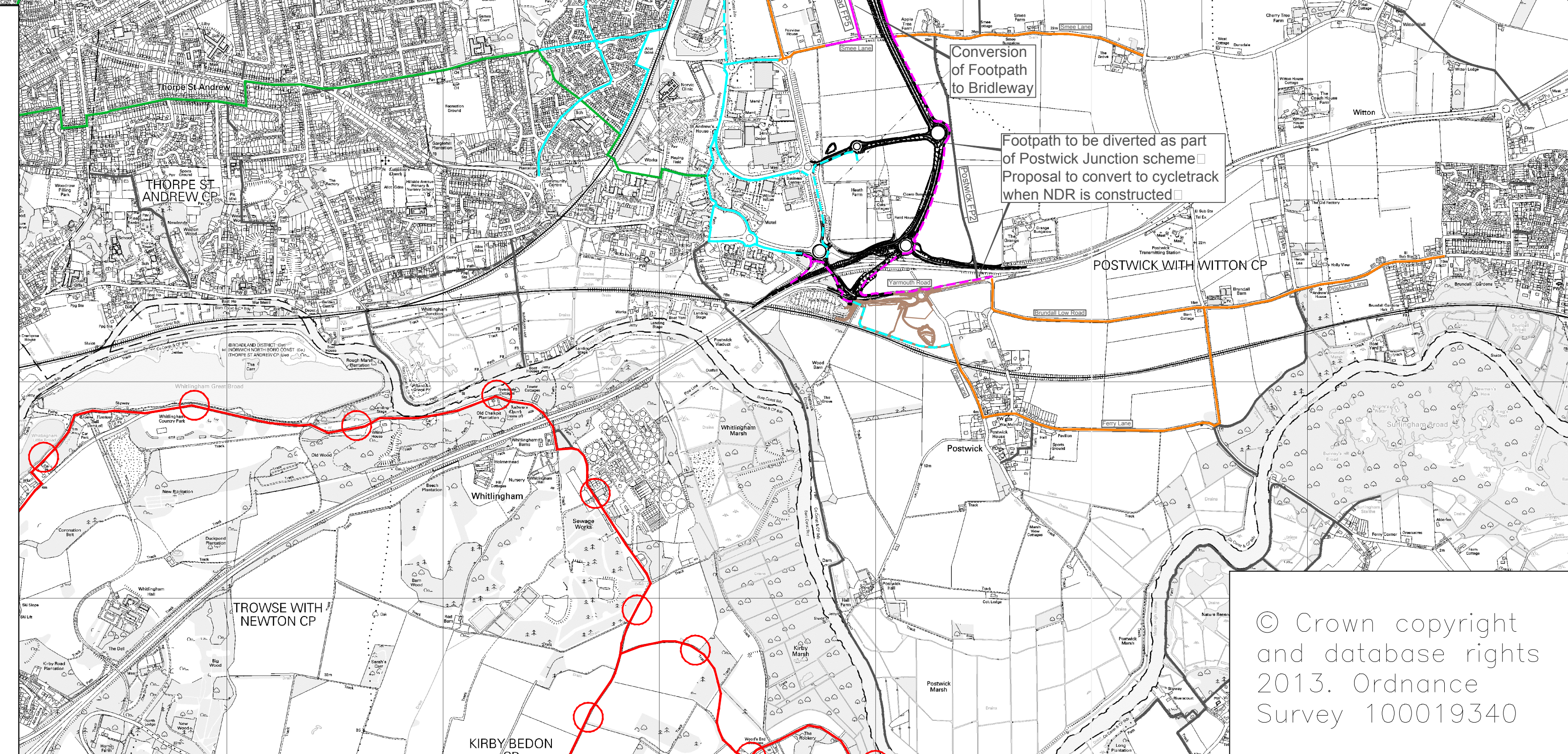
Date: 19/10/13

Appendix F
Non-Motorised User Links
Drawing R1C093-R1-4053A



KEY

Cycle Routes	Public Rights of Way
National Cycle Route 1	Existing Footpaths
Cross City Pedalways (Norwich City Cycle Map)	Existing Restricted Byways / Bridleways
Suggested links using existing Footways/Cycleways	Proposed Footway/Cycleway/Bridleway
Proposed Footway/Cycleway	Other
Proposed Footway/Cycleway (Non-NDR Scheme)	Suggested links using existing roads



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REV	DESCRIPTION	CHECKED	DATE
A	Updates to reflect Engineering Layout Rev E	GB	10/2013

SURVEYED BY	INITIALS	DATE	DRAWING No
OS	OS	2013	R1C093-R1-4053A
DESIGNED BY	DN/GB	01/2013	PROJECT TITLE
DRAWN BY	DN	01/2013	Norwich Northern Distributor Road
CHECKED BY	GB	01/2013	SCALE NTS
			FILE No R1C093

APPENDIX A

NDR Stage 1 Safety Audit Report

November 2013

INTRODUCTION

This report contains the results of a Stage 1 Safety Audit carried out on the above scheme. The Audit was carried out at the request of Norfolk County Council Highways Group.

The Audit Team membership was as follows:-

Nevil Calder BSc(Hons) CEng MICE MCIHT MSoRSA (Audit Team Leader)	Principal Consultant Mott MacDonald
--	--

Kevin Allen BEng(Hons) IEng MCIHT MSoRSA (Audit Team Member)	Project Engineer Network Analysis + Safety Norfolk County Council
---	---

Specialist Advisors:-

Andrew Sykes	Casualty Reduction Officer Norfolk County Council
--------------	--

The Audit took place at Carrow House on 08 and 14 November 2013. The audit comprised an examination of the Safety Audit submission document, previous safety audits of the scheme and a site inspection on 14 November 2013 by the Audit Team Leader. The weather was bright and road surfaces dry.

The terms of reference are as described in Environment, Transport and Development Highways Service Manual Procedure SP03-07. The Auditors have examined and reported only on the road safety implications of the scheme as presented and have not verified the compliance of the design to any other criteria.

ITEMS RAISED AT PREVIOUS AUDIT

Some safety issues raised at previous safety audits (stage 0 March 2007, stage 1 Dec 2008 and Feb 2012) have not been fully addressed and are referred to again in this report under items 1.1, 2.3, 5.1 and 5.3.

ITEMS RAISED AT THIS STAGE 1 AUDIT

1.0 General

1.1 Problem

Location: roadside throughout the scheme

Summary: risk of high severity impact with mature trees

Details of proposed planting were not included in this submission. On high speed roads mature trees present a significant hazard to errant vehicles, resulting in high severity injuries.

Recommendation

In accordance with TD19/06 no shrub planting should occur within 4.5m of the carriageway and no climax species within 9.0m unless protected by VRS.

Consideration should also be given to sideslope gradients within these distances.

Slopes steeper than 1in3 are considered non-traversable ie. on downslopes errant vehicles are likely to rollover or speed up towards any hazard at the bottom.

Where planting is proposed adjacent to visibility splays it should be set back at least 1m in order to allow for future growth. Permanent markers delineating such splays can assist future maintenance.

1.2 Problem

Location: roadside throughout the scheme

Summary: risk of high severity impact with roadside fencing

Details of proposed fencing were not submitted at this stage. On high speed roads fencing with rigid horizontal rails presents a significant hazard to errant vehicles. Impact can result in penetration of the vehicle cabin causing high severity injuries.

Recommendation

On NDR mainline no fencing should have rigid horizontal rails

2.0 Alignment

2.1 Problem

Location: CH8200 and CH10200

Summary: visibility partially obstructed by median VRS

There are locations where visibility appears to be restricted to 2 steps below standard by median VRS in combination with horizontal curvature of 1 step below. This obstruction to visibility is partial (only affects lower height objects) and occurs on non-event sections, away from junctions where braking/queuing might be anticipated; however it should be noted as a departure from standard.

Recommendation

In order to minimise the obstruction to visibility, a median VRS of the wire rope barrier type is recommended due to its narrow profile and lower height.

2.2 Problem

Location: CH8600 approach to airport roundabout

Summary: visibility obstructed by median VRS

Visibility appears to be restricted by the median VRS to 1 step below standard on approach to a roundabout junction. As above, the obstruction is partial, however a departure from standard is not considered appropriate here due to the likelihood of braking/queuing.

Recommendation

Check visibility and amend the alignment and/or widen the median in order meet standard SSD.

2.3 Problem

Location: CH18700

Summary: lay-by provision introduces conflicts

In view of the distributor nature of the road and frequent junction provision, a strategy of non provision of lay-bys has been adopted. The proposed lay-bys at this point are the only ones on the 21km length and the exceptional nature of this location is not understood. They appear to introduce unnecessary potential conflicts.

Recommendation

Delete the proposed lay-bys.

3.0 Junctions

3.1 Problem

Location: NDR roundabouts - radial route approaches

Summary: splitter island lengths

The splitter islands on many of the radial route arms are shorter than desirable on a high speed approach. A longer island would aid conspicuity (particularly as roundabouts will be unlit), improve tangential guidance and minimise risk of crossover accidents on busy exits.

Recommendation

Extend splitter island lengths to 30-50m where practicable.

3.2 Problem

Location: Fakenham Road roundabout

Summary: narrow 3 lane entry/circulatory increases risk of side swipe collisions

The 3-lane north-western entry feeding into a 9m circulatory carriageway is considered to raise the risk of side swipe collisions. Projected traffic flows here do not appear to require 3 lanes.

Recommendation

Reduce the Fakenham Road north-west entry to 2 lanes. This may also offer the opportunity to improve the tangential path guidance provided by the splitter island.

3.3 Problem

Location: Fakenham Road roundabout

Summary: relaxed entry path curvatures raises risk of failure to give way

The entry path radius on the Fakenham Road SE arm appears to be in excess of 100m raising the risk of failure to give way.

Recommendation

Check entry path radius and modify geometry as necessary.

3.4 Problem

Location: Fir covert Road roundabout

Summary: excessive circulatory width for projected flows

The 12m circulatory width (in common with other NDR roundabouts) appears excessive for the projected flows here. This can lead to poor lane discipline, higher speeds and increased risk of accidents on the circulatory area.

Recommendation

Review the need for such a wide circulatory carriageway. If the capacity is judged necessary in the long term then temporary measures to reduce the width may be appropriate.

3.5 Problem

Location: Reepham Road roundabout

Summary: SE arm geometry safety implications

Inadequate tangential guidance is provided by the splitter island on the SE arm which raises the risk of striking the central island or losing control. The flare length also appears to be very short raising concern over potential queuing on this arm.

Recommendation

Review the geometry of this arm to address these issues.

3.6 Problem

Location: Cromer Road westbound merge slip road

Summary: 2-way layout poses risk of head-on collisions

The length of the proposed 2-way section coupled with low eastbound usage raises concern over westbound drivers using it either deliberately or mistakenly for overtaking.

Recommendation

Reposition the access to lagoon 8A to its SE corner thereby significantly shortening the 2-way length to mitigate this risk.

3.7 Problem

Location: Various roundabouts

Summary: Private/service accesses

A number of the roundabouts have an arm serving private access to farms or drainage lagoons. This adds to the complexity of the roundabout layout which can have

adverse safety implications. In addition to clear signing, a different surface treatment would help differentiate these exits for circulating traffic.

Recommendation

Provide flush kerbs and a band of contrasting coloured surfacing to these arms.

3.8 Problem

Location: Airport roundabout

Summary: southern arm layout is potentially misleading for drivers

A 2-lane exit from the roundabout is shown for the private access road to the Airport and Petans training centre. This will make it look unnecessarily like the other dual carriageway exits, increasing the potential for driver confusion. The airport access in particular will need to be gated to avoid inadvertent entry to the airfield.

Recommendation

Redesign this arm to reduce the potential for confusion, providing conspicuous gates together with turning facilities for any errant vehicle to rejoin NDR without reversing onto the roundabout.

3.9 Problem

Location: Broad Lane closure at Plumstead Road

Summary: farm road offers potential rat-run

A farm access road is indicated which bypasses the closure point at the Broad Lane junction. This could be attractive to general through traffic, eroding the benefit of the closure and increasing use of the lower standard farm access junction.

Recommendation

Ensure that the access road is gated

3.10 Problem

Location: Business Park Roundabout

Summary: high speed approach to segregated straight ahead lane

As noted in TD51 (parag 2.71), segregated straight ahead lanes have a number of inherent safety issues. These are exacerbated on a high speed dual carriageway where traffic approaching at 70mph is required to safely negotiate reverse curves of radius more than 6 design steps below standard. The reverse curves make application of superelevation extremely problematical. There is therefore a high attendant risk off loss of control, run-off accidents and HGV rollover.

Recommendation

Reconsider whether this feature is essential (it appears that conflicting traffic on the circulatory is limited to a single lane entry from the Business Park Link which will be interrupted by frequent northbound NDR traffic). If so, then provide measures to reduce speeds on entry to the segregated ahead lane to less than 40mph; the proposed mandatory speed limit is unlikely to suffice. In addition provide measures to mitigate against loss of control (eg high friction surfacing) and potential run-off (eg VRS).

4.0 Non-motorised Users

4.1 Problem

Location: Fir Covert Road Roundabout

Summary: bridleway ends at busy roundabout

A bridleway is indicated on the south side of NDR between Marriotts Way and Fir Covert Road. However this would bring horses out onto Fir Covert Rd roundabout with no obvious continuation of the facility.

Recommendation

Redesignate this stretch as footway/cycleway only.

4.2 Problem

Location: Reepham Road Roundabout

Summary: bridleway adjacent to busy roundabout

A bridleway is indicated on the north-western side of the roundabout in close proximity to the circulatory area where horses may be startled by the close proximity to heavy traffic. Furthermore the bridleway appears to be shown crossing Reepham Road using the roundabout splitter island which is not considered a safe refuge for horses.

Recommendation

Realign the bridleway route further from the roundabout to link with the specific horse crossing of Reepham Road.

4.3 Problem

Location: bridleway - CH10900 beneath Buxton Rd overbridge

Summary: proximity of bridleway to NDR mainline

A bridleway is indicated passing beneath the Buxton Rd overbridge adjacent to the westbound carriageway of NDR. The proximity to oncoming fast moving heavy traffic within the confines of the bridge structure is considered likely to be intimidating for horses with potential for rearing/bolting. This not only poses a danger to riders but also to NDR traffic should fencing not contain the animal.

Recommendation

Delete this section of bridleway; an alternative route appears to be available.

4.4 Problem

Location: Wroxham Road Roundabout

Summary: bridleway adjacent to busy roundabout

A bridleway is indicated on the south-eastern side of the roundabout in close proximity to the circulatory area where horses may be startled by the close proximity to heavy traffic. This appears to be a shared pedestrian cycle route posing a danger to other users. Furthermore there is concern about the risk of pedestrian/cycle crossing points being mistakenly used by horse riders.

The identified horse crossing point on the southern arm of Wroxham Road is around 120m from the roundabout suggesting that visibility in that direction will be less than recommended in TA90 even assuming 50kph roundabout exit speeds.

Recommendation

Realign the horse route further from the roundabout, segregated from ped/cycle use if possible. Move the horse crossing point further from the roundabout.

4.5 Problem

Location: CH17000 Road Roundabout

Summary: bridleway adjacent to railway line

A bridleway is proposed between Plumstead Road and Broad Lane directly adjacent to the railway line. Although rail traffic is quite light, horses may be startled by their close proximity, with potential for rearing/bolting.

Recommendation

Provide secure fencing/screening between bridleway and railway.

4.6 Problem

Location: bridleway - Plumstead Rd South Roundabout to CH17700

Summary: proximity of bridleway to NDR mainline

A bridleway is indicated adjacent to roundabout circulatory and southbound carriageway of NDR. Horses may be startled by the close proximity to fast moving heavy traffic, with potential for rearing/bolting. This poses a danger to riders and also to NDR traffic.

Recommendation

Move the proposed bridleway further from the carriageway and provide screening/fencing.

5.0 Signs, Lighting and Markings

5.1 Problem

Location: throughout the scheme

Summary: lack of street lighting increases night time accident risk

It is noted that the cost/benefit of lighting the scheme has been subject to a separate safety assessment in accordance with TD47/07 and that lighting is not proposed except for the complex Postwick interchange. Nevertheless there is some concern about night time risk, particularly at the large multi-lane roundabouts where some mitigation measures would be beneficial.

Recommendation

Full provision of white, red, amber and green road studs is recommended throughout in accordance with the TSM. Reduced stud spacing may be advantageous on approach to the unlit roundabouts. It is also recommended that key signs associated with the roundabout junctions should be lit, particularly direction signs at each exit (on the circulatory area the sweep of headlights tends to lag behind the driver's viewpoint).

Lighting is particularly beneficial to the safety of vulnerable road users. It may be considered that VRU crossing points at the roundabouts are initially likely to be very lightly used at night. However this should be reviewed in future in conjunction with planned development within and close to the NDR.

5.2 Comment

Location: NDR mainline

Summary: safety benefit of raised profile edge lines

Specific details of road markings were not submitted at this stage. However raised profile edge markings are recommended, not only for the benefit of audio vibratory warning but also improved night time and wet weather visibility.

5.3 Comment


Location: roadside throughout the scheme

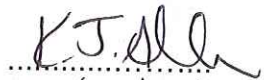

Summary: risk of high severity impact with large diameter sign posts and lighting columns

Post details were not submitted at this stage. However the benefits of passive posts should be assessed in accordance with NCC policy *The Use of Passively Safe Street Furniture in Norfolk*

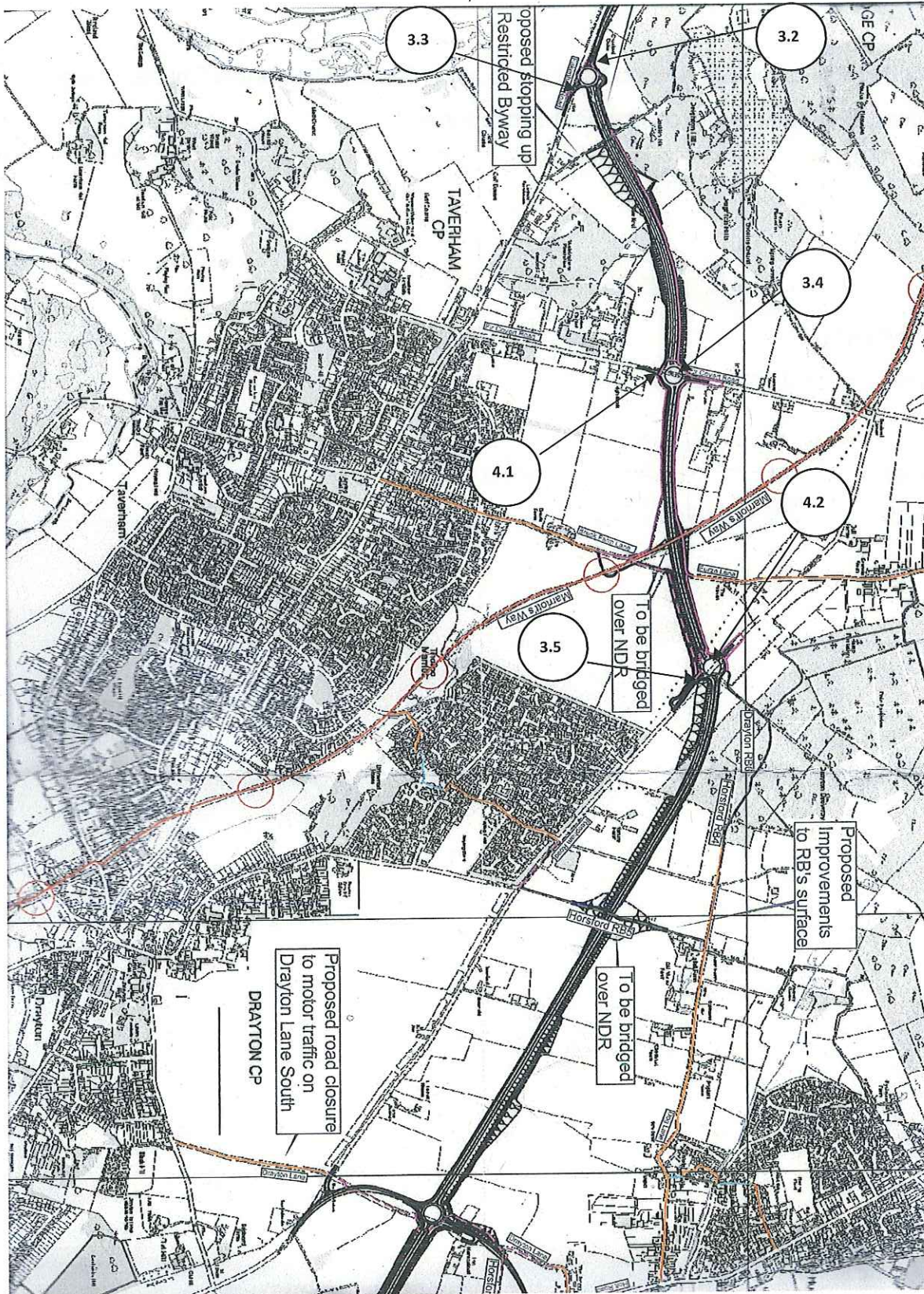
AUDIT TEAM STATEMENT

We certify that this audit has been carried out in accordance with Norfolk County Council Environment, Transport and Development Procedures.

Signed (ATL)  Nevil Calder
Dated 20 Nov 2013

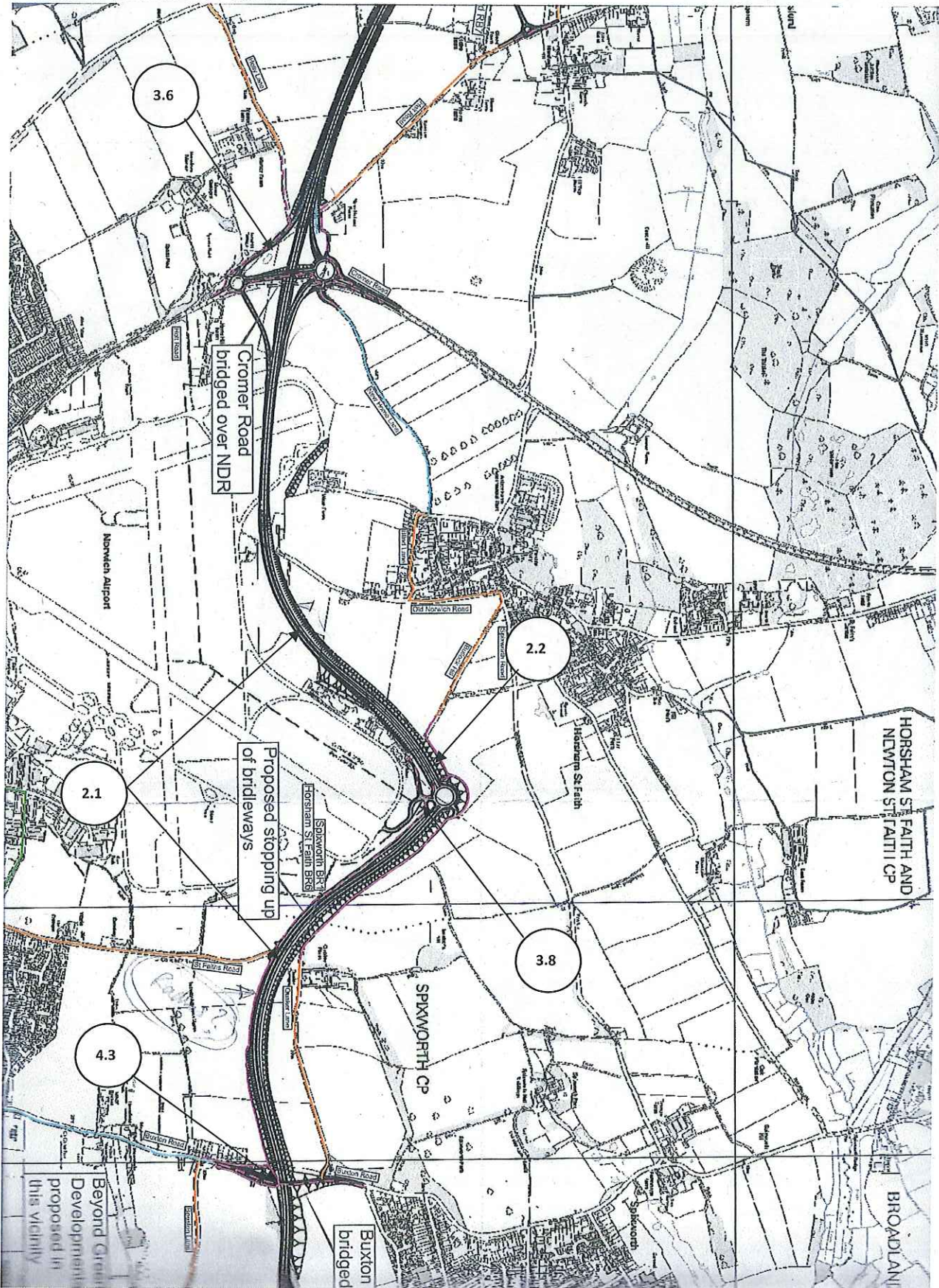
Signed  Kevin Allen
Dated 

APPENDIX A – Problem Location Plan 1



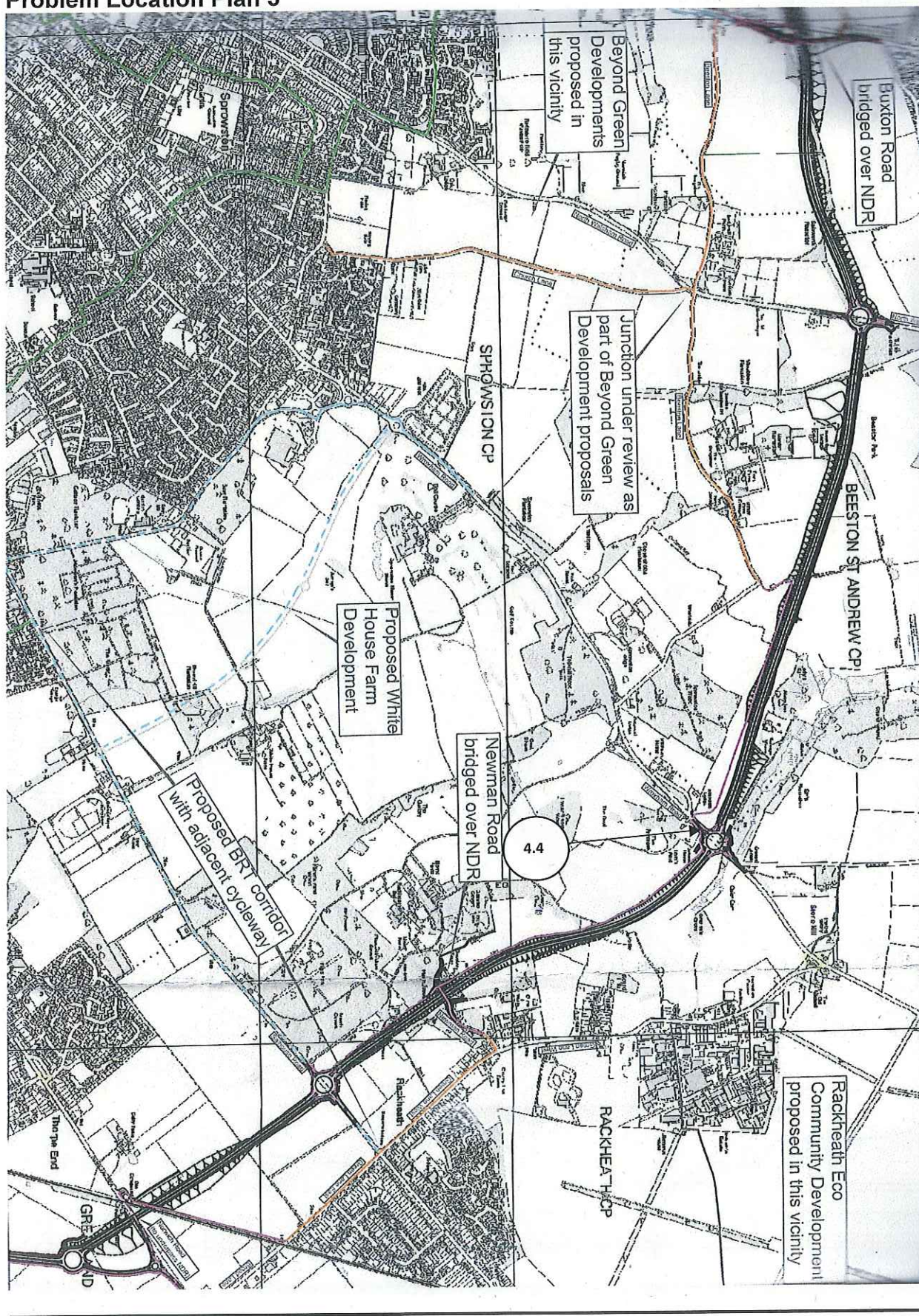
Template Version #8 06/10 JF

Problem Location Plan 2



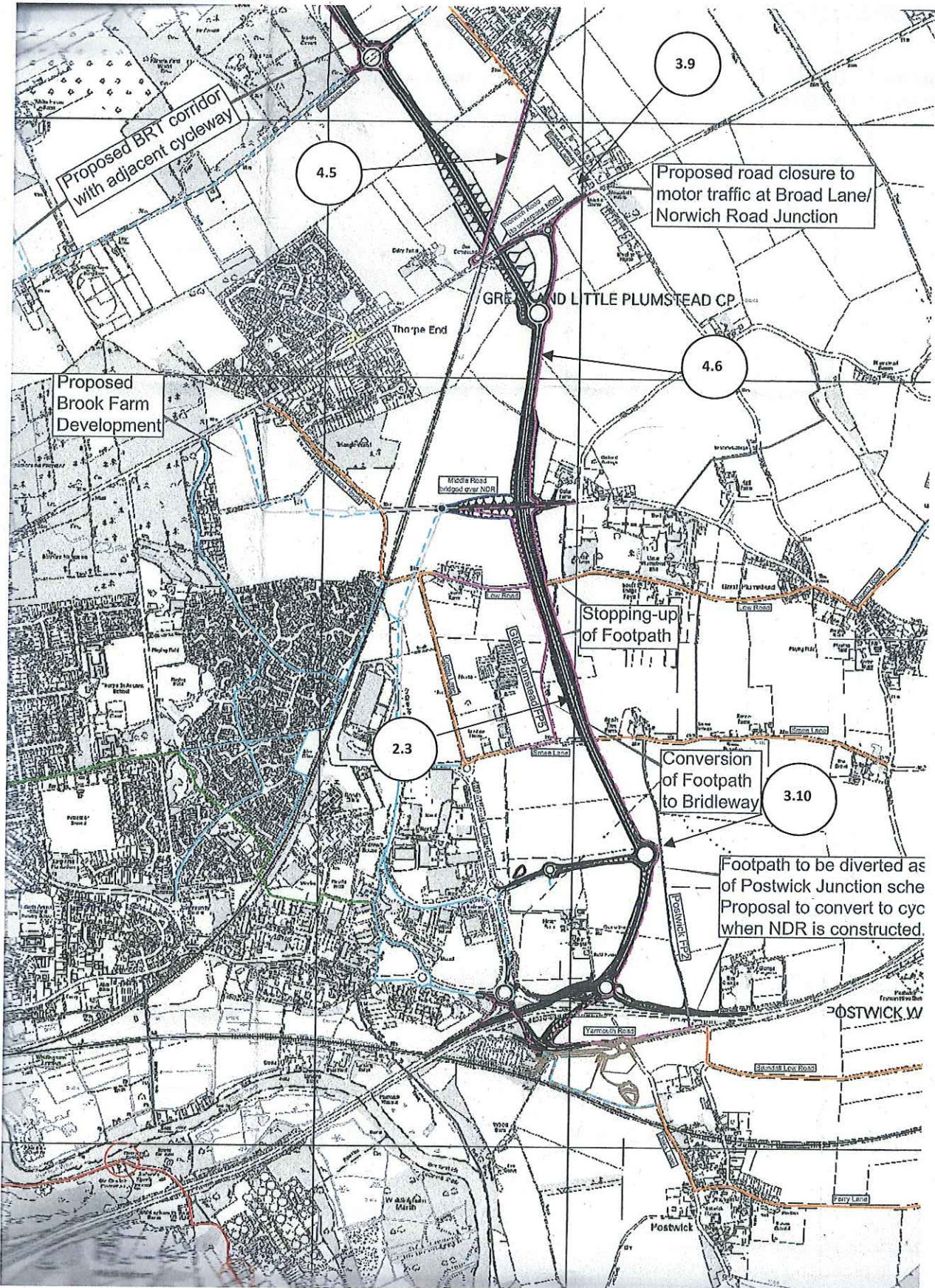
Template Version #8 06/10 JF

Problem Location Plan 3



Template Version #8 06/10 JF

Problem Location Plan 4



Template Version #8 06/10 JF

APPENDIX A

Norwich Northern Distributor Road – Stage 1 Safety Audit Designer's Response

November 2013



Norfolk County Council

NORWICH NORTHERN DISTRIBUTOR ROAD

Stage 1 Safety Audit

Designer's Response

Prepared by Norfolk County Council
November 2013

<http://www.norfolk.gov.uk>

<http://www.mottmac.com>

NORWICH NORTHERN DISTRIBUTOR ROAD

Stage 1 Safety Audit Designer's Response

November 2013

Prepared by:-

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different language please
contact Jonathan Taylor on
01603 224200 minicom 223833.



Introduction

This report is the Designer's response to the Stage 1 Road Safety Audit carried out on the Norwich Northern Distributor Road (NDR). Text extracted from the Stage 1 Road Safety Audit is indicated in italics. The Designer's response to each comment follows the Auditor's original Summary and Recommendation.

The Stage 1 Road Safety Audit report is titled **Norwich NDR Stage 1 Safety Audit** and is dated **14 November 2013**.

Items Raised At This Stage 1 Audit (using the Auditors' numbering references)

1 General

- 1.1 Location: roadside throughout the scheme**
Summary: risk of high severity impact with mature trees
Designer's Response: Agree

Detailed design of the landscape and planting proposal will be carried out in accordance with the recommendation.

- 1.2 Location: roadside throughout the scheme**
Summary: risk of high severity impact with roadside fencing
Designer's Response: Agree

Generally, fencing along the highway boundary will be post and wire with hedge planting where required. We will take into consideration the recommendation during ongoing discussions with landowners and during detailed design.

2 Alignment

- 2.1 Location: CH8200 and CH10200**
Summary: visibility partially obstructed by median VRS
Designer's Response: Disagree

We have investigated this issue and we can confirm that visibility will be restricted to 1 step below standard. Therefore in combination with horizontal curvature of 1 step below standard this is the relaxation and not a departure from standard.

- 2.2 Location: CH8600 approach to airport roundabout**
Summary: visibility obstructed by median VRS
Designer's Response: Disagree

We have investigated this issue and we can confirm that visibility of 295m will be achieved on approach to the Airport roundabout.

2.3 Location: CH18700
Summary: lay-by provision introduces conflicts
Designer's Response: Disagree

The provision of Lay-bys has been considered in accordance with TD 69/07. The spacing of Junctions on the scheme (on average 1 per 2km) is more frequent than the recommended frequency of lay-bys (1 per 2.5km) and therefore generally obviates the need for lay-bys. However two lay-bys on either side of the NDR at chainage 18700 are proposed due to their proximity to the strategic road network where journeys could involve longer distance routes and so their provision is considered appropriate at this location.

3 Junctions

3.1 Location: NDR roundabouts - radial route approaches
Summary: splitter island lengths
Designer's Response: Disagree

The proposed junction layout including splitter islands complies with the current design standard.

3.2 Location: Fakenham Road roundabout
Summary: narrow 3 lane entry/circulatory increases risk of side swipe collisions
Designer's Response: Agree

We will consider modifying the layout from three lanes to two lanes at detailed design stage.

3.3 Location: Fakenham Road roundabout
Summary: relaxed entry path curvatures raises risk of failure to give way
Designer's Response: Disagree

We have investigated this issue and we can confirm that the entry path radius is below 100m in accordance with the current design standard.

3.4 Location: Fir covert Road roundabout
Summary: excessive circulatory width for projected flows
Designer's Response: Agree

We will review the circulatory width at the detailed design stage.

3.5 Location: Reepham Road roundabout
Summary: SE arm geometry safety implications
Designer's Response: Agree

We will review the tangential alignment of the splitter island at the detailed design stage.

- 3.6 Location: Cromer Road westbound merge slip road**
Summary: 2-way layout poses risk of head-on collisions
Designer's Response: Disagree

The drainage lagoon 8A will be accessed from Holly Lane. The 2-way carriageway is only proposed up to the Lagoon 8 access point.

- 3.7 Location: Various roundabouts**
Summary: Private/service accesses
Designer's Response: Agree

We will review the use of the different surface treatment at detailed design stage.

- 3.8 Location: Airport roundabout**
Summary: southern arm layout is potentially misleading for drivers
Designer's Response: Agree

We will review the possibility of reducing the exit width at detailed design stage and also ensure that appropriate signing and gating is provided to avoid inadvertent entry to the airfield. The signing will be developed during detailed design and submitted as part of the Stage 2 Safety Audit.

- 3.9 Location: Broad Lane closure at Plumstead Road**
Summary: farm road offers potential rat-run
Designer's Response: Agree

Access road will be gated.

- 3.10 Location: Business Park Roundabout**
Summary: high speed approach to segregated straight ahead lane
Designer's Response: Agree

The segregated straight ahead filter lane is necessary at this location. Speed reduction measures will be investigated at detailed design stage.

4 Non-motorised users

- 4.1 Location: Fir Covert Road Roundabout**
Summary: bridleway ends at busy roundabout
Designer's Response: Disagree

A physical barrier will be provided at Fir Covert Road to avoid inadvertent equestrian access onto Fir Covert Road.

- 4.2 Location: Reepham Road Roundabout**
Summary: bridleway adjacent to busy roundabout
Designer's Response: Agree

As part of the detailed design, we will review the proposals and realign the bridleway as far as possible from the roundabout. Fence segregation between footway/cycleway and the bridleway will be provided. A cycle barrier will be installed to prevent equestrians using the roundabout splitter island.

4.3 Location: bridleway - CH10900 beneath Buxton Rd overbridge
Summary: proximity of bridleway to NDR mainline
Designer's Response: Disagree

Clear signing and cyclist barrier will be provided to encourage equestrians to use the alternative route and a barrier to prevent equestrian's access to the underpass. The facility is suitable for cyclists and pedestrians and eliminates the need to cross Buxton Road.

4.4 Location: Wroxham Road Roundabout
Summary: bridleway adjacent to busy roundabout
Designer's Response: Agree and Disagree

As part of the detailed design, we will review the proposals and realign the bridleway as far as possible from the roundabout.

The equestrian crossing point is only 15m less than the 135m which is described in the design standard as a preferred minimum (and not an absolute minimum). The design will maximise visibility at the crossing point. Also, visibility is in excess of stopping site distance for main line vehicular traffic.

All bridleways are intended for shared use by equestrians, cyclists and pedestrians. A cycle barrier will be installed to prevent equestrians using the roundabout splitter island.

Positive signing will be developed at detailed design stage to encourage equestrians to use the designated crossing point.

4.5 Location: CH17000 Road Roundabout
Summary: bridleway adjacent to railway line
Designer's Response: Agree

We will investigate the possibility of fencing and hedge planting at detailed design stage.

4.6 Location: bridleway - Plumstead Rd South Roundabout to CH17700
Summary: proximity of bridleway to NDR mainline
Designer's Response: Agree

As part of the detailed design, we will review the proposals and realign the bridleway as far as possible from the roundabout and investigate the possibility of fencing and hedge planting.

5 Signs, Lighting and Markings

5.1 Location: throughout the scheme
Summary: lack of street lighting increases night time accident risk
Designer's Response: Agree

We will investigate the provision of white, amber and green road studs and the lighting of the key roundabout signs at detailed design stage.

- 5.2 Location: NDR mainline**
Summary: safety benefit of raised profile edge lines
Designer's Response: Agree

We will consider the use of raised profile edge markings at detailed design stage.

- 5.3 Location: roadside throughout the scheme**
Summary: risk of high severity impact with large diameter sign posts and lighting columns
Designer's Response: Agree

Passive posts will be considered at detailed design stage in accordance with The Use of Passively Safe Street Furniture in Norfolk.

APPENDIX B

APPENDIX B

Part 1

Crostwick Junction Improvements Preliminary Design Stage 1 Safety Audit Submission

September 2013

**CROSTWICK JUNCTION IMPROVEMENTS
PRELIMINARY DESIGN
STAGE 1 SAFETY AUDIT SUBMISSION**

September 2013

Author of Report Xiangwei Fan

Xiangwei Fan

Checked by Umit Kangalli

Umit Kangalli

Document Ref: 233906-ES-01/S Audit 1/XF

Project Manager/Resident Engineer: Umit Kangalli
Staff Involved in the Design Process: Xiangwei Fan

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5. Traffic Data	3
6. Other Data	

APPENDICES

- A Scheme Drawings
- B Photographs
- C
- D

1. Background

- (a) Traffic modelling work for the proposed NDR shows that there will be an increase in traffic along North Walsham Road (B1150). Turning right out of Crostwick Lane on to the B1150 is currently not easy manoeuvre, particularly during peak time, due to the traffic flow on to the B1150 as well as traffic joining from Rackheath Lane heading in to Norwich. The situation is made worse by the fact that the bell mouth of Crostwick Lane is only a single car width, meaning all cars whether they are performing a left or right turn or going straight ahead must all wait in the same queue.
- (b) The scheme is proposed to widen the existing bell mouth on Crostwick Lane to allow additional capacity for vehicles turning left on to the B1150 and close Rackheath Lane to remove the conflict with vehicles joining the B1150 from Crostwick Lane.

2. Design Standards

- (a) Design speed adopted – Original speed limits to be maintained (North Walsham Road 50mph, Rackheath Lane 60mph, Crostwick Lane 30mph)
- (b) Any departures from standards, giving reasons – There are no departures from standards

3. Plans

(a) General Scheme Layout

A general scheme layout is included in Appendix A - Drawing No. 233906-ES-01-C-DR-00-XX-002

i. Junctions, including visibility splays

The left side of the bell mouth on Crostwick lane will be widened to provide extra space for private cars or public service vehicle/refuse vehicle turning left while a private car is waiting at the giveway line.

ii. Parking

N/A.

iii. Accesses:-

Rackheath Lane will be closed and a turning head will be provided to accommodate HGVs before Rackheath, B1150 junction.

iv. Levels/gradients:-

There will be no significant changes to levels.

v. Details of abutments, parapets, fences, existing signs, central barriers, crests, vehicle parking, and any other restriction to visibility:-

There will be no restrictions to visibility.

vi. Accommodation works:-

There are no known accommodation works at this stage.

vii. Street lighting:-

Junction is not lit and no new lighting proposed.

viii. Signing and lining details, including diagram numbers, sizes and mounting heights:-

Road marking on B1150 needs to be updated. Removing arrows indicating right turn to Rackheath Lane. Signage design will be done as part of NDR.

ix. Drainage information:-

Gullies at the bell mouth of Crostwick lane and Rackheath lane need to be backfilled and new gullies will be provided along the new kerb. Existing kerb outlet needs to be removed and new one will be placed along the new kerb line, connected to existing outlet. See Appendix A – Drawing No. 233906-ES-01-C-DR-00-XX-003.

x. Kerbing details and surfacing information:-

Providing new kerbs at the edge of the widened carriageway and also providing new kerbs along the right side of B1150 to close Rackheath Lane.

xi. Existing and proposed TROs:-

Stopping up of existing Rackheath junction will be done as part of NDR.

xii. Safety fences/barriers:-

N/A.

xiii. Pedestrian provision, including refuges, guard railing, signing, dropped kerbs:-

Existing informal crossing will be kept. No new footway proposed.

xiv. Provision for cyclists:-

N/A.

xv. Equestrian provision:-

N/A.

xvi. Provision for disabled persons:-

N/A. Existing pedestrian facilities will not be affected.

xvii. Bus stops and lay-bys:-

N/A.

xviii. Landscaping:-

None

xix. Service apparatus:-

Existing BT cables and water pipe might be affected by the widening. See Appendix A – Drawing No. 233906-ES-01-C-DR-00-XX-100.

(b) Local Highway Network

A location plan showing the surrounding highway network is included in Appendix A – Drawing No. 233906-ES-01-C-DR-00-XX-001.

4. Site Photographs or Video Recording

Photographs are included in Appendix B.

5. Traffic Data

- (a) Route hierarchy status of all effected roads – Crostwick Lane, North Walsham Road (B1150), Rackheath Lane
- (b) Latest traffic counts, including turning movements where appropriate. Indication of presence of regular queuing or junctions operating near capacity –N/A.
- (c) Traffic forecast data – N/A.
- (d) Measured speed data – N/A.
- (e) Non vehicular movements – N/A.

6. Accident Data

07/11/2012 (Daylight) – Collision with vehicle from right – Slight
04/04/2013 (Daylight) – Right turn joining, head on – Slight
30/07/2013 (Daylight) – Tail end collision – Slight

7. Construction Programme & Operation

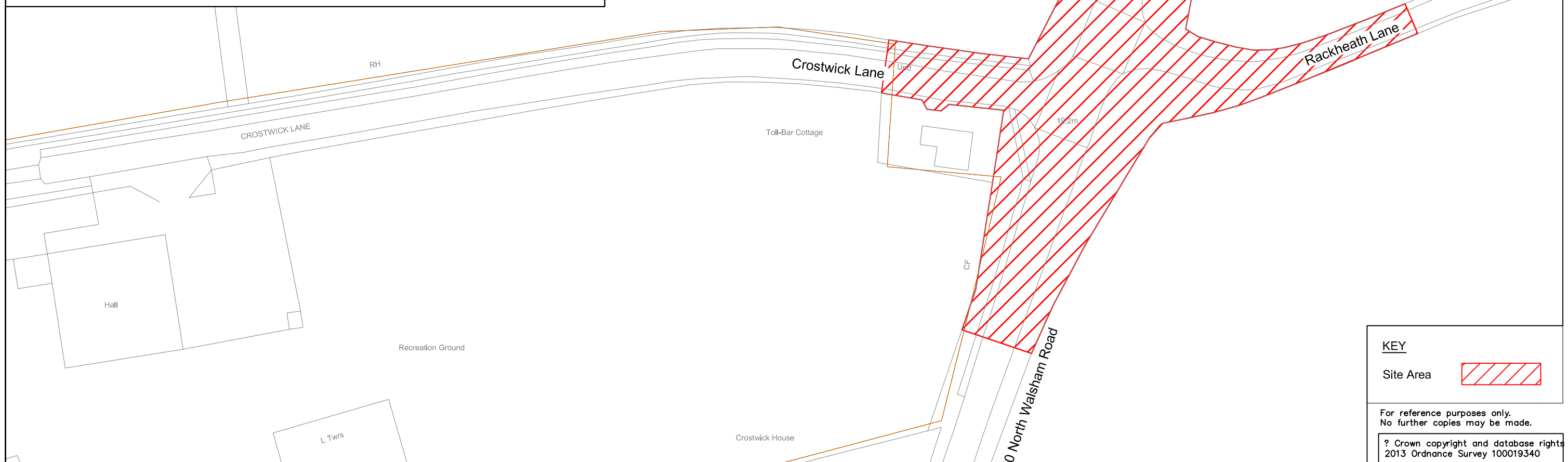
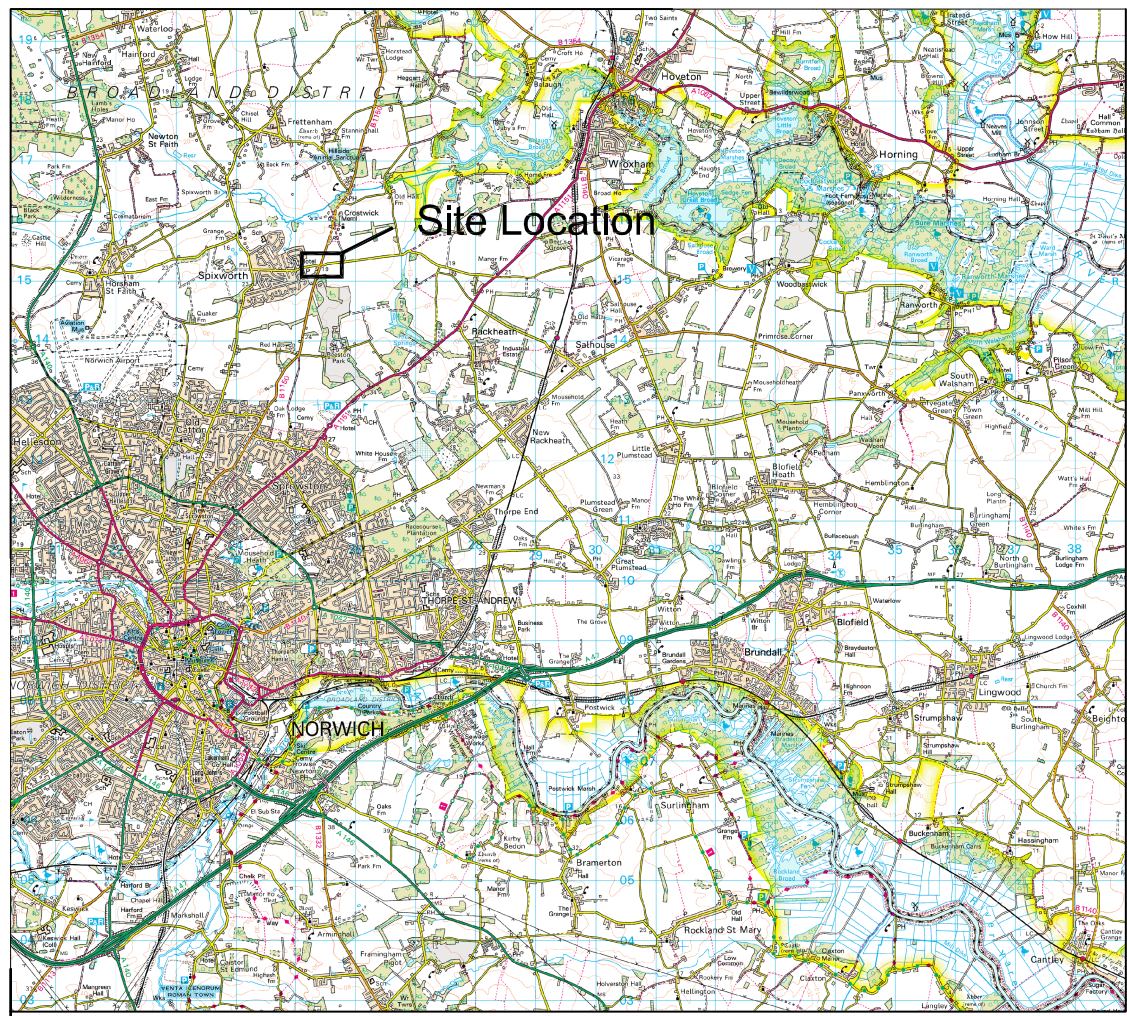
- (a) The scheme will form part of the NDR DCO application and will be delievered together with the mainline works.
- (b) Preliminary design is to be completed by the end of September 2013.
- (c) Detailed design - TBC

8. Other Relevant Information


N/A

APPENDIX A

SCHEME DRAWINGS



KEY

Site Area 

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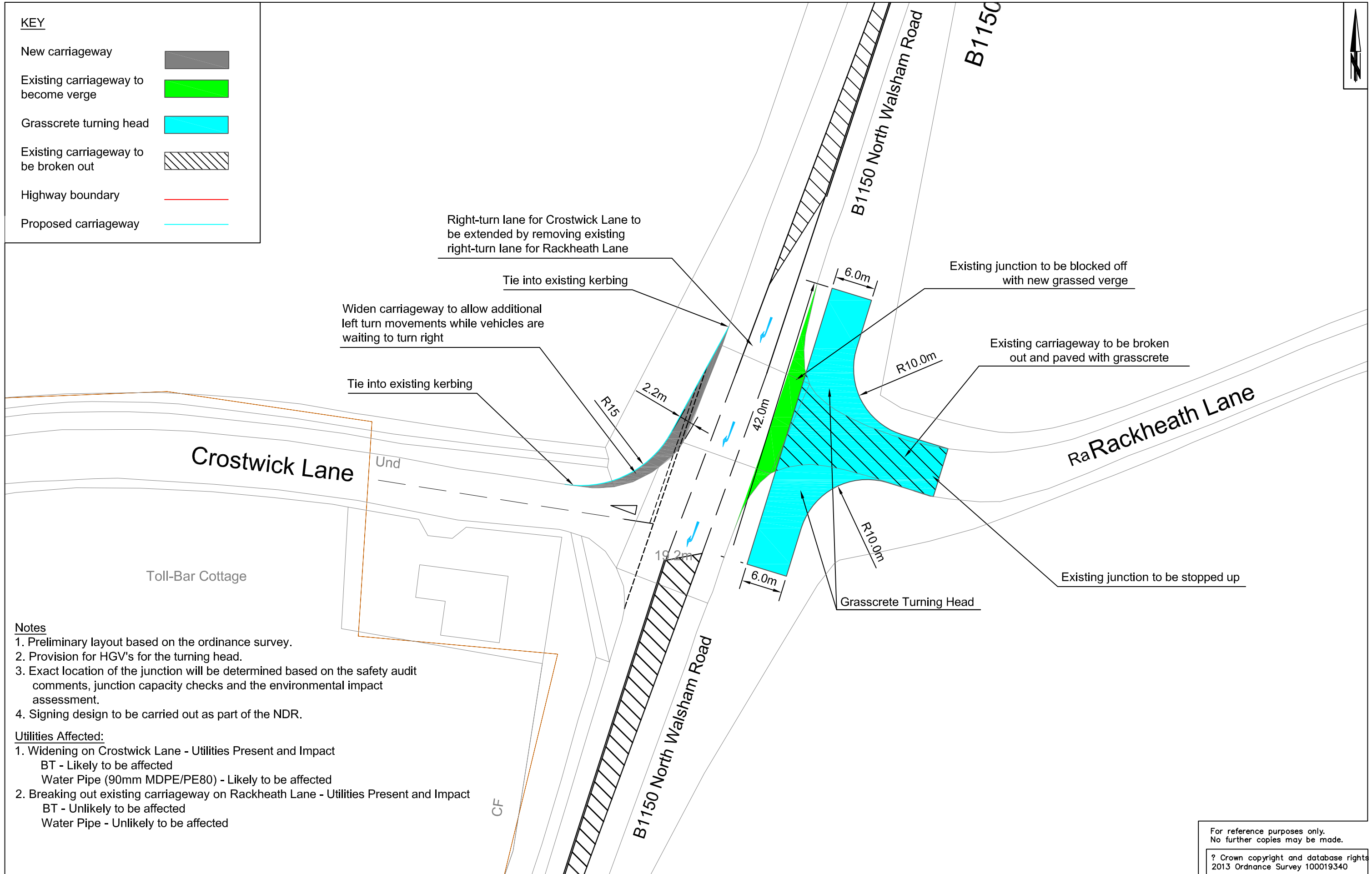
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Site Location Plan

REV.	DESCRIPTION	CHECKED	DATE

DESIGNED BY	INIT.	DATE	DRAWING No.
JCR	JCR	09/13	MMD-233906-ES-01-C-DR-00-XX-001
DRAWN BY	JCR	09/13	PROJECT TITLE
CHECKED BY	UK	09/13	Crostwick Junction Improvements
APPROVED BY	MMG	09/13	SCALE AT A3 1:1000
			FILE No. 233906-ES-01

KEY

- New carriageway
- Existing carriageway to become verge
- Grasscrete turning head
- Existing carriageway to be broken out
- Highway boundary
- Proposed carriageway



Notes

1. Preliminary layout based on the ordinance survey.
2. Provision for HGV's for the turning head.
3. Exact location of the junction will be determined based on the safety audit comments, junction capacity checks and the environmental impact assessment.
4. Signing design to be carried out as part of the NDR.

Utilities Affected:

1. Widening on Crostwick Lane - Utilities Present and Impact
 - BT - Likely to be affected
 - Water Pipe (90mm MDPE/PE80) - Likely to be affected
2. Breaking out existing carriageway on Rackheath Lane - Utilities Present and Impact
 - BT - Unlikely to be affected
 - Water Pipe - Unlikely to be affected

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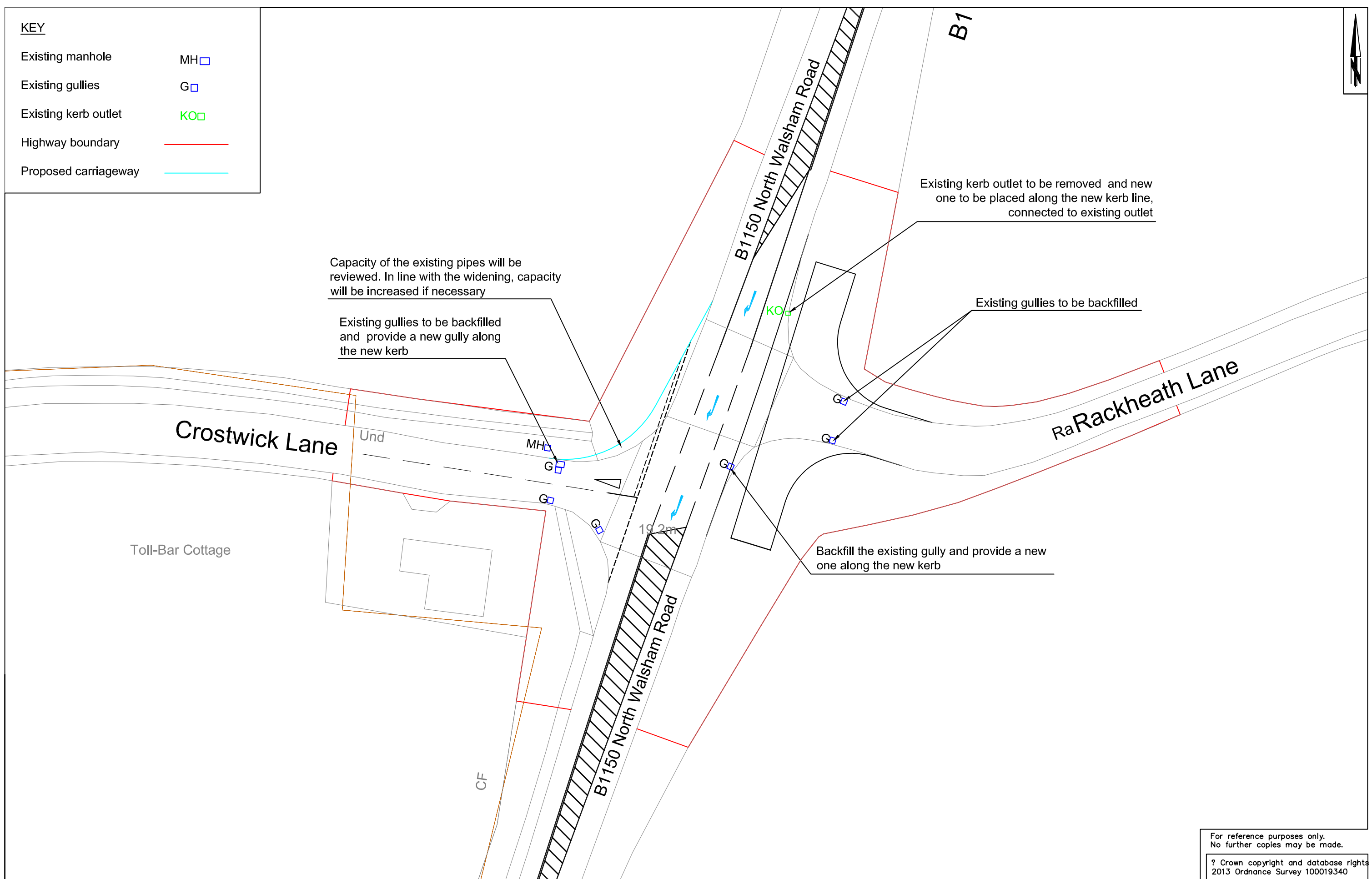
DRAWING TITLE
Preliminary General Arrangement

REV.	DESCRIPTION	CHECKED	DATE

DESIGNED BY	INIT.	DATE	DRAWING No.
XF	XF	09/13	MMD-233906-ES-01-C-DR-00-XX-002
DRAWN BY	JCR	09/13	PROJECT TITLE
CHECKED BY	UK	09/13	Crostwick Junction Improvements
APPROVED BY	MMG	09/13	SCALE AT A3
			1:500
			FILE No.
			233906-ES-01

KEY

- Existing manhole MH □
- Existing gullies G □
- Existing kerb outlet KO □
- Highway boundary ———
- Proposed carriageway ———



Capacity of the existing pipes will be reviewed. In line with the widening, capacity will be increased if necessary

Existing gullies to be backfilled and provide a new gully along the new kerb

Existing kerb outlet to be removed and new one to be placed along the new kerb line, connected to existing outlet

Existing gullies to be backfilled

Backfill the existing gully and provide a new one along the new kerb

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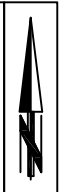
Mike Jackson
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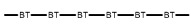








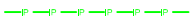




DRAWING TITLE
Outline Drainage Design

REV.	DESCRIPTION	CHECKED	DATE

DESIGNED BY	INIT.	DATE	DRAWING No.
JCR	XF	09/13	MMD-233906-ES-01-C-DR-00-XX-003
CHECKED BY	UK	09/13	PROJECT TITLE
APPROVED BY	MMG	09/13	Crostwick Junction Improvements
SCALE AT A3 1:500			FILE No. 233906-ES-01



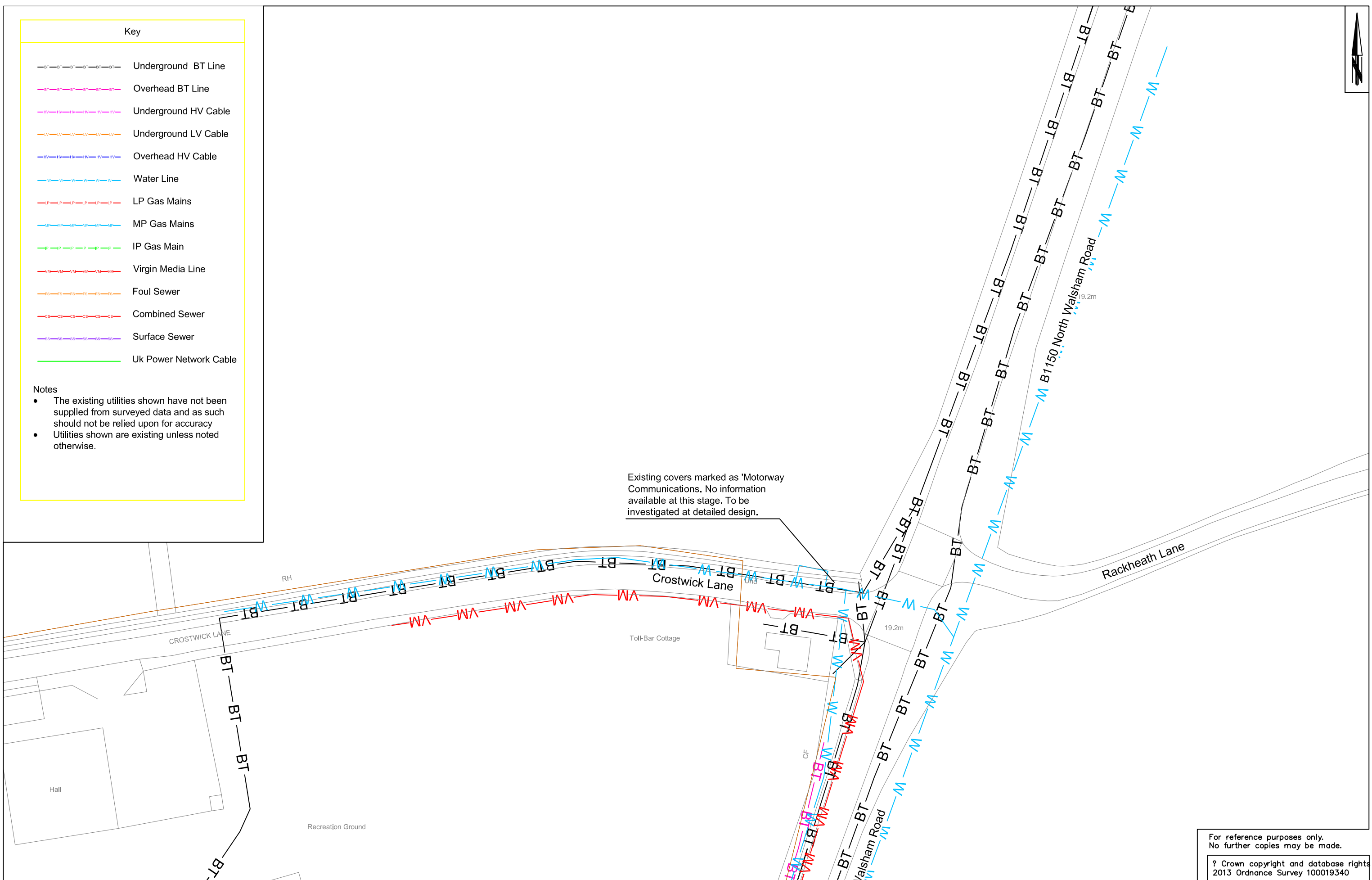
Key

-  Underground BT Line
-  Overhead BT Line
-  Underground HV Cable
-  Underground LV Cable
-  Overhead HV Cable
-  Water Line
-  LP Gas Mains
-  MP Gas Mains
-  IP Gas Main
-  Virgin Media Line
-  Foul Sewer
-  Combined Sewer
-  Surface Sewer
-  UK Power Network Cable

Notes

- The existing utilities shown have not been supplied from surveyed data and as such should not be relied upon for accuracy
- Utilities shown are existing unless noted otherwise.

Existing covers marked as 'Motorway Communications'. No information available at this stage. To be investigated at detailed design.



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DRAWING TITLE
Utilities Layout

REV.	DESCRIPTION	CHECKED	DATE
A	Utilities updated.	UIK	09/2013

DESIGNED BY	INIT.	DATE	DRAWING No.
JCR	JCR	09/13	MMD-233906-ES-01-C-DR-00-XX-100A
JCR	JCR	09/13	PROJECT TITLE
UK	UK	09/13	Crostwick Junction Improvements
MMG	MMG	09/13	SCALE AT A3
			FILE No.
			233906-ES-01

APPENDIX B

SITE PHOTOGRAPHS



PHOTO 1 Facing East on the footway at the left of Crostwick Lane



PHOTO 2 Facing East on the footway at the left of Crostwick Lane



PHOTO 3 Facing Northeast at the bell mouth of Crostwick Lane



PHOTO 4 Facing North at the bell mouth of Crostwick Lane



PHOTO 5 Facing Northeast at the right side kerb of North Walsham Road (B1150)

APPENDIX B

Part 1

B1150 Crostwick: Junction Improvement
Stage 1 Safety Audit
25 September 2013

INTRODUCTION

This report contains the results of a Stage 1 Safety Audit carried out on the above scheme. The Audit was carried out at the request of Norfolk County Council Highways Group.

The Audit Team membership was as follows:-

Nevil Calder BSc(Hons) CEng MICE MCIHT MSoRSA Principal Consultant
(Audit Team Leader) Mott MacDonald

Kevin Allen BEng(Hons) IEng MCIHT MSoRSA Project Engineer
(Audit Team Member) Network Analysis + Safety
Norfolk County Council

Specialist Advisors:-

Andy Micklethwaite Casualty Reduction Officer
Norfolk County Council

The Audit took place at Carrow House on 25 September 2013. The audit comprised an examination of the Safety Audit submission document and a site inspection on 26 September 2013 by the Audit Team Leader. The weather was bright and the road surface dry.

The terms of reference are as described in Environment, Transport and Development Highways Service Manual Procedure SP03-07. The Auditors have examined and reported only on the road safety implications of the scheme as presented and have not verified the compliance of the design to any other criteria.

ITEMS RAISED AT PREVIOUS AUDIT

No previous safety audit.

ITEMS RAISED AT THIS STAGE 1 AUDIT

1.0 General

1.1 No comment

2.0 Alignment

2.1 No comment

3.0 Junctions

3.1 Problem

Location: B1150 right turn into Crostwick Lane

Summary: substandard length RTL increases risk of tail-end collision

The proposed central right turn lane is not dimensioned but scales at 50m. While this is a considerable improvement on the existing situation, it is substandard for a 50mph road, increasing the risk of tail-end collision.

Recommendation

Increase the length of RTL to 65m in accordance with TD42. The adjacent eastern verge appears to offer scope to achieve the necessary carriageway widening.

3.2 Problem

Location: B1150 eastern verge/Rackheath Lane turning head

Summary: potential conflict between mainline traffic and turning traffic

The proposed turning head on Rackheath Lane lies within the eastern verge of B1150 presenting a number of safety issues:-

- Turning vehicles may appear to be on or entering the mainline, causing confusion/distraction to drivers on B1150. This will be exacerbated at night with the added risk of headlight dazzle.
- Any vehicle stationary in the turning head would be an obstruction of the verge, presenting a collision risk in event of a vehicle leaving the carriageway.
- The narrow width between the turning head and B1150 would be easy to cross encouraging abuse of the closure.

Recommendation

Provide a minimum 3.5m wide verge to B1150 free of obstruction. Behind this a physical closure should be provided (see also 4.1 below); ideally this should be a continuous hedgeline to give visual closure without posing a collision hazard to errant vehicles. Rather than provide a turning head at this location it may be better to gate Rackheath Lane at a point further east.

3.3 Comment

Location: Crostwick Lane approach to B1150

Summary: angle of intersection of the junction

Crostwick Lane currently meets B1150 at an angle of around 80degrees. In widening the bellmouth, the opportunity should be taken to true up the final approach to 90degrees in order to optimise driver positioning at the give way lane.

3.4 Comment

Location: Crostwick Lane approach to B1150

Summary: visibility to the left obstructed

It was noted at the time of site visit that the B1150 verge to the north of Crostwick Lane has been allowed to become overgrown by bushes which obstruct visibility to the left for drivers emerging from Crostwick Lane. This should be remedied as soon as possible to achieve 4.5m x 160m splay.



Bushes (behind sign array) obstructing visibility splay

4.0 Non-motorised Users

4.1 Problem

Location: B1150 at junction

Summary: risk of serious injury to NMUs in conflict with heavy traffic

The closure of Rackheath Lane will make this route more attractive and suitable for NMUs, however the busy B1150 poses a crossing risk.

Recommendation


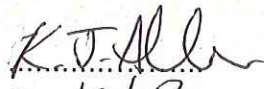
An appropriate gap should be provided in the physical closure point. A refuge island sited in the central hatching immediately south of the RTL would assist pedestrians and cyclists in crossing.

5.0 Signs, Lighting and Markings

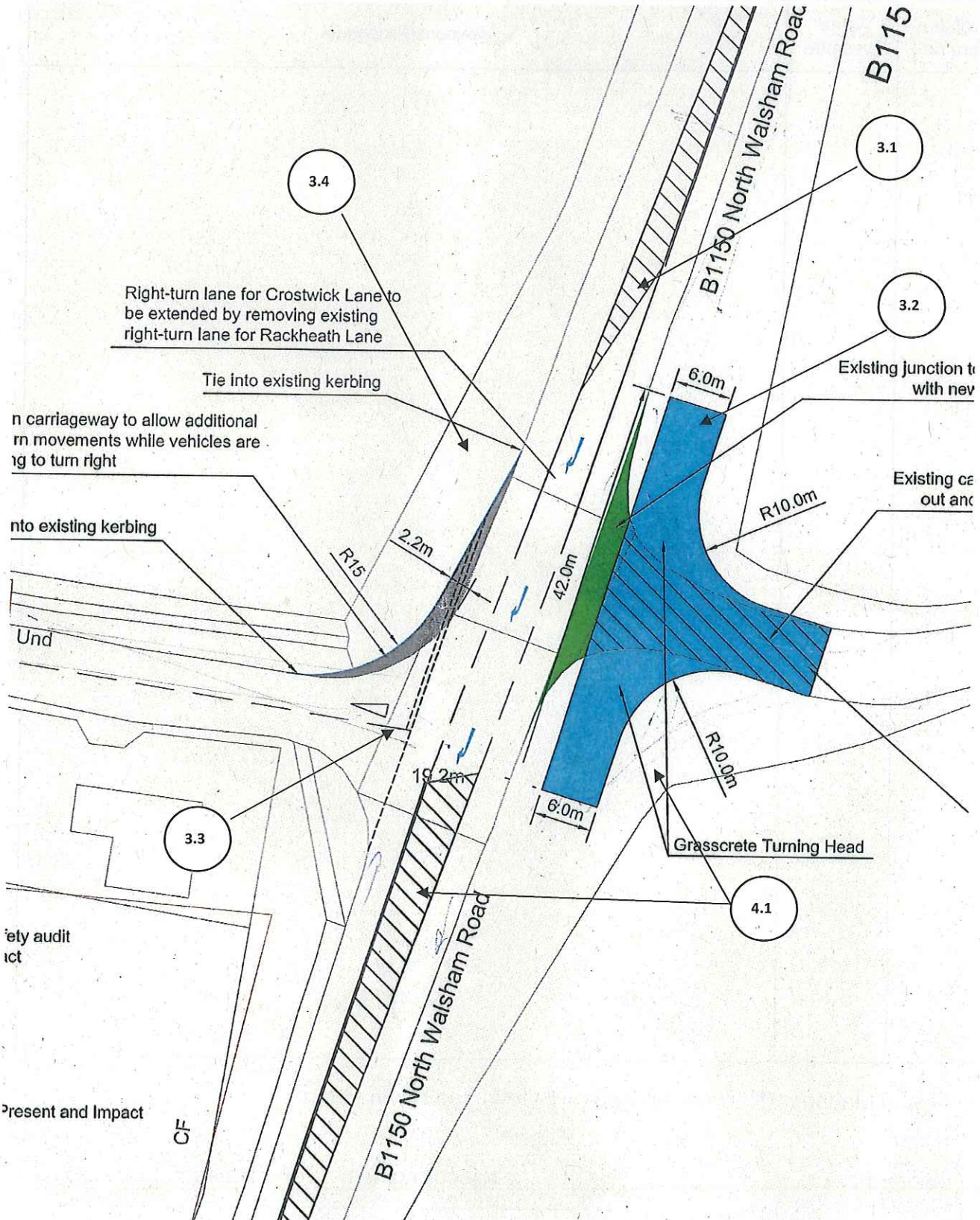
5.1 No comment at this stage

AUDIT TEAM STATEMENT

We certify that this audit has been carried out in accordance with Norfolk County Council Environment, Transport and Development Procedures.

Signed (ATL)		Nevil Calder
Dated	27/9/13	
Signed		Kevin Allen
Dated	27/9/13	

APPENDIX A – Problem Location Plan



Template Version #8 06/10 JF

APPENDIX B

Part 1

Stage 1 Safety Audit, NDR Off Line
Improvements – Crostwick Junction
Response Sheet

29 November 2013

NDR Off line Improvements – Crostwick Junction

RESPONSE SHEET

Problem (para no.)	Agree/ Disagree	Reasons/Proposals
3.1	Agree	The length of turning lane is increased to 65m.
3.2	Agree	Alternative solutions indicated on the drawings. This will be addressed at later stage.
3.3		The alignment and the roadmarkings are revised to improve the intersection angle, however this is based on OS map because a topo-survey is not available at present.
3.4		Maintenance issue beyond the scope of this scheme, NCC informed.
3.5	Disagree	During site visits no evidence of pedestrian use on the East of B1150 is identified. Also there are not any facilities for pedestrians along the Rackheath lane and it is not anticipated that NDR on its own will cause an increase in the number of pedestrians on the East of B1155. Potential increase in the number of pedestrians due to other developments is beyond the scope of our works.

To:- Principal Engineer (Casualty Reduction):

From. UMIT KANGALLI

Signed..........Project Engineer Dated: 29.11.2013

Attached: MMD-233906-ES-01-C-DR-00-XX-002A - Preliminary GA (Latest layout)

Note: If you intend to produce your own version of this page please include Safety Audit file no/date and ATL name

APPENDIX B

Part 2


Rackheath Junction Preliminary Design
Stage 1 Safety Audit Submission

September 2013

RACKHEATH JUNCTION PRELIMINARY DESIGN STAGE 1 SAFETY AUDIT SUBMISSION

September 2013

Author of Report **Umit Kangalli**



Checked by **Andrew Howes**



Document Ref: 233906-ES-02/S Audit 1/XF

Project Manager/Resident Engineer: Umit Kangalli
Staff Involved in the Design Process: Xiangwei Fan

CONTENTS

	Page No.
1. Background	1
2. Design Standards	1
3. Plans	1
4. Site Photographs or Video Recording	3
5. Traffic Data	3
6. Other Data	

APPENDICES

- A Scheme Drawings
- B Photographs
- C
- D

1. Background

- (a) Traffic modelling work for the proposed NDR shows that there will be an increase in traffic along Wroxham Road (A1151). The visibility at the existing Green Lane West/A1151 junction is poor and there is a need to improve the junction to encourage vehicles (particularly HGVs) accessing the Rackheath Industrial estate to use this junction rather than any alternative routes which may take additional traffic through Rackheath village.
- (b) The scheme is proposed to close the existing junction and re-align Green Lane West so it forms a give-way junction with Wroxham Road to the south of the existing location, where both horizontal and vertical visibility can be improved. It is also proposed to widen the existing carriageway to be able to introduce a right hand turn lane on the A1150 for vehicles turning into the re-aligned Green Lane West.

2. Design Standards

- (a) Design speed adopted – Proposed new carriageway 40mph, Green Lane West 40mph, Wroxham Road (A1151) 50mph.
- (b) Any departures from standards, giving reasons – Vertical visibility to the right at the new junction to be checked once the topographical survey is made available.

3. Plans

(a) General Scheme Layout

A general scheme layout is included in Appendix A - Drawing. No. 233906-ES-02 -C-DR-00-XX-006

i. Junctions, including visibility splays

The ghost island junction will improve the visibility to meet the standard and provide an extra lane for right turning vehicles from A1151.

ii. Parking

N/A.

iii. Accesses:-

The existing Green Lane West will be closed at the original A1151 junction and a turning head will be provided there to accommodate Large Refuse vehicle.

iv. Levels/gradients:-

The farm is 1.2 metres lower than the edge of A1151 carriageway. High point of A1151 is 10-20 m to the north of existing junction. Low point of A1151 is approximately 600 m to the south of existing junction.

Green Lane West has a low point close to the mid point of the road between the existing junction and its proposed junction with the re-aligned road.

- v. Details of abutments, parapets, fences, existing signs, central barriers, crests, vehicle parking, and any other restriction to visibility:-**
Trees and fences along A1151 which restrict visibility need to be removed.
- vi. Accommodation works:-**
There are no known accommodation works at this stage.
- vii. Street lighting:-**
Junction is not lit and no new lighting proposed.
- viii. Signing and lining details, including diagram numbers, sizes and mounting heights:-**
Road markings on A1151 junction and new Green Lane West junction will be updated. Sign design will be done as part of NDR.
- ix. Drainage information:-**
The existing drainage of A1151 and Green Lane West junction is improved by using grasscrete. For the proposed carriageway and Northeast part of the new A1151 junction, combined kerb drainage along southern channel is introduced to minimize land taken. For the Southeast part of the new A1151 junction, kerb outlets is to be introduced to increase capacity of existing drainage, discharging to existing swale. Refer to Appendix A - Drawing. No. 233906-ES-02 -C-DR-00-XX-007.
- x. Kerbing details and surfacing information:-**
New kerbs are along proposed carriageway and new A1151 junction. Combined kerb drainage and kerb outlets are included in Appendix A - Drawing. No. 233906-ES-02 -C-DR-00-XX-007.
- xi. Existing and proposed TROs:-**
All TROs including stopping up orders will be managed as part of NDR DCO.
- xii. Safety fences/barriers:-**
None.
- xiii. Pedestrian provision, including refuges, guard railing, signing, dropped kerbs:-**
Existing footpath along Green Lane west will be realigned to match the new layout. Indicative footpath shown on the general arrangement.
- xiv. Provision for cyclists:-**
N/A.

xv. Equestrian provision:-

N/A.

xvi. Provision for disabled persons:-

N/A.

xvii. Bus stops and lay-bys:-

The existing lay-by on Green Lane West will be stopped. No changes to existing bus stops to the north of existing junction on A1151. Proposed realignment is not anticipated to have negative impact on these.

xviii. Landscaping:-

New trees will be planted to replace the trees that will be felled as a result of the widening on A1151. Potential location is the land between the new road and the existing property to the north of it.

xix. Service apparatus:-

Existing BT cables might be affected. Refer to Appendix A – Drawing No. 233906-ES-02-C-DR-00-XX-100.

(b) Local Highway Network

A location plan showing the surrounding highway network is included in Appendix A – Drawing No. 233906-ES-02-C-DR-00-XX-001.

4. Site Photographs or Video Recording

Photographs are included in Appendix B.

5. Traffic Data

- (a) Route hierarchy status of all effected roads – Green Lane West, Wroxham Road (A1151)
- (b) Latest traffic counts, including turning movements where appropriate. Indication of presence of regular queuing or junctions operating near capacity –N/A.
- (c) Traffic forecast data – N/A.
- (d) Measured speed data – N/A.
- (e) Non vehicular movements – N/A.

6. Accident Data

06/09/2008 (Daylight) – Right turn joining, head on – Slight

16/09/2008 (Daylight) – Tail end with vehicle waiting to turn right – Slight

31/01/2012 (Daylight) – Right turn joining, head on – Serious
12/05/2012 (Daylight) – Tail end collision – Slight

7. Construction Programme & Operation

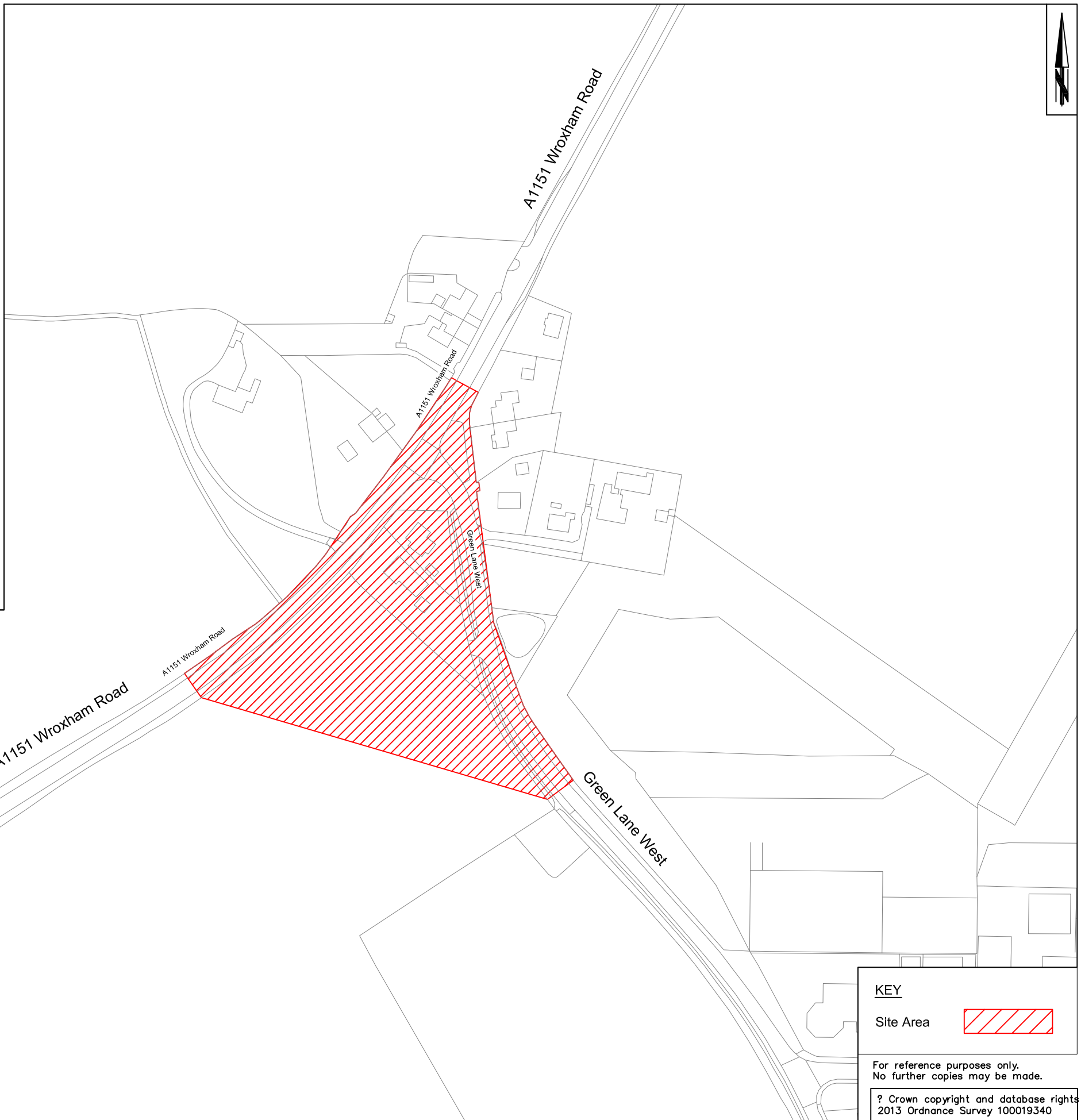
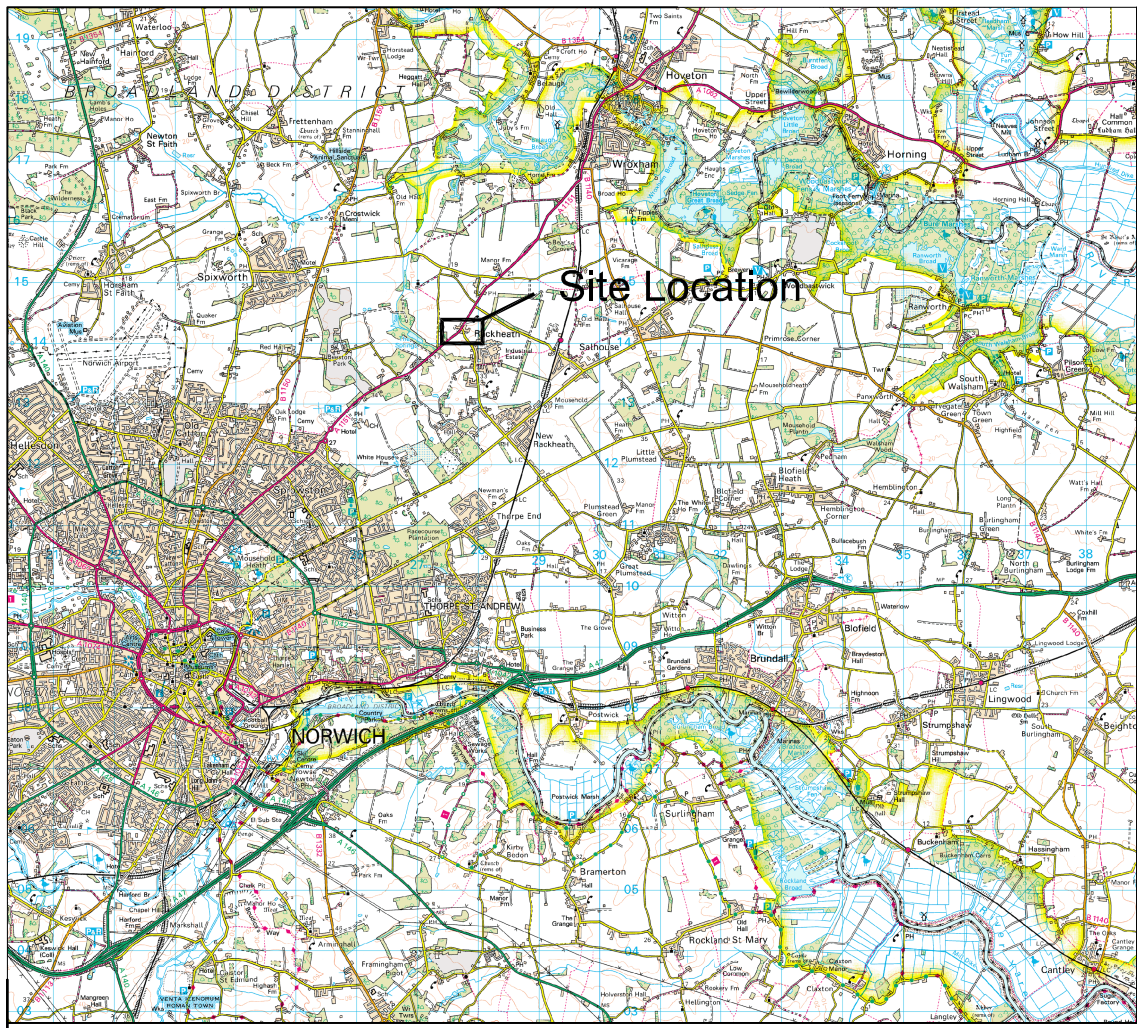
- (a) The scheme will form part of the NDR DCO application and will be delivered together with the mainline works.
- (b) Preliminary design is to be completed by the end of September 2013.
- (c) Detailed design - TBC.

8. Other Relevant Information

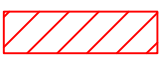
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APPENDIX A

SCHEME DRAWINGS



KEY

Site Area 

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Web www.mottmac.com

DRAWING TITLE
Site Location

REV.	DESCRIPTION	CHECKED	DATE

DESIGNED BY	INIT.	DATE	DRAWING No.
JCR	JCR	08/13	MMD-233906-ES-02-C-DR-00-XX-001
JCR	JCR	09/13	PROJECT TITLE
AH	AH	09/13	Green Lane West - Wroxham Road
MMG	MMG	09/13	Junction Improvements
			SCALE AT A3
			FILE No.
			1:2000
			233906-ES-02

KEY

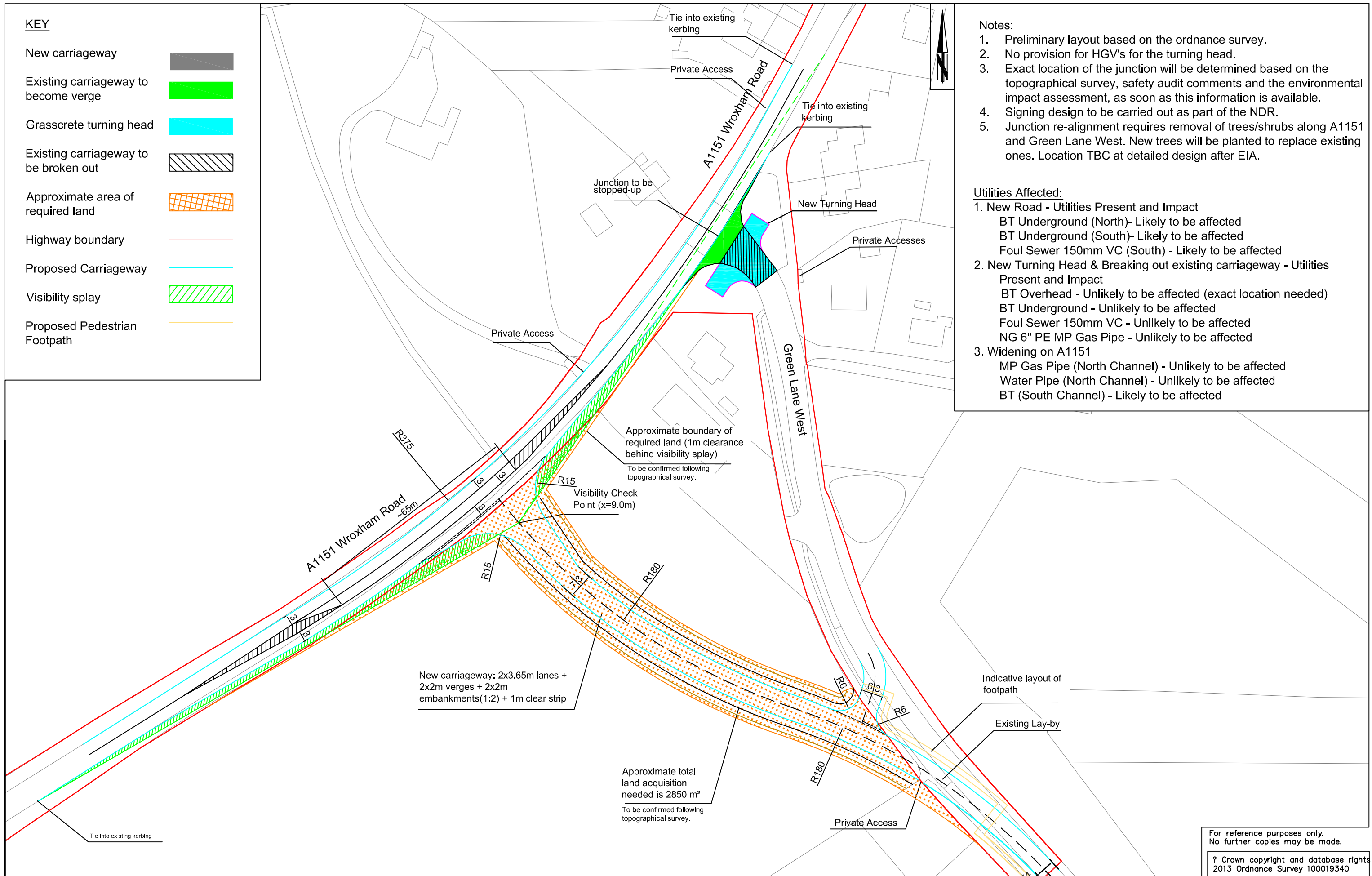
- New carriageway
- Existing carriageway to become verge
- Grasscrete turning head
- Existing carriageway to be broken out
- Approximate area of required land
- Highway boundary
- Proposed Carriageway
- Visibility splay
- Proposed Pedestrian Footpath

Notes:

1. Preliminary layout based on the ordnance survey.
2. No provision for HGV's for the turning head.
3. Exact location of the junction will be determined based on the topographical survey, safety audit comments and the environmental impact assessment, as soon as this information is available.
4. Signing design to be carried out as part of the NDR.
5. Junction re-alignment requires removal of trees/shrubs along A1151 and Green Lane West. New trees will be planted to replace existing ones. Location TBC at detailed design after EIA.

Utilities Affected:

1. New Road - Utilities Present and Impact
 - BT Underground (North)- Likely to be affected
 - BT Underground (South)- Likely to be affected
 - Foul Sewer 150mm VC (South) - Likely to be affected
2. New Turning Head & Breaking out existing carriageway - Utilities Present and Impact
 - BT Overhead - Unlikely to be affected (exact location needed)
 - BT Underground - Unlikely to be affected
 - Foul Sewer 150mm VC - Unlikely to be affected
 - NG 6" PE MP Gas Pipe - Unlikely to be affected
3. Widening on A1151
 - MP Gas Pipe (North Channel) - Unlikely to be affected
 - Water Pipe (North Channel) - Unlikely to be affected
 - BT (South Channel) - Likely to be affected



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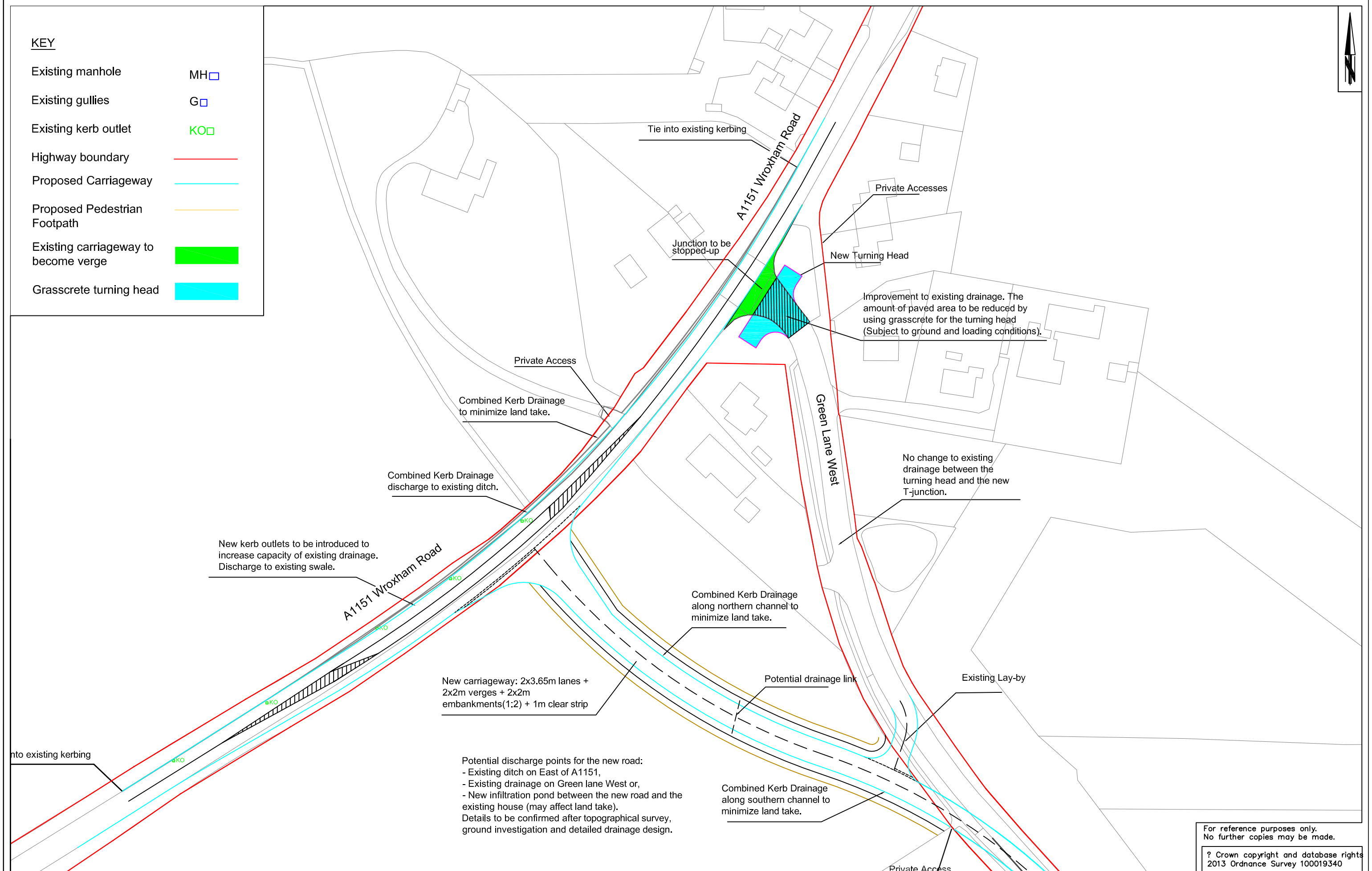
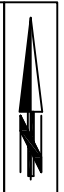
DRAWING TITLE
Preliminary General Arrangement

REV.	DESCRIPTION	CHECKED	DATE

DESIGNED BY	INIT.	DATE	DRAWING No.
JCR	UK	09/13	MMD-233906-ES-02-C-DR-00-XX-006
AH	JCR	09/13	PROJECT TITLE
MMG	AH	09/13	Rakeath Junction Improvements
			SCALE AT A3
			FILE No.
			1:1000
			233906-ES-02

KEY

- Existing manhole MH □
- Existing gullies G □
- Existing kerb outlet KO □
- Highway boundary ———
- Proposed Carriageway ———
- Proposed Pedestrian Footpath ———
- Existing carriageway to become verge ■■■■
- Grasscrete turning head ■■■■



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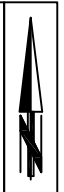
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DRAWING TITLE
Outline Drainage Layout

REV.	DESCRIPTION	CHECKED	DATE

INIT.	DATE	DRAWING No.
DESIGNED BY	UK 09/13	MMD-233906-ES-02-C-DR-00-XX-007
DRAWN BY	JCR 09/13	PROJECT TITLE
CHECKED BY	AH 09/13	Rackeath Junction Improvements
APPROVED BY	MMG 09/13	SCALE AT A3
		1:1000
		FILE No.
		233906-ES-02

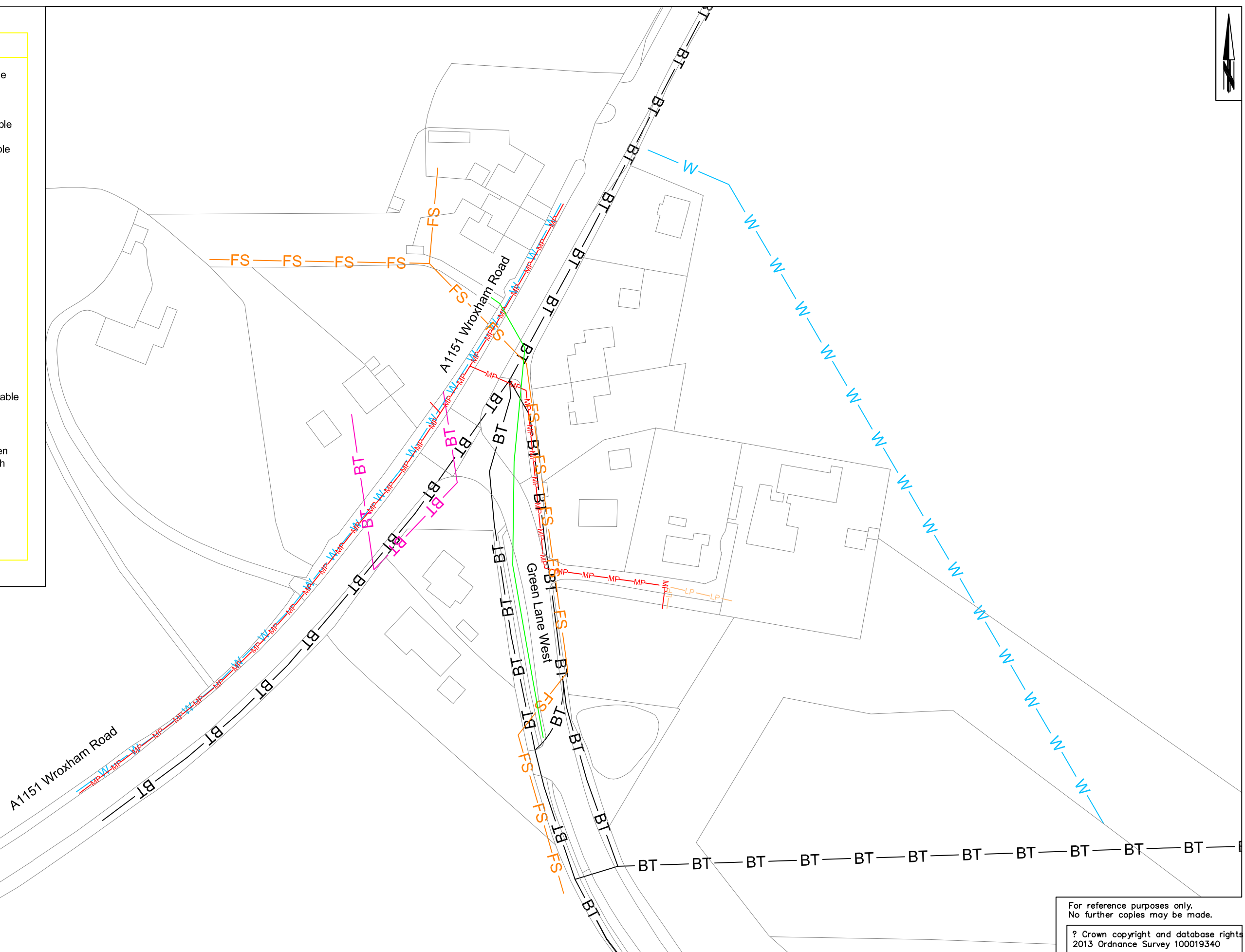


Key

- Underground BT Line
- Overhead BT Line
- Underground HV Cable
- Underground LV Cable
- Overhead HV Cable
- Water Line
- LP Gas Mains
- MP Gas Mains
- IP Gas Main
- Virgin Media Line
- Foul Sewer
- Combined Sewer
- Surface Sewer
- Uk Power Network Cable

Notes

- The existing utilities shown have not been supplied from surveyed data and as such should not be relied upon for accuracy
- Utilities shown are existing unless noted otherwise.



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DRAWING TITLE
Utilities Layout

REV.	DESCRIPTION	CHECKED	DATE

DESIGNED BY	INIT.	DATE	DRAWING No.
JCR	JCR		MMD-233906-ES-02-C-DR-00-XX-100
JCR	JCR		PROJECT TITLE
AH	AH		Green Lane West - Wroxham Road
MMG	MMG		Junction Improvements
			SCALE AT A3
			FILE No.
			1:1000
			233906-ES-02

APPENDIX B

SITE PHOTOGRAPHS



PHOTO 1 Facing Northwest on the footway behind the existing lay-by at the left of Green Lane West



PHOTO 2 Facing North on the footway at the left of existing lay-by



PHOTO 3 Facing North on the footway at the left of Green Lane West



PHOTO 4 Facing Northeast at the bell mouth of Green Lane West



PHOTO 5 Facing Northeast at the right side kerb of Wroxham Road (A1151)



PHOTO 6 Facing Northeast at the left side kerb of Wroxham Road (A1151)



PHOTO 7 Facing Northeast at the right side kerb of Wroxham Road (A1151)



PHOTO 8 Facing Southwest at the left side kerb of Wroxham Road (A1151)



PHOTO 9 Facing Southeast at Wroxham Road (A1151), the farm is 1.2m lower than the existing carriageway

APPENDIX B

Part 2

A1151 Rackheath: Green Lane Junction
Improvement Stage 1 Safety Audit

26 September 2013

INTRODUCTION

This report contains the results of a Stage 1 Safety Audit carried out on the above scheme. The Audit was carried out at the request of Norfolk County Council Highways Group.

The Audit Team membership was as follows:-

Nevil Calder BSc(Hons) CEng MICE MCIHT MSoRSA Principal Consultant
(Audit Team Leader) Mott MacDonald

Kevin Allen BEng(Hons) IEng MCIHT MSoRSA Project Engineer
(Audit Team Member) Network Analysis + Safety
Norfolk County Council

Specialist Advisors:-

Andy Micklethwaite Casualty Reduction Officer
Norfolk County Council

The Audit took place at Carrow House on 26 September 2013. The audit comprised an examination of the Safety Audit submission document and a site inspection on 26 September 2013 by the Audit Team Leader. The weather was bright and the road surface dry.

The terms of reference are as described in Environment, Transport and Development Highways Service Manual Procedure SP03-07. The Auditors have examined and reported only on the road safety implications of the scheme as presented and have not verified the compliance of the design to any other criteria.

ITEMS RAISED AT PREVIOUS AUDIT

No previous safety audit.

ITEMS RAISED AT THIS STAGE 1 AUDIT

1.0 General

1.1 No comment

2.0 Alignment

2.1 Problem

Location: A1151 at closure point

Summary: potential conflict between mainline traffic and turning traffic

Proximity of the proposed turning head on Green Lane West to the A1151 carriageway presents a number of safety issues:-

- The lack of visual closure on the outside of a curve may mislead south-westbound drivers on A1151.
- Turning vehicles may appear to be on or entering the mainline, causing confusion/distraction to drivers on A1151. This will be exacerbated at night with the added risk of headlight dazzle.
- The narrow width between the turning head and A1151 would be easy to cross, encouraging abuse of the closure.

Recommendation

Provide a minimum 3.5m wide verge to A1151 free of obstruction. Behind this a physical closure should be provided in the form of a continuous hedgeline to give visual closure without posing a collision hazard to errant vehicles. An 'L' or 'Y' shaped turning head might better fit the remaining space.

2.2 Problem

Location: new alignment of Green Lane West

Summary: lack of forward visibility envelope

The new alignment departs from the old with a proposed left-hand curve of radius 180m; however no visibility splay is shown on the inside of the curve for north-westbound traffic.

Recommendation

Provide 120m forward visibility envelope. Any boundary hedge should be set back at least 1m from this to allow for future growth, and sufficient land should be acquired for this purpose.

2.3 Comment

Location: A1151

Summary: kerb profile

All proposed kerbing on A1151 should have a 45degree batter profile as this is more forgiving in event of impact on high speed roads.

3.0 Junctions

3.1 Problem

Location: A1151 proposed ghost island RTL

Summary: abrupt tapers increases risk of collision for northbound traffic

The development tapers at each end of the proposed ghost island right turn lane are too abrupt, with substandard tapers of around 1:11. This creates a sharp deflection in the path of south-westbound traffic, raising the risk of loss of control and run-off collisions with potentially serious outcomes.

Recommendation

Redesign the tapers to the TD42 standard of 1:25. With the ghost island being on an existing curve (radius 1 step below standard) it is important that the resulting outside channel line should be a smooth curve not a series of individual changes in direction.

3.2 Problem

Location: A1151 ghost island RTL

Summary: narrow lanes and substandard curve increase the risk of conflict

The proposed ghost island lies on an existing curve of radius 1 step below standard. The RTL will be heavily used by HGVs accessing the nearby industrial estate. In these circumstances the proposed relaxation of RTL width to 3.0m is considered to raise the risk of collision with potential for serious outcomes.

Recommendation

Increase the width of the central RTL to 3.5m to provide adequate lateral clearance on the curving alignment.

3.3 Problem

Location: new junction onto A1151

Summary: lack of channelising island in junction mouth reduces safety

Traffic islands in the mouth of minor roads at rural junctions have significant safety benefit. They are normally provided at all except simple junctions. They help to channelise and guide vehicular movements, shelter waiting vehicles and raise junction conspicuity.

Recommendation

Provide a channelising island in the junction mouth.

3.4 Problem

Location: new junction onto A1151

Summary: gradient of approach

The proposed diversion of Green Lane crosses land which is lower than adjacent A1151. However it is important to avoid a significant uphill gradient on immediate approach to the new junction as this creates delay/difficulty for vehicles pulling out, raising the risk of collision with main road traffic. This is particularly so for the frequent HGVs coming from the nearby industrial estate.

Recommendation

The first 15m of the new road from the junction should be level with A1151.

3.5 Comment

Location: junction of old Green Lane West with new alignment

Summary: lack of junction visibility splay

Visibility splays are not indicated for this junction and there is concern that adequate provision should be made.

Recommendation

Ensure visibility is available at 2.4m set-back - 120m is recommended to the left and 90m to the right (from the side road driver's perspective). Any proposed boundary hedge should be set back at least 1m from this to allow for future growth and sufficient land should be acquired for this purpose.

4.0 Non-motorised Users

4.1 No comment

5.0 Signs, Lighting and Markings

5.1 Comment

Location: A1151 proposed ghost island

Summary: potential overtaking through ghost island

There is an existing prohibitory double white line system in this vicinity due to restricted forward visibility. This system should be extended through the proposed ghost island in order to deter overtaking

AUDIT TEAM STATEMENT

We certify that this audit has been carried out in accordance with Norfolk County Council Environment, Transport and Development Procedures.

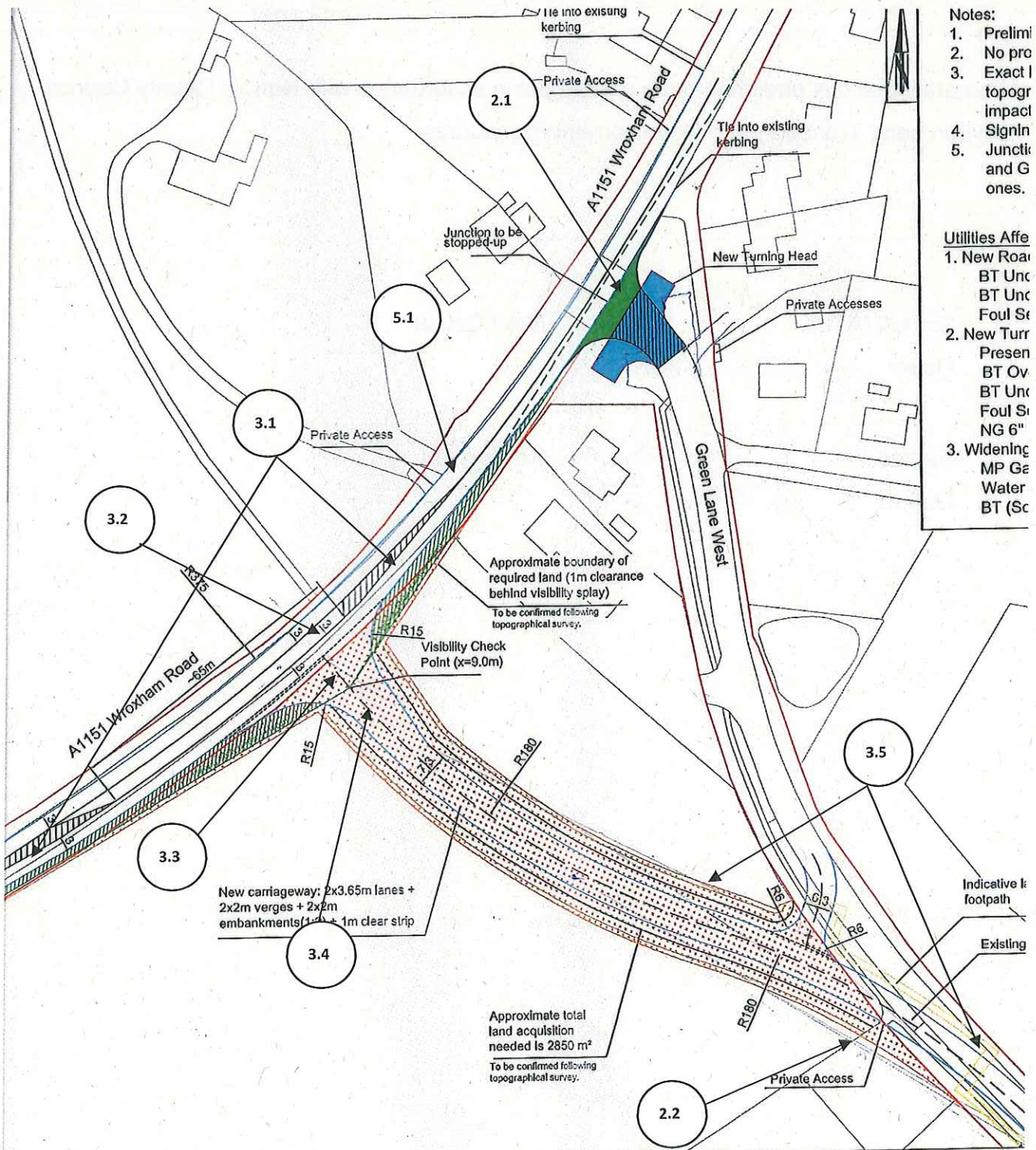
Signed (ATL) .. *N Calder* Nevil Calder

Dated *27/9/13*

Signed *K. Allen* Kevin Allen

Dated *27th September 2013*

APPENDIX A – Problem Location Plan



- Notes:**
1. Prelimi
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APPENDIX B

Part 2

Stage 1 Safety Audit, NDR Off Line
Improvements – Rackheath Junction,
Response Sheet

29 November 2013

NDR Off line Improvements – Rackheath Junction

RESPONSE SHEET

Problem (para no.)	Agree/ Disagree	Reasons/Proposals
2.1	Agree	Alternative solutions indicated on the drawings. This be addressed at later stage.
2.2	Agree	Green Lane West alignment is revised to improve the visibility after discussions with the NDR Team.
2.3		All materials not finalized at this stage.
3.1	Agree	The geometry of the ghost island is improved in accordance with the comments from NDR Team and further input from Casualty Reduction team.
3.2	Agree	The geometry of the ghost island is improved considering the comments from NDR Team and further input from Casualty Reduction team. Revised design shows an RTL lane with reducing from 3.5m to 3.1 at the junction.
3.3	Agree	Junction geometry revised giving consideration to the amount of turning movements, geometric requirements and land issues. A splitter island is provided. A second island required to separate the SB-left turning traffic is not provided because of possible negative impact on the capacity of A1151. Current design is agreed by NCC and Casualty Reduction team.
3.4		Design undertaken from OS map. The site visit and general topography is not likely to require steep slopes on the junction approach. This will be dealt at the detailed design stage.
3.5		The layout of the new simple T junction is improved as part of revisions to the Green Lane West alignment. Current design provides required visibilities.
5.1		The roadmarkings shown on the layouts are indicative. This will be dealt at the detailed design stage.

To:- Principal Engineer (Casualty Reduction):

From. UMIT KANGALLI

Signed..........Project Engineer

Dated: 29.11.2013

Attached: MMD-233906-ES-02-C-DR-00-XX-006C - Preliminary GA (Latest layout)

Note: If you intend to produce your own version of this page please include Safety Audit file no/date and ATL name

APPENDIX B

Part 3

Thorpe End Highway Improvements Preliminary Design Stage 1 Safety Audit Submission

September 2013


**THORPE END HIGHWAY IMPROVEMENTS
PRELIMINARY DESIGN
STAGE 1 SAFETY AUDIT SUBMISSION**

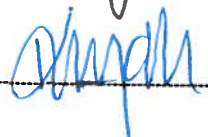
September 2013

Author of Report Joseph Tetteh

Checked by Umit Kangalli

Document Ref: 233906-ES-03/S Audit 1/JT





Project Manager/Resident Engineer: Umit Kangalli
Staff Involved in the Design Process: Joseph Tetteh

CONTENTS

	Page No.
1. Background	1
2. Design Standards	1
3. Plans	1
4. Site Photographs or Video Recording	3
5. Traffic Data	3
6. Other Data	

APPENDICES

- A Scheme Drawings
- B Photographs
- C
- D

1. Background

- (a) Traffic modelling work for the proposed NDR indicates that there will be an increase in traffic along Plumstead Road (C874). As a result Great and Little Plumstead Parish Council raised concerns about increase of traffic through Thorpe End. Therefore a series of highway improvements were investigated to help mitigate any increased traffic through Thorpe End.
- (b) The provision of a new footway in the northern verge of Plumstead Road will allow pedestrians to access the Thrope End shopping area or the existing zebra crossing to access the bus stop and on the southern side of Plumstead Road further to the west. In addition to this the provision of a mini-roundabout at the Plumstead Road/Broadland Drive will assist vehicles from exiting Broadland Drive onto Plumstead Road where difficulties are experienced at present.

2. Design Standards

- (a) Design speed adopted – Original speed limits to be maintained (Broadland Drive 20mph, Plumstead Road 30mph)
- (b) Any departures from standards, giving reasons – There are no departures from standards

3. Plans

(a) General Scheme Layout

A general scheme layout is included in Appendix A - Drawing No. 233906-ES-03-C-DR-00-XX-002

i. Junctions, including visibility splays

The scheme involves the realignment of the existing T-junction into a mini-roundabout to define priority and assist vehicles from exiting Broaland Drive. The existing visibility splay will be reduced by the introduction of the mini-roundabout, however it is proposed that this can be improved by the removal of the small tree on Broadland Drive as indicated on drawing no. 233906-ES-03-C-DR-00-XX-002

ii. Parking

N/A.

iii. Accesses:-

There is an existing access unto Thorpe End garage but this will not be affected by the proposed works.

iv. Levels/gradients:-

Mini-roundabout to be domed and with raised asphalt islands but proposed levels and gradients are to be kept as close to existing levels as possible

- v. Details of abutments, parapets, fences, existing signs, central barriers, crests, vehicle parking, and any other restriction to visibility:-**
Existing trees close to the junction restricts the visibility on Broadland Drive. Removal of small tree on Broadland Drive will improved the visibility splay
- vi. Accommodation works:-**
There are no known accommodation works at this stage.
- vii. Street lighting:-**
Existing street lighting to be revised following confirmed alignment of mini-around
- viii. Signing and lining details, including diagram numbers, sizes and mounting heights:-**
New road markings layout as shown on drawing no. 233906-ES-03-C-DR-00-XX-002 and designed in accordance with TSRGD 2002 and Chapter 5 of the Traffic Signs Manual. Signage design will be done as part of NDR.
- ix. Drainage information:-**
There is an existing drainage system at the junction and this will be and t may be necessary to carry out a drainage survey before detailed design stage.
- x. Kerbing details and surfacing information:-**
Junction will be resurfaced as part of the scheme.
- xi. Existing and proposed TROs:-**
All TROs will be done as part of NDR.
- xii. Safety fences/barriers:-**
N/A.
- xiii. Pedestrian provision, including refuges, guard railing, signing, dropped kerbs:-**
There is a proposal to provide a new 1.5m footway in the northern verge of Plumstead Road with drop kerbs at crossing points.
- xiv. Provision for cyclists:-**
N/A.
- xv. Equestrian provision:-**
N/A.
- xvi. Provision for disabled persons:-**
N/A. Existing pedestrian facilities will not be affected.
- xvii. Bus stops and lay-bys:-**
N/A.

xviii. Landscaping:-

None

xix. Service apparatus:-

Existing BT cables and water pipe may be affected by works See Appendix A – Drawing No. 233906-ES-03-C-DR-00-XX-100.

(b) Local Highway Network

A location plan showing the surrounding highway network is included in Appendix A – Drawing No. 233906-ES-03-C-DR-00-XX-001.

4. Site Photographs or Video Recording

Photographs are included in Appendix B.

5. Traffic Data

- (a) Route hierarchy status of all effected roads – Broadland Drive and Plumstead Road
- (b) Latest traffic counts, including turning movements where appropriate. Indication of presence of regular queuing or junctions operating near capacity –N/A.
- (c) Traffic forecast data – N/A.
- (d) Measured speed data – N/A.
- (e) Non vehicular movements – N/A.

6. Accident Data

There is no accident recorded at this junction

7. Construction Programme & Operation

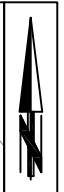
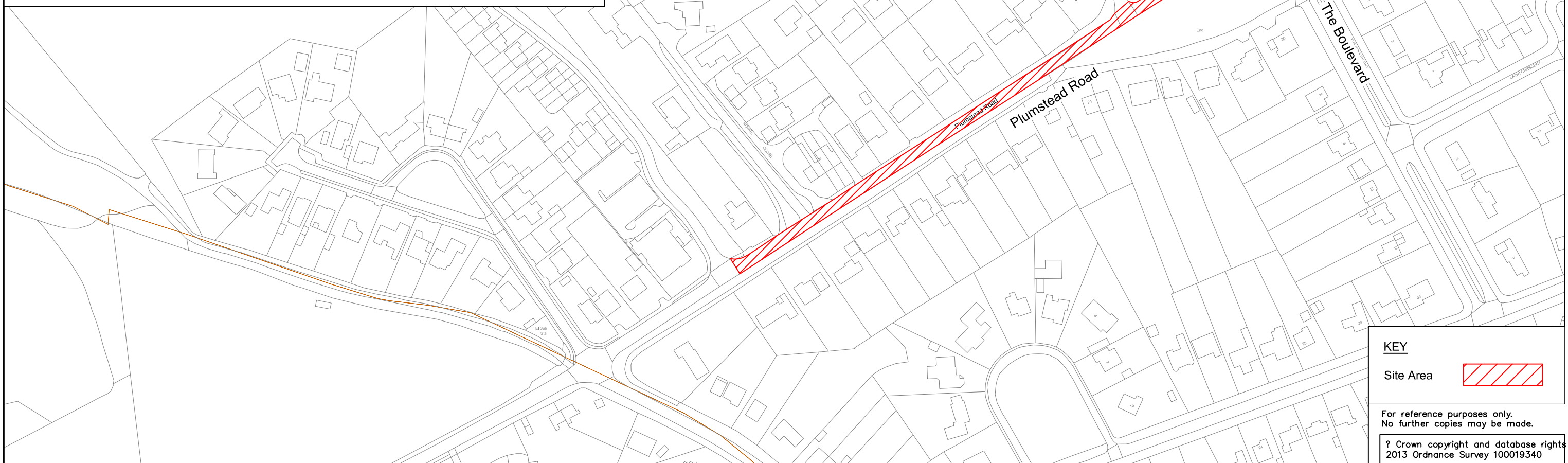
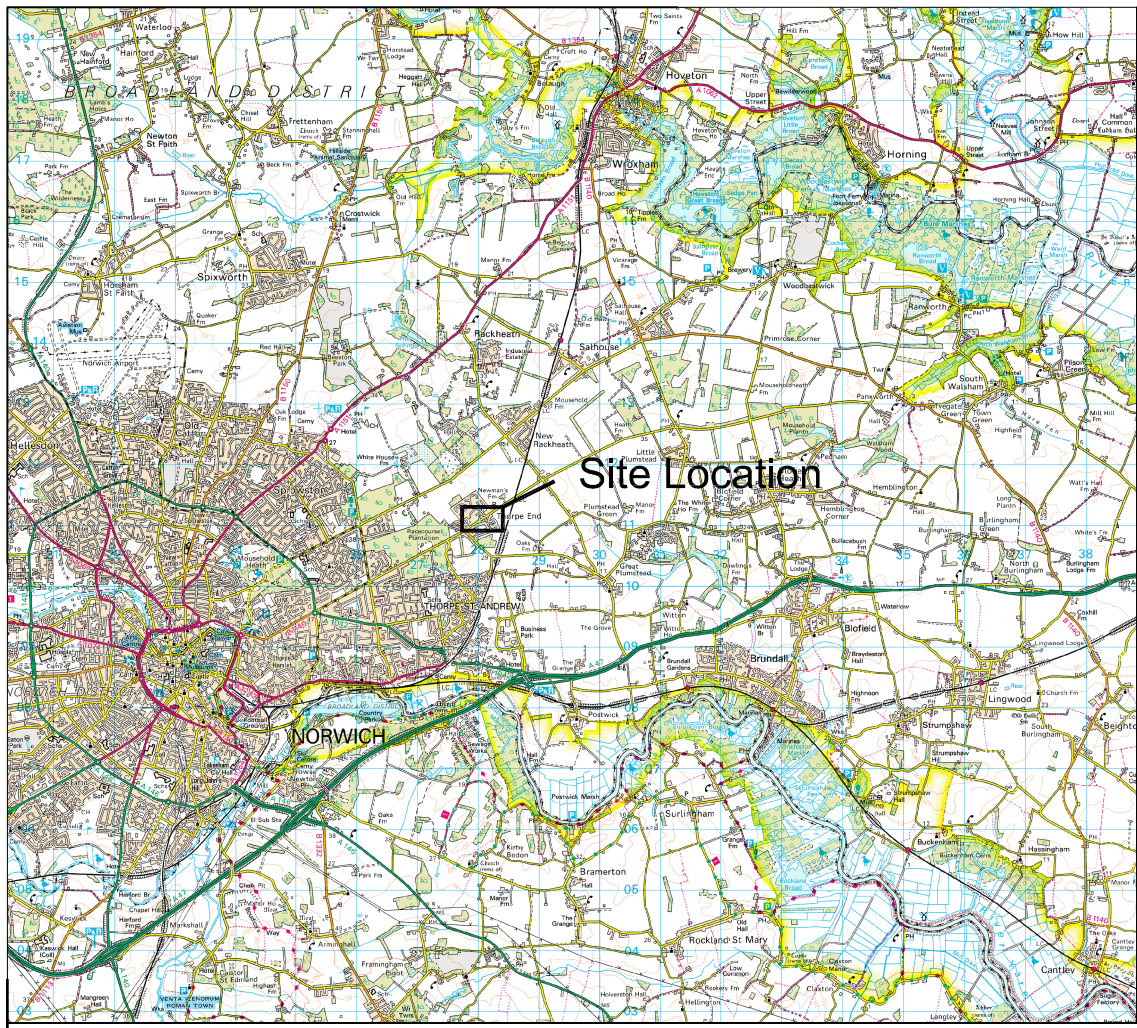
- (a) The scheme will form part of the NDR DCO application and will be delivered together with the mainline works.
- (b) Preliminary design is to be completed by the end of September 2013.
- (c) Detailed design - TBC

8. Other Relevant Information


N/A

APPENDIX A

SCHEME DRAWINGS



KEY

Site Area 

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Norfolk County Council
working with
MAY GURNEY

Mike Jackson
Director of Environment, Transport and Development
Norfolk County Council
County Hall
Martineau Lane
Norwich NR1 2SG

Mott MacDonald
County Hall
Martineau Lane
Norwich, NR1 2US
Tel 01603 767530
Fax 01603 226760
Web www.mottmac.com

DRAWING TITLE
Site Location Plan

REV.	DESCRIPTION	CHECKED	DATE

DESIGNED BY	INIT.	DATE	DRAWING No. MMD-233906-ES-03-C-DR-00-XX-001
JT	JT	09/13	
DRAWN BY	INIT.	DATE	PROJECT TITLE Thorpe End - Plumstead Road Highways Improvements
JCR	JCR	09/13	
CHECKED BY	INIT.	DATE	SCALE AT A3 1:2000
AH	AH	09/13	
APPROVED BY	INIT.	DATE	FILE No. 233906-ES-03
MMG	MMG	09/13	

KEY

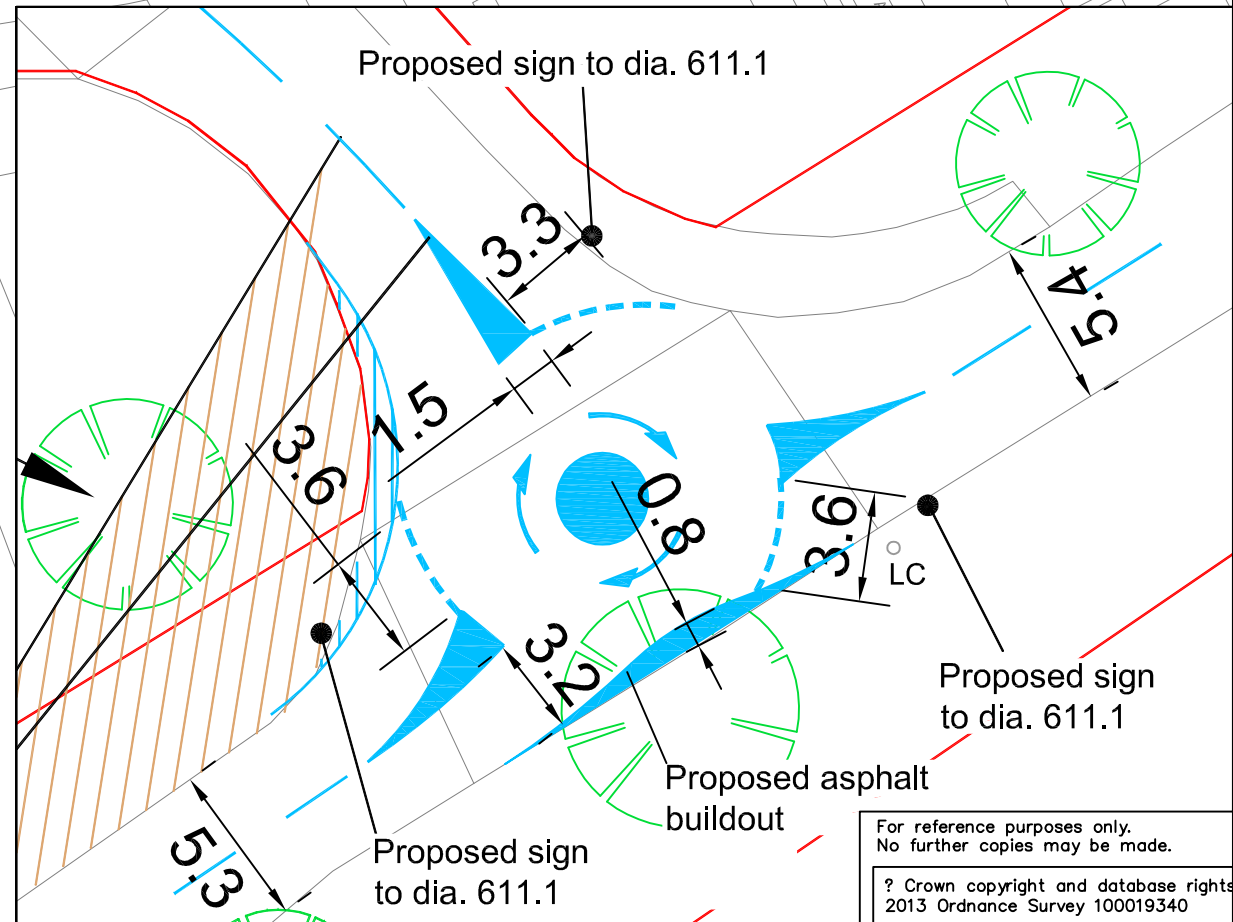
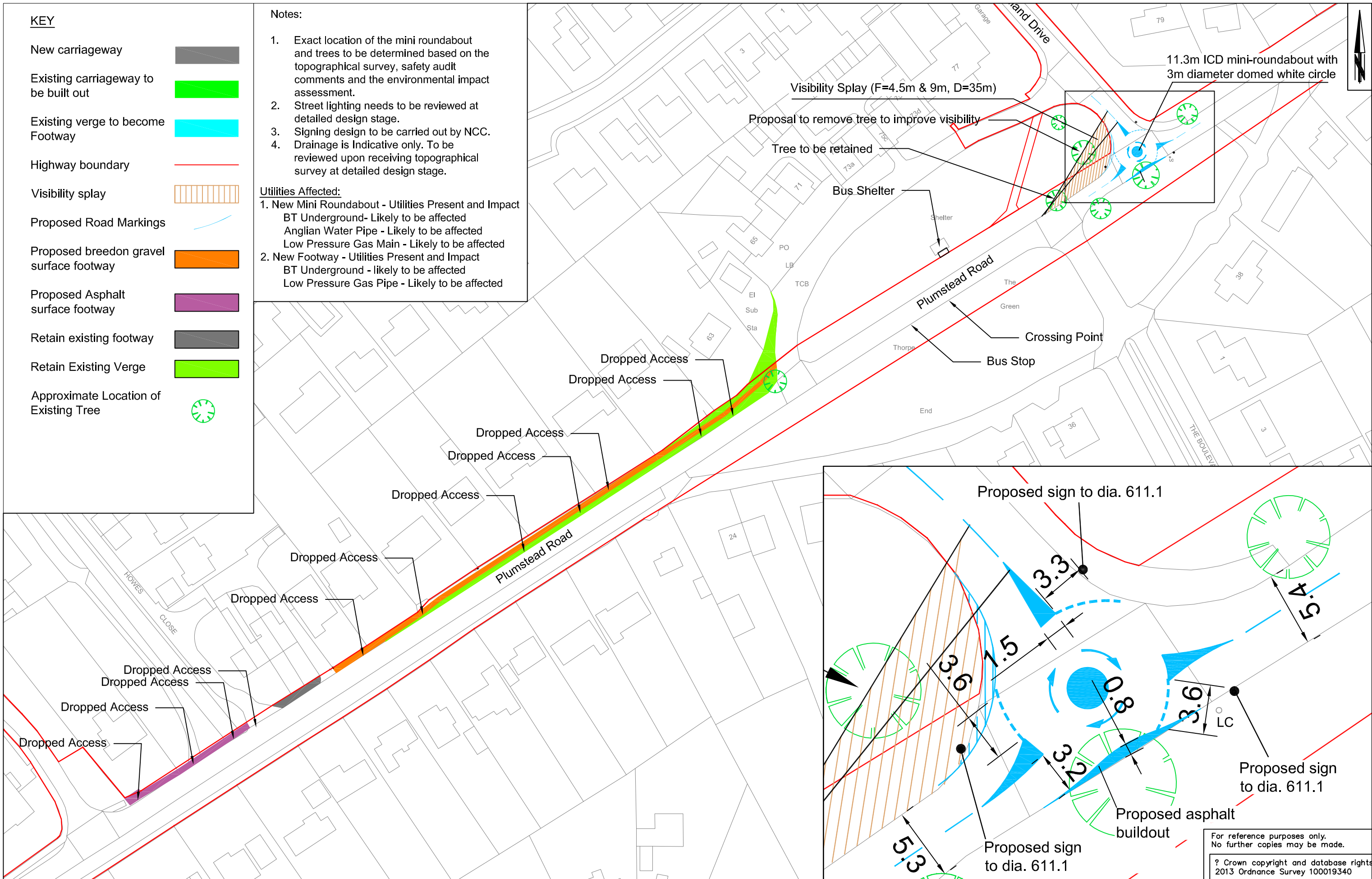
- New carriageway
- Existing carriageway to be built out
- Existing verge to become Footway
- Highway boundary
- Visibility splay
- Proposed Road Markings
- Proposed brendon gravel surface footway
- Proposed Asphalt surface footway
- Retain existing footway
- Retain Existing Verge
- Approximate Location of Existing Tree

Notes:

1. Exact location of the mini roundabout and trees to be determined based on the topographical survey, safety audit comments and the environmental impact assessment.
2. Street lighting needs to be reviewed at detailed design stage.
3. Signing design to be carried out by NCC.
4. Drainage is Indicative only. To be reviewed upon receiving topographical survey at detailed design stage.

Utilities Affected:

1. New Mini Roundabout - Utilities Present and Impact
 BT Underground - Likely to be affected
 Anglian Water Pipe - Likely to be affected
 Low Pressure Gas Main - Likely to be affected
2. New Footway - Utilities Present and Impact
 BT Underground - likely to be affected
 Low Pressure Gas Pipe - Likely to be affected



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Mike Jackson
 Director of Environment, Transport and Development
 Norfolk County Council
 County Hall
 Martineau Lane
 Norwich NR1 2SG

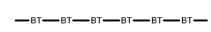

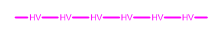

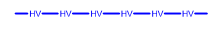

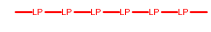

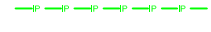
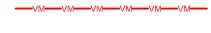

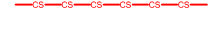


Mott MacDonald
 County Hall
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 Norwich, NR1 2US
 Tel 01603 767530
 Fax 01603 226760
 Web www.mottmac.com

DRAWING TITLE
 Preliminary General Arrangement

REV.	DESCRIPTION	CHECKED	DATE
A	Mini roundabout alignment revised.	UK	09/13

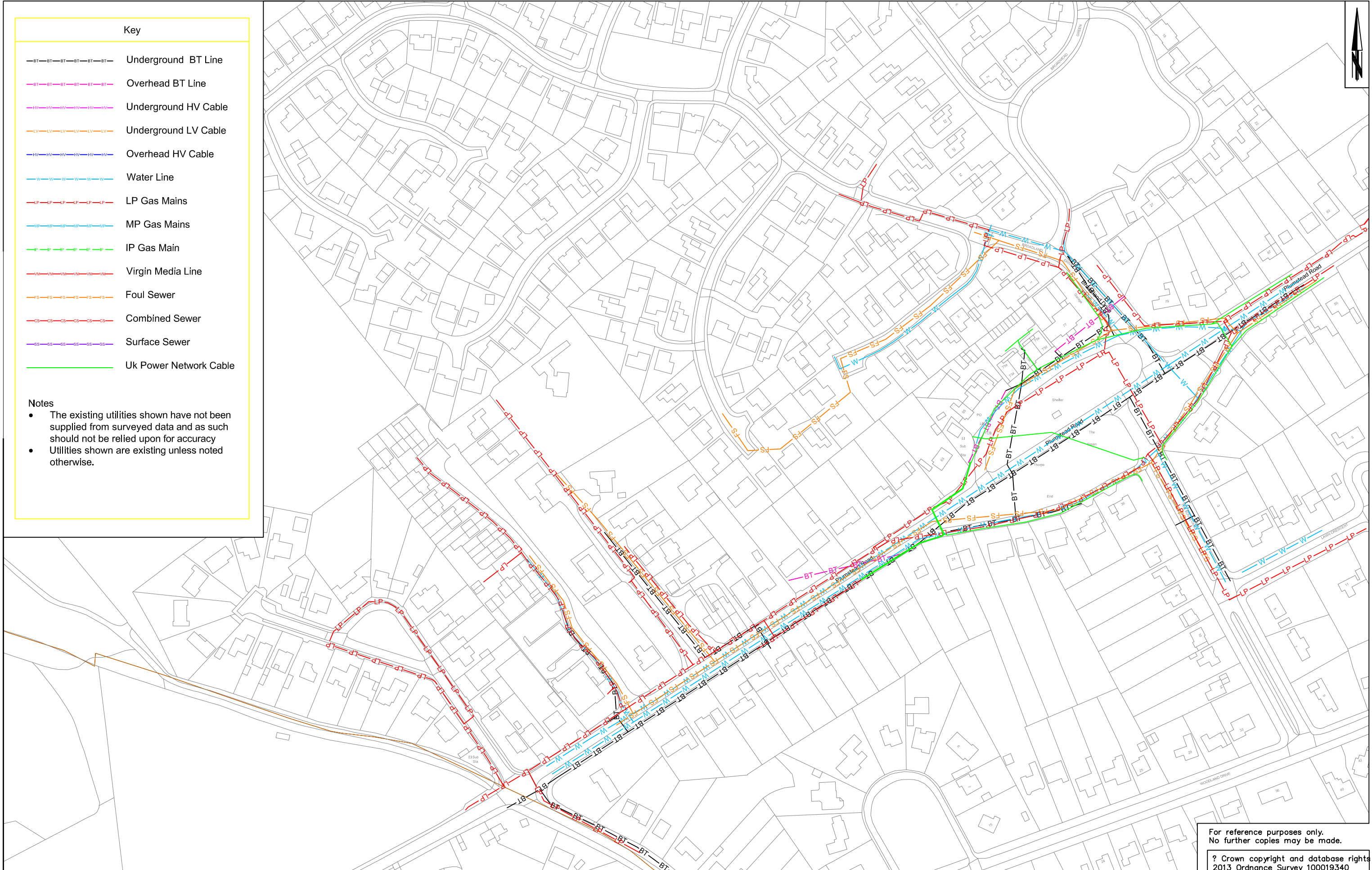
DESIGNED BY	INIT.	DATE	DRAWING No.
JT	JT	09/13	MMD-233906-ES-03-C-DR-00-XX-002A
JCR	JCR	09/13	PROJECT TITLE
AH	AH	09/13	Thorpe End - Plumstead Road
MMG	MMG	09/13	Highways Improvements
			SCALE AT A3
			FILE No.
			233906-ES-02

Key

-  Underground BT Line
-  Overhead BT Line
-  Underground HV Cable
-  Underground LV Cable
-  Overhead HV Cable
-  Water Line
-  LP Gas Mains
-  MP Gas Mains
-  IP Gas Main
-  Virgin Media Line
-  Foul Sewer
-  Combined Sewer
-  Surface Sewer
-  Uk Power Network Cable

Notes

- The existing utilities shown have not been supplied from surveyed data and as such should not be relied upon for accuracy
- Utilities shown are existing unless noted otherwise.



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Mott MacDonald
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Norwich, NR1 2US
Tel 01603 767530
Fax 01603 226760
Web www.mottmac.com

DRAWING TITLE
Utilities Plan

REV.	DESCRIPTION	CHECKED	DATE

DESIGNED BY	INIT.	DATE	DRAWING No.
JCR	JCR		MMD-233906-ES-03-C-DR-00-XX-100
JCR	JCR		PROJECT TITLE
AH	AH		Thorpe End - Plumstead Road
MMG	MMG		Highways Improvements
			SCALE AT A3
			FILE No.
			1:2000
			233906-ES-03

APPENDIX B

SITE PHOTOGRAPHS



PHOTO 1 Facing East on Broadland Drive



PHOTO 2 Facing North on Plumstead Road



PHOTO 3 Facing North on Plumstead Road



PHOTO 4 Facing South on Plumstead Road at the bell mouth of junction

APPENDIX B

Part 3

C874 Plumstead Road Thorpe End:
Highway Improvement Stage 1 Safety
Audit

25 September 2013

INTRODUCTION

This report contains the results of a Stage 1 Safety Audit carried out on the above scheme. The Audit was carried out at the request of Norfolk County Council Highways Group.

The Audit Team membership was as follows:-

Nevil Calder BSc(Hons) CEng MICE MCIHT MSoRSA Principal Consultant
(Audit Team Leader) Mott MacDonald

Kevin Allen BEng(Hons) IEng MCIHT MSoRSA Project Engineer
(Audit Team Member) Network Analysis + Safety
Norfolk County Council

Specialist Advisors:-

Andy Micklethwaite Casualty Reduction Officer
Norfolk County Council

The Audit took place at Carrow House on 25 September 2013. The audit comprised an examination of the Safety Audit submission document and a site inspection on 26 September 2013 by the Audit Team Leader. The weather was bright and the road surface dry.

The terms of reference are as described in Environment, Transport and Development Highways Service Manual Procedure SP03-07. The Auditors have examined and reported only on the road safety implications of the scheme as presented and have not verified the compliance of the design to any other criteria.

ITEMS RAISED AT PREVIOUS AUDIT

No previous safety audit.

ITEMS RAISED AT THIS STAGE 1 AUDIT

1.0 General

1.1 No comment

2.0 Alignment

2.1 No comment

3.0 Junctions

3.1 Comment

Location: proposed mini roundabout

Summary: low side road flows

No traffic flow data was provided with the submission. While overall flows are likely to be appropriate for a mini roundabout, there is concern that due to its residential nature, off-peak flows on Broadland Drive will be low. For regular drivers westbound on Plumstead Road this may affect their expectation of the need to give way. For safe operation of mini roundabouts, side road flows should generally not be less than 10% of main road flows.

3.2 Problem

Location: proposed mini roundabout eastbound approach

Summary: excessive visibility of adjacent entry leading to high approach speeds

Eastbound drivers approaching on Plumstead Road will have excessive visibility of any opposing westbound vehicles due to the straight highway layout. This can lead to early decision making of the need to give way and (in the absence of any opposing traffic) high entry speeds. This can result in conflict with any driver attempting to enter the roundabout from Broadland Drive.

Recommendation

Provide a kerbed splitter island on the eastbound entry to enforce greater lateral shift and encourage lower speeds.

4.0 Non-motorised Users

4.1 No comment

5.0 Signs, Lighting and Markings

5.1 Problem

Location: proposed mini roundabout

Summary: late awareness of mini roundabout due to low conspicuity

There is concern about conspicuity of the proposed mini roundabout within the long straight visual corridor of this stretch of Plumstead Road. This could lead to late driver awareness of the feature and late braking and overshoot collisions.

Recommendation

The kerbed island recommended in 3.2 above would help in this regard, as would a reflective post sited on the proposed build-out on the southern side of the circulatory area. Clear unobstructed siting of the mini roundabout signs is also crucial and the designer should give special consideration to night time conditions.

AUDIT TEAM STATEMENT

We certify that this audit has been carried out in accordance with Norfolk County Council Environment, Transport and Development Procedures.

Signed (ATL) ... *NJ Calder* Nevil Calder
Dated *27/9/13*

Signed *K J Allen* Kevin Allen
Dated *27th September 2013*



APPENDIX A – Problem Location Plan

Not included due to limited nature of the scheme

APPENDIX B

Part 3

Stage 1 Safety Audit, NDR Off Line Improvements – Thorpe End, Response Sheet

29 November 2013

NDR Off line Improvements – Thorpe End

RESPONSE SHEET

Problem (para no.)	Agree/ Disagree	Reasons/Proposals
3.1		Traffic forecast on the minor road at the design year is expected to be more than 10% of the main line, based on the NATS/NDR model. The southern channel line on the WB approach of the road is realigned which will help reducing the speed of WB traffic and improving the expectation of the need to give way.
3.2	Agree	Traffic counts carried out and the mini roundabout geometry revised in accordance with the visibility requirements (for the side road) for the expected future traffic. This is agreed with the NCC and Casualty Reduction Team. Also the geometry of the splitter island roadmarking is improved to increase the deflection of EB traffic. Splitter islands are not found feasible due to narrow road width and the site constraints such as mature oak trees, existing bus stop and boundary issues.
5.1	Agree	The geometry of the splitter island road markings and the southern channel line is improved to reduce the approach speeds. Detailed design of the signs and road markings will be carried out considering this at later stage of the scheme.

To:- Principal Engineer (Casualty Reduction):

From. UMIT KANGALLI

Signed..........Project Engineer Dated: 29.11.2013

Attached: MMD-233906-ES-03-C-DR-00-XX-002D - Preliminary GA (Latest layout)

Note: If you intend to produce your own version of this page please include Safety Audit file no/date and ATL name

APPENDIX C

APPENDIX C

A47/A1042 Postwick Hub Junction Stage
2 Safety Audit Submission

April 2013

A47/A1042 Postwick Hub Junction

Stage 2 Safety Audit Submission

April 2013

PREPARED BY:-

Environment Transport and Development
Design Division
Norfolk County Council
County Hall
Martineau Lane
Norwich
Norfolk
NR1 2SG
Document Ref: R1C150



A47/A1042 Postwick Hub Junction

Author of Submission:-

Highways Technician


Mike Auger

(Sig.)  _____

Checked by:-

Project Engineer

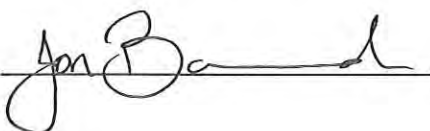
Matt Harrison/Sam Cliff

(Sig.)  _____

Approved by:-

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APPENDICES

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	R1C150-MP-636 Park and Ride Signalised Junction - Traffic Signal Layout
B	Safety Audit Submission Drawings
	R1C150-MP-101A Postwick Junction Exhibition Plan
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Executive Summary

The aim of this safety audit is to bring together all the elements of the A47/A1042 Postwick Hub Junction and its associated works into one safety audit.

The audit will present some modifications to the scheme that have not previously been seen as part of the previous safety audit reports, including additional non motorised user (NMU) measures that have been developed following comments received from various NMU groups during the development of the scheme.

1.0 Background

- 1.0.1. The aim of this safety audit is to bring together all the elements of the Postwick Junction and its associated works into one safety audit.
- 1.0.2. The general layout for the Postwick Junction scheme and its associated works are shown in drawing number R1C150-MP-101A included in Appendix B. All references to elements of the junction in this report are based on figure 1 below.

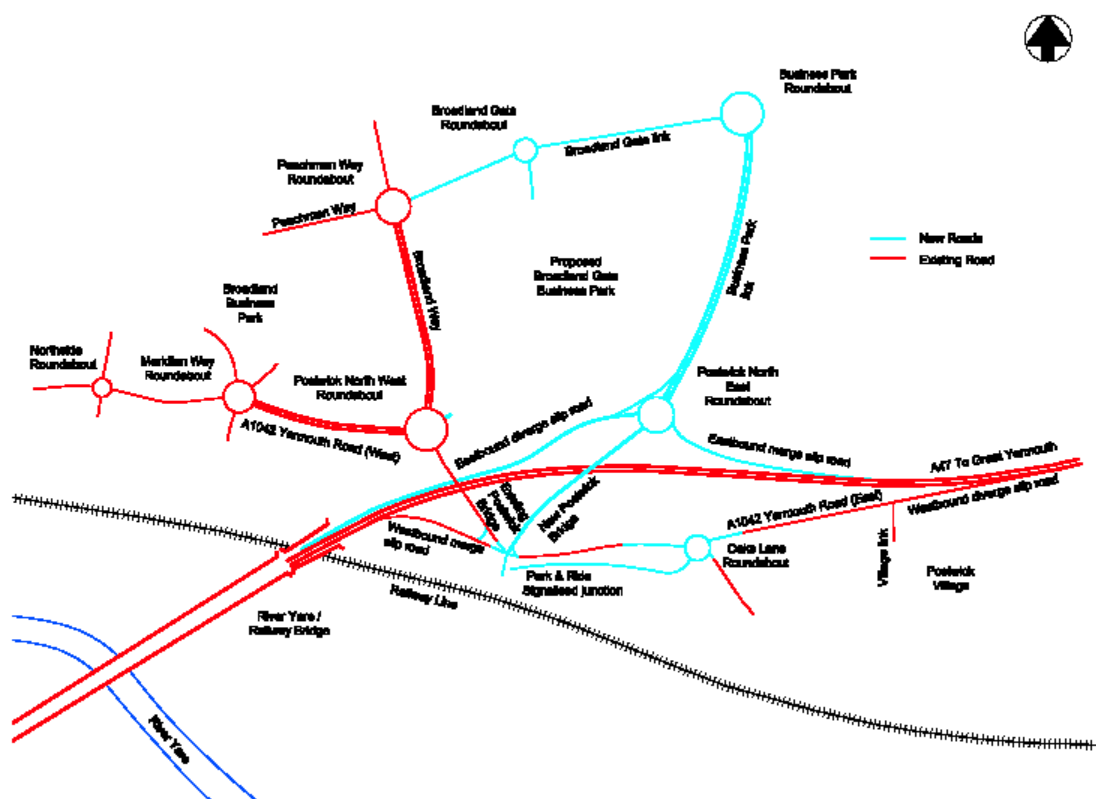


Figure 1 - Schematic layout and naming convention

- 1.0.3. The section below aims to set out each element, how it ties into the proposed Postwick Junction improvements and the previous safety audits processes that it has been through.
- 1.0.4. In the course of the recent development of the project, there have been a number of modifications to the proposed scheme and its associated works

which have not been included in the previous safety audits. The significant modifications have been highlighted in section 1.8 below.

1.1. **The Postwick Junction**

- 1.1.1. The existing Postwick junction was constructed as part of the A47 Norwich Southern Bypass which opened in 1992. It is a grade separated junction linking the A47 trunk road to the A1074 Yarmouth Road leading to the east of Norwich. The Postwick junction provides access to the existing Broadland Business Park immediately to the north of the junction, and to the village of Postwick which lies to the south east. There is a single overbridge linking two roundabouts giving access to these areas. Slip roads on and off the trunk road link to these roundabouts. The westbound diverge slip road leaves the trunk road some way east of the rest of the junction, to join a section of the former trunk road, now the A1042 Yarmouth Road, which also gives access to the village of Postwick.
- 1.1.2. The existing Postwick junction has already been modified since its construction, with the enlargement of the Postwick North West roundabout (located on the north side of the A47) and the addition of segregated left turn lanes. The Highways Agency is concerned that increases in volumes of traffic using the junction could result in operational problems, and in particular that queues on the eastbound diverge slip road off the A47 could extend onto the A47 mainline carriageway, resulting in an unacceptable safety risk. Therefore the Highways Agency have made further development (which could lead to increased demand on this Postwick junction) in the vicinity of the existing Broadland Business Park or to the north east of Norwich, conditional upon the prior improvement of the Postwick Hub junction.
- 1.1.3. Stage 1 Safety Audits were carried out between November 2007 and October 2009 considering a number of different junction options. Thereafter the junction layout shown in R1C093-R1-1285H in Appendix A was submitted for a Stage 2 Safety Audit in January 2010. This audit aimed to provide final details of the proposed Postwick Junction prior to construction of the scheme later that year following the scheme being granted planning permission.

- 1.1.4. Following the January 2010 Audit, the Secretary of State requested in August 2010 that a Public Inquiry into the Slip and Side Roads Orders is held and therefore construction did not commence. The Public Inquiry into the Slip and Side Roads Orders will be held on 3 July 2013.
- 1.1.5. A further interim Stage 2 Safety Audit was then undertaken on the Park and Ride Signalised Junction in March 2013 following some minor changes to the layout and signal timings to optimise the junction following some further modelling work. The Park and Ride Signalised Junction layout submitted for the Safety Audit is shown in drawing R1C150-MP-636 included in Appendix A.
- 1.1.6. The purpose of this safety audit submission was to assess the Park and Ride signalised junction only, focusing on the general junction layout, phasing, traffic flows and queue lengths with details such as vehicle restraint systems, street lighting and earthworks not considered at that time.
- 1.2. Expansion of Postwick Park and Ride site**
- 1.2.1. A proposed scheme to provide 500 additional parking spaces at the Postwick Park & Ride was developed in 2009 to address capacity issues at the site and cater for future additional demand.
- 1.2.2. The scheme is part of the Norwich Area Transportation Strategy (NATS) policy to encourage long stay at Park & Ride site, freeing up city centre car parks for short stay shoppers and visitors, thus allowing for substantial numbers of commuter vehicles to be removed from Norwich city centre.
- 1.2.3. The proposed scheme included new access and egress arrangements for the Park and Ride site. This included a bus only entrance and exit at the proposed signalised junction with the general access and egress for vehicles being moved to a new roundabout at Oaks Lane.
- 1.2.4. The proposed layout shown on drawing number 249610-AD-023F Appendix A, underwent a Stage 2 Safety Audit in January 2010.
- 1.2.5. It is proposed to construct the new access road roundabout at Oaks Lane and the pedestrian/cyclist shared use facility at the same time as the Postwick

Junction improvement. The delivery of the extension of the parking facilities at the Park and Ride site will follow at a later date (currently projected to be 2015).

1.3. **Recent developments**

1.3.1. As discussed above, during the recent development of the scheme there have been a number of modifications made to the proposals that have not been included in the previous audits and are therefore now being presented in this safety audit for the first time.

1.3.2. The significant changes are highlighted in the paragraphs below and discussed further in the relevant section of the safety audit.

New Postwick Bridge

1.3.3. The previous Safety Audits submitted for the Postwick Junction scheme showed the cross section over the New Postwick Bridge as a 2.0m footway on the east side and a 2.0m wide hardened verge on the west side of the bridge, and a four lane 16.4m wide carriageway providing three lanes southbound and one lane northbound with the opposing traffic flows would be separated by a hatched central reserve.

1.3.4. Following feedback from local access groups, it has been highlighted that in addition to the walking link over the bridge, it could prove valuable to allow for the provision of a cycling link if this was incorporated into a sustainable transport route as part of the Northern Distributor Road scheme. Therefore the cross section over the bridge has now been changed to allow a 3m wide footway on the east side of the bridge. This has been achieved by reducing the hardened verge on the west side of the bridge to 1.0m. This will ensure that the bridge can accommodate such a route should this be progressed as part of a future NDR in the future.

Existing Eastbound Diverge Slip Road

1.3.5. Following feedback from various local access groups it has become evident that the existing slip road is currently being used informally by pedestrians and cyclists to access the service path over the A47 Viaduct and bridge over the

Norwich to Great Yarmouth railway line to gain access to Sustrans National Cycle Network Route 1 and Whitlingham Park.

- 1.3.6. Whilst upgrading the service path across the A47 viaduct is beyond the scope of this scheme, to ensure that cyclists are not disadvantaged by the proposed stopping up of the eastbound diverge slip road, the scheme could be changed to include a shared use facility along the line of the existing slip road. This would enable cyclists using the A47 eastbound to connect with the existing and proposed cycle network at the Postwick North West Roundabout.

Broadland Gate Roundabout

- 1.3.7. The Broadland Gate Roundabout submitted as part of January 2010 Stage 2 showed a standard 3 arm roundabout to provide access to the Broadland Gate Business Park.
- 1.3.8. Following this safety audit, this has now been modified to include segregated left turn lane for west bound traffic on Broadland Way into the Broadland Gate Business Park development as shown in drawing R1C150-MP-660 included in Appendix B.

Park and Ride extension

- 1.3.9. Since the Park and Ride Stage 2 Safety Audit in January 2010, two changes to the design have occurred which have not been previously audited.
- 1.3.10. These changes include the widening of the main access carriageway through the Park and Ride site to 6.0m as recommended in the January 2010 audit response to better accommodate two way traffic flow.
- 1.3.11. The layout submitted as part of this safety audit also include additional cycling measures to provide a link along the access road from the signalised junction to the neighbourhood route from Norwich to Brundall and Blofield as shown in the Norwich cycle map published in June 2010 included in Appendix C.

Brundall Low Road and Church Road Bus Stop

- 1.3.12. As part of the planning conditions for the park and ride extension, the existing bus stop on the A1042 Yarmouth on the northern boundary of the application site is to be moved to the junction of Brundall Low Road and Church Road. The location of the proposed bus stop was not submitted as part of the previous audits. The proposed location of the bus stop is shown in drawing 249610-AD-61 included in Appendix B.

Traffic Signs and Road markings

- 1.3.13. The traffic signs and road markings that were included as part of the Safety Audits in January 2010 and February 2013 have been updated and changed to reflect the latest developments in the scheme. The proposed traffic signs and road markings are shown in drawing R1C150-MP-663, 664 and 665 included in Appendix B.

1.4. Previous Safety Audit Reports

- 1.4.1. The above Safety Audit submissions discussed above in this section have not been included in the appendices of this report, but can be made available if required.

2.0 Scheme Description and Design Standards

- 2.1. The general layout for the Postwick Hub Junction scheme and its associated works are shown in drawings R1C150-MP101A, R1C150-MP-636A and R1C150-MP-660 to 665 included in Appendix B.
- 2.2. The Scheme will be subject to a 40mph speed limit other than on slip roads and the Park and Ride Access Road. Therefore the appropriate design speed is 70kph in accordance with DMRB design standard TD 9/93: Highway Link Design, paragraph 1.8, Table 2. The proposed speed limits are shown in drawings R1C150-MP-663, 664, 665 contained in Appendix B.
- 2.3. The slip road design speed is determined from the mainline A47 design speed, as the A47 is a national speed limit rural dual carriageway a design speed of 120kph applies, therefore the appropriate design speed for the slip road is 70kph in accordance with DMRB design standard TD 22/06: Layout of Grade Separated Junctions paragraph 4.5, Table 4/1.

2.4. Eastbound Diverge Slip Road

- 2.4.1. The proposed Eastbound diverge slip road passes under the existing Postwick Bridge and connects to the proposed Postwick North East Roundabout. The slip road has been designed to TD22/06 and is a 7.3m wide two lane carriageway with 2.5m verges and 1.0m carriageway edge hardstrips with a maximum gradient of 6%. The existing Eastbound diverge slip road and its associated segregated left turn lane will be closed as a result of the introduction of this new diverge slip road. The new slip road starts at the same location as the existing slip road, which is just off of the eastern end of the existing River Yare/Railway Bridge.
- 2.4.2. The nearest compliant layout that could be provided within the constraints for the new diverge slip road is a Layout Type B. This layout allows a taper diverge, where diverging traffic leaves the mainline A47 over a specified flare distance, the flare is followed by an auxiliary lane which is an additional lane at the side of the mainline to provide increased diverge opportunity and additional space for weaving traffic. This layout was submitted as a Departure from Standard in 2008 and approved in 2012.

2.5. **Eastbound Merge Slip Road**

- 2.5.1. The proposed Eastbound merge slip road is designed as per TD22/06 with a 3.7m wide single lane with a 2.0m nearside verge and 3.3m nearside hardshoulder, 0.7m offside carriageway edge hardstrip and 2.8m offside verge with a maximum gradient of 6%.
- 2.5.2. The nearest compliant layout that could be provided is a Type B Layout, which has an auxiliary lane followed by a taper merge over a specified flare distance.
- 2.5.3. This layout was submitted and approved by the Highways Agency as a Departure from Standard in 2008.
- 2.5.4. The provision of this slip road has resulted in the need to close the existing private means of access to The Grange property from the A47 trunk road.

2.6. **Westbound Diverge Slip Road**

- 2.6.1. There are no design changes proposed on the existing diverge from the A47 where the proposed Scheme design would tie into the existing westbound diverge slip road at Oak's Lane.

2.7. **Westbound Merge Slip Road**

- 2.7.1. The proposed Scheme ties into the existing westbound merge slip road after the Park and Ride signalised junction and retains the existing two-lane taper merge layout onto the A47. The existing layout is not a standard layout as per TD 22/06.
- 2.7.2. A Departure from Standard to retain the existing two-lane taper merge was submitted to the Highways Agency in 2012 and approved in January 2013.

2.8. **Postwick North East Roundabout**

- 2.8.1. The proposed eastbound diverge slip road connects into a proposed new at-grade North East roundabout. The roundabout is a 4-arm roundabout with an Inscribed Circle Diameter (ICD) of 70m and a 9.0m wide circulatory carriageway.

2.8.2. A segregated left turn lane at the proposed roundabout would be provided to cater for the left-turn manoeuvre from the eastbound diverge slip road into the proposed Business Park link road leading to the proposed Business Park roundabout.

2.9. **The Grange**

2.9.1. The Grange is a private residence to the north of the A47 which currently has a private means of access 200m east of the end of the existing eastbound merge slip road taper. This “entry only” access allows eastbound traffic to enter The Grange by turning left off the A47. This arrangement is unsatisfactory in terms of highway safety, creating a potential conflict with traffic joining the trunk road from the eastbound merge slip road. As the proposed eastbound diverge slip road would join the A47 further east than at present, it is proposed that this “entry only” private means of access will be stopped up as part of the Scheme. A new replacement private means of access via the new Postwick North East Roundabout is proposed.

2.10. **Business Park Link Road**

2.10.1. The proposed Business Park link road is an all-purpose dual two-lane carriageway linking the North East roundabout and the Business Park roundabout. Each carriageway would be in the form of a 7.3m carriageway comprising two running lanes 3.65m in width with a 1.0m hardstrip on the nearside and offside. The verges would be a minimum 2.5m in width and the central reserve would be 2.5m wide. A 1.0m wide footpath is proposed running along the eastern side of the Business Park Link Road.

2.11. **Business Park Roundabout**

2.11.1. The proposed Business Park link road connects into the proposed at-grade Business Park roundabout. The roundabout is a 2-arm roundabout with an ICD of 90m and a 12m wide circulatory carriageway.

2.12. **Broadland Gate Roundabout**

2.12.1. The Broadland Gate roundabout is a 3-arm roundabout with an ICD of 50m and a 9.0m wide circulatory carriageway and a segregated left turn lane for west

bound traffic into the Broadland Gate Business Park development. The roundabout is connected to the Business Park roundabout to the east, the proposed Broadland Gate Business Park to the south and to the existing Peachman Way roundabout to the west by the Broadland Gate link road.

2.13. **Broadland Gate Link**

2.13.1. The proposed Broadland Gate link road would be a single carriageway link road. The link road would be in the form of a 7.3m wide carriageway with 2.5m wide verges and no hardstrips. The carriageway width would increase on the approach to the roundabouts to provide additional lanes on the entry to the circulatory carriageway.

2.14. **New Postwick Bridge**

2.14.1. As discussed in section 1, the layout of the new Postwick Bridge has changed since the previous safety audits. A 3.0m hardened footway will be provided on the west side of the bridge. The proposed link road over the bridge will provide four 3.65m wide carriageway lanes, three lanes southbound and one lane northbound with opposing traffic flows separated by a hatched 1.8m central reserve.

2.14.2. The cross section over the bridge comprises 3.0m footway on the east side and a 1.0m wide hardened verge on the west side of the bridge, and the four lane 16.4m wide carriageway.

2.15. **Existing Postwick Bridge**

2.15.1. The scheme proposals over the existing Postwick bridge would utilise the existing bridge deck to provide a 3.0m shared use footway/cycleway on the west side of the bridge, a three lane 9.0m carriageway (two lanes southbound one lane northbound) and a 1.0m verge on the east side of the bridge.

2.15.2. The proposed lane widths are below the standard lane width of 3.65m as described in DMRB TD 27/05. DMRB TD 16/07 states at paragraph 7.24 that a minimum lane entry width of 3.0m should be provided on the approach to a roundabout and DMRB TD 50/04 states at paragraph 2.22 a minimum lane entry width of 3.0m should be provided on the approach to a signal controlled

junction. Therefore due to the short length over the bridge of 145m between junctions, the lane widths are considered acceptable as junction approach widths.

2.16. **Park and Ride Signalised Junction**

- 2.16.1. The existing southern roundabout would be replaced by a fully signalised junction. A drawing of the junction including traffic signal phasing diagrams is shown in drawing R1C150-MP-636A included in Appendix B.
- 2.16.2. The current access into the Park and Ride site will be restricted to bus only access and egress. General car access/egress would be via the new roundabout junction at Oaks Lane proposed as part of the extension of the existing Park and Ride site.
- 2.16.3. The method of control for the traffic signal installation is intended to react to the varying traffic demands throughout the day. The junction will incorporate queue detection to restrict excessive queues.
- 2.16.4. The access to the Park and Ride site, the A47 westbound merge slip road and the segregated right turn from the existing Postwick Bridge will include on demand crossing phases for pedestrians and cyclists.
- 2.16.5. The staging for the traffic signal layout is as follows:
- 2.16.6. Stage 1 - This allows traffic heading southeast bound over the existing Postwick bridge to turn right onto the westbound merge slip road, ahead and right for buses only into the park and ride site, ahead for traffic heading east towards the access to the Park and Ride site and Postwick, and left turn out of the Park and Ride site for buses only. In addition this stage allows pedestrian/cyclist to cross between the large traffic island and the Park and Ride site.
- 2.16.7. Stage 2 - This stage allows traffic heading southwest over the new Postwick bridge into the junction to turn right towards Norwich over the existing Postwick bridge, ahead and right onto the A47 westbound merge slip road, ahead for buses only into the park and ride site and left for traffic heading east towards the access for the Park and Ride site and Postwick. In addition this stage allows pedestrian/cyclists to cross between the existing Postwick bridge and the large

traffic island before the Park and Ride site and across the bus only exit from the Park and Ride site.

2.16.8. Stage 3 - This stage allows westbound traffic to travel ahead onto the A47 westbound merge slip road, ahead and right towards Norwich over the existing Postwick bridge and to turn right over the new Postwick bridge. In addition this stage allows pedestrian/cyclist to cross between the existing Postwick bridge and the large traffic island before the Park and Ride site, as well as across the bus only entry and exits from the Park and Ride site.

2.17. **Oaks Lane Roundabout**

2.17.1. A new roundabout is proposed at Oaks Lane as part of the extension to the existing Park and Ride site. The roundabout is a 4-arm roundabout with a 54m ICD and a 10.0m wide circulatory carriageway width. The eastern arm would connect to the existing A1042 Yarmouth Road, the south eastern arm would connect to Oak's Lane, the south western arm would provide a new access into the Park and Ride site, with the western arm continuing along the A1042 to the Park and Ride signalised junction.

2.18. **Postwick Park and Ride**

2.18.1. A new access to the Park and Ride site for general vehicles would be provided via the new roundabout at the junction of Oak Lane with the A1042 slip road from the A47. The new access road would be a minimum of 6.0m wide carriageway with two 3.0m carriageway lanes. The access road would be subject to a 10mph speed limit enforced by speed cushions as shown in drawings R1C150-MP-664 included in Appendix B.

2.18.2. Buses only would continue to enter and exit the site using the existing entry point via the proposed signalised junction during the morning peak until 11.30 am when they will enter via the new Oak Lane roundabout. Buses would continue to leave the site via the proposed signalised junction as described in section 2.15 above. A new section of bus only carriageway will allow buses to access the existing park and ride bus terminal. Passengers will be picked up and dropped off at the existing bus terminal along with a drop off only point adjacent to the proposed extension site.

- 2.18.3. To prevent unauthorised vehicular access into the Park and Ride site outside the hours of operation, a single arm field gate will be installed across the access to the site, with an automated exit barrier used across the exit carriageway.
- 2.18.4. To prevent unauthorised vehicular access to the access road to the proposed lagoon and access road adjacent to the existing bus terminal, lockable double steel farm gates will be used.
- 2.18.5. **Brundal Low Road/Church Road bus stop**
- 2.18.6. As part of the scheme to expand the park and ride site, the existing bus stop located on the A1042 Yarmouth Road between the existing Park and Ride entrance and Oaks Lane will be moved to the junction of Brundal Low Road and Church Road. The layout and location of the new bus stop and shelter are shown on 249610-AD-61 included in Appendix B.
- 2.19. **New Postwick Bridge**
- 2.19.1. The proposed bridge design is for a three span steel and concrete composite bridge, crossing the A47 Norwich Southern Bypass with a skew angle of 54 degrees.
- 2.19.2. One Departure from Standard has been identified and applied for, this relates to the omission of Abutment Galleries from the design. Abutment galleries are provided below expansion and rotational joints to facilitate inspection and maintenance.
- 2.19.3. DMRB BA 57/01 and BD 57/01: Design for Durability requires that abutment galleries are incorporated into the design. It is proposed that the provision of abutment galleries shall be omitted as it is considered that there is adequate safe access for inspection and maintenance of the bearings at the abutments, in addition it is considered that abutment galleries often constitute a confined space and are susceptible to vandalism and can constitute an additional maintenance liability. In addition it is noted that none of the existing bridge structures on the A47 Norwich Southern by-pass have abutment galleries. Instead it is proposed that the main beams should found directly onto the

bearing shelf with ballast wall immediately behind rather than providing an enclosed abutment gallery

2.19.4. Based on these criteria a Departure from Standard for the omission of Abutment Galleries was submitted to the HA and approved in 2010.

2.20. **Existing Postwick Bridge**

2.20.1. The works to the existing bridge fall into two parts, one is the modifications to construct a new off-slip lane between the north pier and abutment, the other is the works to the bridge deck associated with the revision of the carriageway / lane alignment over the bridge and the provision for cyclists.

2.20.2. It is proposed that a new eastbound diverge slip road is to be constructed between the north pier and abutment of the bridge, in order to do so the existing batter slope in front of the north abutment will need to be removed. In order to enable this, a new retaining wall structure would need to be constructed in front of the north abutment to ensure that it is supported and does not move when the fill that supports it is removed for the construction of the slip lane.

2.20.3. The works to the bridge deck are proposed in order to accommodate the re-alignment of the carriageway over the structure, to provide a 3.0m wide foot / cycleway on the west side with three 3.0m wide lanes for traffic. A new parapet, 1.40m high, on the west side of the bridge is required in order to accommodate cyclists on the new widened west side footway.

2.21. **Facilities for Non Motorised Users**

2.21.1. The details of proposed walking, cycling facilities are shown in drawing R1C150-MP-608 and 609 included in Appendix B.

2.21.2. To the east of the Scheme, an existing footpath (Postwick Footpath No. 2) runs south from Smee Lane along a field boundary to the A47, where it crosses the A47 at grade, and continues from the A47 to its terminus on the A1042 Yarmouth Road. There are currently steps either side of the A47 to access this crossing, the current condition of the steps indicates that this footpath is not well used.

- 2.21.3. As part of the proposed Scheme this length of Footpath No. 2 would be stopped up and diverted on a new alignment towards the proposed Business Park Roundabout and then southwards alongside the Business Park link road to a point where a safe crossing could be made across the new eastbound merge slip road. This route would continue across the new Postwick bridge over the A47. From the Park and Ride signalised junction the route would continue along the verge of the A1042 Yarmouth Road to the point where the existing Footpath No. 2 originally joined the A1042 Yarmouth Road.
- 2.21.4. The re-aligned Footpath No. 2 would consist of a 1.0m wide compacted sub-base footpath. Over the new Postwick bridge a 3.0m wide hardened surface would be provided to enable a future upgrade to a pedestrian/cyclist facility. The proposed facilities will remove the need for pedestrians to cross the A47 at grade, providing a significantly safer option.
- 2.21.5. Across the existing Postwick Bridge the current pedestrian and cycle facilities across would be altered, removing both the existing northbound and southbound on-carriageway facility for cyclists, and providing a shared use facility along the western side of the bridge, linking to the shared use facilities on Yarmouth Road and through the Postwick Park and Ride site. The new facilities proposed as part of the Park and Ride extension include a 3.0m wide off-carriageway shared use link from the Park and Ride signalised junction to Oak's Lane.
- 2.21.6. To cater for cyclists using the neighbourhood route from the A1042 Yarmouth Road, across the existing Postwick Bridge and onto Brundall Low Road, shown in the Norwich Cycle Map included in Appendix C, cyclists will be sign posted from the signalised junction along the proposed Park and Ride access road, bypassing the proposed barrier facilities via the arrangement shown in drawing R1C150-MP-609 included in Appendix B, leaving the site via the Oaks Lane Roundabout and continuing on carriageway (as the current situation) to Brundall Low Road.
- 2.21.7. As discussed in section 2.16 the Park and Ride signalised junction would also include signal controlled crossings with on-demand phases for pedestrians and cyclists.

- 2.21.8. As discussed in section 1.3, the existing eastbound diverge slip road is currently being used informally by pedestrians and cyclists to access the service path over the A47 Viaduct and bridge over the Norwich to Great Yarmouth railway line, to gain access to Sustrans National Cycle Network Route 1 and Whitlingham Park.
- 2.21.9. The current service path used by cyclists and pedestrians over the A47 Viaduct and bridge is 1.5m wide with a 0.8m hard strip between kerb edge and solid white line marking the edge of the carriageway. The service path is abutted along the edge of the viaduct by a 1.0m high parapet.
- 2.21.10. The width of the current layout does not comply with current design standards for a Non Motorised User (NMU) facility. The width would need to be a minimum of 2.0m for a pedestrian facility (TA 90/05 paragraph 7.4) and a minimum of 2.5m wide for a shared use pedestrian and cycle facility (TA 90/05 section 7) adjacent to a parapet with a 0.5m separation between the NMU route and the carriageway.
- 2.21.11. In combination with the cost of providing the recommended option above there are also concerns about the potential of lighting conflicts on unlit high-speed roads where the contra-flow cyclists would be extremely vulnerable unless there was considerable separation or lighting baffles and safety barriers throughout the entire length.
- 2.21.12. To ensure that cyclists are not disadvantaged by the proposed stopping up of the eastbound diverge slip road, it is proposed that a shared use facility will be provided on the line of the existing slip road. This would enable cyclists using the A47 eastbound to connect with the existing and proposed cycle network at the Postwick North West Roundabout and would therefore not be disadvantaged by the stopping up. For cyclists travelling westbound down the slip road, end of cycle route and cyclists dismount signs will be provided to inform users that the facility does not continue across the A47 viaduct. The proposed layout is shown in drawing number R1C150-MP-608, included in Appendix B.

3.0 Street lighting

- 3.1. The design of the Street lighting has been developed in accordance with the requirements of the DMRB. Therefore the proposed North East Roundabout, Broadland Gate Roundabout proposed Park and Ride signalised junction will be lit in accordance with TD51/03 and British Standard 5489-1:2013 Code of practice for the design of road lighting.
- 3.2. In accordance with TA 49/07, an initial assessment regarding the need to light the other sections of the proposed scheme has been undertaken. The assessment indicates that it would not be cost beneficial to light the 2 arm Business Park roundabout or the surrounding links, and as the distance between lit sections was sufficiently long enough (greater than 4 times the Stopping Sight Distance) then this section could remain unlit. All other locations would require lighting.
- 3.3. On the above basis the proposed road lighting scheme is shown in drawing R1C150-MP-663, 664 and 665 included in Appendix B.
- 3.4. Traffic signs and bollards will be illuminated as required in accordance with The Traffic Signs and Regulations and General Directions 2002.

4.0 Vehicle Restraint Systems

- 4.1. The development of the proposals for vehicle restraint systems (VRS) have been assessed and designed dependent on whether the section of the scheme forms part of the Trunk Road Network or the Local County Highway Network.
- 4.2. On the Trunk Road sections of the scheme, the provision of VRS has been assessed and designed in accordance with the DMRB TD19/06 and the Road Restraint Risk Assessment Process (RRRAP).
- 4.3. Where the scheme would form part of the local County Highway network, the provision of VRS has been assessed using the emerging "The Use of Vehicle Restraint Systems in Norfolk" guidance on County Roads developed by Norfolk County Council.
- 4.4. The proposed VRS design is shown in drawing R1C150-MP-663, 664 and 665 included in Appendix B.

5.0 Planned Development

- 5.1. There are a number of approved and committed developments in the area. These include the proposed Broadland Gate Business Park development, the proposed Brook Farm / Laurel Farm development, and the additional 1,000 dwellings identified in the Joint Core Strategy. The Broadland Gate Business Park is a significant development comprising a commercial zone of up to 42,000m² of B1 and B8 uses; a business village containing up to 4,500m² of A1, A2, A3 and A4 uses; a community zone comprising up to 7,500m² of C2, C3 and D1 uses; a hotel and leisure zone comprising up to 9,100m² of C1, A3, A4 and D2 uses; and a 1,200m² car showroom. It has planning approval, which is conditioned on, inter alia, provision of the Postwick Hub junction scheme. The Secretary of State for Transport has required that the BGBP, which would increase the traffic using the Postwick junction of the A47, cannot be occupied until the existing junction has been improved as proposed.
- 5.2. The Brook Farm / Laurel Farm development is a development proposal for the provision of 600 dwellings with a local centre incorporating 1,035 m² of A1 retail and a community hall and approximately 57,480 m² of B1, B2 or B8 (office, industrial, storage) employment uses, together with a link road and site for a railway halt on land to the north of the existing Broadland Business Park. The proposal has the benefit of a resolution to grant planning permission subject to a planning obligation and various planning conditions. One of the proposed conditions, as directed by the Secretary of State for Transport, is that the development cannot commence until the Scheme has been provided.
- 5.3. The Joint Core Strategy identifies significant potential for further development once the Postwick junction has been improved. This includes the business park expansion and housing development delivered by Broadland Gate Business Park and Brook Farm Laurel Farm, and at least 1,000 further dwellings.

6.0 Traffic Data

- 6.1. The proposed Scheme has been designed to provide a road network with sufficient capacity to cater for planned new development and in which proposed junctions operate adequately and avoid queuing back onto the A47 trunk road with the accompanying safety risk. The Scheme also provides capacity and flexibility so that the Postwick Hub junction would operate satisfactorily if the Northern Distributor Road (NDR) were to be connected to it.
- 6.2. A forecasting report has been produced showing the traffic flows and queue lengths, staging, phasing and signal timings for the whole of the Postwick Hub Junction.
- 6.3. The forecasting years are 2015, 2020 and 2030. Two traffic scenarios have been used, one is called 'Core' and the other is 'High' and the differences between the two scenarios are as follows:

Core Scenario

- Trip generation uses 85 percentile rates from TRICS 2012.
- Trip distribution based on a gravity model.
- Broadland Gate and Laurel Farm development sites are included.

High Scenario

- Trip generation extracted from the Postwick Transport Assessment Report.
- Trip distribution based on Postwick Transport Assessment Report.
- Broadland Gate, Laurel Farm and Brook Farm development sites were included.

- 6.4. The forecasting report can be made available to the audit team if required.

7.0 Amendments to existing TRO's

- 7.1. As part of the scheme amendments to two existing Traffic Regulation Orders are proposed.
- 7.2. A TRO will be brought forward to extend 40mph speed limit to a point east of the proposed new Park and Ride access roundabout at the junction with Oaks Lane as shown in drawing R1C150-MP-665 included in Appendix B.
- 7.3. A second TRO is proposed to convert the existing Park and Ride access to a Bus only access and egress as shown in drawing R1C150-MP-664 included in Appendix B.

8.0 Site Location

- 8.1. A plan showing the location of the scheme is shown in figure 2 below.

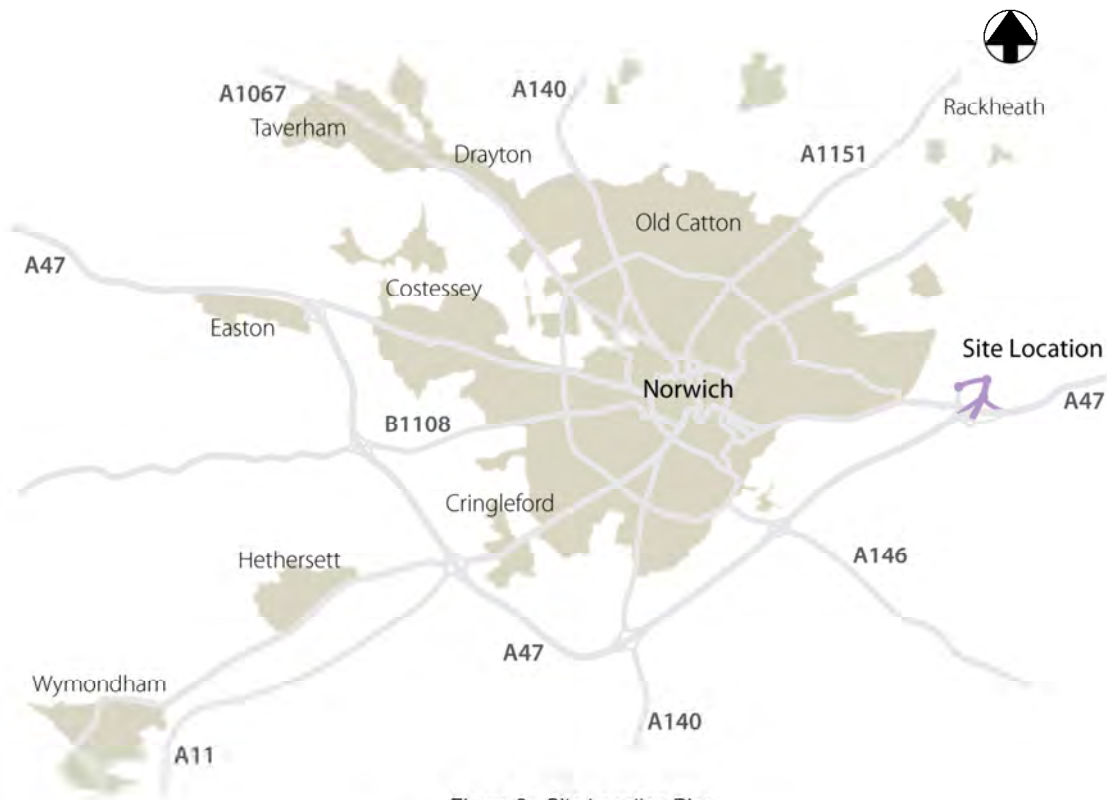
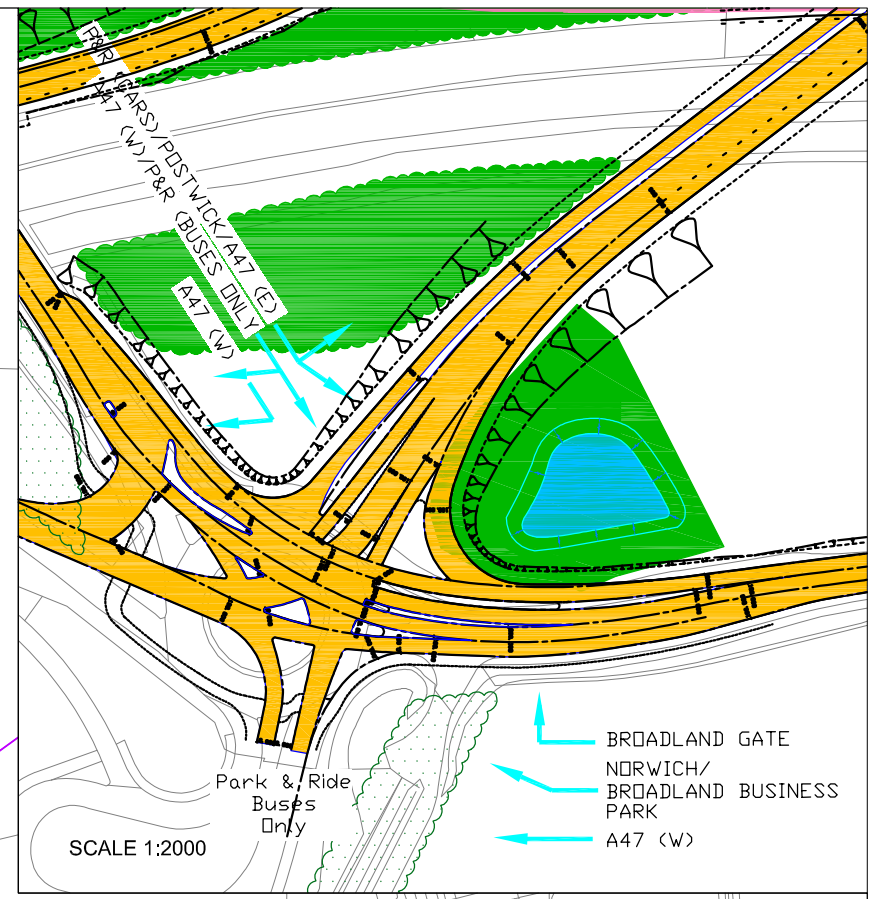
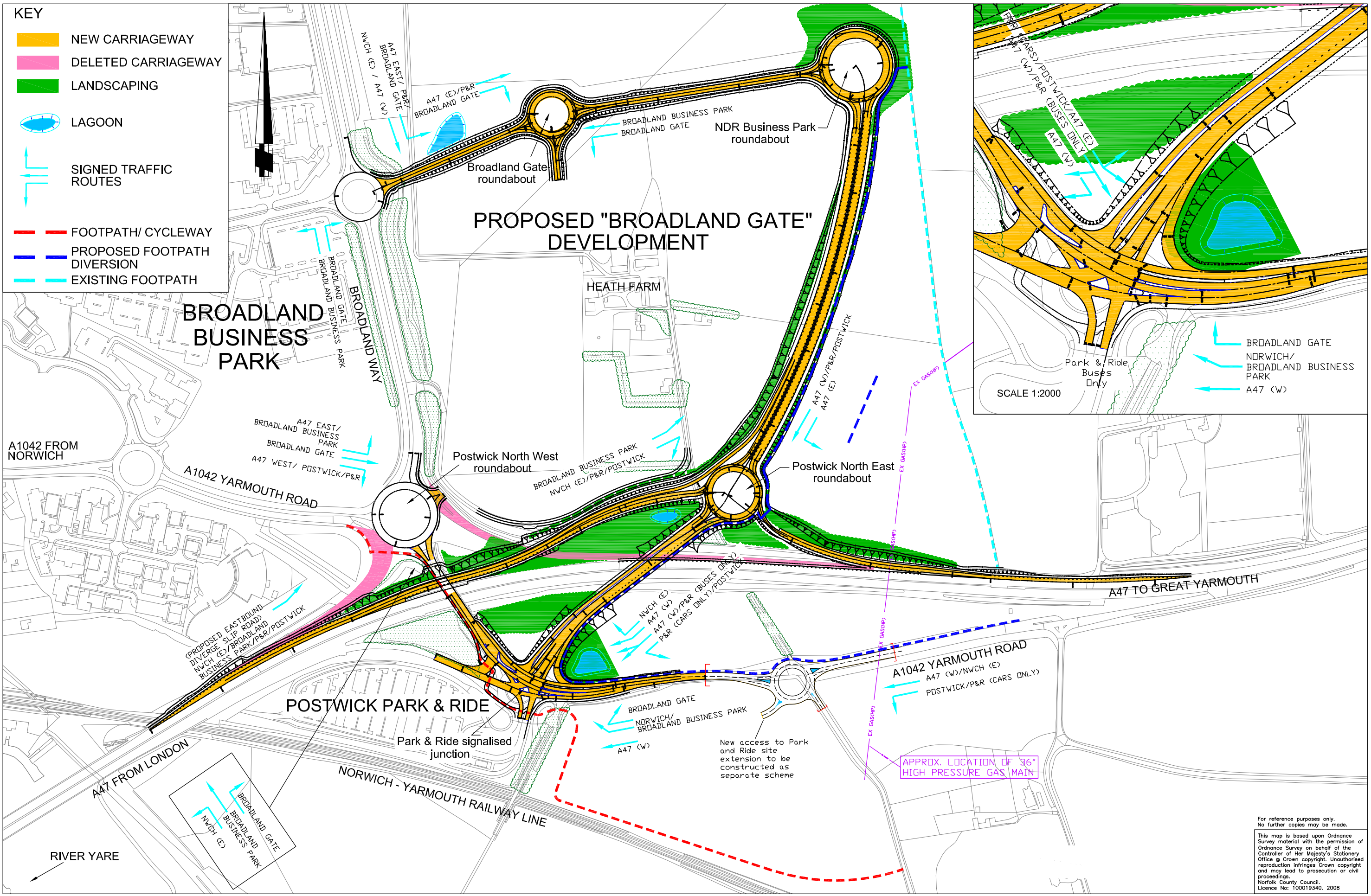


Figure 2 - Site Location Plan

Figure 2 - Site Location

APPENDIX A



- KEY**
- NEW CARRIAGEWAY
 - DELETED CARRIAGEWAY
 - LANDSCAPING
 - LAGOON
 - SIGNED TRAFFIC ROUTES
 - FOOTPATH/ CYCLEWAY
 - PROPOSED FOOTPATH DIVERSION
 - EXISTING FOOTPATH

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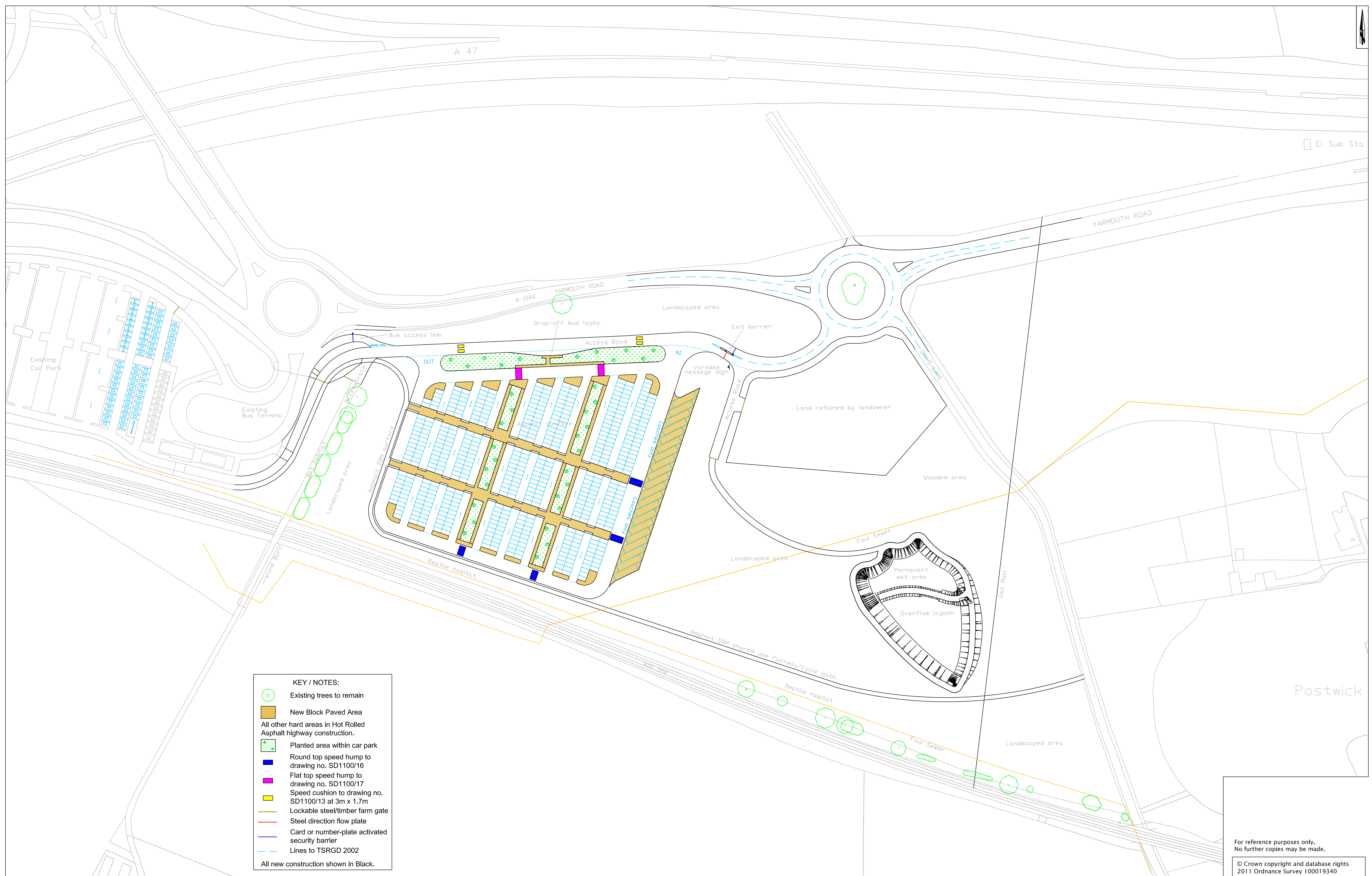


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DRAWING TITLE
 NORWICH BROADLAND GATE DEVELOPMENT
 POSTWICK JUNCTION - OPTION 10DD
 JUNCTIONS AND ACCESS ROADS - FIGURE 4.2

REV.	DESCRIPTION	CHECKED	DATE
C	Postwick model updated, P&R roundabout updated		03/08
D	Cycle routes & footpaths added	RM	05/08
E	New Access to Broadland Gate - Postwick North West R/B	RM	07/09
F	Signed Traffic Routes Changed	RM	07/09
G	Access to BG from NW r/b modified	RM	08/09
H	P&R Signalled Junction Layout Updated	CA	10/09

	INITIALS	DATE	DRAWING No.
SURVEYED BY	OS	2008	R1C093-R1-1285H
DESIGNED BY	NCC	01/09	PROJECT TITLE
DRAWN BY	DB	01/09	Norwich Northern Distributor Road
CHECKED BY	PD	01/09	SCALE
			1:NTS
			FILE No.
			R1C093



- KEY / NOTES:**
- Existing trees to remain
 - New Block Paved Area
 - All other hard areas in Hot Rolled Asphalt highway construction.
 - Planted area within car park
 - Round top speed hump to drawing no. SD1100/16
 - Flat top speed hump to drawing no. SD1100/17
 - Speed cushion to drawing no. SD1100/13 at 3m x 1.7m
 - Lockable steel/timber farm gate
 - Steel direction flow plate
 - Card or number-plate activated security barrier
 - Lines to TSRGD 2002
- All new construction shown in Black.

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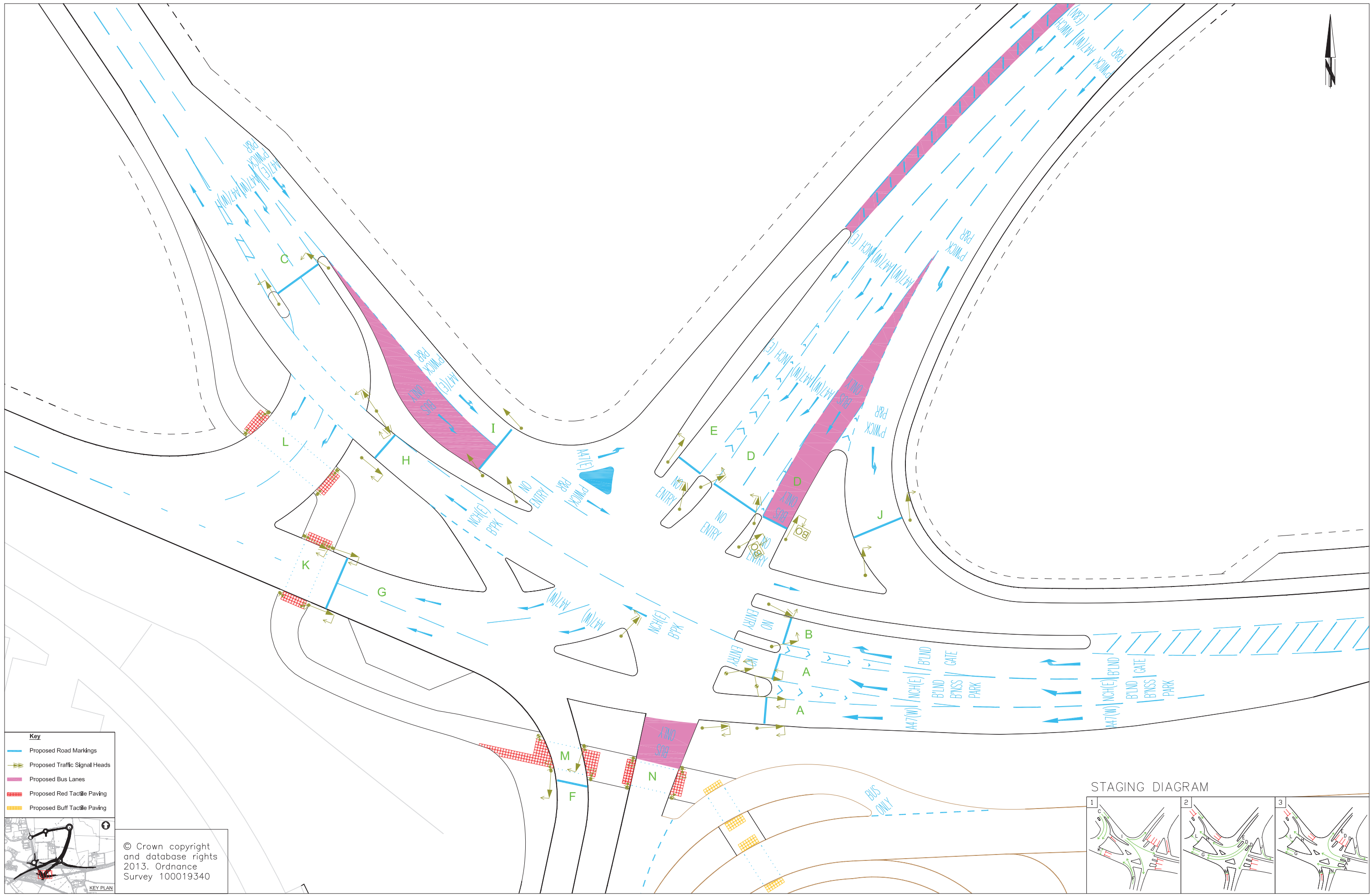
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County Hall
Martineau Lane
Norwich, NR1 2US
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DRAWING TITLE

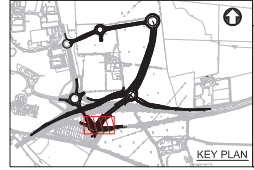
SITE PLAN

REV.	DESCRIPTION	CHECKED	DATE
e	Extra approach lane on A47 off-slip arm	RF	10/09
f	Bus access and drop-off added	RF	10/09

DESIGNED BY	INIT.	DATE	DRAWING No.
AMH	AMH	04/09	249610-AD-023f
DRAWN BY	AMH	04/09	PROJECT TITLE
CHECKED BY	RF	04/09	Postwick Growth Point: Park and Ride Extension and Access Scheme
APPROVED BY	RF	04/09	SCALE AT A1 1:1000
			FILE No. 249610-AD



- Key**
- Proposed Road Markings
 - Proposed Traffic Signal Heads
 - Proposed Bus Lanes
 - Proposed Red Tactile Paving
 - Proposed Buff Tactile Paving



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DRAWING TITLE
 POSTWICK HUB JUNCTION
 PARK AND RIDE SIGNALISED JUNCTION
 TRAFFIC SIGNAL LAYOUT

REV.	DESCRIPTION	CHECKED	DATE

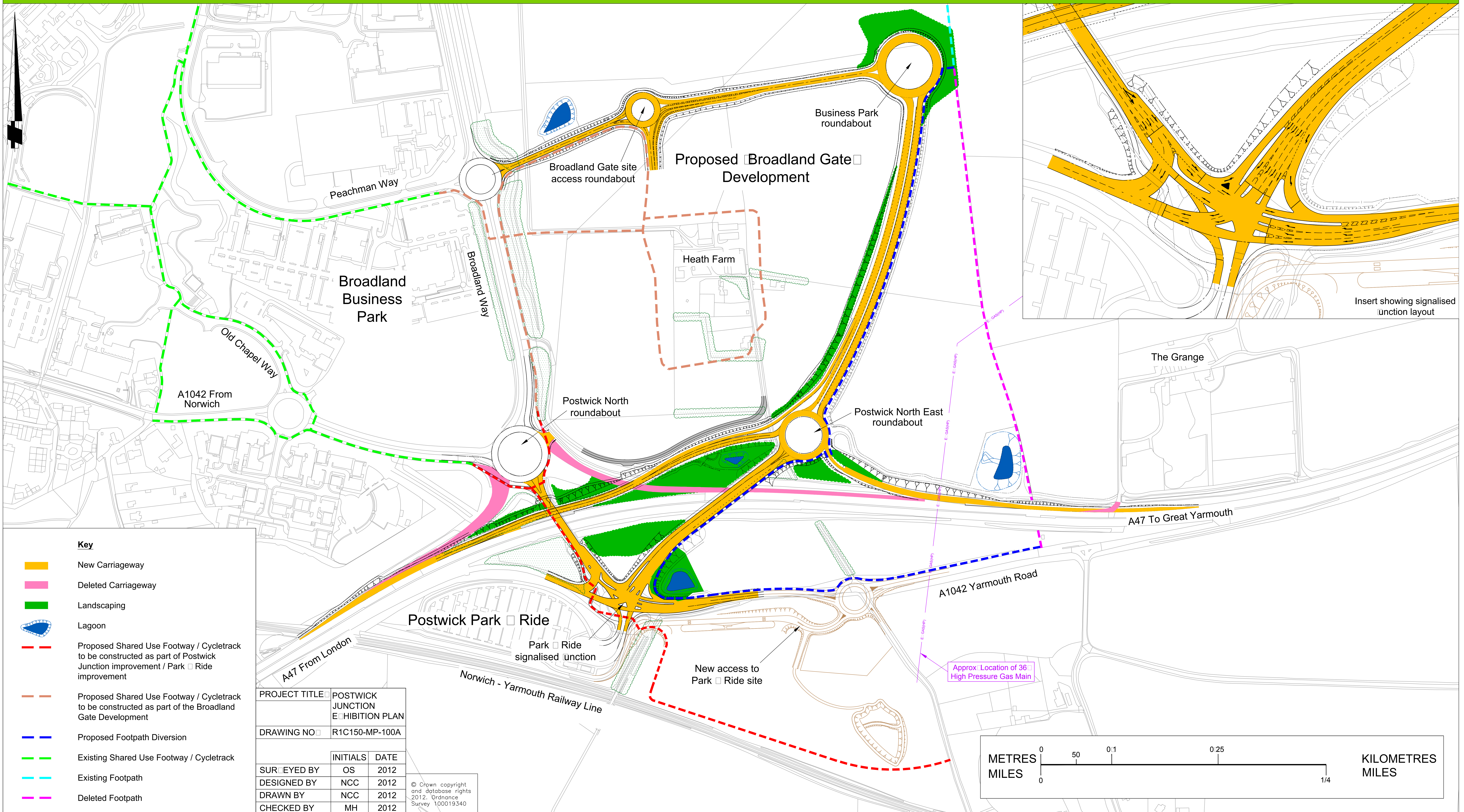
SURVEYED BY	INITIALS	DATE	DRAWING No.
OS/MG	OS/MG	2012/2008	R1C150-MP-636
DESIGNED BY	DG	01/13	PROJECT TITLE
DRAWN BY	DG	01/13	POSTWICK HUB JUNCTION
CHECKED BY	SC	02/13	SCALE 1:250@A1
			FILE No. R1C150

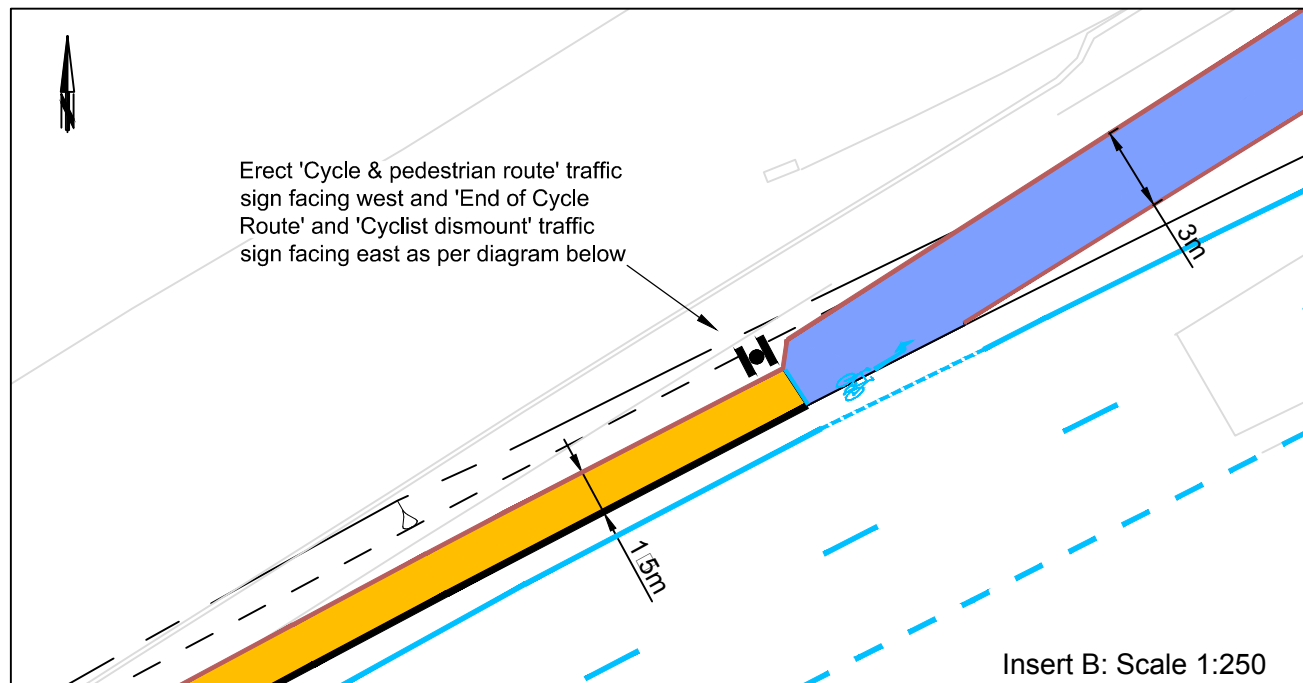
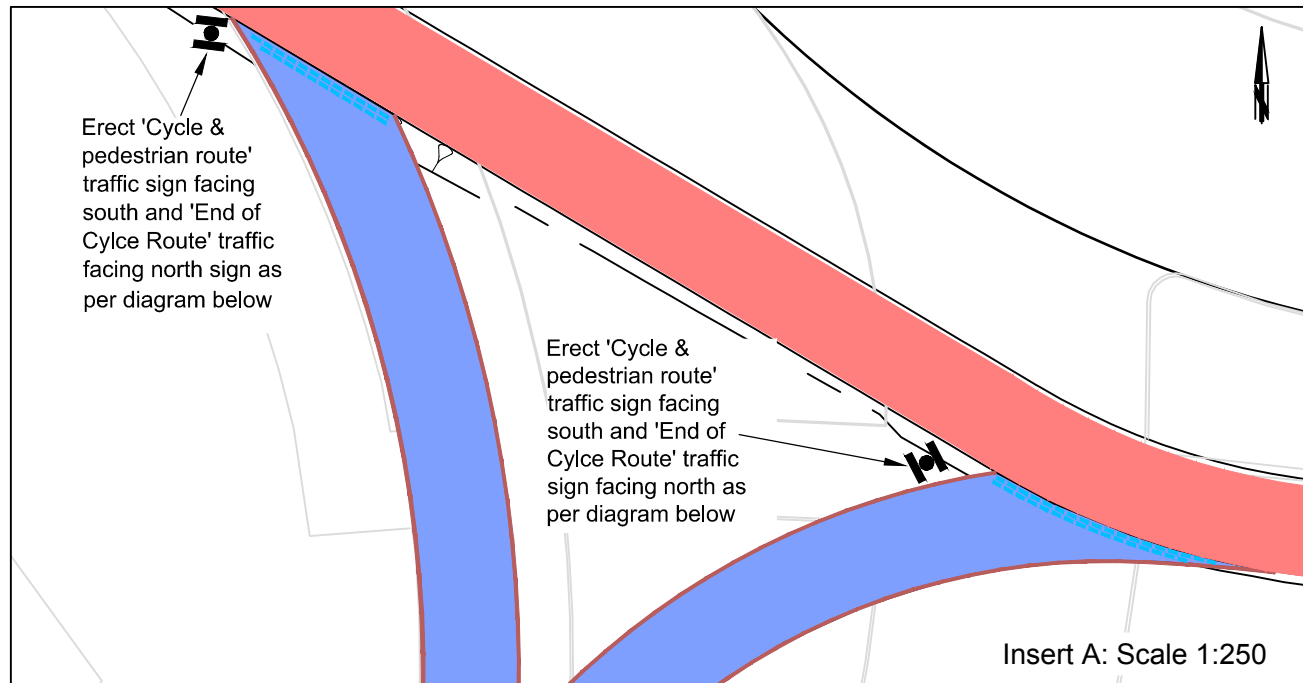


APPENDIX B




Norwich Area Transport Strategy Implementation

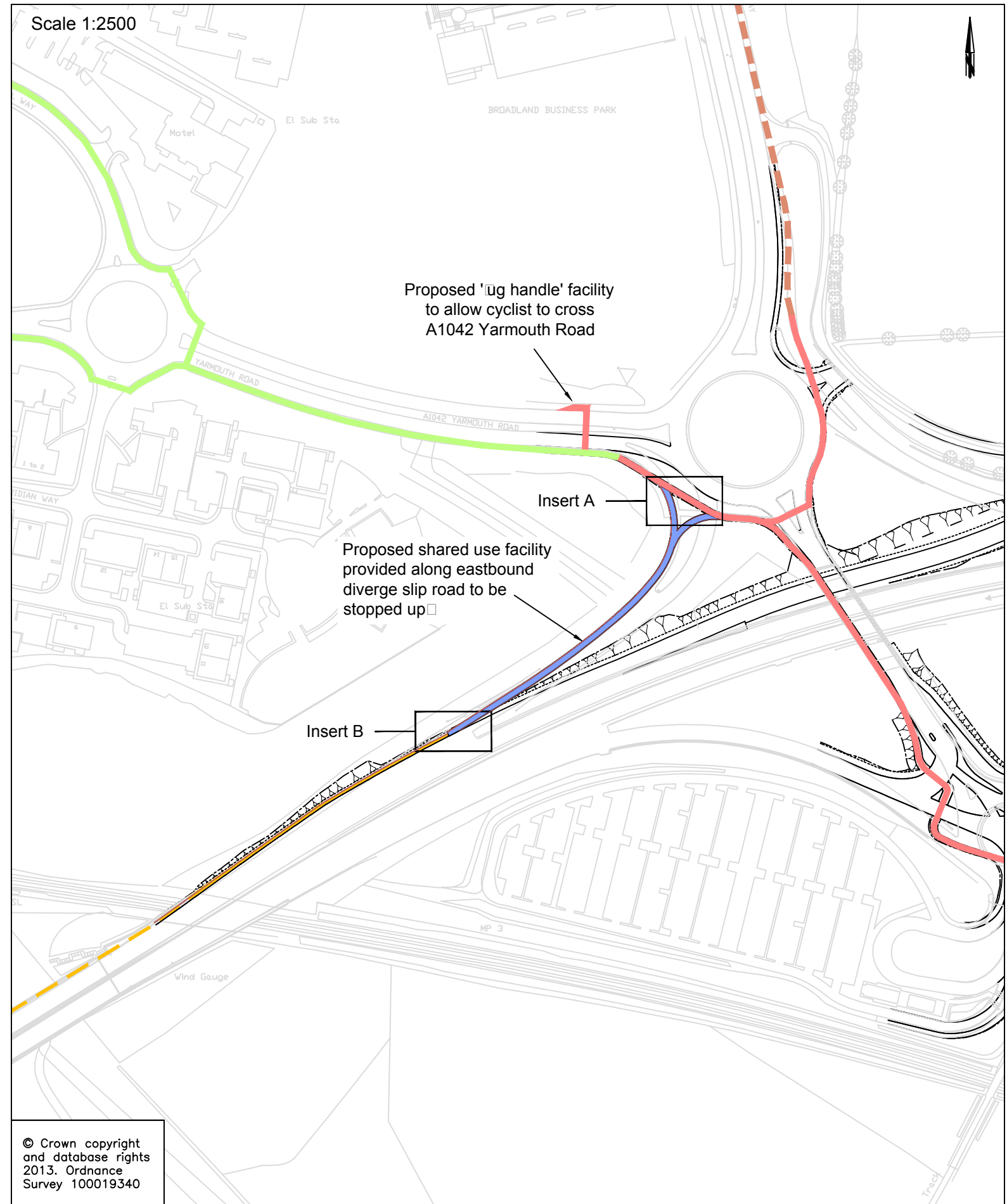
Postwick Junction





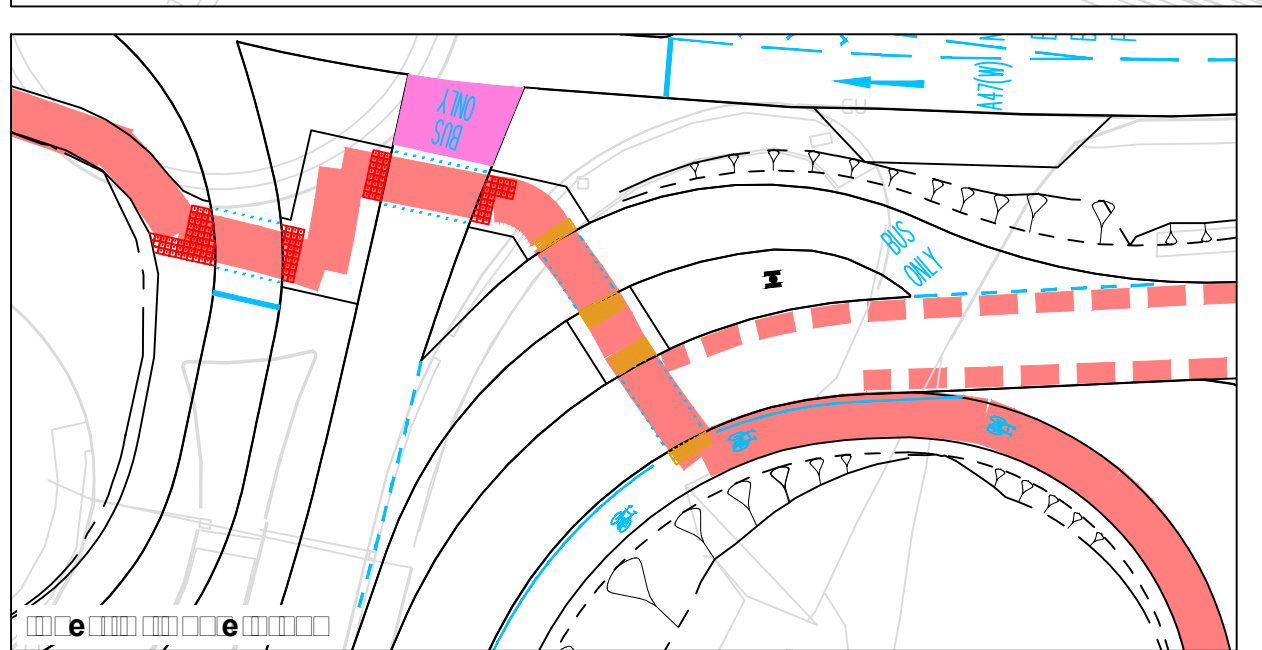
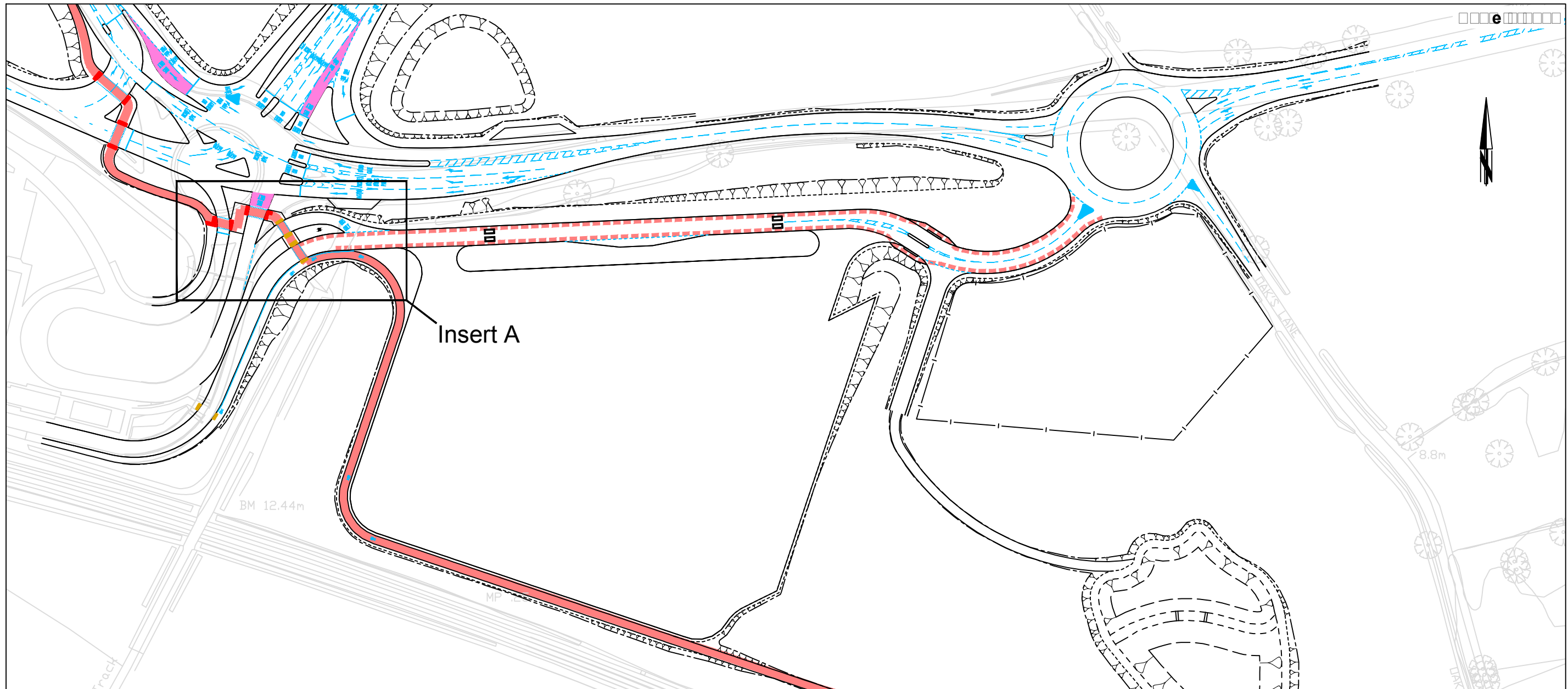
Key

- Proposed Shared Use Facility to be constructed as part of Postwick Junction proposals
 - Proposed Shared Use Facility to be constructed as part of the Broadland Gate Development
 - Proposed Shared Use Facility along deleted carriageway
 - Proposed service path to link to existing service path across A47 River Yare viaduct
 - Existing service path
 - Existing Shared Use Footway / Cycletrack
 - Proposed carriageway markings
- Traffic signs
-  Ref 956 - Shared use facility sign
 -  Ref 965 - End of cycle route sign
 -  Ref 966 - Cyclists dismount sign



REV.	DESCRIPTION	CHECKED	DATE

SURVEYED BY	INITIALS	DATE	DRAWING No.
			R1C150-MP-60
DESIGNED BY	MA	09/12	PROJECT TITLE
DRAWN BY	MA	04/13	POSTWICK HUB JUNCTION
CHECKED BY	MH	04/13	SCALE AS SHOWN
			FILE No. R1C150



- Key**
- Proposed Shared Use Facilities
 - Proposed connection to neighborhood route (Brundall)
 - Proposed Jug Handles
 - Proposed Speed Cushions

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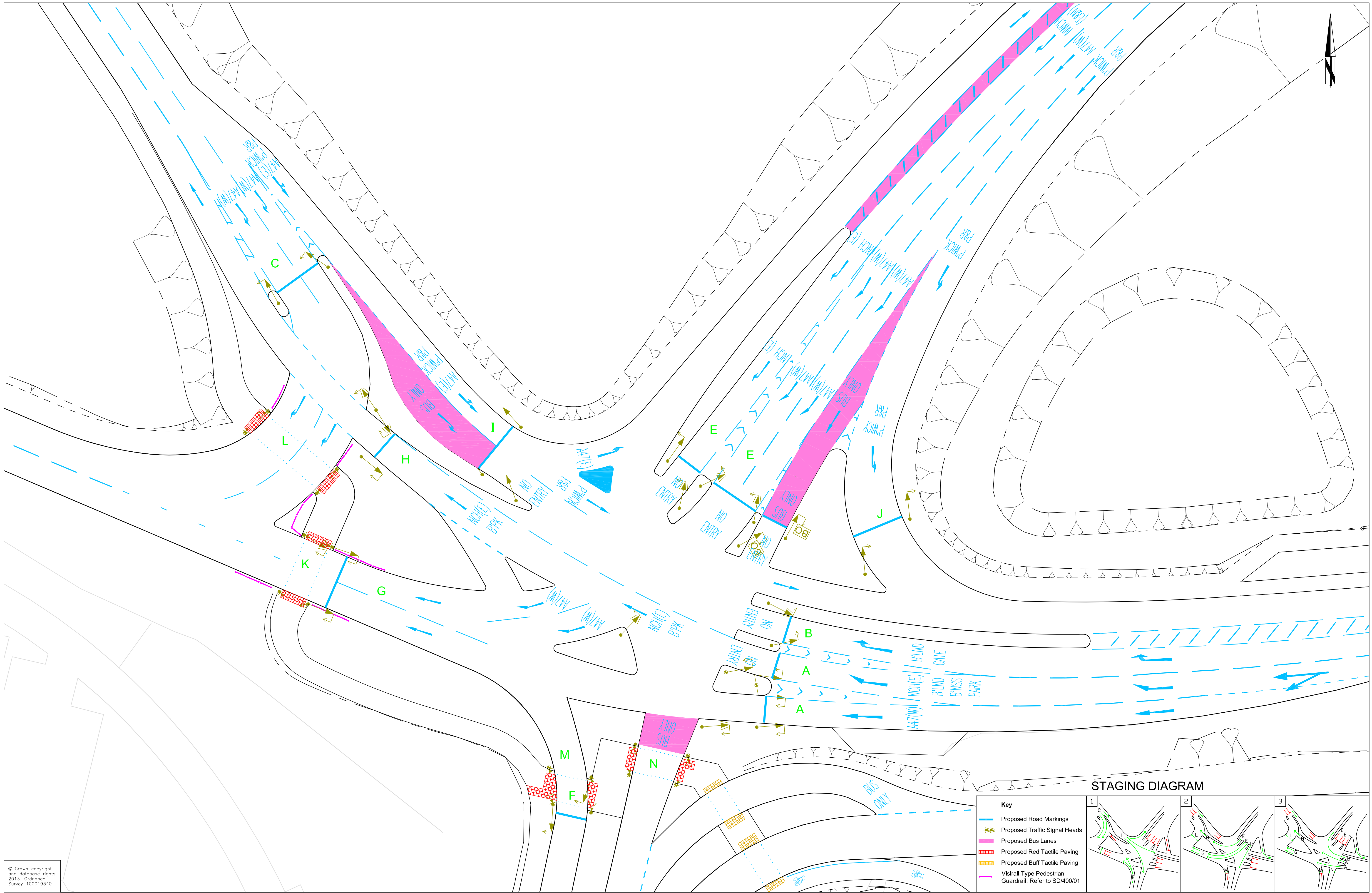


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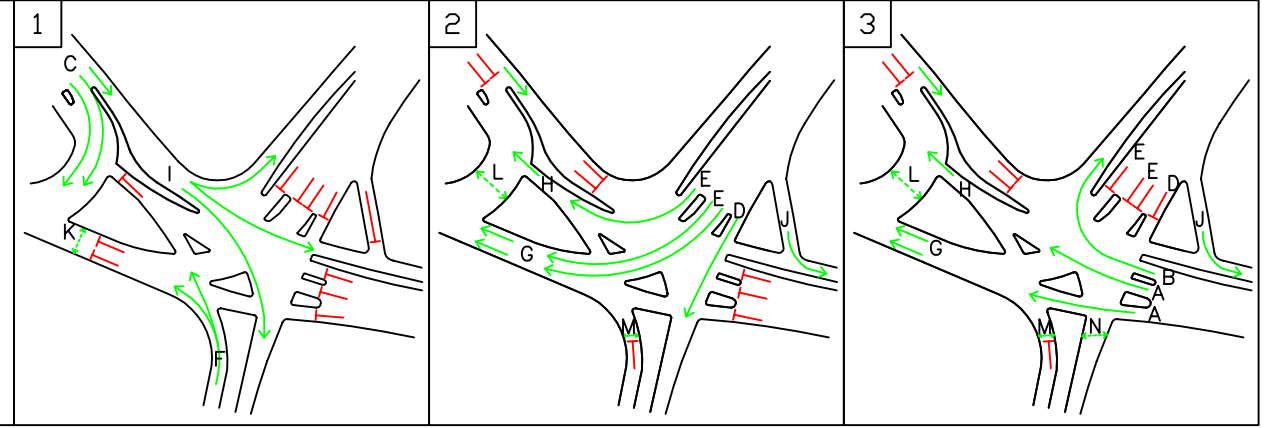
DRAWING TITLE
 Postwick Junction
 Non motorised user facilities
 Postwick Park and Ride

REV.	DESCRIPTION	CHECKED	DATE

SURVEYED BY	INITIALS	DATE	DRAWING No.
			R1C150-MP-609
DESIGNED BY	MA	09/12	PROJECT TITLE
DRAWN BY	BF	09/12	POSTWICK HUB JUNCTION
CHECKED BY	MH	04/13	SCALE AS SHOWN
			FILE No. R1C150



STAGING DIAGRAM



Key

- Proposed Road Markings
- Proposed Traffic Signal Heads
- Proposed Bus Lanes
- Proposed Red Tactile Paving
- Proposed Buff Tactile Paving
- Visirail Type Pedestrian Guardrail. Refer to SD/400/01

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DRAWING TITLE
 POSTWICK HUB JUNCTION
 PARK AND RIDE SIGNALISED JUNCTION
 TRAFFIC SIGNAL LAYOUT (SHEET 1 OF 1)

REV.	DESCRIPTION	CHECKED	DATE
A	Amendments following Interim Stage 2 Safety Audit	SWC	04/13

SURVEYED BY	INITIALS	DATE	DRAWING No.
OS/MG	OS/MG	2012/2008	R1C150-MP-636 A
DESIGNED BY	DG	01/13	PROJECT TITLE
DRAWN BY	DG	01/13	POSTWICK HUB JUNCTION
CHECKED BY	SC	02/13	SCALE
			1:250@A1
			FILE No.
			R1C150



- KERBING & FOOTWAYS KEY**
- Proposed Shared Use Footway/Cycleway with bound surface
 - Proposed unbound Footway (1.0m wide)
 - Proposed Footway with bound surface
 - Existing Footway
 - Proposed half-battered kerb - Type 1 (125mm upstand) to NCC standard details SD/1100/1
 - Proposed splayed kerb - Type 2 (125mm upstand) to NCC standard details SD/1100/1
 - Proposed dropped kerb - Type 4 (0-6mm upstand at pedestrian crossing - 25mm for vehicle access) to NCC standard details SD/1100/1
 - Proposed transition kerb - Type 7 to NCC standard details SD/1100/1
 - Proposed Envirodeck Combined Drainage kerb
 - Proposed Drainage Kerb
 - Proposed footway edging - Type 6 to NCC standard details SD/1100/1
 - Red Tactiles (450 x 450mm)
 - Buff Tactiles (450 x 450mm)

- PAVEMENTS KEY**
- Proposed Carriageway Construction with min. 65 PS Surface Course
 - Proposed Carriageway Construction with min. 65 PS Surface Course
 - Proposed Pavement for private means of access
 - Proposed Maintenance Bay
 - Proposed Traffic Island
 - Proposed 2.0m wide bitumen channel

- GENERAL KEY**
- Hedgerow
 - Group of specimen trees
 - Native tree and shrub mix
 - Low maintenance grass seed mix
 - Wildflower grass seed mix
 - Timber post and 3 strained wire or 3 rail fence
 - Stock-Proof fence
 - Close-Boarded fence
 - New Road Markings

Note:
 1: No tree or shrub shall be planted within 4.5m of the carriageway edge
 2: No tree or shrub shall be planted within 1.0m of the RS

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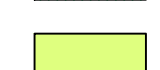




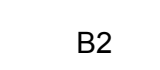
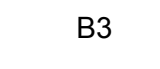



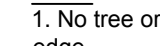
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 POSTWICK JUNCTION ENGINEERING LAYOUT
 LANDSCAPING PAVEMENTS KERBING
 FOOTWAYS (SHEET 1 OF 3)

REV	DESCRIPTION	CHECKED	DATE

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SURVEYED BY	OS/MG	2012	R1C150-MP-660
DESIGNED BY	SWC	04/13	PROJECT TITLE
DRAWN BY	LW	04/13	POSTWICK HUB JUNCTION
CHECKED BY	MH	04/13	SCALE 1:1000 A1
			FILE No R1C150

- KERBING & FOOTWAYS KEY**
-  Proposed Shared Use Footway/Cycleway with bound surface
 -  Proposed unbound Footway (1.0m wide)
 -  Proposed Footway with bound surface
 -  Proposed half-battered kerb - Type 1 (125mm upstand) to NCC standard details SD/1100/1
 -  Proposed splayed kerb - Type 2 (125mm upstand) to NCC standard details SD/1100/1
 -  Proposed dropped kerb - Type 4 (0-6mm upstand at pedestrian crossing & 25mm for vehicle access) to NCC standard details SD/1100/1
 -  Proposed transition kerb - Type 7 to NCC standard details SD/1100/1
 -  Proposed Envirodeck Combined Drainage kerb
 -  Proposed Drainage Kerb
 -  Proposed footway edging - Type 6 to NCC standard details SD/1100/1
 -  Red Tactiles (450 x 450mm)
 -  Buff Tactiles (450 x 450mm)

- PAVEMENTS KEY**
-  Proposed Carriageway Construction with min. 55 PS Surface Course
 -  Proposed Carriageway Construction with min. 65 PS Surface Course
 -  Proposed Pavement for private means of access
 -  Proposed Pavement for Park Ride access road
 -  Proposed Maintenance Bay
 -  Proposed Traffic Island
 -  Proposed 2.0m wide bitumen channel
 -  Proposed coloured surfacing

- GENERAL KEY**
-  Hedgerow
 -  Group of specimen trees
 -  Native tree and shrub mix
 -  Low maintenance grass seed mix
 -  Wildflower grass seed mix
 -  Lagoon Planting Mix
 -  Marginal Planting Mix
 -  B1 Automatic 4.2m barrier passcode exit system
 -  B2 Single 4.2m lockable steel gate with 'flow plate' in carriageway below
 -  B3 Automatic 4.9m barrier 'bus entry' system
 -  Timber post and 3 strained wire or 3 rail fence
 -  Stock-Proof fence
 -  Close-Boarded fence
 -  New Road Markings

Note:
 1: No tree or shrub shall be planted within 4.5m of the carriageway edge
 2: No tree or shrub shall be planted within 1.0m of the RS



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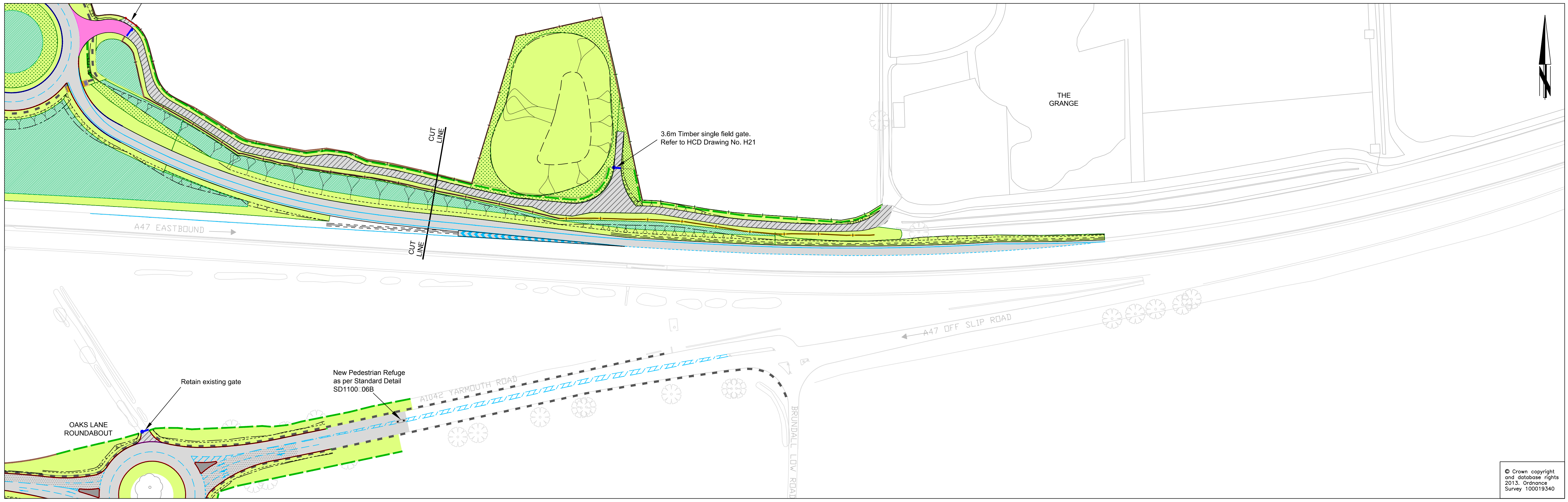


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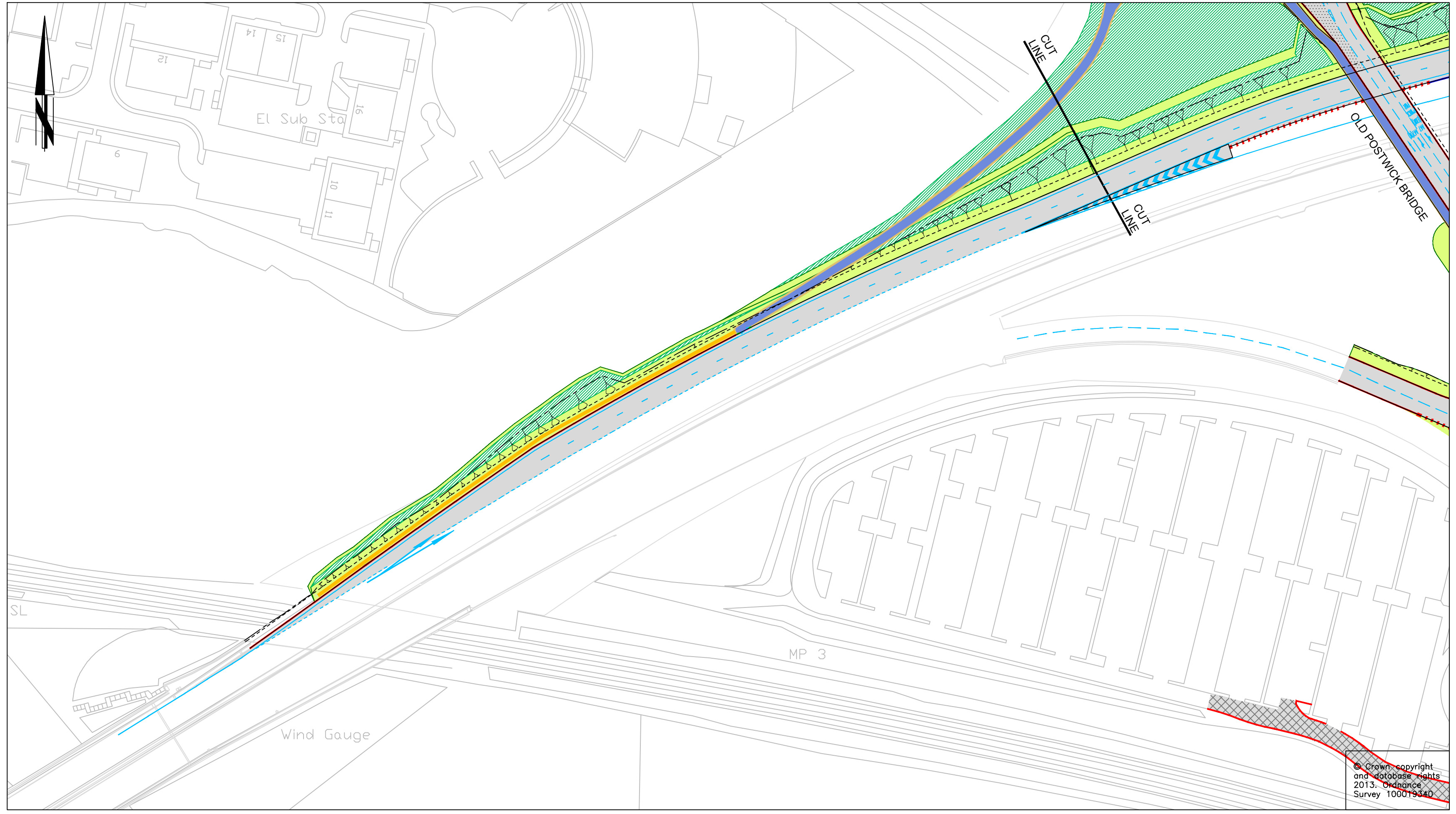
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 POSTWICK JUNCTION ENGINEERING LAYOUT
 LANDSCAPING PAVEMENTS KERBING
 FOOTWAYS (SHEET 2 OF 3)

REV	DESCRIPTION	CHECKED	DATE

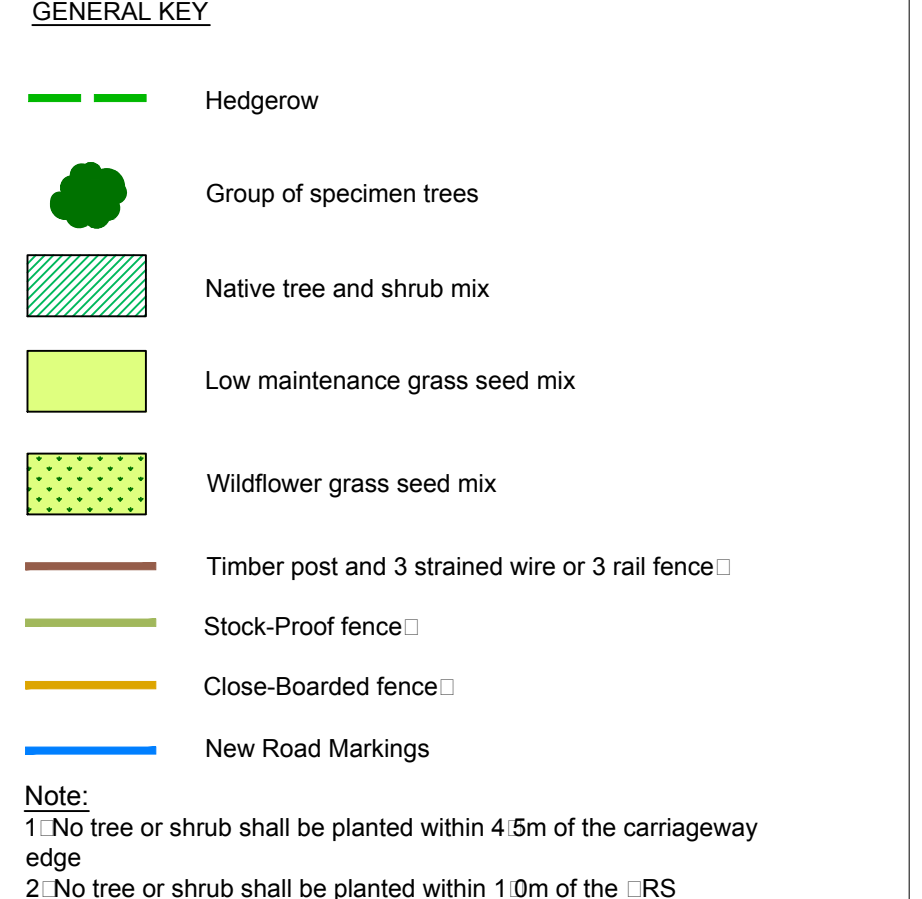
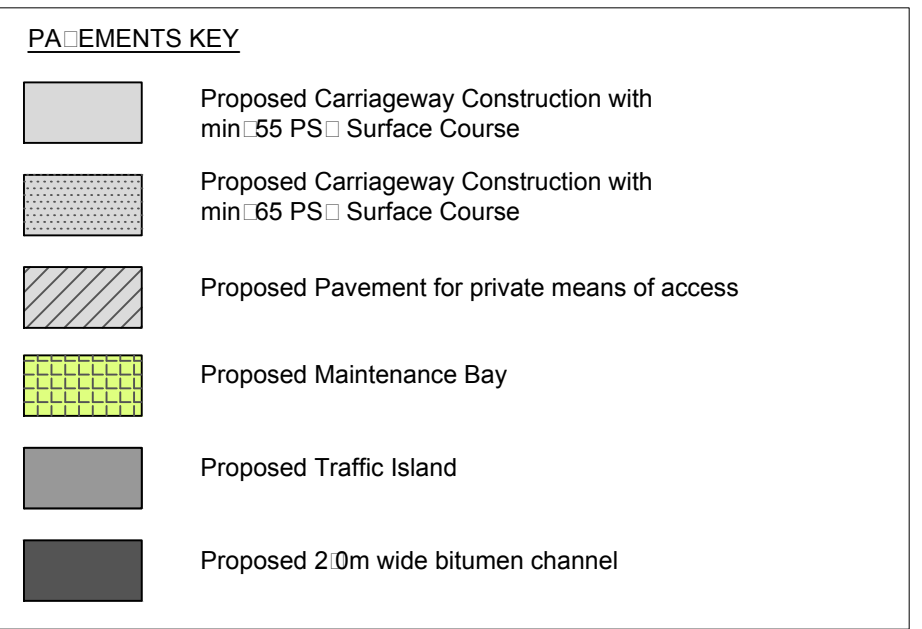
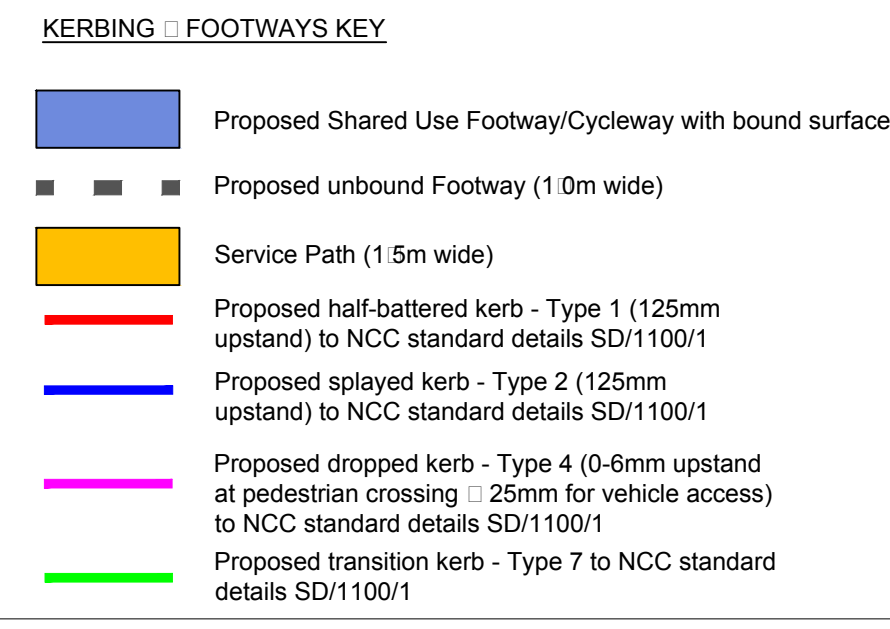
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OS/MG	OS/MG	2012	R1C150-MP-661
DESIGNED BY	INITIALS	DATE	PROJECT TITLE
SWC	SWC	04/13	POSTWICK HUB JUNCTION
DRAWN BY	INITIALS	DATE	SCALE
LW	LW	04/13	1:1000 A1
CHECKED BY	INITIALS	DATE	FILE No
MH	MH	04/13	R1C150



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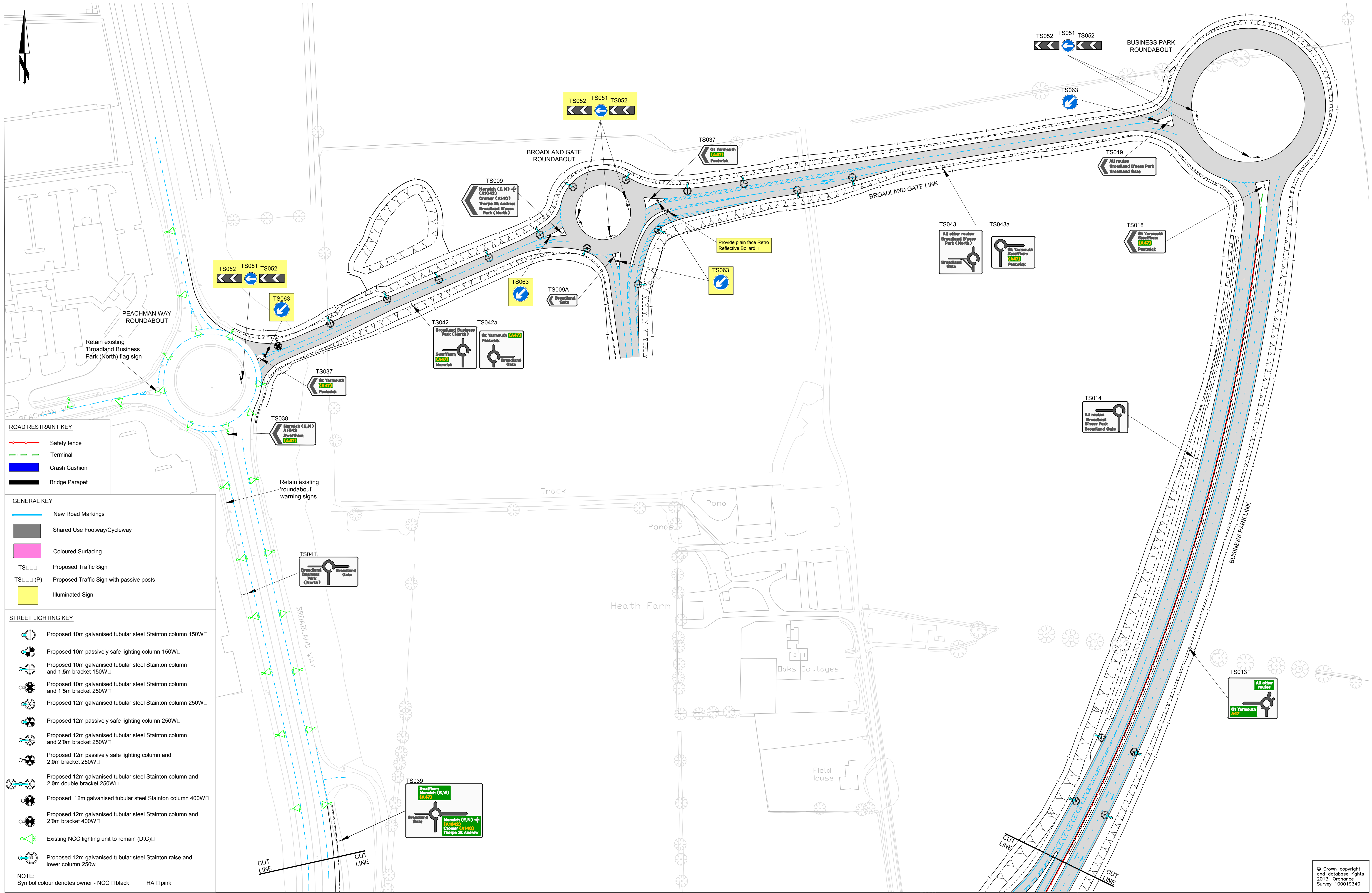


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DRAWING TITLE
 POSTWICK JUNCTION ENGINEERING LAYOUT
 LANDSCAPING / PAVEMENTS / KERBING
 / FOOTWAYS (SHEET 3 OF 3)

REV	DESCRIPTION	CHECKED	DATE

SURVEYED BY	INITIALS	DATE	DRAWING No
SURVEYED BY	OS/MG	2012	R1C150-MP-662
DESIGNED BY	SWC	04/13	PROJECT TITLE
DRAWN BY	LW	04/13	POSTWICK HUB JUNCTION
CHECKED BY	MH	04/13	SCALE 1:1000 A1
			FILE No R1C150



ROAD RESTRAINT KEY

- Safety fence
- Terminal
- Crash Cushion
- Bridge Parapet

GENERAL KEY

- New Road Markings
- Shared Use Footway/Cycleway
- Coloured Surfacing
- TS□□□ Proposed Traffic Sign
- TS□□□(P) Proposed Traffic Sign with passive posts
- Illuminated Sign

STREET LIGHTING KEY

- Proposed 10m galvanised tubular steel Stainton column 150W
- Proposed 10m passively safe lighting column 150W
- Proposed 10m galvanised tubular steel Stainton column and 1.5m bracket 150W
- Proposed 10m galvanised tubular steel Stainton column and 1.5m bracket 250W
- Proposed 12m galvanised tubular steel Stainton column 250W
- Proposed 12m passively safe lighting column 250W
- Proposed 12m galvanised tubular steel Stainton column and 2.0m bracket 250W
- Proposed 12m passively safe lighting column and 2.0m bracket 250W
- Proposed 12m galvanised tubular steel Stainton column and 2.0m double bracket 250W
- Proposed 12m galvanised tubular steel Stainton column 400W
- Proposed 12m galvanised tubular steel Stainton column and 2.0m bracket 400W
- Existing NCC lighting unit to remain (DIC)
- Proposed 12m galvanised tubular steel Stainton raise and lower column 250w

NOTE:
Symbol colour denotes owner - NCC □ black HA □ pink



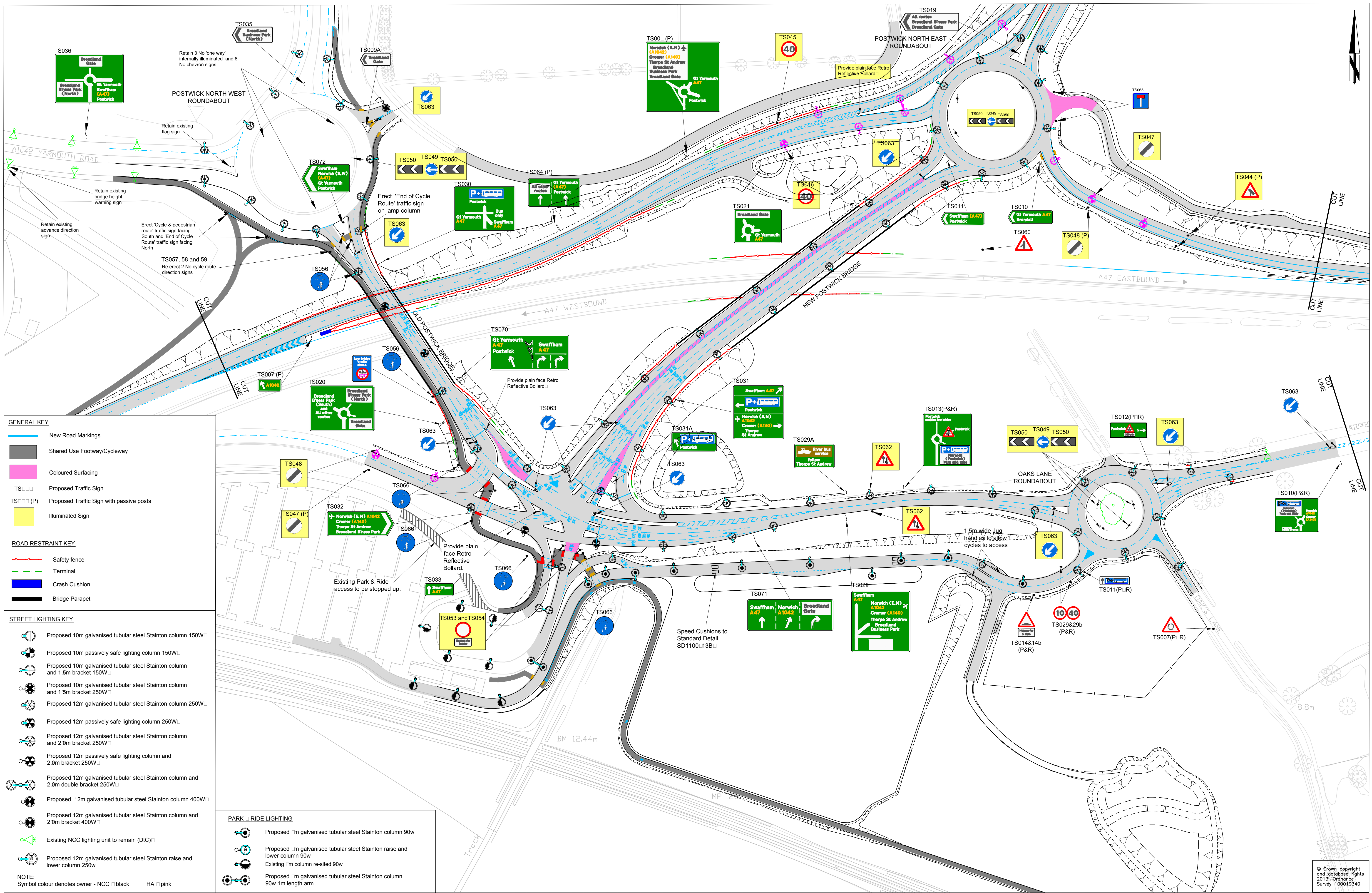
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DRAWING TITLE
POSTWICK JUNCTION ENGINEERING LAYOUT
TRAFFIC SIGNS □ ROAD MARKINGS □ ROAD RESTRAINTS □
STREET LIGHTING (SHEET 1 OF 3)

RE	DESCRIPTION	CHECKED	DATE

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SUR. EYED BY	OS/MG	2012	R1C150-MP-663
DESIGNED BY	SWC	04/13	PROJECT TITLE
DRAWN BY	LW	04/13	POSTWICK HUB JUNCTION
CHECKED BY	MH	04/13	SCALE 1:1000 □ A1
			FILE No R1C150

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- GENERAL KEY**
- New Road Markings
 - Shared Use Footway/Cycleway
 - Coloured Surfacing
 - Proposed Traffic Sign
 - Proposed Traffic Sign with passive posts
 - Illuminated Sign
- ROAD RESTRAINT KEY**
- Safety fence
 - Terminal
 - Crash Cushion
 - Bridge Parapet
- STREET LIGHTING KEY**
- Proposed 10m galvanised tubular steel Stainton column 150W
 - Proposed 10m passively safe lighting column 150W
 - Proposed 10m galvanised tubular steel Stainton column and 1.5m bracket 150W
 - Proposed 10m galvanised tubular steel Stainton column and 1.5m bracket 250W
 - Proposed 12m galvanised tubular steel Stainton column 250W
 - Proposed 12m passively safe lighting column 250W
 - Proposed 12m galvanised tubular steel Stainton column and 2.0m bracket 250W
 - Proposed 12m passively safe lighting column and 2.0m bracket 250W
 - Proposed 12m galvanised tubular steel Stainton column and 2.0m double bracket 250W
 - Proposed 12m galvanised tubular steel Stainton column 400W
 - Proposed 12m galvanised tubular steel Stainton column and 2.0m bracket 400W
 - Existing NCC lighting unit to remain (DIC)
 - Proposed 12m galvanised tubular steel Stainton raise and lower column 250W
- PARK & RIDE LIGHTING**
- Proposed 1m galvanised tubular steel Stainton column 90w
 - Proposed 1m galvanised tubular steel Stainton raise and lower column 90w
 - Existing 1m column re-sited 90w
 - Proposed 1m galvanised tubular steel Stainton column 90w 1m length arm
- NOTE:
Symbol colour denotes owner - NCC black HA pink



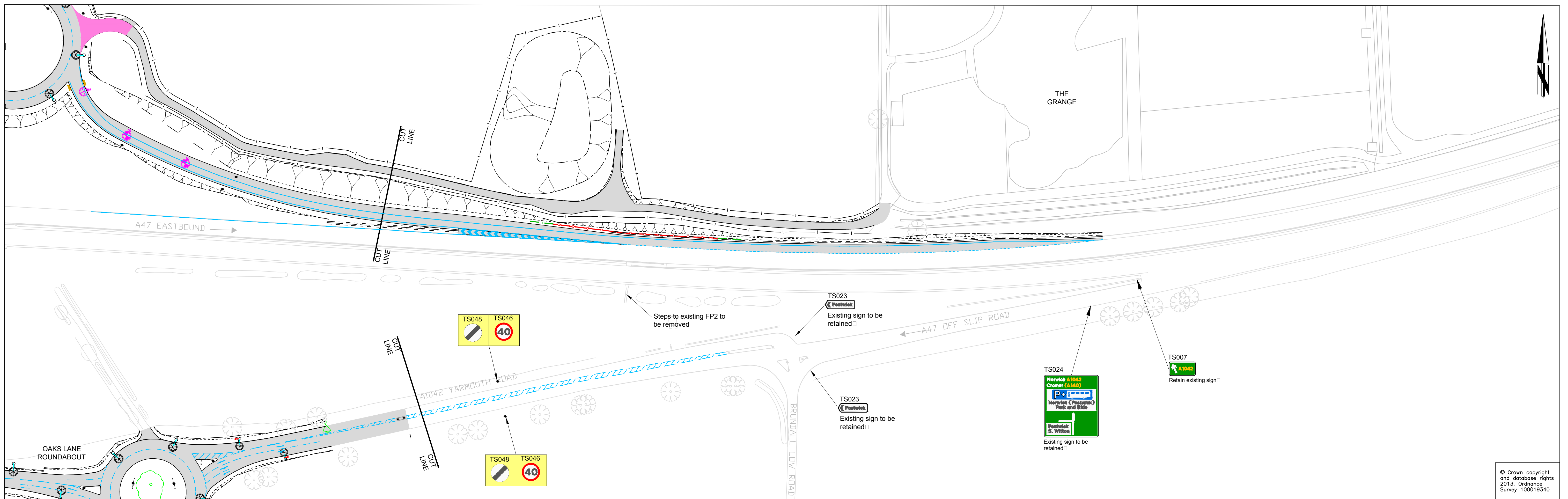
Mike Jackson
Director of Environment, Transport and Development
Norfolk County Council
County Hall
Martineau Lane
Norwich NR1 2SG

DRAWING TITLE
POSTWICK JUNCTION ENGINEERING LAYOUT
TRAFFIC SIGNS ROAD MARKINGS ROAD RESTRAINTS
STREET LIGHTING (SHEET 2 OF 3)

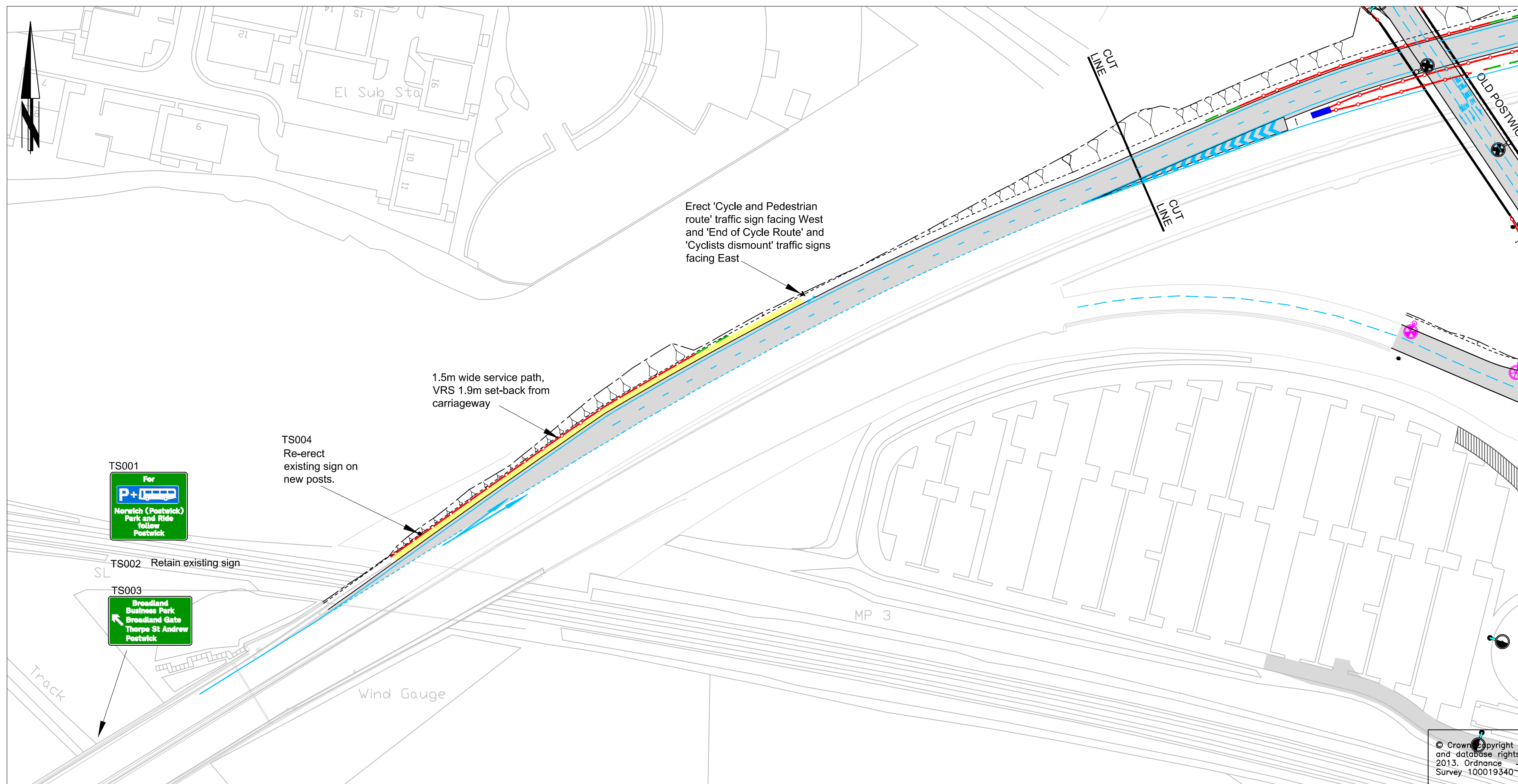
RE	DESCRIPTION	CHECKED	DATE

SUR. EYED BY	INITIALS	DATE	DRAWING No
SUR. EYED BY	OS/MG	2012	R1C150-MP-664
DESIGNED BY	SWC	04/13	PROJECT TITLE
DRAWN BY	LW	04/13	POSTWICK HUB JUNCTION
CHECKED BY	MH	04/13	SCALE 1:1000 A1
			FILE No R1C150

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ROAD RESTRAINT KEY	
	Safety fence
	Terminal
	Crash Cushion
	Bridge Parapet

STREET LIGHTING KEY	
	Proposed 10m galvanised tubular steel Stainton column 150W
	Proposed 10m passively safe lighting column 150W
	Proposed 10m galvanised tubular steel Stainton column and 1.5m bracket 150W
	Proposed 10m galvanised tubular steel Stainton column and 1.5m bracket 250W
	Proposed 12m galvanised tubular steel Stainton column 250W
	Proposed 12m passively safe lighting column 250W
	Proposed 12m galvanised tubular steel Stainton column and 2.0m bracket 250W
	Proposed 12m passively safe lighting column and 2.0m bracket 250W
	Proposed 12m galvanised tubular steel Stainton column and 2.0m double bracket 250W
	Proposed 12m galvanised tubular steel Stainton column 400W
	Proposed 12m galvanised tubular steel Stainton column and 2.0m bracket 400W
	Existing NCC lighting unit to remain (DTC)
	Proposed 12m galvanised tubular steel Stainton raise and lower column 250w

GENERAL KEY	
	New Road Markings
	Shared Use Footway/Cycleway
	Coloured Surfacing
	Proposed Traffic Sign
	Proposed Traffic Sign with passive posts
	Illuminated Sign

NOTE: Symbol colour denotes owner - NCC black HA pink

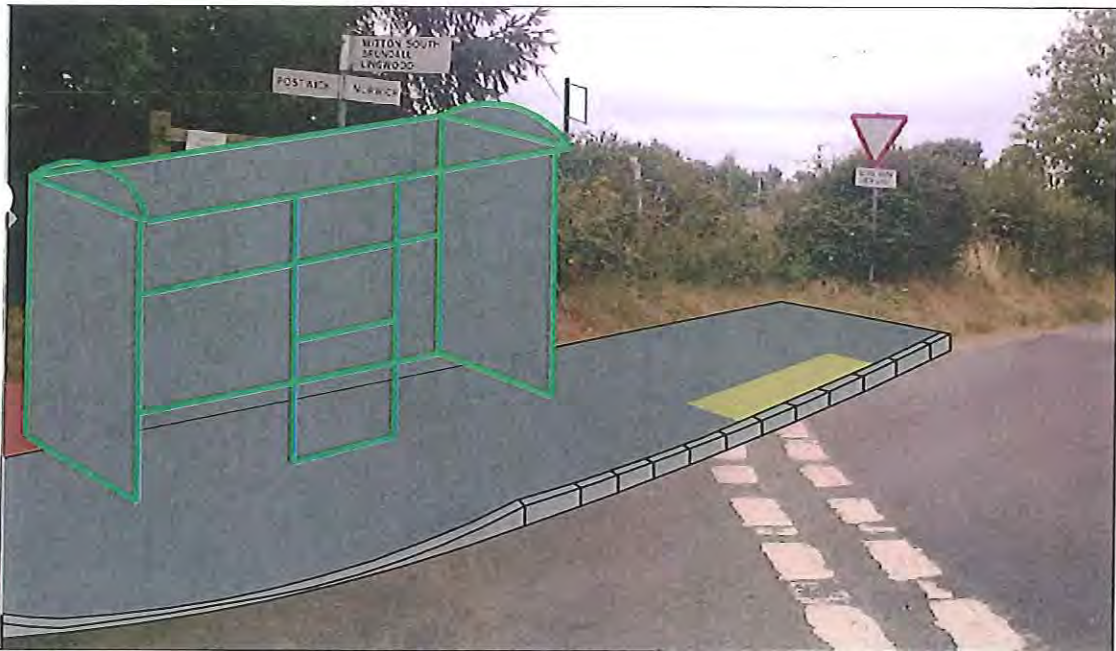
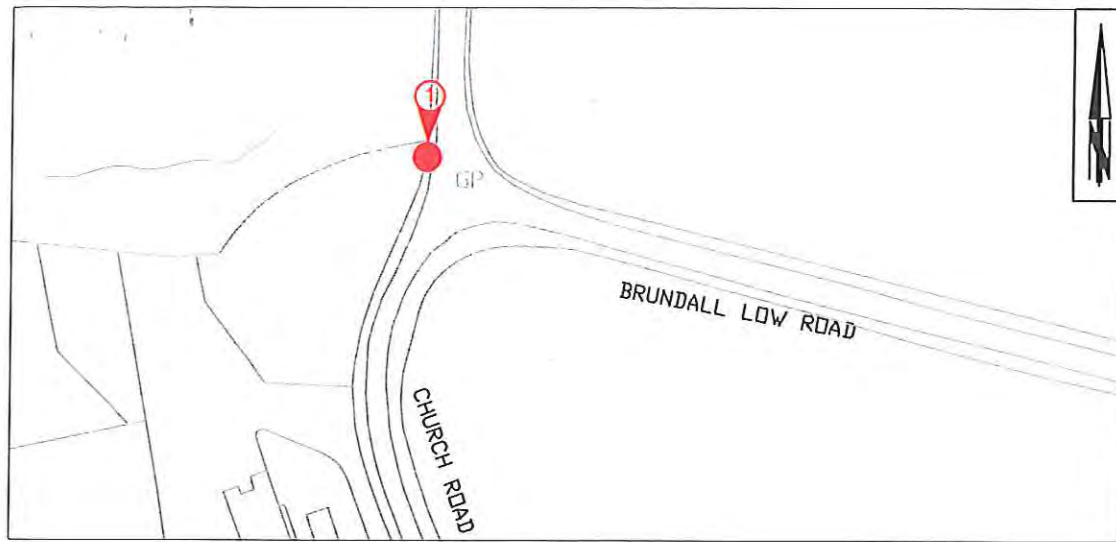


Mike Jackson
 Director of Environment, Transport and Development
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DRAWING TITLE
 POSTWICK JUNCTION ENGINEERING LAYOUT
 TRAFFIC SIGNS ROAD MARKINGS ROAD RESTRAINTS
 STREET LIGHTING (SHEET 3 OF 3)

RE	DESCRIPTION	CHECKED	DATE

SUR	DESIGNED BY	DRAWN BY	CHECKED BY	INITIALS	DATE	DRAWING No	PROJECT TITLE	SCALE	FILE No
						R1C150-MP-665	POSTWICK HUB JUNCTION	1:1000 A1	R1C150



NOTES:

- Excavate existing verge. Construct new stop on 100mm thick Type 1 granular sub-base, install barfaced paving slabs (PA25), and surface with asphalt(PA3) to tie in with new kerb height at bus stop.

- Bus shelter to be installed during construction of bus stop platform

Ex K1 = Retain existing Type 1 kerbs 125mm upstand.


K1T = New PCC K1 cut to transition.


K1R = New PCC K1 raised kerb installed with 150mm upstand


K4 = New PCC Type 4 dropped kerb.


K7 = New PCC Type 7 kerb.

K6 = New PCC Type 6 kerb to be installed.

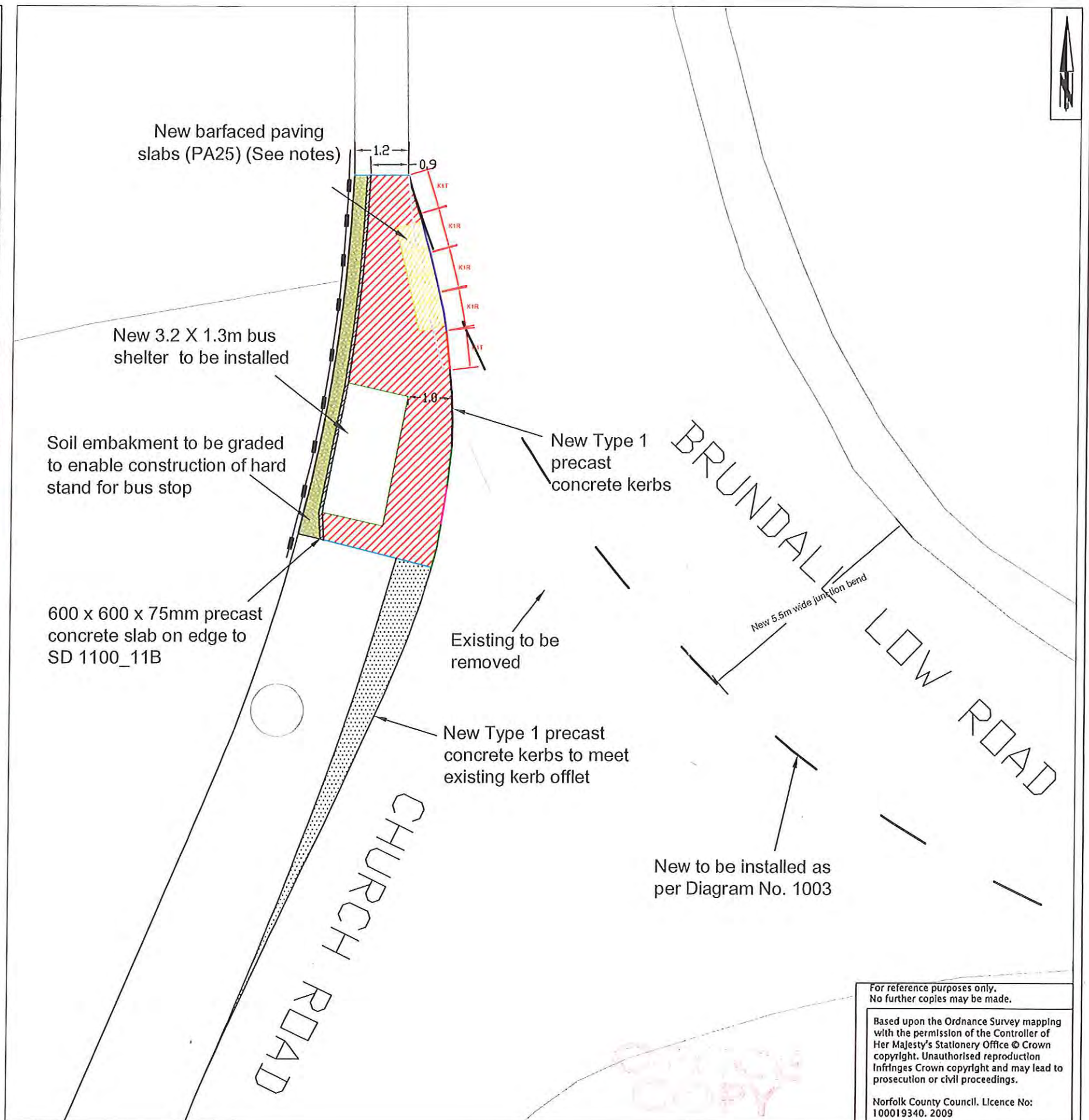
 New hard stand surface Type PA3 and grade d to new raised level.

 Barfaced Paving colour grey (600mm x 600mm)

 Existing wooden fence to act as boundary

 Soil infill behind new new Type 1 precast concrete kerbing

- Refer to NCC Standard detail SD/1100/21 (Latest revision) for further construction information



New to be installed as per Diagram No. 1003

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Norfolk County Council
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MAY GURNEY

Mike Jackson
Director of Planning and Transportation
Norfolk County Council
County Hall
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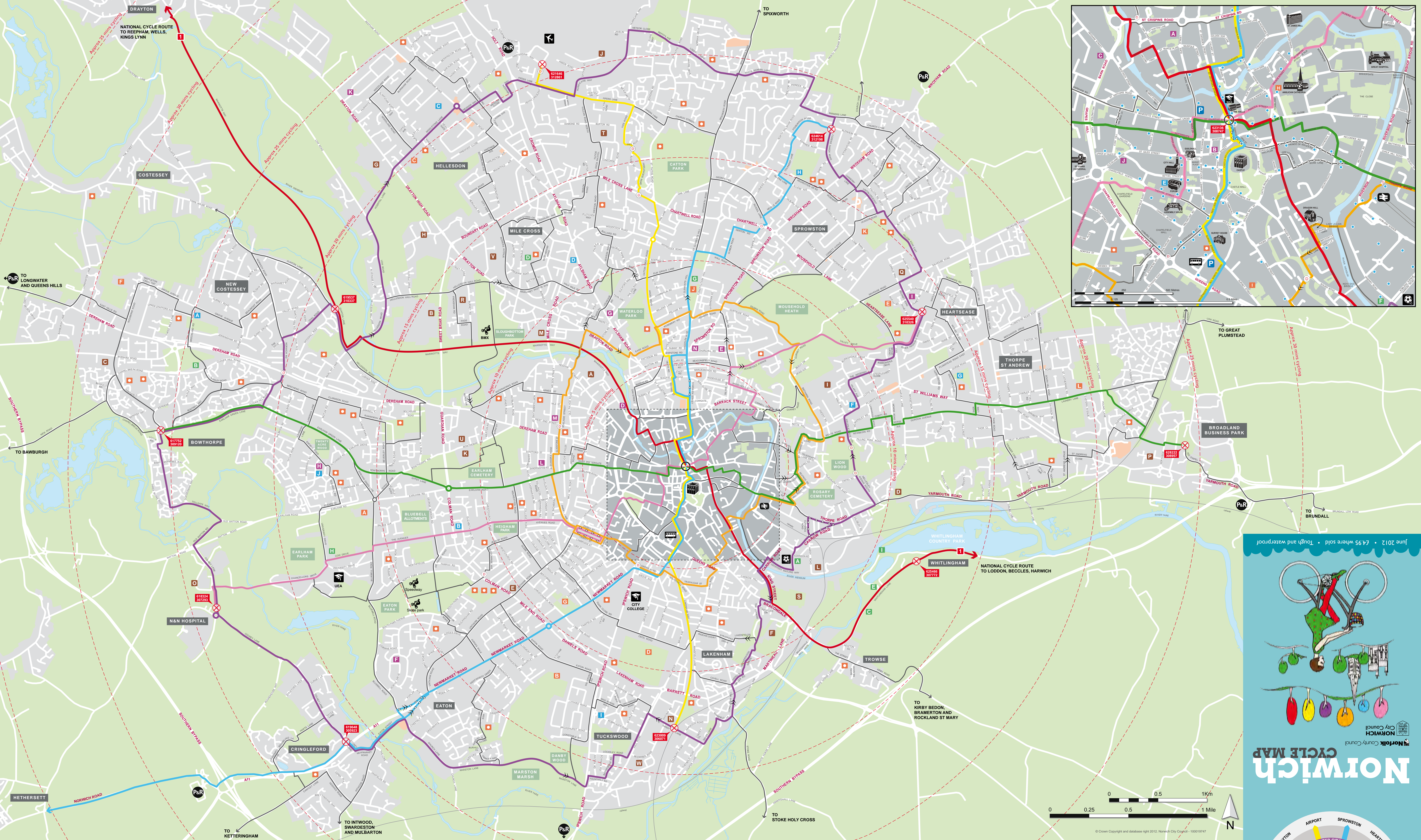
Mott MacDonald
County Hall
Martineau Lane
Norwich, NR1 2UB
Tel 01603 767530
Fax 01603 226760
Web www.mottmac.com

DRAWING TITLE
Bus Stop and Shelter 1
Church Road Junction

REV.	DESCRIPTION	CHECKED	DATE

DESIGNED BY	INIT.	DATE	DRAWING No.
NT	NT	08/09	249610-AD-60
DRAWN BY	NT	09/09	PROJECT TITLE
CHECKED BY	NT	09/09	Postwick Growth Point: Park & Ride Extension and access Schema
APPROVED BY	NT	09/09	SCALE AT A3 1: 100
			FILE No. 249610-AD

APPENDIX C



Norwich feels good on a bike...

... the pace is right to spot a bargain in a quirky shop or pause for a conversation with a friend in the park. The city's rich texture rolls out in front of you. The city is compact, making it manageable to ride from the edge to the centre in under twenty minutes. But you need to know where to go...

... welcome to the new cycle network.

It features five pedalways that cross the city from one side to the other and meet in the middle at St Andrews Plain. Two more encircle the city – one near the centre (the inner circuit), the other on the edge (the outer circuit). Each has a colour. The coloured pedalways are perfect for commuting and getting fit. They are complemented by neighbourhood routes that help you get around from your home to schools and shops, or they can be connected for longer journeys.

Norwich is yours to discover.

Happy pedalling!

How to use this map

Planning your route
The map has two sides. Use this side for planning your route. It shows where the pedalways go and how they relate to facilities so you can pick the best combination of routes. The main routes are coloured and the colours will be used on signs along the way. There is a larger scale inset map that shows the city centre.

Journey times and route conditions
Turn over to discover more about the five cross-city pedalways. The route lines have been straightened to show you how far your ride is. Each trip is centred on St Andrews Plain and the miles count by as you travel away from or towards it.
Details of the route conditions are shown on the line so you can see where busy traffic and cycle lanes are. It also shows traffic-free sections. These are usually shared with pedestrians so please ride courteously and be prepared to use your bell. The gradient of each pedalway is beneath each line.
All this information helps you to decide how much time you need for your journey.

More information
This map will be combined with signs and web-based information. We are also working to improve the network through building projects. These things will happen gradually, so if you want to keep up-to-date with developments or say how we can do better visit www.norwich.gov.uk or scan the code.

Pedalways

- Cross city**
- Drayton ↔ Whittingham National Cycle Route 1
 - Bowthorpe ↔ Broadland Business Park
 - N&N Hospital ↔ Heartsease
 - Cringleford ↔ Sprowston
 - Lakenham ↔ Airport
- Circular**
- Outer circuit
 - Inner circuit
- Local**
- Neighbourhood routes
- One way
- ⤴ Steep hill (arrows point uphill)
- P Long stay secure cycle parking
- Cycle stand parking

- Grid reference cross
- St Andrews Plain (centre of the network)
- Railway station (including cycle hire – opening 2012/13)
- Bus station
- Park and ride (cycle parking available)
- Norwich City Football Club
- Higher and further education
- Norwich 12 buildings (the city's outstanding buildings spanning 1,000 years of history)
- Airport
- Cycle sport venue
- Local shopping centres

Libraries

- A Costessey
- B Earham
- C Hellesdon
- D Mile Cross
- E Millennium
- F Riverside Road
- G St Williams Way
- H UEA Sports Park
- I Tuckswold
- J West Earham

Sport facilities

- A Carrow Park
- B Football Development Centre
- C Norfolk Snowsports Club
- D Norman Centre
- E Norwich Rowing Club
- F Riverside Leisure Centre
- G Sewell Park College Sports Centre
- H UEA Sports Park
- I Whittingham Outdoor Education Centre

Schools

- A First, infant, primary or special
- B City Academy
- C City of Norwich School
- D City of Norwich School
- E Hewett
- F Open Academy
- G Ormiston Victory Academy
- H Norwich High School for Girls
- I Norwich School
- J Notre Dame
- K Sewell Park College
- L Thorpe St Andrew High

Bicycle shops

- A Bicycle Links
- B Cycles UK
- C Freemans
- D Halfords
- E John Borwell
- F Leisure Cycles
- G Mandarin (Aylsham Road)
- H Mandarin (West Earham)
- I Molly's Cycles
- J Pedal Revolution
- K Sorens
- L Specialised Cycles
- M Streetlife
- N Velo Cycles

Employment areas

- A Barker Street
- B Bayer Crop Science
- C Bowthorpe Industrial Estate
- D Broadland District Council
- E Colman Hospital
- F County Hall
- G Hellesdon Hospital
- H Hellesdon Park Industrial Estate
- I HM Prison Knox Road
- J Hurricane Way Industrial Estate
- K Julian Hospital
- L Lawrence Scott Electromotors
- M Mile Cross Business Centre
- N Whiting Road Employment Area
- O Norwich Research Park
- P St Andrews Business Park
- Q Salhouse Road Industrial Estate
- R Sweet Briar Industrial Estate
- S Unilever
- T Vulcan Road Industrial Estate
- U West Norwich Hospital
- V Whiffler Road Industrial Estate
- W White Lodge Business Park

June 2012 • £4.95 where sold • Tough and waterproof

NORWICH CYCLE MAP

Norwich City Council
Norfolk County Council

Supported by:

- Broadland District Council
- South Norfolk Council
- Greater Norwich Partnership
- EUROPEAN UNION
- SHARING 24
- NORWICH 12
- sustrans

APPENDIX C

Postwick Hub Junction Stage 2 Safety Audit

10 April 2013

INTRODUCTION

This report contains the results of a Stage 2 Safety Audit carried out on the above scheme. The Audit was carried out at the request of Norfolk County Council Highways Group .

The Audit Team membership was as follows:-

Tim Young BSc, MCIHT, MSoRSA

Engineer

(Audit Team Leader)

Network Analysis + Safety

Norfolk County Council

Julian Fonseka EngTech, MCIHT, MSoRSA

Project Technician

(Audit Team Member)

Network Analysis + Safety

Norfolk County Council

Specialist Advisors:-

Andrew Micklethwaite

P2W Casualty Reduction Officer

Norfolk County Council

John Thomas

Engineer

ITS

Norfolk County Council

The Audit took place at County Hall on 10 April 2013. The audit comprised an examination of the Safety Audit submission document and a site inspection by the Audit Team Leader.

The terms of reference are as described in Environment, Transport and Development Highways Service Manual Procedure SP03-07. The Auditors have examined and reported only on the road safety implications of the scheme as presented and have not verified the compliance of the design to any other criteria.

ITEMS RAISED AT PREVIOUS AUDIT

All issues raised at the previous audit have been resolved.

ITEMS RAISED AT THIS STAGE 2 AUDIT

1.0 General

1.1 Comment – Location of Tree planting

Location – Throughout scheme

Please ensure that no trees provided as part of landscaping works are planted closer to the edge of the carriageway than 4.5m and that a rigorous maintenance regime is in place to prevent self-seeded trees from encroaching.

2.0 Alignment

2.1 Problem – Alignment of roundabout entry lanes

Location – Business Park north eastbound entries, Postwick North northbound entry, Oaks Lane east & westbound entries, Peachman Way westbound entry.

The alignment of the entry lanes at the above roundabouts is such that a vehicle is aimed at the central island rather than meeting it tangentially. If the entry lane alignment is not correct then vehicle paths may overlap while manoeuvring or a vehicle may strike the central island.

Recommendation

Check and adjust if necessary the alignment of entry lanes on the approach to the roundabouts within the scheme extents. The geometry of existing roundabouts on the periphery of the scheme should also be checked.

2.2 Problem – Length of merge on roundabout exit

Location – Westbound exit of Business Park roundabout

The predominant movement at this roundabout will be from south to west. The proposed layout is a dual carriageway on the Business Park link road which reduces to a single lane on the westbound exit. The westbound merge scales at approximately 20m, this appears too short and could result in vehicles striking the splitter island or being forcing into the oncoming lane whilst attempting to overtake.

Recommendation

Check that the length of the merge lane is appropriate to anticipated flows and increase its length if necessary to reduce the likelihood of conflict on the westbound exit. It may also be prudent to examine if the other merge tapers on the roundabouts within the scheme have sufficient capacity.

3.0 Junctions

3.1 Problem – Layout of segregated left turn lane

Location – Broadland Gate roundabout

The proposed layout for the Broadland Gate roundabout shows a segregated left turn lane, however only part of its layout is shown to the south. It is unclear how vehicles on the left turn lane will join the adjacent traffic lane. It is a black box item in TD51/03 that a merge can only be provided where 2 or more lanes on exit can be provided. If not a give way layout is required.

Recommendation

Provide a revised layout showing the full extent of the segregated left turn/the access road into Broadland Gate. This will allow the correct layout of segregated left turn to be determined from TD51/03 and if it should be a merge or give way arrangement.

3.2 Problem – Lane widths at roundabout give way line

Location – Northbound approach to Business Park roundabout

The proposed lane widths scale at approximately 5m each; this is greater than the 3m-3.5m stipulated in paragraph 7.24 of TD16/07. Wider lane widths encourage higher entry speeds onto the circulatory carriageway which can result in failure to give way from adjacent arms or loss of control type collisions.

Recommendation

To be read in conjunction with 2.2 above and 3.3 below. Reconsider the width of the northbound approach lanes. If this results in an impact on roundabout capacity then it may be possible to offset this against minor changes in the entry flair, angle and alignment.

3.3 Problem - Failure to give way collisions due to imbalanced flows

Location – Business Park roundabout

The proposed layout shows a 2 arm roundabout design for the Business Park roundabout. On opening, the dominant manoeuvres at this junction will be a left turn from the Business Park link road to the Broadland Gate link road and a vice versa right turn from the Broadland Gate to Business Park. The proposed geometry and width of the circulatory carriageway will allow this manoeuvre to be performed at high speed. Consequently drivers will become habituated to not giving way to the right which increases the risk of failure to give way should a driver wish to perform a u turn at the roundabout.

Recommendation

Redesign the geometry of the roundabout entry from the Business Park link road northbound entry to reflect the expected manoeuvres and reduce entry/circulatory speeds to reduce the risk of failure to give way.

3.4 Comment – Position of proposed bus stop

Location – Brundall Low Road

A new bus stop is proposed at the junction of Brundall Low Road and Church Road. Its position on the outside of the bend is such that a bus driver may find it difficult to align with the kerbs/barfaced paving. This would then make boarding and alighting from a bus more difficult for passengers with reduced mobility or those with pushchairs/buggies. The designer should consider if an alternative location can be chosen that has a better alignment.

4.0 Non-motorised Users

4.1 Problem – Shape of Tactile Paving

Location – Western side of Park and Ride junction

Tactile paving has been provided for the pedestrian crossing points (stages K and L) on the A47 (W) slip road. The layouts proposed for the central island are of the correct rectangular layout however; their opposites are missing the correct leg to form the L shape required. The reason the leg is important is that it provides tactile clues to blind and partially sighted pedestrians on where they may find the push button poles with rotating cones. They also give an indication to blind or partially sighted users of the direction from which traffic will be approaching.

Recommendation

Provide an appropriate tactile paving leg at these 2 locations to aid blind and partially sighted pedestrians. General convention is for it to extend to the rear of the footway/highway boundary however, in this instance that would result in an overly long and confusing layout. Therefore the designer's discretion should be used to determine the appropriate length at this location.

4.2 Problem – Uncontrolled crossing layout

Location – Within Park and Ride Site

2 uncontrolled pedestrian crossing points are located within the park and ride site. They are the primary pedestrian access from the park and ride to the new junction. The drawing supplied (R1C150-MP—363A) shows 2 rows of pedestrian studs delineating the crossing points. This layout is incorrect as it is potentially confusing for blind and partially sighted users. This is because the convention is to use pedestrian studs at controlled crossings only.

Recommendation

Remove the pedestrian studs from the uncontrolled crossing point. In addition as pedestrians have to cross 2 separate traffic lanes one of which being a bus only lane it may be prudent to provide appropriate 'look left' and 'look right' carriageway markings to alert pedestrians.

4.3 Comment – Westbound cyclist access to A47

Location – Old eastbound A47 slip road

The new shared use facility is designed to allow cyclists to slip off the A47 when eastbound and to access existing and proposed cycling facilities within Broadland Business Park and the Proposed Broadland Gates development. The new shared use

facility will also allow westbound cyclist's access to other parts of the Road Network via the service path. The service path is only 1.5m wide, therefore it is very important that cyclists receive a strong message that they should dismount at this point.

5.0 Signs, Lighting and Markings

5.1 Problem – Lack of circulatory lane markings increases risk of side swipe collisions

Location – Business Park/Broadland Gates/Postwick North and Broadland Way Roundabouts.

The four roundabouts above are not shown to have circulatory lane markings, whereas the Postwick Northeast roundabout does. Lane markings have the benefit of encouraging lower circulatory speeds and reduce the risk of side swipe collisions where 2 vehicles try and occupy the same piece of carriageway. In addition they also have benefits in terms of capacity as they allow a higher number of vehicles to use the junction.

Recommendation

Provide appropriate circulatory lane markings on all roundabouts to be constructed or affected by this scheme.

5.2 Comment – Illumination of signs ref TS063

Location – A1042 on island east of new P&R roundabout

2 new signs to diagram 610 are located on a refuge island to the east of the new P&R roundabout. Like other signs to diagram 610 within the scheme they are within a street lighting system. Under current regulations these signs require illumination to comply.

The designer should ensure that these and all signs to diagram 610 within the street lit sections of scheme are illuminated. This does not apply to those signs present on islands that contain a traffic signal head that faces in the same direction.

5.3 Problem – Business Park and Broadland Gate Link roads not fully illuminated

Location – East of Broadland Gate Roundabout and north of Postwick north east roundabout.

Sections of the Broadland Gate and Business Park link roads, including the Business Park roundabout are not illuminated. TD34/07 para 3.18 states that lighting should not terminate closer to the conflict point (the roundabout) than 1.5 times the stopping sight distance. In this case it would be 180m based on a 40mph design speed. Scaling from the plan (R1C150-MP-663) the proposed street lighting to the east of the Broadland Gate roundabout terminates at 120m.

Recommendation

Extend the proposed street lighting on the Broadland Gate link road to 180m. This would then terminate only 120m from the Business Park roundabout, which is less than the required 1.5 times the stopping sight distance in TD34/07. Therefore the Business Park roundabout should also be lit and as a consequence the Business Park link would also require lighting.

5.4 Problem – Position of signs on central islands (reference TS051 and 052)

Location – Various within scheme

Chevron signing and keep left roundels are being provided on the central islands of roundabouts within the scheme. The position of these signs is critical as they provide a 'target' that informs a driver of the point at which they must perform a sharp change of direction. They also aid drivers in understanding the layout of a junction and formulation of an appropriate approach speed. The positions shown of some of the sign arrangements are away from the direct line of sight of approaching drivers.

Recommendation

Check the positions of the sign arrangements on the central islands and ensure that drivers approaching can see them at a minimum of the stopping sight distance appropriate to the chosen design speed.

5.5 Problem – Destination markings on the carriageway

Location – Eastbound diverge slip road

Destination road markings have been proposed extensively within the signalised junction to aid driver's decision making through this complex layout. They have not been used elsewhere in the scheme but could be of benefit to drivers at other locations in addition to the proposed direction signing.

Recommendation

An example of where their use might be of benefit would be on the long eastbound diverge slip road where drivers have to decide whether or not to take the left turn slip road and also what lane they are required to be in on the Postwick Northeast roundabout.

5.6 Problem – Non-passively safe sign posts (ref TS024)

Location- A47 westbound off slip

The existing direction sign TS024 is to be retained however it is supported by a wide base post, presumably for illumination purposes. A sign in this location within a 60mph speed limit is not considered passively safe.


Recommendation

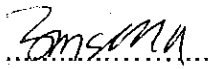
For consistency with other signing arrangements on the A47 slip roads within the scheme this one should also be made passively safe by the use of new posts. It may

also prudent to consider the adjacent sign (TS007) for conversion to passive posts in line with the Highways Agency policy.

AUDIT TEAM STATEMENT

We certify that this audit has been carried out in accordance with Norfolk County Council Environment, Transport and Development Procedures.

Signed (ATL)  Tim Young
Dated 19/04/13.

Signed  Julian Fonseca
Dated 19/04/13.

APPENDIX C

Postwick Hub Junction Stage 2 Safety Audit, Response Sheet

24 May 2013

RESPONSE SHEET

Problem (para no.)	Agree/ Disagree	Reasons/Proposals
1.1	Noted	All landscaping has been designed with a 4.5m setback from the carriageway.
2.1	Disagree	All alignments have been checked and are tangential to centre island except the northbound approach to the existing north west roundabout. Accident data does not indicate that there is an issue with entry.
2.2	Agreed	Exit taper to be widened.
3.1	Noted	The detailed design of the internal road layout is still to be completed and will form part of the reserved matters for the Broadland Gate Business Park planning application.
3.2	Agreed	Hatching will be provided adjacent to the splitter island resulting in a reduced entry width of 7.3m
3.3	Agreed	The circulatory width will be reduced to 8m by hatching. The width will be further reduced to 4.0m adjacent to the splitter islands again by providing hatching.
3.4	Agreed	The bus stop is to be located on the opposite side of the junction to aid bus alignment.
4.1	Agreed	Legs to be added to tactile crossings.
4.2	Agreed	Studs to be removed.
4.3	Noted	
5.1	Agreed	Circulatory lane markings will be provided.
5.2	Agreed	Signs will be illuminated.
5.3	Agreed	In line with the County's ongoing commitment to lower CO2 emissions it had been proposed not to light this section. The lighting had been designed one step below standard resulting in a reduced stopping sight distance of 135m. However, following the comments from the audit team the lighting will be extended as recommended.
5.4	Agreed	Location of signs to be reviewed and adjusted.
5.5	Agreed/ Noted	Markings on eastbound diverge will be provided. Suggest that other possible other locations to be reviewed/monitored post construction possibly at Stage 3.
5.6	Agreed	Passive posts on westbound diverge will be provided for TS024 & TS007.

To:- Team Manager (Network Analysis + Safety): fao Tim Young

From: Postwick Hub Junction Project Team

Signed: M Harrison

Project Engineer

Dated: 24th May 2013

Note: If producing your own version of this page please include **SAFETY AUDIT FILE NO/DATE & ATL name**

The Norfolk County Council (Norwich Northern Distributor Road (A1067 to A47(T))) Order

10.2 Design and Departures Report

Planning Act 2008

Infrastructure Planning

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

PINS Reference Number: TR010015

Document Reference: 10.2

Regulation Number: 5(2)(q)

Author: Norfolk County Council

Revision	Date	Description
0	8 th January 2014	Revision For Submission

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1 Key Summary

- 1.1.1 Norfolk County Council adopted a preferred route for the Norwich Northern Distributor Road (known as the NDR) from the A1067 Fakenham Road at Attlebridge to the A47 at Postwick in September 2005. The highway alignment and geometry of the junctions were then developed in accordance with the highway standards, as far as reasonably practicable.
- 1.1.2 The purpose of this report is to outline the design approach adopted and departures from standards relating to the Design Manual for Roads and Bridges (DMRB) used by Norfolk County Council in the design of the mainline alignment of the NDR.
- 1.1.3 Compliance with the Design Manual for Roads and Bridges (DMRB) is mandatory for all Trunk Road works. Where it has not been possible to comply with the DMRB on the Trunk Road elements of the NDR scheme a departure from standard has been applied for. The details of these departures could be found in section 3 of this report. Four departure applications have been submitted and approved by the Highways Agency.
- 1.1.4 Where it has not been possible to comply with the DMRB on the local highway network sections of the NDR scheme the departures have been considered through the road safety audit process. The details of these departures could be found in section 4 of this report.

2 Introduction

2.1 The Scheme

- 2.1.1 This document is submitted in relation to the application for a Development Consent Order by Norfolk County Council to the Secretary of State, under the Planning Act 2008.
- 2.1.2 The Application is for the Norfolk County Council (Norwich Northern Distributor Road (A1067 to A47(T))) Order, to grant development consent for the construction of a new highway between the A1067 Fakenham Road and the A47 Trunk Road at Postwick and associated improvements to the existing highway network to the north and north east of Norwich
- 2.1.3 The majority of the junctions along the NDR are designed as at-grade roundabouts. Two grade-separated junctions are to be provided, one at the junction with the A140 and one where the NDR joins the A47(T). A signalised junction will be provided at the Postwick Park and Ride Junction.
- 2.1.4 Where the NDR joins the A47 Trunk Road at Postwick Junction, the new eastbound slip roads would become part of the trunk road network, with the remainder of the NDR incorporated into the local highway network.
- 2.1.5 The schematic layout of the NDR and the naming conventions for its component elements are illustrated in Appendix A.
- 2.1.6 Regulations 5 and 6 of the Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 provide the statutory requirements for what must accompany a development consent application.
- 2.1.7 This document comprises part of the application documents and relates to Regulation 5(2)(q) of the Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009.
- 2.1.8 Norfolk County Council (NCC) has included this document to outline the design approach adopted and the departures from standards relating to the Design Manual for Roads and Bridges (DMRB) used by Norfolk County Council in the design of the mainline alignment of the NDR.

2.2 Design Development

- 2.2.1 The requirement for an NDR was first formally identified in 1992 following a review of transportation strategies for the Greater Norwich area. Extensive public consultation and stakeholder engagement has helped to inform the development of the scheme since then. The various consultations carried out are explained in sections 3 and 4 of the Pre-application Consultation Report (document reference 5.1) which forms part of the application.
- 2.2.2 The County Council adopted a preferred route for the NDR from the A1067 Fakenham Road at Attlebridge to the A47 at Postwick in September 2005. Since then the highway alignment and geometry of the junctions have been developed in accordance with the highway standards as far as reasonably practicable. This report explains the route alignment and outlines departures from standards relating to the Design Manual for Roads and Bridges (DMRB) used in the design of the mainline alignment of the NDR.
- 2.2.3 The Transport Assessment (document reference 5.5) explains the shortcomings of the existing road network on the northern side of Norwich and the need for improved strategic connections between the radial routes, the A47(T), and the existing and proposed development areas served by these roads (including Norwich International Airport and the employment clusters at Postwick and Rackheath). Chapter 3 of the Environmental Statement (document reference 6.1) explains the need for a new strategic route and the alternatives that have been considered. Any new strategic route serving the northern parts of Norwich and its rural hinterland needs to have a connection with the A47(T), which is the closest part of the national Strategic Road Network. Given the significance of existing and proposed employment and housing growth to the north east of the city, a location on the A47(T) to the east of Norwich is the most appropriate starting point for any such new route. Such a location would also be of most benefit for improving accessibility and connectivity between the employment opportunities within Norwich and the Great Yarmouth Enterprise Zone. The existing Postwick junction (which already serves the Park and Ride site and the employment cluster at Broadland Business Park and related business parks) is the optimum location on the A47(T).
- 2.2.4 The aim was to provide a strategic connection between the A47(T) at Postwick and as many of the radial routes as possible, addressing current transport problems and also serving planned growth to the north east of Norwich. As Chapter 3 of the Environmental Statement explains, substantial

environmental constraints have been identified to any route lying to the west of the A1067 Fakenham Road because of the presence of the ecologically sensitive Wensum Valley. However, assessment has shown that a route from Postwick as far as the A1067 would be achievable without undue environmental impact. Norwich International Airport lies adjacent to the A140 Cromer Road, and any route would need to avoid prejudicing the operational requirements of the Airport. These constraints essentially define the route corridor within which the road has to be aligned. The corridor chosen for the NDR connects the A47(T) at Postwick with the A1067 Fakenham Road and respects these constraints. Within the identified corridor, the alignment selected for the road as far as is practicable minimises its impact on existing communities, sensitive environmental areas, and heritage assets.

- 2.2.5 Changes were made to the emerging scheme proposals as a result of responses received to the various consultations. The more recent changes to the scheme resulting from consultation in 2012 and 2013 are explained in the Pre-application Consultation Report.
- 2.2.6 Environmental assessment has been undertaken in parallel with all stages of scheme development, in accordance with the DMRB. An Environmental Impact Assessment has been undertaken of the final scheme and the results recorded in an Environmental Statement (document reference 6.1 and 6.2) which forms part of the application.
- 2.2.7 The aim of the design process has been to avoid impacts where possible. Where that proved impractical, environmental mitigation measures were incorporated into the Scheme design via an iterative design process. The environment team was represented at design meetings and Scheme design thus evolved with regard to environmental and social considerations. The effectiveness of the process was supported and informed by parallel assessment activities and consultation.

2.3 Design Concept

- 2.3.1 The NDR has been designed using current design standards contained in the DMRB. The DMRB sets a standard of good practice that has been developed principally for Trunk Roads and motorways. It is for the local highway authority to decide on the extent to which the documents in the manual are appropriate when used for local road schemes.
- 2.3.2 Compliance with the DMRB is mandatory for all Trunk Road works. Where it has not been possible to comply with the DMRB on the Trunk Road elements

of the NDR scheme a departure from standard has been applied for. Four departure applications have been submitted to the Highways Agency. The departure submissions are explained in section 3.

- 2.3.3 Where it has not been possible to comply with the DMRB on the local highway network sections of the NDR the departures have been considered through the road safety audit process. The departures from standards are explained in section 4.

2.4 Road Design Standards and Design Speeds

- 2.4.1 All main line links will be designed to the Design manual for Roads and Bridges (DMRB):
- 2.4.2 TD 9/93: Highway Link Design
- 2.4.3 TD 27/05: Cross-Sections and Headrooms
- 2.4.4 TD 22/06: Layout of Grade Separated Junctions
- 2.4.5 TD 51/03: Segregated Left Turn Lanes and Subsidiary Deflection Islands at Roundabouts
- 2.4.6 Roundabouts are designed in accordance with the DMRB:
- 2.4.7 TD 16/07: Geometric design of roundabouts
- 2.4.8 The NDR mainline alignment has been designed using the design speeds shown in Appendix A. Based on these design speeds sections 3 and 4 set out any departures from standards required.
- 2.4.9 Postwick Junction will be subject to a 40mph speed limit other than on slip roads. A design speed of 70kph has been adopted in accordance with DMRB TD 9/93: Highway Link Design except on the existing and proposed bridge crossings where a lower design speed of 60kph has been adopted. The lower speed is appropriate due to the short length of the links between junctions.
- 2.4.10 The slip road design speed for both the A47 and A140 grade separated junctions is determined from the mainline design speed. Both the mainline carriageways are subject to design speed of 120kph. Therefore the appropriate design speed for the slip roads is 70kph in accordance with DMRB TD 22/06: Layout of Grade Separated Junctions paragraph 4.5, Table 4/1. The slip road design speed is 70kph when the slip road is less than 0.75km in length and provides a connection to the local highway at-grade, the

lower speed is appropriate as vehicles will be slowing down or accelerating away from the local highway junction.

- 2.4.11 The NDR mainline carriageway north of the Business Park Roundabout will be subject to the relevant national speed limit (70mph). Therefore a design speed of 120kph has been adopted for the majority of the NDR mainline carriageway, in accordance with DMRB TD 9/93: Highway Link Design.
- 2.4.12 A design speed of 100kph has been adopted on the link road between Salhouse Road and Plumstead Road Roundabouts. The section between the roundabouts, which crosses the railway line, is 1200m long. It is considered that the 85% speed would not exceed 100kph on this section and that this would consequently be an appropriate design speed to apply for this section only.
- 2.4.13 The NDR mainline carriageway joins the existing A1067 Fakenham Road at its western end, the section of new carriageway between the proposed Fakenham Road Roundabout and the tie-in is a single carriageway road and therefore a design speed of 100kph is appropriate.

3 A47 Trunk Road Design

3.1 Eastbound Diverge Slip Road

- 3.1.1 Due to the low downstream flow predicted for the A47 mainline, the diverge type is not specified in Figure 2/5 of TD22/06. The traffic flows (vph) from the latest traffic modelling and corresponding design requirements are summarised in Tables F1 and F2 of Appendix B. The tables show that in both AM and PM peaks the traffic flows are above the threshold of 1200 vph for a Type A layout in both scenarios, suggesting that a Type A layout would not be suitable and a Type B or Type D layout should be adopted.
- 3.1.2 Working within the existing physical constraints of the River Yare/Railway Bridge and the Existing Postwick Bridge, a Layout D for a diverge slip road would require the widening of the River Yare/Railway Bridge which was estimated to cost £42 million in 2008. The nearest compliant layout that could be provided within the constraints for the new diverge slip road is a Layout B Parallel Diverge. This layout allows a taper diverge, where diverging traffic leaves the mainline A47 over a specified flare distance. The flare is followed by an auxiliary lane which is an additional lane at the side of the mainline and would provide a greater weaving length along the slip road in advance of the segregated left turn proposed at the North East Roundabout than a preferred ghost island diverge Layout B. This layout was submitted and approved as a departure from standards.

3.2 Eastbound Merge Slip Road

- 3.2.1 Due to the low upstream flows predicted for the A47 mainline, the merge type is not specified in Figure 2/3 of TD22/06. A Type E or Type F merge layout would require an additional lane on the A47 mainline carriageway. The nearest compliant layout that could be provided within the constraints for the new merge slip road is Layout B. A Layout B comprises an auxiliary lane followed by a taper merge over a specified flare distance. A Layout B was submitted and approved as a departure from standards.
- 3.2.2 The traffic flows (vph) from the latest traffic modelling and corresponding design requirements are summarised in Tables F3 and F4 of Appendix B.
- 3.2.3 The departure from standards is justified as a fully compliant design would require an additional lane on the A47 extending 2.6km to the following junction with an estimated cost at the time of the departure submission of £30m.

3.3 Westbound Diverge Slip Road

- 3.3.1 No design changes are proposed on the existing westbound diverge from the A47. The existing diverge slip road is a Type A taper diverge.
- 3.3.2 The traffic flows (vph) from the latest traffic modelling and corresponding design requirements are summarised in Tables F5 and F6 of Appendix B. The capacity assessment shows that in the 2017 AM and PM peak and the 2032 AM peak a two lane slip road with hard strip should be provided in accordance with TD 22/06 table 3/1b. However when the vph flows are inserted into Figure 2/5 the flows for all scenarios fall within the threshold of 1,200 vph for a single lane slip road other than the 2032 AM peak where the vph flow is 1,222. The design team therefore feel that a Layout A comprising a single lane slip road with two lanes on the A47 main line would still be appropriate.

3.4 Westbound Merge Slip Road

- 3.4.1 The proposed Scheme ties into the existing westbound merge slip road after the Park and Ride signalised junction. It is proposed to retain the existing two-lane taper merge layout onto the A47. The existing layout is not a standard layout as per TD 22/06.
- 3.4.2 The traffic flows (vph) from the latest traffic modelling and corresponding design requirements are summarised in Tables F7 and F8 of Appendix B. The slip road flows require the provision of a two lane slip road however due to the low upstream mainline flow the merge type is not specified in TD 22/06 Figure 2/3.
- 3.4.3 The nearest compliant TD 22/06 layout F could not be provided, as a type F layout would require an additional lane on the A47 mainline carriageway.
- 3.4.4 No works are proposed to the westbound merge taper layout as part of the proposed Scheme but in view of paragraph 2.28 of TD 22/06 a departure from standards to retain the existing two-lane taper merge was submitted and approved. The departure approval requires the provision of a two lane taper Layout D which can be accommodated within the existing carriageway footprint with minor modification to the road markings.
- 3.4.5 The departure is justified as a fully TD 22/06 compliant design would require an additional lane on the A47 with widening of the River Yare bridge. Based on the 2008 departure submission for the eastbound diverge the additional cost of providing this third lane would be in the order of £42m.

3.5 Structures

- 3.5.1 The proposed bridge design is for a three span steel and concrete composite bridge, crossing the A47 Norwich Southern Bypass with a skew angle of 54 degrees. One departure from standard has been identified which relates to the omission of abutment galleries from the design. Abutment galleries are provided below expansion and rotational joints to facilitate inspection and maintenance. The departure from standards was submitted and approved.

4 Local Highway Network

4.1 Carriageway Design

4.1.1 The predicted flows for an opening year of 2017 base on the latest traffic modelling are shown in Table 1 below.

Section of NDR	2017 Annual Average Daily Traffic (AADT)
A1067 to Fir Covert Road	12,300
Fir Covert Road to Reepham Road	14,200
Reepham Road to Drayton Lane	19,000
Drayton Lane to A140	22,300
A140 to B1150	19,500
B1150 to A1151	27,100
A1151 to Salhouse Road	33,000
Salhouse Road to Plumstead Road	35,200
Plumstead Road to A47	32,900

Table 1 – Predicted NDR Annual Average Daily Traffic (AADT) flows at year of opening (2017)

4.1.2 TA 46/97 and TD 70/08 give recommendations for the opening year AADT flows for carriageway standards as follows:

- Single 7.3m with hard strips (S2) – up to 13,000 vehicles per day;
- Wide Single 10m with hard strips (WS2) – between 6,000 and 21,000 vehicles per day;
- Wide Single 2+1 carriageway with hard strips (WS2+1) – up to 25,000 vehicles per day;
- Dual 2 lane all purpose with hard strips (D2AP) – between 11,000 and 39,000 vehicles per day.

4.1.3 The predicted flows for the NDR are in excess of the recommended economic flow range for S2 with the exception of the section between the A1067 and Fir Covert Road.

4.1.4 The predicted flows for the NDR are in excess of the recommended economic flow range for WS2 and WS2+1 for the section between the B1150 and the A47. Whilst WS2 could be provided between the A1067 and Drayton Lane lengths of WS2 in excess of 2km require departure from standard approval (TD 9/93 section 1.28).

- 4.1.5 Although the safety performance of WS2 roads is better than standard S2, it is significantly poorer than for dual carriageways. TRL research indicates that WS2 roads have accident rates over 30% higher than D2AP. For accidents causing deaths and serious injury the rate is 100% higher. In addition, WS2 roads have a higher than expected percentage of accidents involving overtaking than S2. This collision type has a high risk of death or serious injury as the outcome.
- 4.1.6 The basic design principle of WS2+1 is to promote journey time reliability on long distance single carriageway roads. The NDR's primary purpose is a distributor road. It would be difficult to decide what direction you would provide the additional lane between the individual roundabout junctions. Also, WS2+1 would introduce route inconsistency and the safety performance would be worse than D2AP due to the lack of median barrier.
- 4.1.7 A D2AP would provide a consistent standard for the NDR, it would provide continuity of road type with the A47 Norwich Southern Bypass and would provide a superior performance in terms of link accidents and user costs.

4.2 Mainline Horizontal Design

- 4.2.1 Table 3 TD9/93 gives standards for horizontal curvature for the relevant design speeds.
- 4.2.2 Paragraph 3.4 TD9/93 states relaxations in standard may be made at the discretion of the designer of up to 4 steps below desirable minimum standard for all-purpose band B roads.
- 4.2.3 Paragraph 3.15 TD9/93 states transition curves shall be provided on curves the radius of which are less than that shown in table 3, Minimum R without elimination of Adverse Camber & Transitions.
- 4.2.4 Paragraph 3.16 TD9/93 states 'q' values for transition curves should not normally exceed the value of 0.3 m/sec³.
- 4.2.5 The horizontal alignment for the proposed mainline link roads are shown in Appendix C, based on the design speeds specified in section 2.4 there are no departures from standards required for the mainline horizontal alignment.

4.3 Mainline Vertical Design

- 4.3.1 Table 3 TD9/93 gives standards for vertical curvature for the relevant design speeds.

- 4.3.2 Paragraph 4.9 TD9/93 states relaxations in standard for crest curves may be made at the discretion of the designer of up to 3 steps below desirable minimum standard for all-purpose band B roads.
- 4.3.3 Paragraph 4.14 TD9/93 states relaxations in standard for sag curves may be made at the discretion of the designer of up to 1 step below the absolute minimum standard for all-purpose roads.
- 4.3.4 Paragraph 1.26 TD9/93 states relaxations below Desirable Minimum in vertical curvature for crest curves and Absolute Minimum for sag curves are not permitted on the immediate approaches to a junction as defined in paragraph 1.26.
- 4.3.5 Paragraph 4.2 TD 9/93 states that only gradients greater than 8% are considered as a departure from standards.
- 4.3.6 The vertical alignment for the proposed mainline link roads are shown in Appendix D, based on the design speeds specified in section 2.4 there are no departures from standards required for the mainline vertical alignment.

4.4 Mainline Cross Section

- 4.4.1 Paragraph 4.2 in TD27/05 states the standards for new carriageway paved widths.
- 4.4.2 The cross sections for the proposed mainline link roads are shown in Appendix E.
- 4.4.3 The proposed cross section along the length of the mainline design is in accordance with TD27/05 for carriageway, hardstrip and central reserve widths, in some cases verge width provision is 1.5m rather than the required 2.5m. In these situations the verge is reduced due to the need to accommodate a shallow drainage swale. The swales are generally 3.0m wide with 1 in 5 side slopes and a depth of 200mm.

4.5 Mainline Stopping Sight Distance

- 4.5.1 Table 3 TD9/93 gives standards for stopping sight distance (SSD) for the relevant design speeds.
- 4.5.2 Paragraph 2.8 TD9/93 states relaxations in standard may be made at the discretion of the designer of up to 3 steps below desirable minimum standard for all-purpose band B roads.

- 4.5.3 Paragraph 2.2 TD 9/93 states that the SSD shall be measured from a minimum driver's eye height of between 1.05m and 2m to an object height of between 0.26m and 2.0m both above the road surface. It shall be checked in both the horizontal and vertical plane, in the case of dual carriageways between any two points in the centre of each lane for both carriageways on the inside of the curve.
- 4.5.4 Paragraph 1.26 in TD9/93 states relaxations below desirable minimum are not permitted on the immediate approaches to junction as defined in paragraph 1.26.
- 4.5.5 The SSD for the proposed link roads are shown in Appendix F based on the design speeds specified in section 2.4 there is one departure from standards required for the mainline SSD.
- 4.5.6 The NDR passes under Middle Road bridge between Plumstead Road Roundabout (South) and the Business Park Roundabout. At this location the Stopping Sight Distance (SSD) is restricted to 2 steps below standard for westbound lane 2 vehicles due to the presence of the required Vehicle Restraint System (VRS) and the bridge pier within the central reservation. Two steps below desirable minimum would normally be considered a relaxation. The horizontal radius under the bridge is also 1 step below standard and therefore this combination of relaxations is a departure from standards. The departure is considered acceptable by the design team as the reduction in SSD will be a momentary visibility impairment only. Increased visibility will be achievable over the VRS and behind the bridge pier.

4.6 A140 Grade Separated Junction

- 4.6.1 Due to the low flows predicted at the junction the diverge type is not specified in Figure 2/5 of TD22/06 for either the eastbound or westbound diverges from the mainline NDR carriageway. The traffic flows (vph) from the latest traffic modelling and corresponding diverge slip road design requirements are summarised in Tables F1, F2, F5 and F6 of Appendix G. The tables show that in both AM and PM peaks the traffic flows are below the threshold of 1200 vph for a Type A layout in both scenarios, suggesting that a Type A layout would be suitable. A Type A layout has therefore been adopted.
- 4.6.2 For the eastbound and westbound merge slip roads the traffic flows (vph) from the latest traffic modelling and corresponding design requirements are summarised in Tables F3, F4, F7 and F8 of Appendix G. The tables show that the ideal layout for the merge slip roads is a Type E lane gain layout. A

Type E layout would provide a single lane merge slip road joining a one lane NDR mainline carriageway to form a two lane downstream mainline carriageway. However, for reasons of route continuity, the NDR mainline has been designed with two lanes throughout. Therefore the nearest compliant layout is a Type A single lane taper merge. A Type A layout has therefore been adopted as a departure from standards.

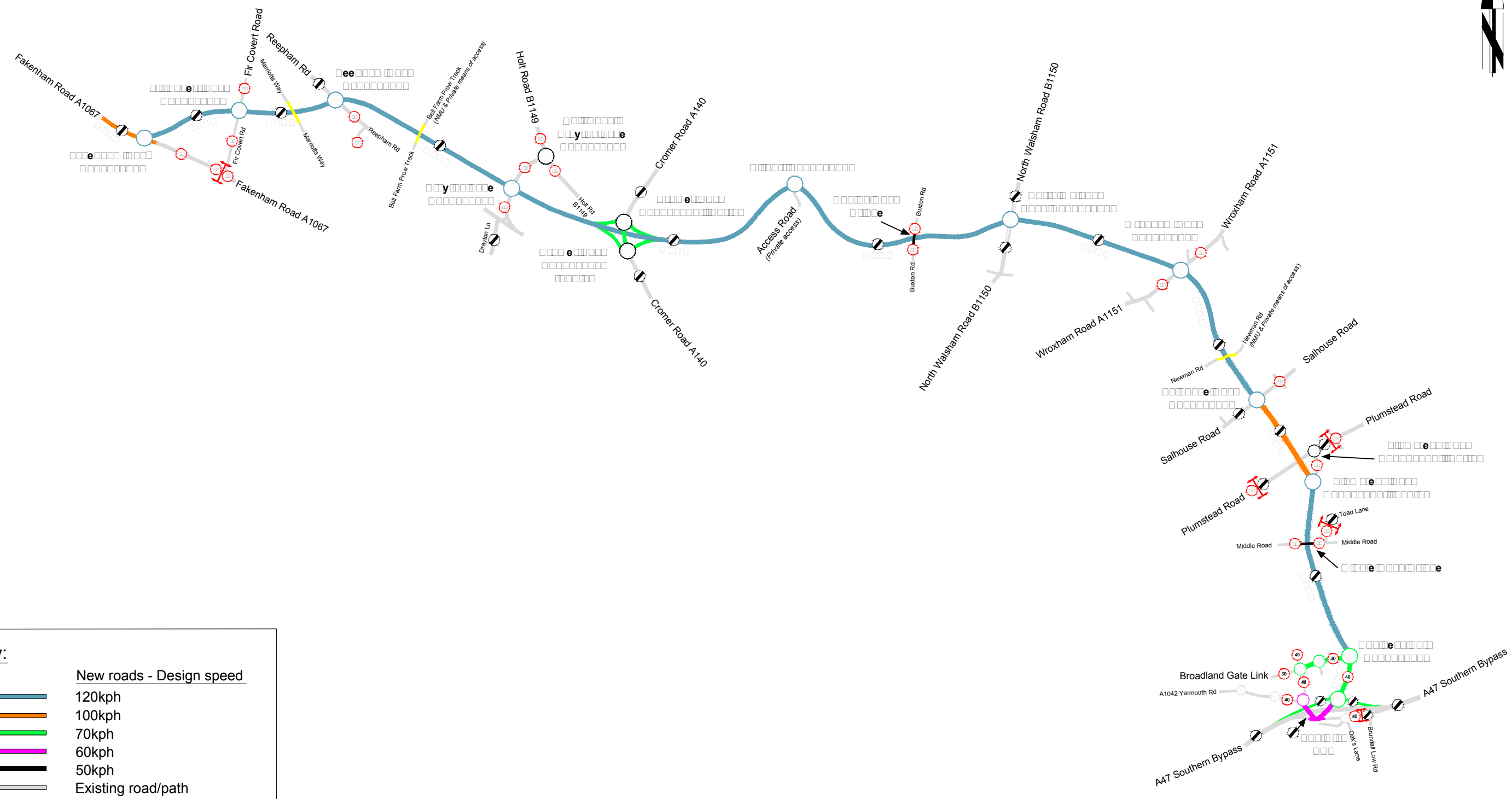
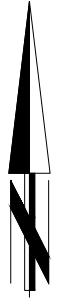
- 4.6.3 The westbound merge slip road has a two way section near the A140 Cromer Road Roundabout South. This is to allow access to a property and for maintenance vehicles to access the lagoon. Therefore the eastbound flow on the slip road will be extremely low. Paragraph 5.27 in TD22/06 states that two way slip roads must be dual carriageway with opposing traffic separated by a physical central reserve with vehicle restraint system. Due to the low opposing flow it is considered that a physical separation would result in an overdesigned layout. Therefore the two-way section of the slip road is a departure from standards and has been designed as a 7.3m wide two way carriageway. Signing will be provided to inform drivers of the layout ahead.

5 Conclusion

- 5.1.1 The proposed alignment follows the County Council's adopted preferred route for the NDR from the A1067 Fakenham Road at Attlebridge to the A47(T) at Postwick. The highway alignment and geometry of the junctions have been developed in accordance with the highway standards as far as reasonably practicable and with the objective of minimising its environmental impact within the available route corridor.
- 5.1.2 Compliance with the Design Manual for Roads and Bridges (DMRB) is mandatory for all Trunk Road works. Where it has not been possible to comply with the DMRB on the Trunk Road elements of the NDR scheme a departure from standards has been applied for. Four departure applications have been submitted to and approved by the Highways Agency. These departures are a result of working within the existing physical constraints of the River Yare/Railway Bridge and the Existing Postwick Bridge.
- 5.1.3 Where it has not been possible to comply with the DMRB on the local highway network sections of the NDR scheme the departures have been considered through the road safety audit process.
- 5.1.4 Two departures from standard are associated with the mainline alignment and two departures from standard are associated with the A140 grade separated junction. These departures have been reviewed during the road safety audit process and accepted by the independent safety audit team.

6 Appendices

Appendix A – R1C093-R1-4342 NDR Layout - Design Speeds



Key:

- New roads - Design speed
- 120kph
- 100kph
- 70kph
- 60kph
- 50kph
- Existing road/path
- Non motorised user (NMU) crossing
- Speed limit MPH/National
- Link road reference number

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DRAWING TITLE
 NORWICH NORTHERN DISTRIBUTOR ROAD (NDR)
 NDR LAYOUT - DESIGN SPEEDS

REV.	DESCRIPTION	CHECKED	DATE

SURVEYED BY	INITIALS	DATE	DRAWING No.
OS	OS		R1C093-R1-4342
DESIGNED BY	AC-J	10/13	PROJECT TITLE
DRAWN BY	AC-J	10/13	Norwich Northern Distributor Road
CHECKED BY	SWC	11/13	SCALE
			1:50000 at A3
			FILE No.
			R1C093

Appendix B – Postwick A47 Slip Road Capacity Assessments

A47/A1042 Postwick Hub Junction Slip Roads – Layout Capacity Assessment

Eastbound Diverge Slip Road

	A47 Eastbound Diverge	A47 Eastbound Downstream	A47 Eastbound Upstream	Slip Road Requirement	Mainline Requirement	Diverge Type Required
AM	1,747	813	2,560	DG2E Two lanes with hardstrip	Two lanes upstream, One lane downstream	Not specified
PM	1,528	1,141	2,669	DG2E Two lanes with hardstrip	Two lanes upstream, One lane downstream	Not specified

Table F1 – A47 Eastbound diverge 2017 (Traffic volumes vph)

	A47 Eastbound Diverge	A47 Eastbound Downstream	A47 Eastbound Upstream	Slip Road Requirement	Mainline Requirement	Diverge Type Required
AM	2,236	844	3,080	DG2E Two lanes with hardstrip	Two lanes upstream, One lane downstream	Not specified
PM	2,006	1,175	3,181	DG2E Two lanes with hardstrip	Three lanes upstream, One lane downstream	Not specified

Table F2 – A47 Eastbound diverge 2032 (Traffic volumes vph)

Eastbound Merge Slip Road

	A47 Eastbound Merge	A47 Eastbound Upstream	A47 Eastbound Downstream	Slip Road Requirement	Mainline Requirement	Merge Required
AM	839	813	1,652	MG1C Single lane with hardshoulder	One lane upstream, Two lanes downstream	Type E (lane gain)
PM	1,210	1,141	2,351	MG2E Two lanes with hardstrip	One lane upstream, Two lanes downstream	Not specified

Table F3 – A47 Eastbound merge 2017 (Traffic volumes vph)

	A47 Eastbound Merge	A47 Eastbound Upstream	A47 Eastbound Downstream	Slip Road Requirement	Mainline Requirement	Merge Required
AM	864	844	1,708	MG1C Single lane with hardshoulder	One lane upstream, Two lanes downstream	Type E (lane gain)
PM	1,250	1,175	2,425	MG1E Two lanes with hardshoulder	One lane upstream, Two lanes downstream	Not specified

Table F4 – A47 Eastbound merge 2032 (Traffic volumes vph)

A47/A1042 Postwick Hub Junction Slip Roads – Layout Capacity Assessment

Westbound Diverge Slip Road

	A47 Westbound Diverge	A47 Westbound Downstream	A47 Westbound Upstream	Slip Road Requirement	Mainline Requirement	Diverge Type Required
AM	1,186	1,123	2,309	DG2E Two lanes with hardstrip	Two lanes upstream, One lane downstream	Not specified
PM	815	999	1,814	DG2E Two lanes with hardstrip	Two lanes upstream, One lane downstream	Not specified

Table F5 – A47 Westbound diverge 2017 (Traffic volumes vph)

	A47 Westbound Diverge	A47 Westbound Downstream	A47 Westbound Upstream	Slip Road Requirement	Mainline Requirement	Diverge Type Required
AM	1,222	1,273	2,495	DG2E Two lanes with hardstrip	Two lanes upstream, One lane downstream	Not specified
PM	590	1,184	1,774	DG1C Single lane with hardshoulder	Two lanes upstream, One lane downstream	Not specified

Table F6 – A47 Westbound diverge 2032(Traffic volumes vph)

Westbound Merge Slip Road

	A47 Westbound Merge	A47 Westbound Upstream	A47 Westbound Downstream	Slip Road Requirement	Mainline Requirement	Merge Required
AM	1,479	1,123	2,602	MG2E Two lanes with hardstrip	One lane upstream, Two lanes downstream	Not specified
PM	1,742	999	2,741	MG2E Two lanes with hardstrip	One lane upstream, Two lanes downstream	Not specified

Table F7 – A47 Westbound merge 2017 (Traffic volumes vph)

	A47 Westbound Merge	A47 Westbound Upstream	A47 Westbound Downstream	Slip Road Requirement	Mainline Requirement	Merge Required
AM	1,751	1,273	3,024	MG2E Two lanes with hardstrip	One lane upstream, Two lanes downstream	Not specified
PM	2,074	1,184	3,258	MG2E Two lanes with hardstrip	One lane upstream, Three lanes downstream	Not specified

Table F8 – A47 Westbound merge 2032 (Traffic volumes vph)

Appendix C – Horizontal Alignment Report

NDR - Main Alignment - Horizontal Report

DMRB Compliance of Horizontal Curve											
Control String	Design Speed (km/h)	Chainage	Radius (m)	Length (m)	Hand of Curve	Steps below Desirable	Transition requirement	Desirable Transition Compliance (q=0.3)	Super-elevation (%)	Comments	Relaxation or Departure
MCM1	100	0.000	Straight	17.665	NA	NA	NA	NA	NA	Straight	None
		17.665	Transition	68.939	NA	NA	NA	NA	NA	Transition	None
		86.604	1020	20.610	Left	0	Required	Yes	3.5	Superelevation achieved	None
		107.214	Transition	68.940	NA	NA	NA	NA	NA	Transition	None
		176.154	Straight	167.787	NA	NA	NA	NA	NA	Straight	None
		343.941	Transition	68.941	NA	NA	NA	NA	NA	Transition	None
		412.882	1020	295.049	Left	0	Required	Yes	3.5	Superelevation achieved	None
		707.932	50	8.401	Right	NA	NA	NA	NA	Not a design curve	None
	716.332	50	11.914	Left	NA	NA	NA	NA	Not a design curve	None	
MCM2	120	0.000	50	30.860	Left	NA	NA	NA	NA	Not a design curve	None
		30.860	50	14.350	Right	NA	NA	NA	NA	Not a design curve	None
		45.210	1030	273.372	Left	0	Required	Yes	5	Superelevation achieved	None
		318.583	Transition	117.973	NA	NA	NA	NA	NA	Transition	None
		436.556	Transition	117.973	NA	NA	NA	NA	NA	Transition	None
		554.529	1030	646.771	Right	0	Required	Yes	5	Superelevation achieved	None
		1201.300	50	35.665	Left	NA	NA	NA	NA	Not a design curve	None
	1236.965	50	1.993	Right	NA	NA	NA	NA	Not a design curve	None	
MCMB	120	0.000	50	32.792	Right	NA	NA	NA	NA	Not a design curve	None
		32.792	Straight	57.511	NA	NA	NA	NA	NA	Straight	None
		90.303	2040	1040.195	Left	0	NA	NA	NA	End to end curve	None
		1130.498	50	27.922	Left	NA	NA	NA	NA	Not a design curve	None
		1158.420	50	10.910	Right	NA	NA	NA	NA	Not a design curve	None
MCM3	120	0.000	50	36.869	Right	NA	NA	NA	NA	Not a design curve	None
		36.869	1030	457.953	Right	0	Required	Yes	5	Superelevation achieved	None
		494.822	Transition	117.973	NA	NA	NA	NA	NA	Transition	None
		612.795	Straight	1343.93	NA	NA	NA	NA	NA	Straight	None
		1956.730	Transition	12.151	NA	NA	NA	NA	NA	Transition	None
		1968.881	10000	402.233	Right	0	Not Required	Yes	NA	Radius > 2880m	None
		2371.114	75	42.784	Left	NA	NA	NA	NA	Not a design curve	None

NDR - Main Alignment - Horizontal Report

DMRB Compliance of Horizontal Curve											
Control String	Design Speed (km/h)	Chainage	Radius (m)	Length (m)	Hands of Curve	Steps below Desirable	Transition requirement	Desirable Transition Compliance (q=0.3)	Super-elevation (%)	Comments	Relaxation or Departure
MCM9	120	0.000	75	0.768	Left	NA	NA	NA	NA	Not a design curve	None
		0.768	75	43.585	Right	NA	NA	NA	NA	Not a design curve	None
		44.353	3500	609.854	Left	0	Not Required	NA	NA	Radius > 2880m	None
		654.207	Transition	8.302	NA	NA	NA	NA	NA	Transition	None
		662.509	4600	1728.39	Left	0	Not Required	NA	NA	Radius > 2880m	None
		2390.903	Transition	140.04	NA	NA	NA	NA	NA	Transition	None
		2530.943	730	507.899	Left	1	Required	Yes	7	Superelevation achieved	Relaxation
		3038.842	Transition	166.456	NA	NA	NA	NA	NA	Transition	None
		3205.297	Transition	117.973	NA	NA	NA	NA	NA	Transition	None
		3323.270	1030	455.19	Right	0	Required	Yes	5	Super achieved	None
	3778.461	45	13.457	Right	NA	NA	NA	NA	Not a design curve	None	
MCM4	120	0.000	45	33.472	Right	NA	NA	NA	NA	Not a design curve	None
		33.472	1030	320.275	Right	0	Required	Yes	5	Superelevation achieved	None
		353.746	Transition	117.973	NA	NA	NA	NA	NA	Transition	None
		471.720	Transition	166.456	NA	NA	NA	NA	NA	Transition	None
		638.175	730	757.886	Left	1	Required	Yes	7	Superelevation achieved	Relaxation
		1396.061	Transition	166.456	NA	NA	NA	NA	NA	Transition	None
		1562.517	Straight	87.589	NA	NA	NA	NA	NA	Straight	None
		1650.105	Transition	117.973	NA	NA	NA	NA	NA	Transition	None
		1768.079	1030	229.757	Right	0	Required	Yes	5	Superelevation achieved	None
		1997.835	Transition	117.973	NA	NA	NA	NA	NA	Transition	None
		2115.809	Transition	166.456	NA	NA	NA	NA	NA	Transition	None
		2282.264	730	196.622	Left	1	Required	Yes	7	Superelevation achieved	Relaxation
		2478.886	Transition	166.456	NA	NA	NA	NA	NA	Transition	None
		2645.342	Transition	117.973	NA	NA	NA	NA	NA	Transition	None
		2763.315	1030	190.839	Right	0	Required	Yes	5	Superelevation achieved	None
	2954.154	75	22.522	Left	NA	NA	NA	NA	Not a design curve	None	
	2976.676	75	3.036	Right	NA	NA	NA	NA	Not a design curve	None	

NDR - Main Alignment - Horizontal Report

DMRB Compliance of Horizontal Curve

Control String	Design Speed (km/h)	Chainage	Radius (m)	Length (m)	Hands of Curve	Steps below Desirable	Transition requirement	Desirable Transition Compliance (q=0.3)	Super-elevation (%)	Comments	Relaxation or Departure
MCM5	120	0.000	75	43.926	Right	NA	NA	NA	NA	Not a design curve	None
		43.926	Straight	322.851	NA	NA	NA	NA	NA	Straight	None
		366.777	Transition	117.973	NA	NA	NA	NA	NA	Transition	None
		484.751	1030	88.687	Right	0	Required	Yes	5	Superelevation achieved	None
		573.438	Transition	117.973	NA	NA	NA	NA	NA	Transition	None
		691.411	Straight	832.997	NA	NA	NA	NA	NA	Straight	None
		1524.408	Transition	42.192	NA	NA	NA	NA	NA	Transition	None
		1566.599	2880	141.961	Left	0	Not Required	Yes	NA	Radius = 2880m	None
		1708.56	Transition	42.192	NA	NA	NA	NA	NA	Transition	None
		1750.752	Transition	77.397	NA	NA	NA	NA	NA	Transition	None
		1828.149	1570	274.463	Right	0	Required	Yes	3.3	Superelevation achieved	None
		2102.612	75	31.015	Left	NA	NA	NA	NA	Not a design curve	None
	2133.627	75	4.833	Right	NA	NA	NA	NA	Not a design curve	None	
MCM6	120	0.000	74	43.555	Right	NA	NA	NA	NA	Not a design curve	None
		43.555	Straight	18.255	NA	NA	NA	NA	NA	Straight	None
		61.81	Transition	166.456	NA	NA	NA	NA	NA	Transition	None
		228.266	730	325.666	Right	1	Required	Yes	7	Superelevation achieved	Relaxation
		553.932	Transition	166.456	NA	NA	NA	NA	NA	Transition	None
		720.388	Transition	166.456	NA	NA	NA	NA	NA	Transition	None
		886.843	730	126.079	Left	1	Required	Yes	7	Superelevation achieved	Relaxation
		1012.922	Transition	166.456	NA	NA	NA	NA	NA	Transition	None
		1179.378	Straight	394.397	NA	NA	NA	NA	NA	Straight	None
		1573.775	Transition	38.575	NA	NA	NA	NA	NA	Transition	None
		1612.35	3150	206.084	Left	0	Not Required	Yes	NA	Radius > 2880m	None
		1818.435	75	43.371	Left	NA	NA	NA	NA	Not a design curve	None
	1861.805	75	1.072	Right	NA	NA	NA	NA	Not a design curve	None	

NDR - Main Alignment - Horizontal Report

DMRB Compliance of Horizontal Curve											
Control String	Design Speed (km/h)	Chainage	Radius (m)	Length (m)	Hands of Curve	Steps below Desirable	Transition requirement	Desirable Transition Compliance	Super-elevation (%)	Comments	Relaxation or Departure
MCM7	100	0.000	75	43.862	Right	NA	NA	NA	NA	Not a design curve	None
		43.862	Straight	324.609	NA	NA	NA	NA	NA	Straight	None
		368.47	Transition	40.504	NA	NA	NA	NA	NA	Transition	None
		408.975	3000	234.759	Right	0	Not Required	Yes	NA	Radius > 2880m	None
		643.733	Transition	40.504	NA	NA	NA	NA	NA	Transition	None
		684.238	Straight	470.078	NA	NA	NA	NA	NA	Straight	None
		1154.316	50	25.383	Left	NA	NA	NA	NA	Not a design curve	None
		1179.699	50	22.039	Right	NA	NA	NA	NA	Not a design curve	None
MCM8	120	0.000	50	36.135	Right	NA	NA	NA	NA	Not a design curve	None
		36.135	Straight	489.811	NA	NA	NA	NA	NA	Straight	None
		525.946	Transition	166.456	NA	NA	NA	NA	NA	Transition	None
		692.402	730	155.681	Left	1	Required	Yes	7	Superelevation achieved	Relaxation
		848.083	Transition	166.456	NA	NA	NA	NA	NA	Transition	None
		1014.538	Straight	527.336	NA	NA	NA	NA	NA	Straight	None
		1541.874	Transition	99.194	NA	NA	NA	NA	NA	Transition	None
		1641.068	1225	75.346	Left	0	Required	Yes	4.2	Superelevation achieved	None
		1716.414	Transition	99.194	NA	NA	NA	NA	NA	Transition	None
		1815.608	Straight	356.27	NA	NA	NA	NA	NA	Straight	None
		2171.877	50	26.208	Left	NA	NA	NA	NA	Not a design curve	None
	2198.085	50	16.572	Right	NA	NA	NA	NA	Not a design curve	None	
MMM1	70	0.000	50	36.983	Right	NA	NA	NA	NA	Not a design curve	None
		36.983	1020	512.655	Right	0	NA	NA	NA	End to end curve	None
		549.638	50	9.28	Left	NA	NA	NA	NA	Not a design curve	None
MMM5	60	0.000	1610	45.215	Left	NA	NA	NA	NA	Transition	None
		45.215	255	68.485	Right	0	Required	Yes	2.5	Approach to junction	None
		113.7	Straight	111.641	NA	NA	NA	NA	NA	Straight	None
		225.341	255	26.493	Right	NA	Required	NA	2.5	Not a design curve	None
		251.834	255	26.493	Left	NA	Required	NA	2.5	Not a design curve	None
		278.327	Straight	22.979	NA	NA	NA	NA	NA	Not a design curve	None
		301.306	50	26.454	Left	NA	NA	NA	NA	Not a design curve	None

Appendix D – Vertical Alignment Report

NDR - Main Alignment - Vertical Report

DMRB Compliance of Vertical Curve									
Control String	Design Speed (km/h)	Chainage	Grade (%)	K Value (m)	Curve type	Steps Level below	Within 1.5XSSD from Junction	Compliance Vertical	Relaxation or Departure
MCM1	100	0.000	1.06	Grade	NA	0	Y	Y	None
		133.108	1.69	26.00	Sag	0	Y	Y	None
		150.010	2.34	100.00	Hog	0	Y	Y	None
		654.732	-2.70	26.00	Sag	0	Y	Y	None
		725.033	0.00	Grade	NA	NA	N	NA	Not a design grade
MCM2	120	0.000	0.00	Grade	NA	NA	N	NA	Not a design grade
		1.448	0.00	2.00	Hog	NA	N	NA	Not a design grade
		8.028	-3.29	7.50	Sag	NA	N	NA	Not a design grade
		43.962	1.50	55.00	Hog	NA	Y	Y	Not a design grade
		71.545	1.00	Grade	NA	0	Y	Y	None
		255.170	1.00	182.00	Hog	0	Y	Y	None
		386.341	0.28	37.00	Sag	0	Y	Y	None
		487.007	3.00	Grade	NA	0	N	Y	None
		820.705	3.00	182.00	Hog	0	Y	Y	None
		1180.609	1.02	7.50	Hog	NA	Y	NA	Not a design grade
1188.278	0.00	Grade	NA	NA	Y	NA	Not a design grade		
MCMB	120	0.000	0.00	Grade	NA	NA	N	NA	Not a design grade
		0.863	0.00	7.50	Sag	NA	N	NA	Not a design grade
		16.677	2.11	7.50	Hog	NA	N	NA	Not a design grade
		27.973	0.60	182.00	Hog	0	Y	Y	None
		228.616	-0.50	Grade	NA	0	Y	Y	None
		1093.885	-0.50	37.00	Sag	0	Y	Y	None
		1112.385	0.00	Grade	NA	NA	Y	NA	Not a design grade
MCM3	120	0.000	0.00	Grade	NA	NA	N	NA	Not a design grade
		72.845	0.00	7.50	Hog	NA	Y	NA	Not a design grade
		79.394	-0.87	Grade	NA	0	Y	Y	None
		156.150	-0.87	50.00	Sag	0	Y	Y	None
		268.818	1.38	182.00	Hog	0	Y	Y	None
		754.645	-1.29	50.00	Sag	0	N	Y	None
		794.107	-0.50	Grade	NA	0	N	Y	None
		1681.407	-0.50	50.00	Sag	0	N	Y	None
		1736.469	0.60	Grade	NA	0	Y	Y	None

NDR - Main Alignment - Vertical Report

DMRB Compliance of Vertical Curve									
Control String	Design Speed (km/h)	Chainage	Grade (%)	K Value (m)	Curve type	Steps Level below	Within 1.5XSSD from Junction	Compliance Vertical	Relaxation or Departure
MCM9	120	0.000	0.60	Grade	NA	NA	N	NA	Not a design grade
		224.112	0.60	230.00	Hog	0	Y	Y	None
		553.235	-0.83	Grade	NA	0	N	Y	None
		947.247	-0.83	500.00	Hog	0	N	Y	None
		1388.017	-1.71	37.00	Sag	0	N	Y	None
		1510.603	1.60	Grade	NA	0	N	Y	None
		1859.536	1.60	220.00	Hog	0	N	Y	None
		2564.219	-1.60	Grade	NA	0	N	Y	None
		2746.227	-1.60	50.00	Sag	0	N	Y	None
		2801.223	-0.50	Grade	NA	0	N	Y	None
		3344.592	-0.50	50.00	Sag	0	Y	Y	None
3394.582	-0.50	Grade	NA	0	Y	Y	None		
MCM4	120	0.000	0.50	Grade	NA	0	N	Y	None
		116.195	0.50	182.00	Hog	0	Y	Y	None
		381.486	-0.96	Grade	NA	0	Y	Y	None
		585.790	-0.96	50.00	Sag	0	N	Y	None
		671.152	0.75	Grade	NA	0	N	Y	None
		1023.002	0.75	182.00	Hog	0	N	Y	None
		1460.630	-1.65	Grade	NA	0	N	Y	None
		1764.451	-1.65	37.00	Sag	0	N	Y	None
		1895.865	1.90	182.00	Hog	0	N	Y	None
		2150.165	0.50	Grade	NA	0	N	Y	None
		2462.536	0.50	182.00	Hog	0	Y	Y	None
		2644.535	-0.50	Grade	NA	0	Y	Y	None
		2903.062	-0.50	7.50	Hog	NA	Y	NA	Not a design grade
2906.362	-0.94	Grade	NA	NA	Y	NA	Not a design grade		

NDR - Main Alignment - Vertical Report

DMRB Compliance of Vertical Curve									
Control String	Design Speed (km/h)	Chainage	Grade (%)	K Value (m)	Curve type	Steps Level below	Within 1.5XSSD from Junction	Compliance Vertical	Relaxation or Departure
MCM5	120.00	0.000	-0.94	Grade	NA	NA	N	NA	Not a design grade
		71.962	-0.94	7.50	Hog	NA	Y	NA	Not a design grade
		78.037	-1.75	Grade	NA	0	Y	Y	None
		277.350	-1.75	50.00	Sag	0	Y	Y	None
		339.850	-0.50	Grade	NA	0	Y	Y	None
		519.890	-0.50	50.00	Sag	0	N	Y	None
		569.890	0.50	Grade	NA	0	N	Y	None
		738.140	0.50	182.00	Hog	0	N	Y	None
		1136.151	-1.69	50.00	Sag	0	N	Y	None
		1257.994	0.75	Grade	NA	0	N	Y	None
		1672.106	0.75	182.00	Hog	0	Y	Y	None
		1899.605	-0.50	Grade	NA	0	Y	Y	None
		2061.585	-0.50	7.50	Sag	NA	Y	NA	Not a design grade
2065.335	0.00	Grade	NA	NA	Y	NA	Not a design grade		
MCM6	120.00	0.000	0.00	Grade	NA	NA	NA	NA	Not a design grade
		75.636	0.00	7.50	Sag	NA	Y	NA	Not a design grade
		79.311	0.49	182.00	Hog	0	Y	Y	None
		259.492	-0.50	Grade	NA	0	Y	Y	None
		543.891	-0.50	37.00	Sag	0	N	Y	None
		674.837	3.14	182.00	Hog	0	N	Y	None
		1154.842	0.50	Grade	NA	0	N	Y	None
		1786.047	0.50	7.50	Hog	NA	Y	NA	Not a design grade
1789.797	0.00	Grade	NA	NA	Y	NA	Not a design grade		
MCM7	100	0.000	0.00	Grade	NA	NA	N	NA	Not a design grade
		60.806	0.00	7.50	Hog	NA	Y	NA	Not a design grade
		66.278	-0.73	Grade	NA	0	Y	Y	None
		283.829	-0.73	37.00	Sag	0	Y	Y	None
		416.22	2.85	100.00	Hog	0	N	Y	None
		1075.545	-3.74	26.000	Sag	0	Y	Y	None
		1107.093	-2.53	7.500	Sag	NA	Y	NA	Not a design grade
		1118.575	-1.00	Grade	NA	NA	Y	NA	Not a design grade

NDR - Main Alignment - Vertical Report

DMRB Compliance of Vertical Curve									
Control String	Design Speed (km/h)	Chainage	Grade (%)	K Value (m)	Curve type	Steps Level below	Within 1.5XSSD from Junction	Compliance Vertical	Relaxation or Departure
MCM8	120	0.000	-1.00	Grade	NA	NA	N	NA	Not a design grade
		56.927	-1.00	7.50	Sag	NA	Y	NA	Not a design grade
		68.176	0.50	Grade	NA	0	Y	Y	None
		532.07	0.50	182.00	Hog	0	N	Y	None
		738.308	-0.63	50.00	Sag	0	N	Y	None
		802.461	0.65	182.00	Hog	0	N	Y	None
		1011.724	-0.50	Grade	NA	0	N	Y	None
		1405.686	-0.50	50.00	Sag	0	N	Y	None
		1489.423	1.17	182.00	Hog	0	N	Y	None
		1794.222	-0.50	Grade	NA	0	Y	Y	None
		1958.870	-0.50	50.00	Sag	0	Y	Y	None
		2033.869	1.00	Grade	NA	0	Y	Y	None
		2136.250	1.00	7.50	Hog	NA	Y	NA	Not a design grade
2143.75	0.00	Grade	NA	NA	Y	NA	Not a design grade		
MMM1	70	0.000	-0.35	Grade	NA	0	Y	Y	None
MMM5	60	0.000	2.50	Grade	NA	NA	N	NA	Not a design grade
		1.635	2.50	13.00	Sag	0	N	Y	None
		47.135	6.00	Grade	NA	0	Y	Y	None
		140.831	6.00	17.00	Hog	0	Y	Y	None
		263.552	-1.16	34.00	Sag	0	Y	Y	None

Appendix E – Cross Sections Report

NDR - Main Alignment - Cross Sections

DMRB Compliance of Cross Sections													
CHAINAGE (m)	Left						Central Reserve	Right					
	Swale	Verge	Hard Strip	Lane 1	Lane 2	Hard Strip		Hard Strip	Lane 3	Lane 4	Hard Strip	Verge	Swale
		2.5	1	3.65	3.65	1		1	3.65	3.65	1	2.5	
0	3	1.5	1	3.65	Single Carriageway					3.65	1	2.5	n/a
250	3	1.5	1	3.65	Single Carriageway					3.65	1	2.5	n/a
500	Fakenham Road Roundabout												
750	n/a	2.5	1	3.65	3.65	1	8.35	1	3.65	3.65	1	2.5	n/a
1000	n/a	2.5	1	3.65	3.65	1	8.54	1	3.65	3.65	1	1.5	3
1250	n/a	2.5	1	3.65	3.65	1	8.55	1	3.65	3.65	1	3.03	3
1500	n/a	2.5	1	3.65	3.65	1	8.44	1	3.65	3.65	1	3.19	3
1750	Fir Covert Road Roundabout												
2000	3	1.5	1	3.65	3.65	1	3.14	1	3.65	3.65	1	1.5	3
2250	3	1.5	1	3.65	3.65	1	3.11	1	3.65	3.65	1	1.5	3
2500	3	1.5	1	3.65	3.65	1	2.95	1	3.65	3.65	1	1.5	3
2750	3	1.5	1	3.65	3.65	1	2.68	1	3.65	3.65	1	1.5	3
	Reepham Road Roundabout												
3000	Roundabout approach												
3250	n/a	2.5	1	3.65	3.65	1	3.38	1	3.65	3.65	1	3.19	3
3500	3	1.5	1	3.65	3.65	1	2.68	1	3.65	3.65	1	1.5	3
3750	3	1.5	1	3.65	3.65	1	2.5	1	3.65	3.65	1	1.5	3
4000	3	1.5	1	3.65	3.65	1	2.5	1	3.65	3.65	1	1.5	3
4250	3	1.5	1	3.65	3.65	1	2.5	1	3.65	3.65	1	1.5	3
4500	3	1.5	1	3.65	3.65	1	2.5	1	3.65	3.65	1	1.5	3
4750	3	1.5	1	3.65	3.65	1	2.5	1	3.65	3.65	1	1.5	3
5000	3	1.5	1	3.65	3.65	1	2.5	1	3.65	3.65	1	1.5	3
5250	Roundabout approach												
	Drayton Lane Roundabout												
5500	3	1.5	1	3.65	3.65	1	2.59	1	3.65	3.65	1	1.5	3
5750	3	1.5	1	3.65	3.65	1	2.5	1	3.65	3.65	1	1.5	3
6000	3	1.5	1	3.65	3.65	1	2.5	1	3.65	3.65	1	1.5	3

NDR - Main Alignment - Cross Sections

CHAINAGE (m)	Left						Central Reserve	Right					
	Swale	Verge	Hard Strip	Lane 1	Lane 2	Hard Strip		Hard Strip	Lane 3	Lane 4	Hard Strip	Verge	Swale
		2.5	1	3.65	3.65	1	2.5	1	3.65	3.65	1	2.5	
6250	3	1.5	1	3.65	3.65	1	2.5	1	3.65	3.65	1	1.5	3
6500	n/a	3.93	1	3.65	3.65	1	2.5	1	3.65	3.65	1	2.12	Slip Rd
6750	3	1.5	1	3.65	3.65	1	2.5	1	3.65	3.65	1	1.5	3
	Cromer Road Overbridge												
7000	3	1.5	1	3.65	3.65	1	2.5	1	3.65	3.65	1	1.5	3
7250	3	2.84	1	3.65	3.65	1	2.5	1	3.65	3.65	Slip Road		
7500	3	1.5	1	3.65	3.65	1	2.5	1	3.65	3.65	1	1.5	3
7750	3	1.59	1	3.65	3.65	1	3.59	1	3.65	3.65	1	1.5	3
8000	3	5.06	1	3.65	3.65	1	5.7	1	3.65	3.65	1	2.5	n/a
8250	3	5.09	1	3.65	3.65	1	5.7	1	3.65	3.65	1	2.5	n/a
8500	3	1.5	1	3.65	3.65	1	6.92	1	3.65	3.65	1	1.5	3
8750	3	1.5	1	3.65	3.65	1	8.36	1	3.65	3.65	1	3.01	3
9000	3	1.5	1	3.65	3.65	1	8.36	1	3.65	3.65	1	3.22	3
	Airport Roundabout												
9250	3	1.5	1	3.65	3.65	1	3.38	1	3.65	3.65	1	3.86	3
9500	3	1.5	1	3.65	3.65	1	3.5	1	3.65	3.65	1	1.61	3
9750	3	3.93	1	3.65	3.65	1	5.66	1	3.65	3.65	1	2.5	n/a
10000	3	5.48	1	3.65	3.65	1	5.7	1	3.65	3.65	1	2.5	n/a
10250	3	5.48	1	3.65	3.65	1	5.7	1	3.65	3.65	1	1.5	3
10500	3	4.14	1	3.65	3.65	1	5.62	1	3.65	3.65	1	1.5	3
10750	3	1.5	1	3.65	3.65	1	2.5	1	3.65	3.65	1	1.5	3
11000	3	1.5	1	3.65	3.65	1	3.38	1	3.65	3.65	1	3.24	3
11250	3	1.5	1	3.65	3.65	1	4.43	1	3.65	3.65	1	1.5	3
11500	3	5.19	1	3.65	3.65	1	5.69	1	3.65	3.65	1	2.5	n/a
11750	3	1.5	1	3.65	3.65	1	7.11	1	3.65	3.65	1	1.5	3
12000	Roundabout approach												
	North Walsham Road Roundabout												
12250	3	1.5	1	3.65	3.65	1	2.5	1	3.65	3.65	1	1.5	3
12500	3	1.5	1	3.65	3.65	1	2.74	1	3.65	3.65	1	1.5	3
12750	3	1.5	1	3.65	3.65	1	2.78	1	3.65	3.65	1	1.5	3

NDR - Main Alignment - Cross Sections

CHAINAGE (m)	Left						Central Reserve	Right					
	Swale	Verge	Hard Strip	Lane 1	Lane 2	Hard Strip		Hard Strip	Lane 3	Lane 4	Hard Strip	Verge	Swale
		2.5	1	3.65	3.65	1	2.5	1	3.65	3.65	1	2.5	
13000	3	1.5	1	3.65	3.65	1	2.53	1	3.65	3.65	1	1.5	3
13250	3	1.5	1	3.65	3.65	1	2.56	1	3.65	3.65	1	1.5	3
13500	3	1.5	1	3.65	3.65	1	2.59	1	3.65	3.65	1	1.5	3
13750	3	1.5	1	3.65	3.65	1	2.56	1	3.65	3.65	1	1.5	3
14000	3	1.5	1	3.65	3.65	1	4.7	1	3.65	3.65	1	1.5	3
14250	Wroxham Road Roundabout												
14500	n/a	2.5	1	3.65	3.65	1	4.7	1	3.65	3.65	1	1.5	3
14750	n/a	2.5	1	3.65	3.65	1	5.68	1	3.65	3.65	1	4.89	3
15000	3	1.5	1	3.65	3.65	1	5.67	1	3.65	3.65	1	1.5	3
15250	3	3.78	1	3.65	3.65	1	5.51	1	3.65	3.65	1	1.5	3
15500	3	1.5	1	3.65	3.65	1	2.5	1	3.65	3.65	1	1.5	3
15750	3	1.5	1	3.65	3.65	1	2.5	1	3.65	3.65	1	1.5	3
16000	n/a	4.52	1	3.65	3.65	1	3.19	1	3.65	3.65	1	1.5	3
	Salhouse Road Roundabout												
16250	3	1.5	1	3.65	3.65	1	2.5	1	3.65	3.65	1	1.5	3
16500	n/a	2.5	1	3.65	3.65	1	2.5	1	3.65	3.65	1	2.5	n/a
16750	n/a	2.5	1	3.65	3.65	1	2.5	1	3.65	3.65	1	2.5	n/a
17000	n/a	2.5	1	3.65	3.65	1	2.5	1	3.65	3.65	1	2.5	n/a
17250	Roundabout approach												
	Plumstead Road Roundabout South												
17500	3	1.5	1	3.65	3.65	1	2.5	1	3.65	3.65	1	1.5	3
17750	3	1.5	1	3.65	3.65	1	2.5	1	3.65	3.65	1	1.5	3
18000	3	3.68	1	3.65	3.65	1	5.55	1	3.65	3.65	1	1.5	3
18250	3	1.47	1	3.65	3.65	1	3.74	1	3.65	3.65	1	1.5	3
18500	3	1.5	1	3.65	3.65	1	2.5	1	3.65	3.65	1	1.5	3
18750	Lay-by		1	3.65	3.65	1	2.5	1	3.65	3.65	1	Lay-by	
19000	3	1.5	1	3.65	3.65	1	2.5	1	3.65	3.65	1	1.5	3
19250	3	1.5	1	3.65	3.65	1	2.5	1	3.65	3.65	1	1.5	3

NDR - Main Alignment - Cross Sections

CHAINAGE (m)	Left						Central Reserve	Right					
	Swale	Verge	Hard Strip	Lane 1	Lane 2	Hard Strip		Hard Strip	Lane 3	Lane 4	Hard Strip	Verge	Swale
		2.5	1	3.65	3.65	1	2.5	1	3.65	3.65	1	2.5	
19500	Business Park Roundabout												
19750	n/a	4.5	1	3.65	3.65	1	2.5	1	3.65	3.65	1	2	6.586
20000	n/a	4.5	1	3.65	3.65	1	2.5	1	5.347	Island 3.29m	SLT 6.447m	verge 6.018m	
	Roundabout approach												
	North East Roundabout												
	New Postwick Bridge												
20250	n/a	Foot way = 3		3.65	3.65	Lane 3 = 3.65		1.8	n/a	3.65	n/a	Hardened verge 1m n/a	
	Park and Ride Signalesed Junction												

Appendix F – Stopping Sight Distance Report

NDR-Main Alignment SSD Report

Reference Strings	Design Speed (km/h)	SSD Required	Direction	Chainage Range	Lane	Step below standard	Relaxation or Departure	Reason	Comments
MCM1	100	215	Eastbound	0 to 715	1	None	None		
		215	Westbound	5 to 720	1	None	None		
MCM2	120	295	Eastbound	80 to 1105	1	None	None		
		295			2	None	None		
		295	Westbound	115 to 1110	1	None	None		
		295			2	None	None		
MCMB	120	295	Eastbound	110 to 1065	1	1 step	Relaxation		
		295			2	None	None		
		295	Westbound	115 to 1080	1	None	None		
		295			2	1 step	Relaxation		
MCM3	120	295	Eastbound	80 to 2300	1	1 step	Relaxation		
		295			2	2 step	Relaxation		
		295	Westbound	105 to 2335	1	1 step	Relaxation		
		295			2	None	None		
MCM9	120	295	Eastbound	85 to 3720	1	None	None		
		295			2	None	None		
		295	Westbound	310 to 3500	1	1 step	Relaxation		
		295			2	1 step	Relaxation		
MCM4	120	295	Eastbound	80 to 2835	1	1 step	Relaxation		
		295			2	2 step	Relaxation		
		295	Westbound	75 to 2890	1	1 step	Relaxation		
		295			2	1 step	Relaxation		
MCM5	120	295	Eastbound	75 to 2025	1	1 step	Relaxation		
		295			2	1 step	Relaxation		
		295	Westbound	95 to 2050	1	1 step	Relaxation		
		295			2	1 step	Relaxation		
MCM6	120	295	Eastbound	170 to 1740	1	None	None		
		295			2	1 step	Relaxation		
		295	Westbound	170 to 1775	1	1 step	Relaxation		
		295			2	1 step	Relaxation		
MCM7	100	215	Eastbound	170 to 1095	1	1 step	Relaxation		
		215			2	1 step	Relaxation		
		215	Westbound	175 to 1100	1	None	None		
		215			2	None	None		
MCM8	120	295	Eastbound	80 to 1950	1	1 step	Relaxation		
		295			2	1 step	Relaxation		
		295	Westbound	80 to 1945	1	1 step	Relaxation		
		295			2	2 step	Departure	Horizontal radius is 1 step below	Center reserve VRS - Visibility splay crosses VRS and Bridge piers
MMM1	70	120	Eastbound	100 to 460	1	None	None		
		120			2	None	None		
		120	Westbound	100 to 460	1	None	None		
		120			2	None	None		
MMM5	60	90	Eastbound	0 to 275	1	1 step	Relaxation		
		90	Westbound	0 to 275	1	1 step	Relaxation		
		90	Westbound	0 to 275	2	1 step	Relaxation		

Appendix G – NDR/A140 Slip Road Capacity Assessments

NDR/A140 Slip Roads – Layout Capacity Assessment

Eastbound Diverge Slip Road

	NDR Eastbound Diverge	NDR Eastbound Downstream	NDR Eastbound Upstream	Slip Road Requirement	Mainline Requirement	Diverge Type Required
AM	555	811	1,366	DG1C Single lane with hardshoulder	One lane upstream, One lane downstream	Not Specified
PM	481	654	1,135	DG1C Single lane with hardshoulder	One lane upstream, One lane downstream	Not Specified

Table F1 – NDR Eastbound diverge 2017 (Traffic volumes vph)

	NDR Eastbound Diverge	NDR Eastbound Downstream	NDR Eastbound Upstream	Slip Road Requirement	Mainline Requirement	Diverge Type Required
AM	653	1,172	1,825	DG1C Single lane with hardshoulder	Two lanes upstream, One lane downstream	Not Specified
PM	520	994	1,514	DG1C Single lane with hardshoulder	One lane upstream, One lane downstream	Not Specified

Table F2 – NDR Eastbound diverge 2032 (Traffic volumes vph)

Eastbound Merge Slip Road

	NDR Eastbound Merge	NDR Eastbound Upstream	NDR Eastbound Downstream	Slip Road Requirement	Mainline Requirement	Merge Required
AM	289	811	1,100	MG1C Single lane with hardshoulder	One lane upstream, One lane downstream	Type E (lain gain)
PM	296	654	950	MG1C Single lane with hardshoulder	One lane upstream, One lane downstream	Type E (lain gain)

Table F3 – NDR Eastbound merge 2017 (Traffic volumes vph)

	NDR Eastbound Merge	NDR Eastbound Upstream	NDR Eastbound Downstream	Slip Road Requirement	Mainline Requirement	Merge Required
AM	443	1,172	1,615	MG1C Single lane with hardshoulder	One lane upstream, Two lanes downstream	Type E (lain gain)
PM	565	994	1,559	MG1C Single lane with hardshoulder	One lane upstream, Two lanes downstream	Type E (lain gain)

Table F4 – NDR Eastbound merge 2032 (Traffic volumes vph)

NDR/A140 Slip Roads – Layout Capacity Assessment

Westbound Diverge Slip Road

	NDR Westbound Diverge	NDR Westbound Downstream	NDR Westbound Upstream	Slip Road Requirement	Mainline Requirement	Diverge Type Required
AM	297	616	913	DG1C Single lane with hardshoulder	One lane upstream, One lane downstream	Not Specified
PM	255	722	977	DG1C Single lane with hardshoulder	One lane upstream, One lane downstream	Not Specified

Table F5 – NDR Westbound diverge 2017 (Traffic volumes vph)

	NDR Westbound Diverge	NDR Westbound Downstream	NDR Westbound Upstream	Slip Road Requirement	Mainline Requirement	Diverge Type Required
AM	618	883	1,501	DG1C Single lane with hardshoulder	One lane upstream, One lane downstream	Not Specified
PM	395	967	1,362	DG1C Single lane with hardshoulder	One lane upstream, One lane downstream	Not Specified

Table F6 – NDR Westbound diverge 2032(Traffic volumes vph)

Westbound Merge Slip Road

	NDR Westbound Merge	NDR Westbound Upstream	NDR Westbound Downstream	Slip Road Requirement	Mainline Requirement	Merge Required
AM	342	616	958	MG1C Single lane with hardshoulder	One lane upstream, One lane downstream	Type E (lain gain)
PM	471	722	1,193	MG1C Single lane with hardshoulder	One lane upstream, One lane downstream	Type E (lain gain)

Table F7 – NDR Westbound merge 2017 (Traffic volumes vph)

	NDR Westbound Merge	NDR Westbound Upstream	NDR Westbound Downstream	Slip Road Requirement	Mainline Requirement	Merge Required
AM	415	883	1,298	MG1C Single lane with hardshoulder	One lane upstream, One lane downstream	Type E (lain gain)
PM	611	967	1,578	MG1C Single lane with hardshoulder	One lane upstream, One lane downstream	Type E (lain gain)

Table F8 – NDR Westbound merge 2032 (Traffic volumes vph)

7 Glossary

crest curve	a vertical curve that rises to a high point
grade separated junction	a road junction where roads cross at different levels
hardstrip	a surfaced strip that abuts the carriageway edge
mainline	the carriageway carrying the main flow of traffic (generally passing straight through a junction or interchange)
merge/diverge	a layout where merging or diverging traffic joins or leaves the mainline carriageway
sag curve	a vertical curve that falls to a low point
slip road	a connector road within a junction between a mainline carriageway and the local highway network, or visa versa.
vehicle restraint system	a concrete or steel barrier installed alongside, or on the central reserve of, a road to restrain vehicles and minimise the risk of their collision with hazardous features.

The Norfolk County Council (Norwich Northern Distributor Road (A1067 to A47(T))) Order

10.3 Land Use and Economic Development Report

Planning Act 2008

Infrastructure Planning

The Infrastructure Planning (Applications: Prescribed Forms and Procedure)
Regulations 2009

PINS Reference Number: TR010015

Document Reference: 10.3

Regulation Number: 5(2)(q)

Author: Norfolk County Council

Revision	Date	Description
0	8 th January 2014	Revision for submission

Mott MacDonald Internal Audit			
Revision	Originator	Checked By	Approved By
0	S Cox	G Owen	P Hammond G Kelly

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This document is submitted in relation to the application for a proposed development by Norfolk County Council to the Planning Inspectorate, under the Planning Act 2008.

The application is for the Norfolk County Council (Norwich Northern Distributor Road (A1067 to A47(T))) Order, to grant development consent for the construction of a new highway running west-east between the A1067 Fakenham Road and the A47 Trunk Road at Postwick, including improvements to the existing highway network to the north and north east of Norwich.

This document comprises part of the application documents and relates to Regulation 5(2)(q) of the Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009.

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Executive Summary

- 1 Norwich is the largest city in East Anglia and the economic centre for Norfolk. The success of 'Greater Norwich' - a wider area than the city alone extending to the districts of Broadland, Norwich and South Norfolk (see Figure 1.1 below - is vital to the economic success of Norfolk and of the East Anglian sub-region (Cambridgeshire, Norfolk and Suffolk). Greater Norwich is an area that has experienced growth, and is anticipated to experience further growth in population and economic activity. The proposed Norwich Northern Distributor Road (NDR) is part of long-term infrastructure planning to support the delivery of housing and jobs to the north and north-east of Norwich between Norwich International Airport and the proposed Postwick Hub.
- 2 The NDR is the subject of a direction which was given by the Secretary of State for Transport on 9 August 2013 under section 35 of the Planning Act 2008 (the Direction). The Direction stated that the proposed NDR is nationally significant and is to be treated as development for which development consent under the Planning Act 2008 is required. The effect of the Direction is that consent for the construction and operation of the NDR is required to be pursuant to a development consent order (DCO) granted by the Secretary of State for Transport under the Planning Act 2008. This report forms part of NCC's application for a DCO for the NDR.
- 3 The economic impact assessment of the proposed NDR is provided within the context of the Joint Core Strategy's (JCS) stated growth targets which are in place to guide the future of the Greater Norwich economy. The NDR is a key strategic piece of infrastructure and will play a key role in supporting the delivery of growth in housing and jobs over the next two decades. The JCS contains twelve over-riding objectives, which underpin the spatial vision of creating some 36,820 new homes and 27,000 new jobs between 2008 and 2026 in the Greater Norwich area (Joint Core Strategy, pages 20-23).
- 4 The purpose of this report is to provide an explanation of the relationship between the proposed NDR and sites earmarked for development and to assess the economic development impact of the NDR in terms of jobs and dwellings which are assessed on a site-by-site basis with respect to the influence of the NDR on bringing development forward. A separate report has been produced which focuses on transport economics and benefits (the NDR Economic Appraisal Report).

- 5 The NDR, including the Postwick Hub, will bring the very substantial benefits described in Section 5. As is shown in Table 5.3 of the main report, these benefits include:
- **4,358** net additional direct jobs arising from the development sites listed in this report;
 - when multiplier effects are included this figure (of 4,358) rises to **5,230** net additional jobs that would not otherwise arise in Greater Norwich;
 - **£1.099bn** of additional GVA is forecast to be generated by those **5,230** jobs over some 30 years;
 - **£966m** of net additional physical investment in roads, infrastructure and housing; and
 - an average of **426** construction jobs (rising to **511** when multiplier effects are included) in each of the years until development is complete (estimated at 2034).

1. Introduction

1.1 Study team

1.1.1 Mott MacDonald's Economic, Social & Market Research team was appointed by Norfolk County Council (NCC) in March 2013 to prepare an economic impact assessment of the Norwich Northern Distributor Road (hereafter referred to as the NDR).

1.2 Method of approach

1.2.1 The report presents the professional opinion of the study team. It considers the economic development impact of the NDR and provides evidence in support of the NDR; it also presents wider evidence of the relationship between road schemes and economic development. A range of techniques and approaches have been deployed in order to assess the potential economic development benefits of the NDR, including:

- a review of the local economic baseline for the study area;
- a review of relevant policy and strategy documents in relation to the NDR;
- a review of existing and proposed development sites that will be affected by the NDR;
- a summary assessment of net additional economic development impacts attributed to the NDR in terms of jobs created, Gross Value Added (GVA) and new dwellings constructed; and
- a review of evidence from academic and consultancy reports analysing the links between road improvements and economic benefits.

1.2.2 HM Treasury, through the Green Book: Appraisal and Evaluation in Central Government (2003 updated in July 2011) (the Green Book), has issued mandatory guidance on how cost-benefit analyses should be conducted by public sector bodies appraising proposals before funds are committed to a policy, programme or project. The Green Book provides general guidance on appraisal. The Treasury expects individual spending departments to use the Green Book's principles to develop detailed guidance in their respective spheres of activity. The Department for Transport (DfT) has developed detailed guidance for the assessment of transport projects that emphasises, for instance, savings in travel time and reductions in carbon emissions consequent on improvements in transport facilities. This guidance is set out in the DfT's WebTAG guidance, which is subordinate to the principles in the Green Book.

1.2.3 This report is concerned with the wider consequences of investment in NDR. An assessment of wider economic development benefits is required as part of the Green Book appraisal process where such benefits are deemed significant,

as is the case with the NDR. The Transport White Paper¹ also draws attention to the ways in which transport programmes can have a favourable impact on jobs and growth, through both the demand and supply side of the labour market. The aim of this report is to apply the Green Book and Transport White Paper approach in the context of wider economic development benefits associated with construction and operation of the NDR.

1.3 Description of the NDR

- 1.3.1 The Scheme (the Norwich Northern Distributor Road, known as “the NDR”) is a dual carriageway all-purpose strategic distributor road, to be classified as the A1270 Principal Road, which would link the A1067 Fakenham Road, near Attlebridge, to the A47 Trunk Road (T) at Postwick. This will be over a length of approximately 20.4 km. Refer to the General Arrangement Plans in document number 2.6.
- 1.3.2 1.2.1 From west to east, the scheme will start with a realignment of 750m of the A1067 Fakenham Road to the north of the existing carriageway, where the NDR (A1270) starts at a new at-grade roundabout junction, located to the west of Taverham. The NDR would then continue eastwards as a dual carriageway to its new at-grade roundabout junction with the C262 Fir Covert Road. From this roundabout, the NDR would then cross the Marriott’s Way (a permissive path providing a pedestrian, cycling and horse riding facility along the route of a disused railway) which will be taken across the NDR via a new bridge), to a new at-grade roundabout junction with the C261 Reepham Road. The NDR would then continue south eastwards, crossing Bell Farm Track/Horsford Restricted Byway No. 5 (which will be taken up over the NDR via a new Restricted Byway and private access accommodation bridge) before connecting with a new at-grade roundabout junction, just west of the existing C282 Drayton Lane, and which new roundabout will have two new link road connections, one with the C261 Reepham Road and one with the B1149 Holt Road, to replace the existing Drayton Lane.
- 1.3.3 1.2.2 From here, the NDR would then continue south eastwards to a new grade-separated junction (provision of a bridge over the NDR with slip roads to/from the NDR) with the A140 Cromer Road, located close to and just north west of Norwich International Airport. The provision of this grade-separated junction will require the stopping up of lengths of the B1149 Holt Road and Holly Lane (U57142), as well as a length of the A140 Cromer Road, which will be replaced by a new highway west of its existing position, which will be taken over the NDR and provide the connection for its four connecting slip roads.

¹ Creating Growth, Cutting Carbon: Making Sustainable Local Transport Happen, January 2011, Cm 7996

East of the A140, the NDR would continue as a dual carriageway, turning north eastwards around the northern boundary of the airport to a further new at-grade roundabout junction at the northern tip of the airport. The primary purpose of this roundabout is to allow the NDR to undertake a roughly 90 degree change of direction around the Airport site. From this roundabout, the NDR would continue south eastwards, skirting the north east boundary of the airport, before turning eastwards and passing under a new highway, which will be carried by bridge over the NDR, immediately to the east of the existing C246 Buxton Road, and which would provide the new connection for its realignment sections north and south of the NDR.

- 1.3.4 The route of the dual carriageway NDR would then continue eastwards through the north of Beeston Park. It would then connect with both the B1150 North Walsham Road and the A1151 Wroxham Road via a new at-grade roundabout at each location, before turning south eastwards and entering the north eastern section of Rackheath Park approximately 250 metres from the western end of Sir Edward Stracey Road (U57538). It would then continue south eastwards, passing under a new bridleway and access bridge across the NDR, some 200 metres south west of the junction of Newman Road (U57490) with Long's Crescent (U57852).
- 1.3.5 The NDR would then connect with the C283 Salhouse Road via a new at-grade roundabout, before rising up on an embankment (maximum height approximately 8.5 metres), to cross both the Norwich to Cromer & Sheringham rail line and the C874 Plumstead Road on individual bridges in close proximity, prior to a new at-grade roundabout on the NDR, which would connect it via a new link road to a further small at-grade roundabout on the C874 Plumstead Road.
- 1.3.6 The NDR route would then continue southwards, crossing under the C442 Middle Road (which would be raised to pass over the NDR, on its existing alignment, via a new bridge) before connecting with a new at-grade roundabout known as the Business Park Roundabout.
- 1.3.7 At this point a single carriageway link is provided westwards to the existing C829/C830 Broadland Way/C831 Peachman Way roundabout and includes an at-grade roundabout on the link road to the proposed Broadland Gate Business Park.
- 1.3.8 From the Business Park roundabout the NDR proceeds southwards as a dual carriageway to a new Postwick north east at-grade roundabout immediately north of the A47(T) Norwich Southern Bypass. This roundabout has links from a

new A47(T) eastbound diverge slip road and a new A47(T) eastbound merge slip road. The NDR continues over the A47(T) as a four lane carriageway, one lane north and three south, on a new bridge and terminates at its southernmost point at a signalised junction, which replaces the existing Park and Ride roundabout with the A1042 Yarmouth Road.

1.3.9 This signalised junction would provide further links:

- Directly to and from the park and ride site for buses;
- West to the existing Postwick North West roundabout, via the existing Postwick bridge over the A47(T);
- East to the proposed park and ride site entrance at the proposed Oak's Lane roundabout and further East to the Brundall Low Road junction with the A1042 Yarmouth Road to Postwick village; and
- West to the A47(T) via an existing westbound merge slip road.

1.3.10 The works at Postwick Junction, will include modifications to the existing Postwick north west roundabout (as a result of closing the existing eastbound diverge slip road) and to the existing A1042 Yarmouth Road overbridge of the A47(T), to provide revised traffic lanes and the provision of a shared use cycle/footway.

1.3.11 The route of the NDR that has been described above is, for the majority of its length, within Broadland District. It does, however, for a short stretch close to Norwich International Airport, fall within the administrative area of Norwich City Council. A very small part of the works at Postwick falls within the administrative area of The Broads Authority. The new road from west to east runs through the following parishes:

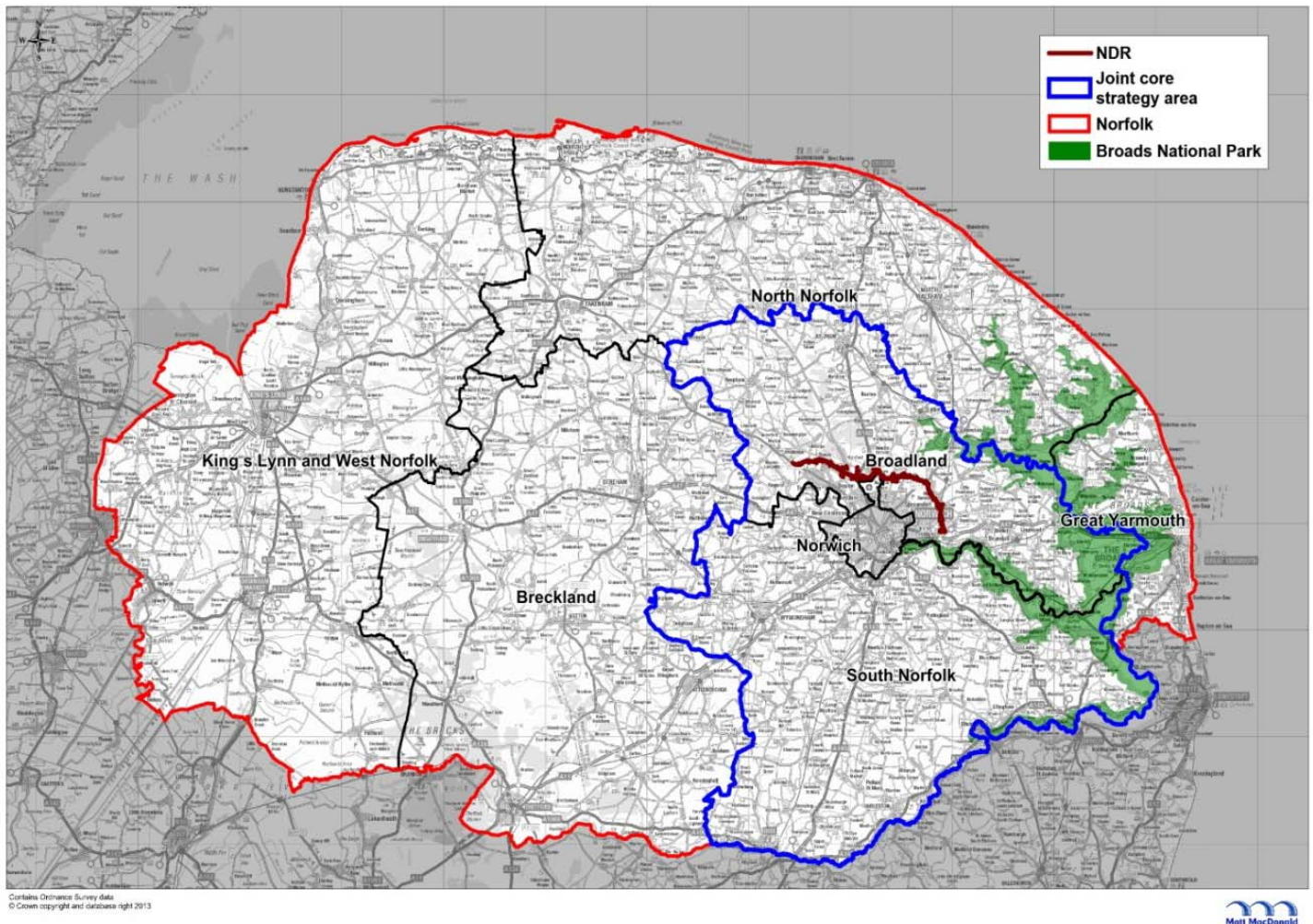
- Attlebridge;
- Taverham;
- Drayton;
- Horsford;
- Horsham St Faith and Newton St Faith;
- Spixworth;
- Beeston St Andrew;
- Sprowston;
- Rackheath;
- Great and Little Plumstead; and
- Postwick with Witton.

1.4 The study area

1.4.1 The core area subject to the impact of the NDR is defined as the JCS area (i.e. the combined administrative areas of Broadland District Council, Norwich City Council and South Norfolk Council), which is the strategic planning area within which planned growth is proposed to be accommodated. This area is the study area for the purposes of this report. Parts of Broadland, South Norfolk and a

very small area of Norwich are also covered by the Broads Authority (which is a separate planning authority in its own right) and these areas are not included within the JCS area boundary. However, as the Broads Authority Core Strategy has no separate jobs or housing targets, these boundary distinctions have no significance in the context of this report. Given the strategic importance of the NDR in the County of Norfolk, this report will also consider the wider role of the NDR in supporting growth in Norfolk more generally. Figure 1.1 below shows the location of the NDR and the local authority areas referred to in this report.

Figure 1.1 – NDR within study area (the JCS area) and local authority areas referred to in this report



1.5 Report structure

1.5.1 The remainder of the report is structured as follows:

- Section 2 – presents the economic baseline for the area.
- Section 3 – sets out the policy framework for the area.
- Section 4 – reviews the business consultation carried out in 2011.
- Section 5 – presents an assessment of the NDR's potential economic development benefits
- Section 6 – contains a summary of the NDR's potential economic development benefits.
- Appendix A – sets out the calculations of economic development benefit.
- Appendix B – provides an overview of the findings of studies considering the role of road schemes in supporting local economic development and growth.

2 Economic Baseline

2.1.1 This section provides an overview of the existing economic characteristics of the study area in terms of employment, business, skills, unemployment and deprivation. A range of indicators are used and mapped at Lower Layer Super Output Area (LSOA) level² for ease of comparing spatial patterns. However, given that Census 2011 data remains relevant and is based on a greater sample of population than other data sets which are based on surveys (for example Annual Population Survey, Business Register and Employment Survey) it has been used where relevant throughout this section.

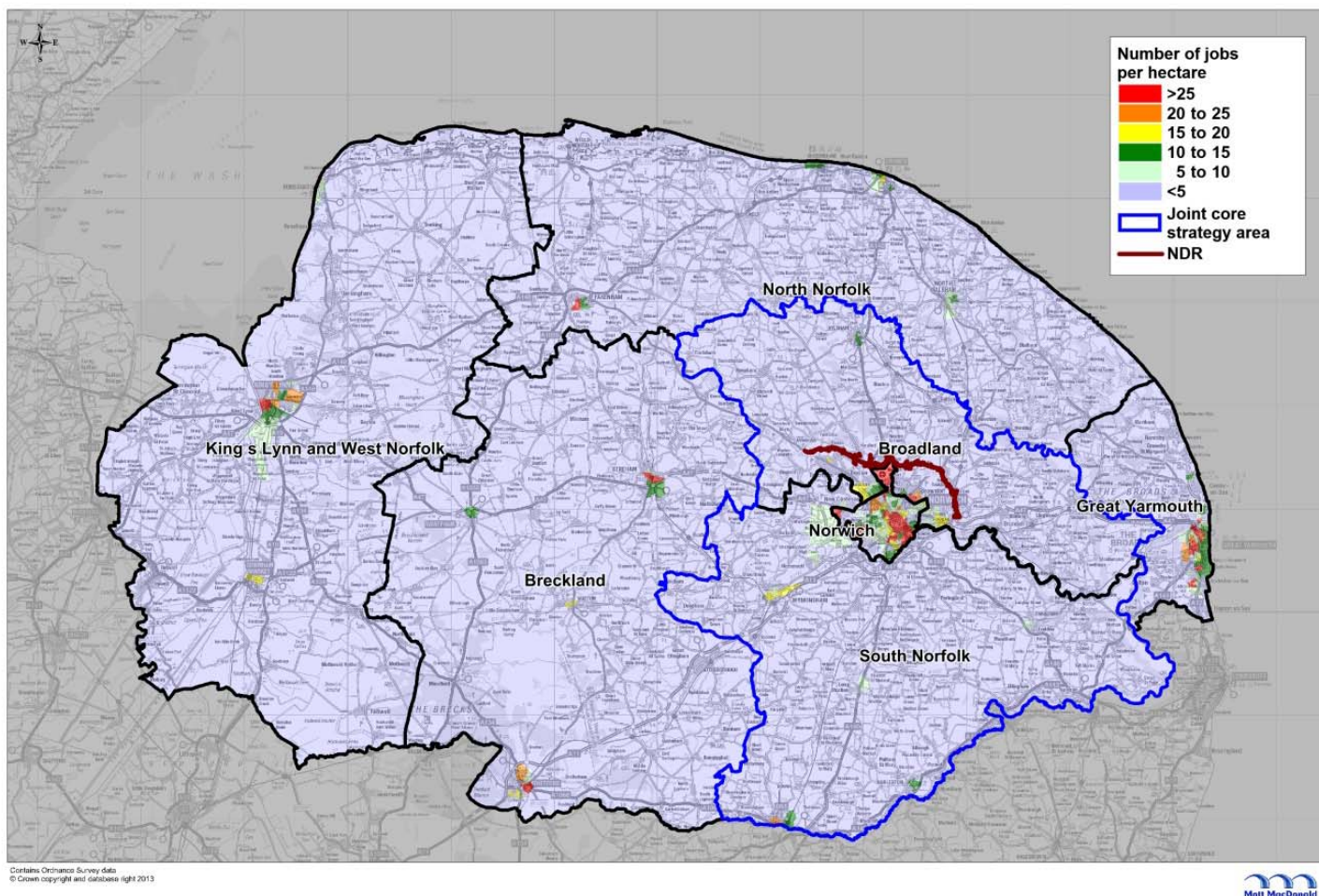
2.2 Employment and skills

Employment

2.2.1 Employment density, as shown in Figure 2.1, illustrates the significance of Norwich as a sub-regional employment hub. The city centre and Norwich Airport Industrial Estate are visible as concentrations of employment (as red areas on the map) in Figure 2.1. Broadland Business Park is visible (as a yellow area on the map) to the east of Norwich adjoining the eastern end of the NDR and the influence of Norwich Research Park (NRP) (as a light green area on the map) to the west of Norwich is clear. The NDR has the potential to support growth and development to the northeast of Norwich and increase employment density in that area by providing improved access to employment for residents of North Norwich and north-east Norfolk. Given its proximity to the Airport and scope to provide modern commercial space, northeast Norwich has the potential to be the prime location for future indigenous growth, inward investment and foreign direct investment. Companies looking for large premises on sites that are well connected to the strategic road network and to the Airport could be accommodated in that area. This is particularly the case if the companies are in growth sectors such as aerospace, advanced engineering and offshore energy due to the likelihood that they are operating in global markets and have greater need for international travel which can be facilitated through the Airport and particularly its routes to Amsterdam providing access to KLM's global network.

² A Lower Layer Super Output Area (LSOA) is a geographic area, built from 4 to 6 groups of contiguous Output Areas, automatically generated to be as consistent in population size as possible, for the purpose of reporting on small area statistics in England and Wales. LSOAs were created from 2001 Census data and a LSOA typically contains a minimum population of 1,000 and a mean population of 1,500. (Source: Office of National Statistics) Further information available at: <http://www.ons.gov.uk/ons/guide-method/geography/beginner-s-guide/census/super-output-areas--soas--index.html>

Figure 2.1 – Employment density, 2011



Source: Business Register and Employment Survey (BRES), 2011

Skills

2.2.2 In Figure 2.2 below, educational attainment and skills are presented based on the proportion of residents aged 16+ that have attained Level 4 (Bachelor degree) or above. It is shown that the higher densities of more highly skilled people live in central and southern parts of Norwich city, the northern part of South Norfolk (adjoining Norwich), however, there are also pockets of high density populations of highly skilled people within the north and north western Norfolk areas of Kings Lynn and West Norfolk, in the north of North Norfolk and in the north, east and west of Broadland.

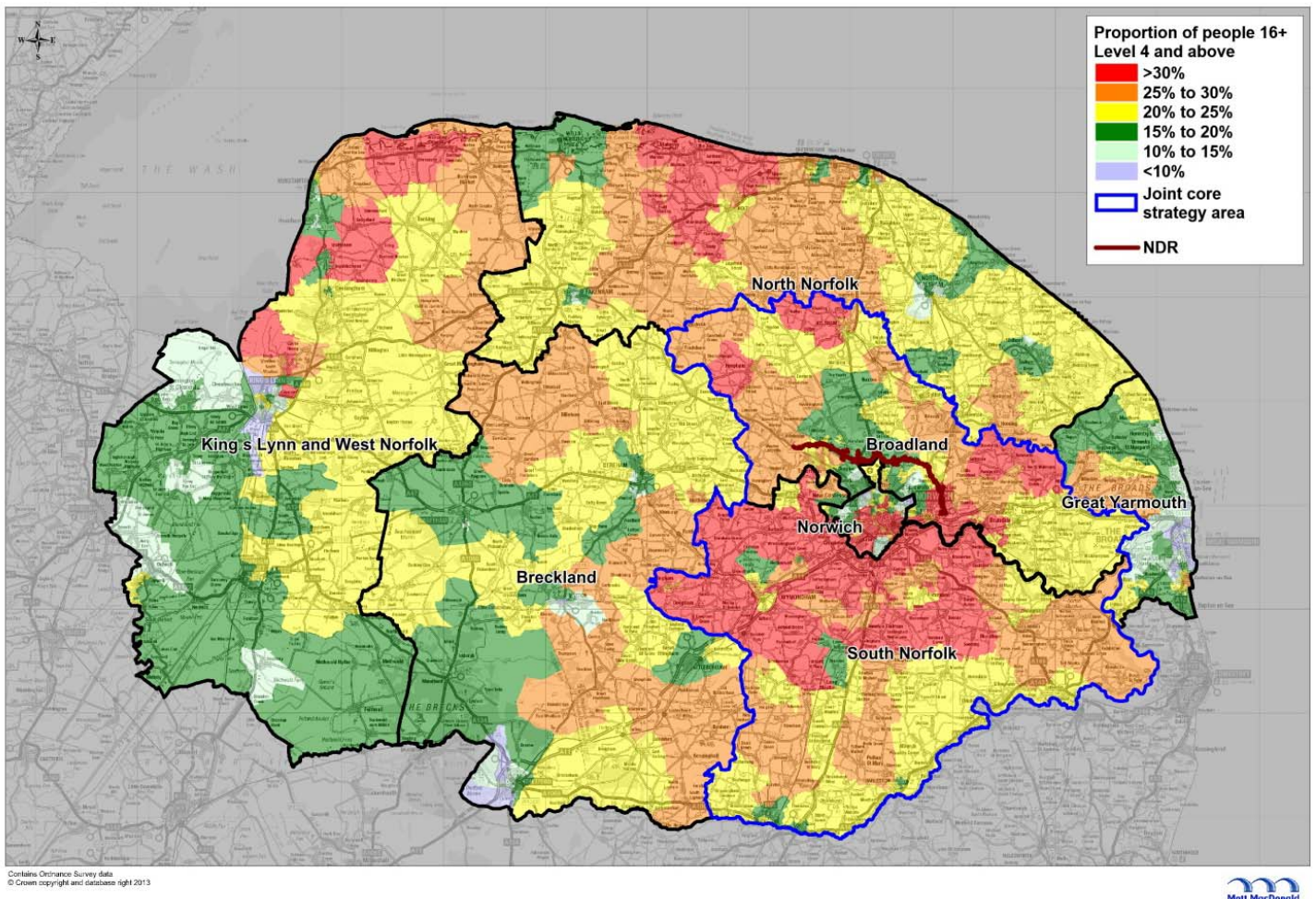
2.2.3 The spatial pattern around Norwich city and north parts of South Norfolk reflects the location of the University of East Anglia, and is similar to that observed in other university cities. It is also influenced by the housing market, location of employers employing highly-educated people (such as Norwich Research Park

(NRP)) and good connectivity between residential and employment areas. For the JCS area overall, 26% of residents have attained Level 4 qualifications and above (compared to 27.4% of residents in England as a whole).

- 2.2.4 In comparison, the proposed alignment of the NDR runs through an area of relatively lower skills (shown in green on the map). The enhanced connectivity which the NDR would bring to this area would provide improved access to employment opportunities for residents living to the north of the city, whilst also simultaneously providing businesses in that area with access to a wider and more highly educated/ skilled labour market catchment area. In order to ensure that residents with lower skill levels were able to seek new employment opportunities that arise in the area there would need to be parallel interventions to provide training and skills development courses for local residents in-line with the needs of businesses. An example of this is that in addition to the existing training organisations and facilities in the area (e.g. City College) a new University Technical College (with a particular focus on engineering and energy sector training) is to be built in Norwich. The goal of the University Technical College is to provide students with skills and qualifications to go either to university or to take up skilled employment at age 18 with a particular focus on the engineering and energy sectors. An £8m construction project is underway in Old Hall Road in Norwich to provide the facility which will open in September 2014 and a start has recently been made on recruiting students: the intake is to be 300 students in Year 1. It has the support of a number of significant employers. University of East Anglia sponsorship and the backing of the Transforming Education in Norfolk (TEN) Group (The TEN Group is a federation of educational institutions in Norfolk, all committed to excellence in education³.)

³ <http://tengroup.org.uk/>

Figure 2.2 – Proportion of residents aged 16+ holding Level 4 qualifications and above, 2011



Source: Census 2011

Unemployment

2.2.5 Figure 2.4 indicates that there are concentrations of unemployment in the urban areas of Norwich (especially to the north of the city), Great Yarmouth, Thetford (especially to the north-west of the town) (in Breckland), and King's Lynn. Beyond these urban areas, the unemployment rate in the County is generally below 4%. Given the scale of national and global economic downturn since 2008, this suggests the area has demonstrated some resilience in comparison to other parts of the UK, perhaps influenced by a higher proportion of retirement age residents. A further feature of the Norfolk labour market is, however, the

much greater degree of part-time working than in the country as a whole⁴, suggesting a low pressure of labour demand. Although the alignment of the NDR generally passes through areas of low unemployment, it could provide improved access to employment opportunities for unemployed residents living in neighbourhoods to the central and northern areas of Norwich where unemployment is generally higher than the rest of the JCS area. For the JCS area, the unemployment rate at the Census 2011 was 4.2% with 11,864 people registered as unemployed⁵.

2.2.6 Since the 2011 Census, economic recovery has gradually been experienced throughout the UK and there has been an increase in employment rates and reduction in unemployment rates alongside an increase in average wage levels. In November 2013 the Office for National Statistics (ONS) reported (ONS, Labour Market Statistics, November 2013)⁶ reported that for the UK in July to September 2013:

- *“The employment rate for those aged from 16 to 64 was 71.8%, up 0.3 percentage points from April to June 2013 and up 0.6 from a year earlier. There were 29.95 million people in employment aged 16 and over, up 177,000 from April to June 2013 and up 378,000 from a year earlier.*
- *The unemployment rate was 7.6% of the economically active population, down 0.2 percentage points from April to June 2013 and from a year earlier. There were 2.47 million unemployed people aged 16 and over, down 48,000 from April to June 2013 and from a year earlier.*
- *The inactivity rate for those aged from 16 to 64 was 22.2%, down 0.2 percentage points from April to June 2013 and down 0.4 percentage points from a year earlier. There were 8.92 million economically inactive people aged from 16 to 64, down 69,000 from April to June 2013 and down 149,000 from a year earlier.*
- *Total pay rose by 0.7% compared with July to September 2012. Regular pay rose by 0.8% over the same period.”* (ONS, Labour Market Statistics, November 2013, p1)

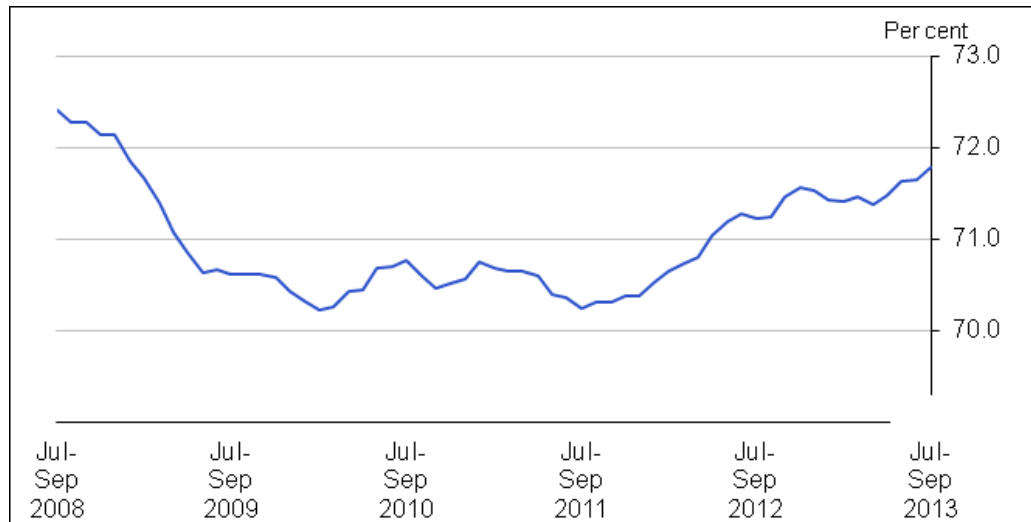
2.2.7 Figure 2.3 shows the trend in the employment rate for the UK during the course of the recession.

⁴ Data from NOMIS (Annual Business Inquiry, Employee Analysis (2008), Available from: <https://www.nomisweb.co.uk/reports/imp/la/1967128599/report.aspx>) indicates 37% of workers in Norfolk are part-time compared to 31% nationally

⁵ Census 2011 data on unemployment is based on the 16-74 year old economically active population. This is a different measure than that used for reporting monthly unemployment rates by ONS. The Census data is included here because it can be mapped to LSOA level along with other data from the Census. An updated unemployment position for September 2013 is presented below but the two data sets are not directly comparable.

⁶ Available at <http://www.ons.gov.uk/ons/rel/lms/labour-market-statistics/november-2013/statistical-bulletin.html>

Figure 2.3 Employment rate (aged 16 to 64), seasonally adjusted



Source: ONS, Labour Market Statistics, November 2013, p5

2.2.8 The data in Table 2.1 below presents the unemployment position for Norfolk at September 2013. This is based on the 16-64 age group so is different and not directly comparable with the Census 2011 data:

- across Norfolk in September 2013, when there were 14,308 people registered as unemployed (an unemployment rate of 2.7%);
- in the JCS area (comprising the administrative areas of Broadland, Norwich and South Norfolk), which had 6,136 people aged 16-64 registered as unemployed in September 2013 (an unemployment rate of 4.1% in Norwich, 1.5% in Broadland and 1.7% in South Norfolk); and
- across England as a whole, where there were 1,078,299 people unemployed (an unemployment rate of 3.1%).

Table 2.1 – Claimant count unemployment rate, residents aged 16-64⁷, September 2013

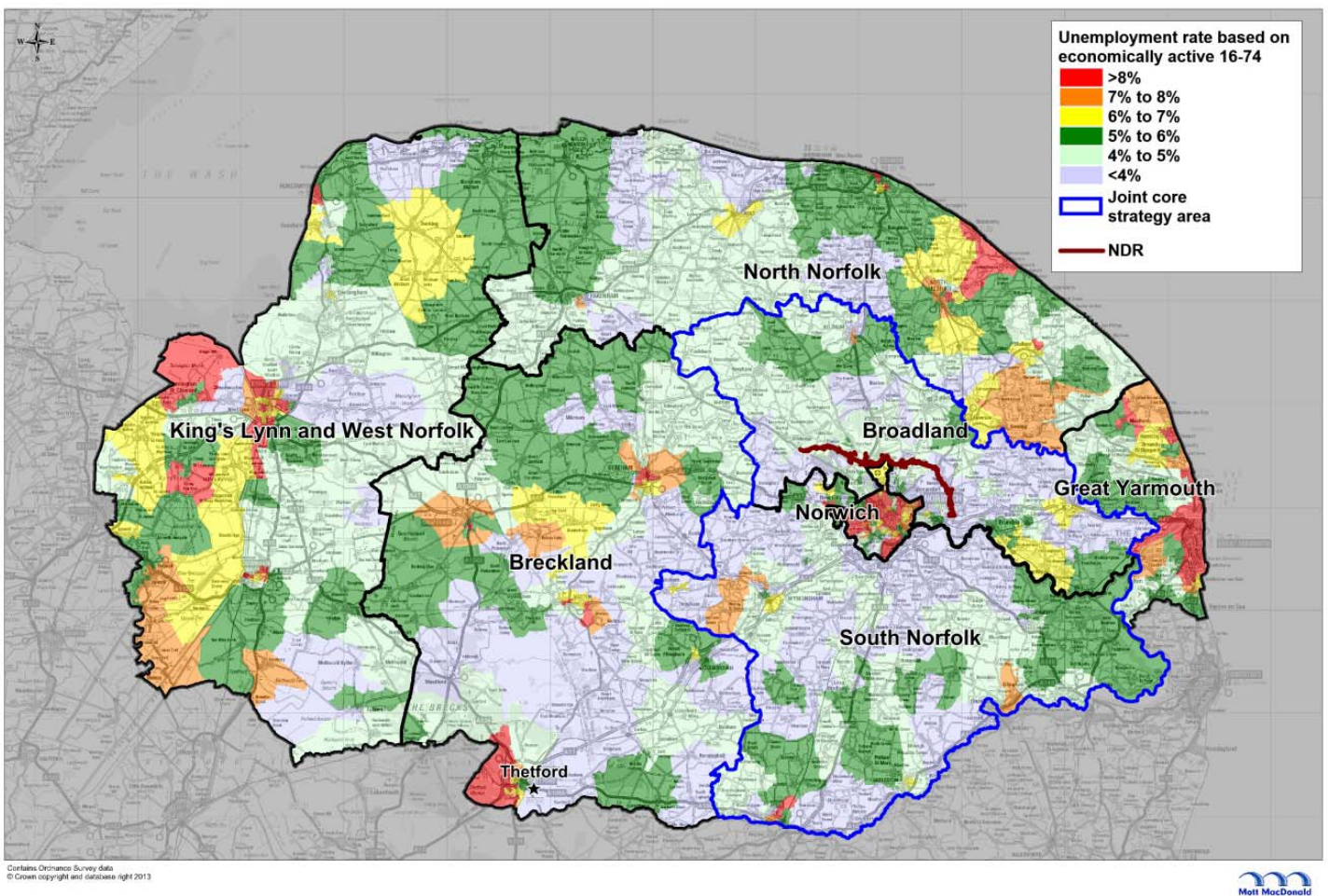
Area	Number of claimants	Unemployment rate (%)
Breckland	1,811	2.3
Broadland	1,151	1.5
Great Yarmouth	2,845	4.8

⁷ The September 2013 data is based on economically active residents aged 16-64 and is not directly comparable with unemployment from Census 2011 though it does provide a reflection on the current position

Area	Number of claimants	Unemployment rate (%)
King's Lynn & West Norfolk	2,355	2.7
North Norfolk	1,161	2.0
Norwich	3,737	4.1
South Norfolk	1,248	1.7
Norfolk (as a whole and comprising the 7 areas listed above)	14,308	2.7
England	1,078,299	3.1

Source: ONS via NOMIS (ONS official labour market statistics), Claimant count excludes Universal Credit (benefits) claimants

Figure 2.4 – Unemployment rate for economically active population aged 16-74⁸, 2011



⁸ See earlier note: 2011 (for economically active aged 16-74) unemployment data should not be directly compared with the 2013 (for economically active aged 16-64) unemployment data in this report.

Source: Census 2011

2.2.9 Table 2.2, below, supports the map set out in Figure 2.4 and presents Census-based unemployment figures for each district as well as regional and national comparators.

Table 2.2 - Unemployment as a proportion of economically active population (aged 16-74), 2011

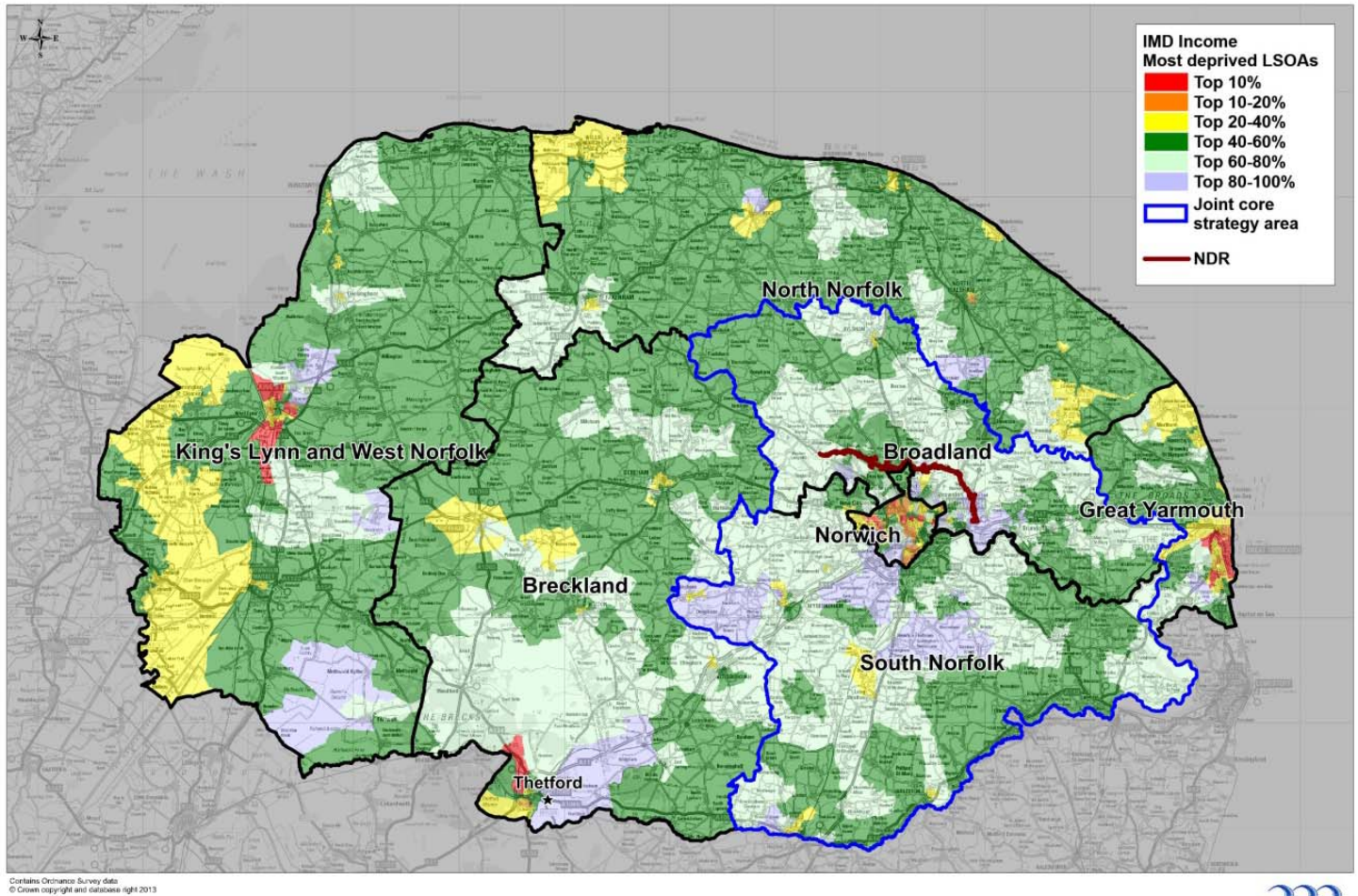
Area	Unemployment	Economically Active Population (aged 16-74)	% unemployed as Proportion of Economically Active
Breckland	3,728	65,029	5.7
Broadland	2,691	64,232	4.2
Great Yarmouth	4,754	46,018	10.3
King's Lynn & West Norfolk	4,436	71,704	6.2
North Norfolk	2,636	45,819	5.8
Norwich	6,348	68,772	9.2
South Norfolk	2,825	63,158	4.5
JCS Area	11,864	196,162	6.0
East of England	188,578	3,038,090	6.2
England	2,020,413	27,183,134	7.4

Source: Census 2011

2.3 Income

2.3.1 Figure 2.5 below presents data from the Indices of Deprivation (IMD) (2010) based on income levels in each LSOA. Some parts of Norfolk, particularly South Norfolk, southern areas of King's Lynn and West Norfolk, and southern areas of Breckland, are relatively affluent when ranked against English LSOAs. At the other end of the scale, urban centres in Norfolk, particularly Norwich, Great Yarmouth, northern Thetford (in Breckland), and King's Lynn are within the 10% most deprived LSOAs in England when ranked on income levels notably to the north and northeast of Norwich city.

Figure 2.5 – IMD Income Bands, 2010



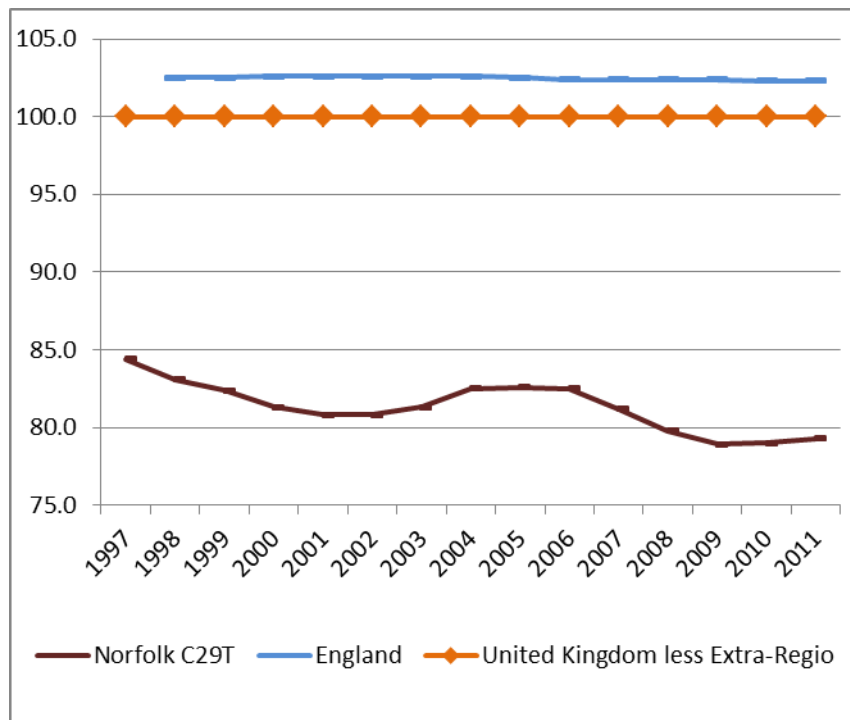
Source: IMD, 2010

2.4 Gross Value Added

2.4.1 The overall productivity of Norfolk’s economy is illustrated in Figure 2.6 below. It shows the county’s per capita contribution to national income (Gross Value Added (GVA) being the only measure of national income locally⁹) and the relative decline of Norfolk’s per capita GVA compared to the UK over the fifteen years shown.

⁹ Technically GVA relates to Gross Domestic Product (GDP), and even then the national level of GVA needs to be adjusted for taxes and subsidies to arrive at GDP. Moreover, GDP is only approximately equal to national income because the national income includes net income from overseas investments. There is, finally, an adjustment to be made in respect of ‘extra regio’, i.e. GVA arising in the UK but not in any particular area (this is mainly North Sea output). None of these technicalities need detain us here given the close correlation between national GVA, national GDP and national income, and the fact that, of the three, only GVA is available at sub-regional level..

Figure 2.6 – Headline GVA per head indices at current basic prices: UK, England and Norfolk, 1997-2011



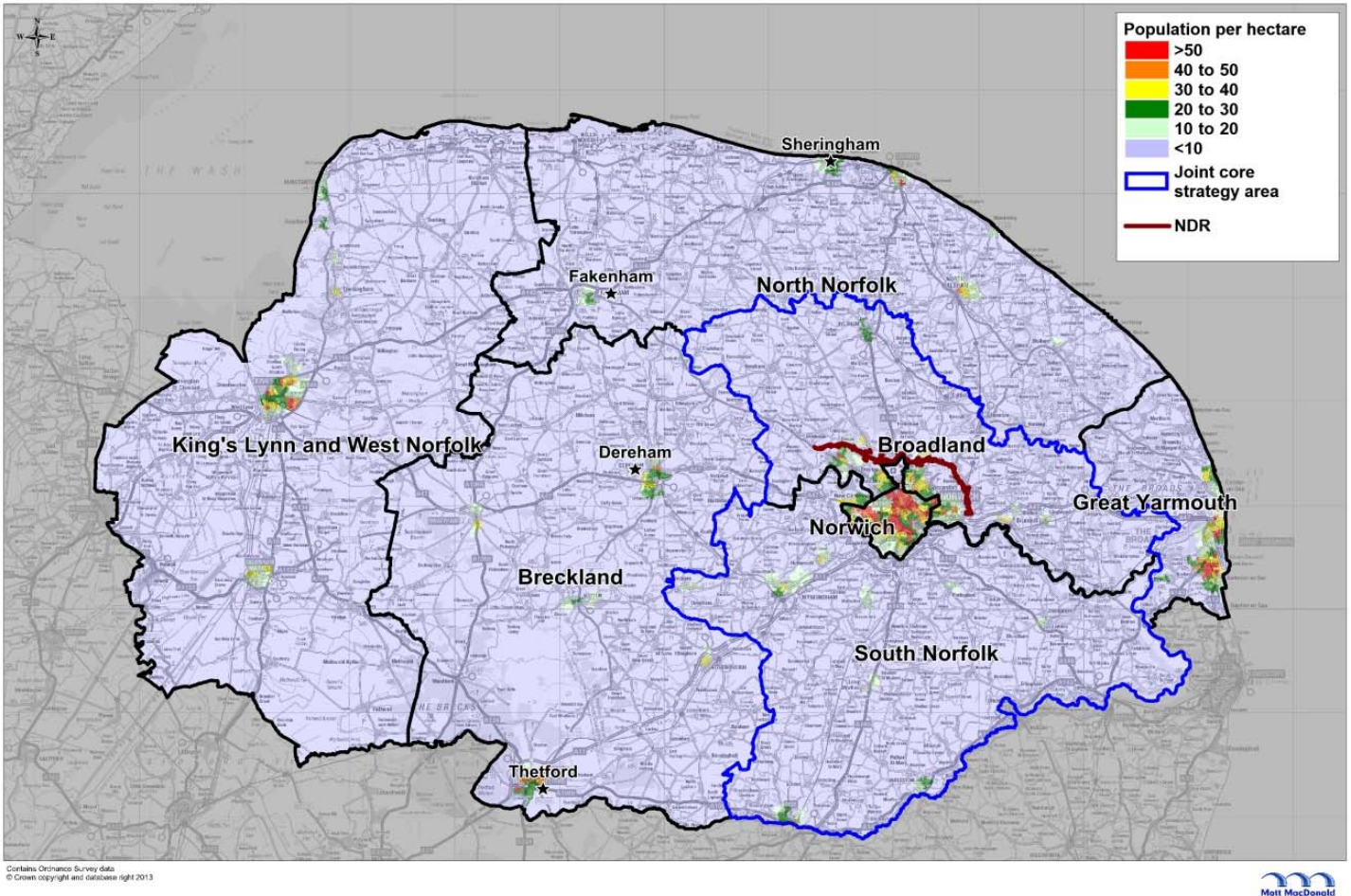
Source: Office for National Statistics

2.5 Population and deprivation

Population

2.5.1 Similar to employment density, population density is also generally low across Norfolk with the central and northern areas of Norwich recognisable as having the greatest concentrations of population, in addition to other urban centres within the county including Great Yarmouth (to the east), and areas surrounding King’s Lynn (Figure 2.7). Areas to the north and north-east of Norwich accommodate the next tier of more populous areas which is where future growth is being planned for and in close proximity to the NDR. Further economic growth is essential if population growth is to occur as the JCS anticipates. The NDR has a potential role to play in improving transport connections for workers around the Greater Norwich area, North Norfolk and Great Yarmouth

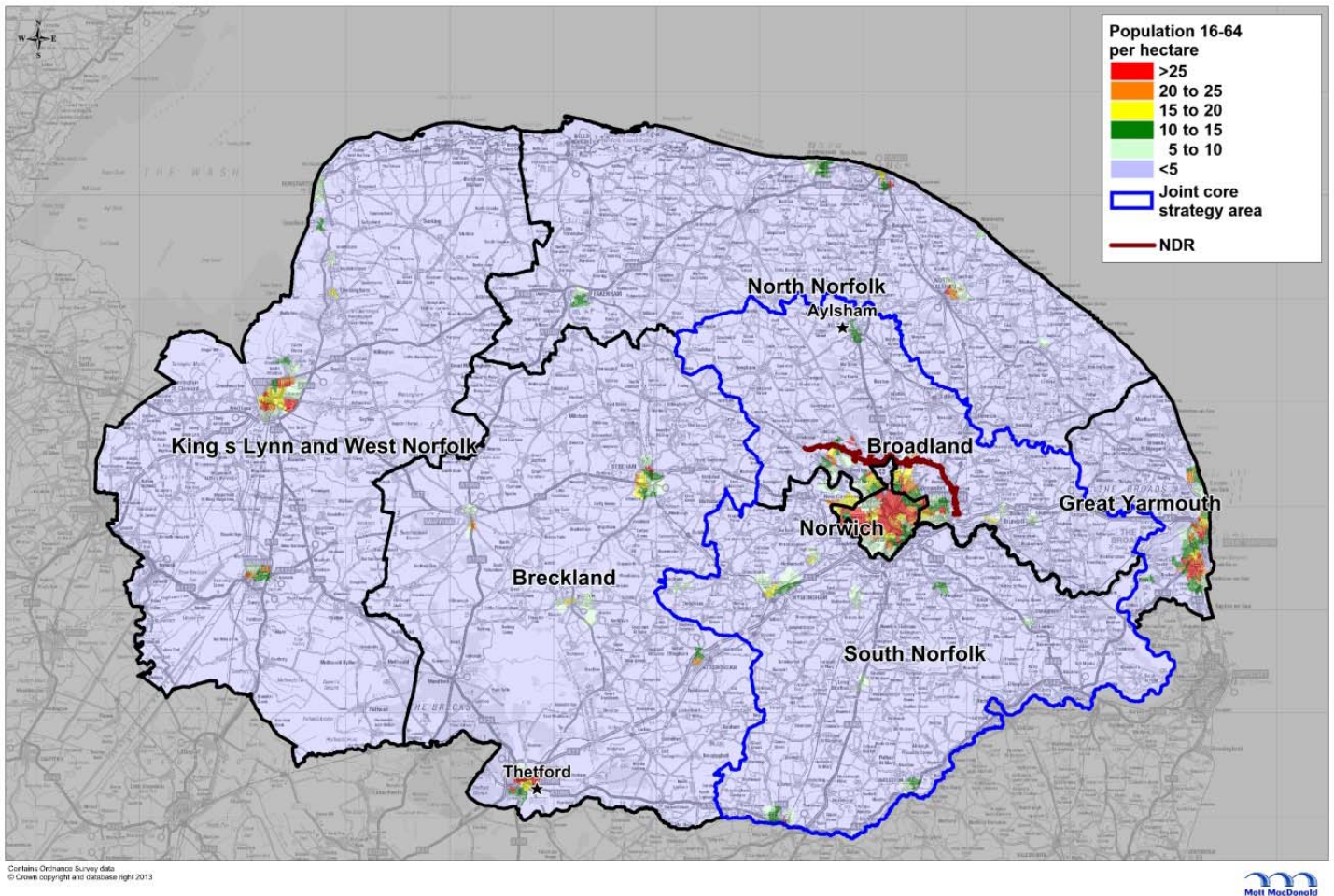
Figure 2.7 – Population density (total population), 2011



Source: Census, 2011

2.5.2 Moreover, in Figure 2.8 the relationship between residential areas with higher concentrations of working age residents (aged 16-64) and the NDR is shown. Again, high density populations are found within and around the urban centres across Norfolk including Norwich city, Great Yarmouth, Thetford and parts of King’s Lynn. In comparison to the rest of Norfolk, there are high concentrations of working age residents at the western and eastern ends of the NDR route as well as in the market town of Aylsham to the north. The NDR would benefit these people by improving access to employment opportunities that will arise along the route of the NDR, at Norwich International Airport and in Norwich city centre while, simultaneously, increasing the labour catchment available to businesses benefiting from improved transport connections due to the NDR.

Figure 2.8 – Population density (working age population aged 16-64 years), 2011



Source: Census, 2011

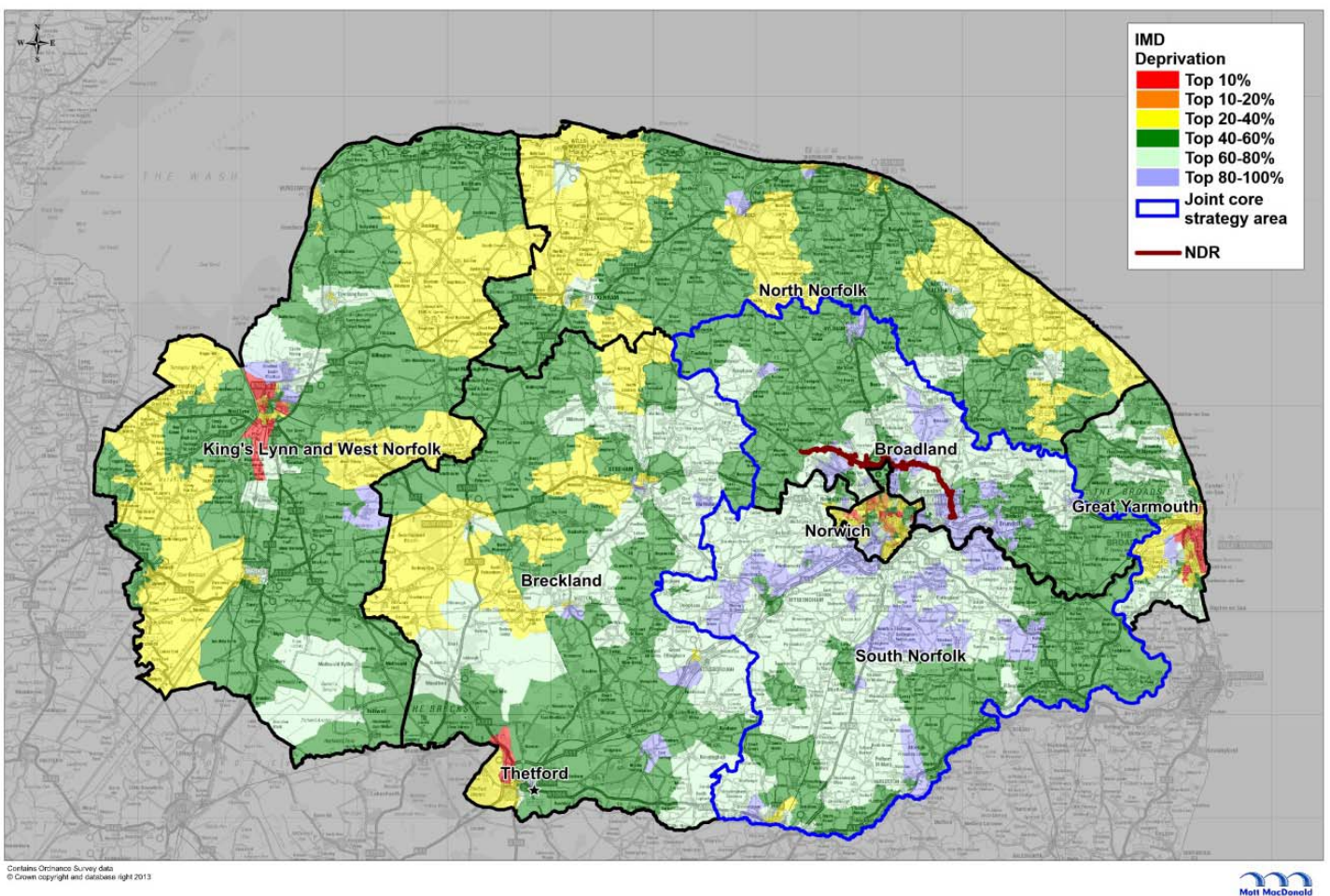
Deprivation

2.5.3 Deprivation is measured through the Government's Index of Multiple Deprivation (IMD), last updated in 2010¹⁰ and based on an overall ranking based on domain scores for: income; employment, health deprivation & disability; education, skills & training; barriers to housing & services; crime; and, living environment. Norwich's hinterland in the JCS area is characterised by large areas of relatively low deprivation. As with some of the other indicators reviewed in this section, the urban areas of Norwich, Great Yarmouth, King's Lynn and Thetford, as well as some of the littoral parts of North Norfolk, are characterised by relatively higher levels of multiple deprivation. Parts of central and northern Norwich have IMD scores ranking in the top 10% and top 11-20% of the most deprived LSOAs in England (see Figure 2.9 below), and many of

¹⁰ More details available at: <https://www.gov.uk/government/publications/english-indices-of-deprivation-2010>

the most deprived areas are in close proximity to the proposed alignment of the NDR. Residents of these areas should benefit from improved access to local employment opportunities that arise after the NDR's construction as employment sites are developed and businesses occupy the commercial space constructed. This has potential to reduce relative levels of deprivation by overcoming some of the barriers to labour market participation posed by travel costs providing that residents have requisite skills and qualifications to satisfy the needs of employers and compete in the labour market.

Figure 2.9 – Levels of deprivation by LSOA, 2010



Source: IMD, 2010

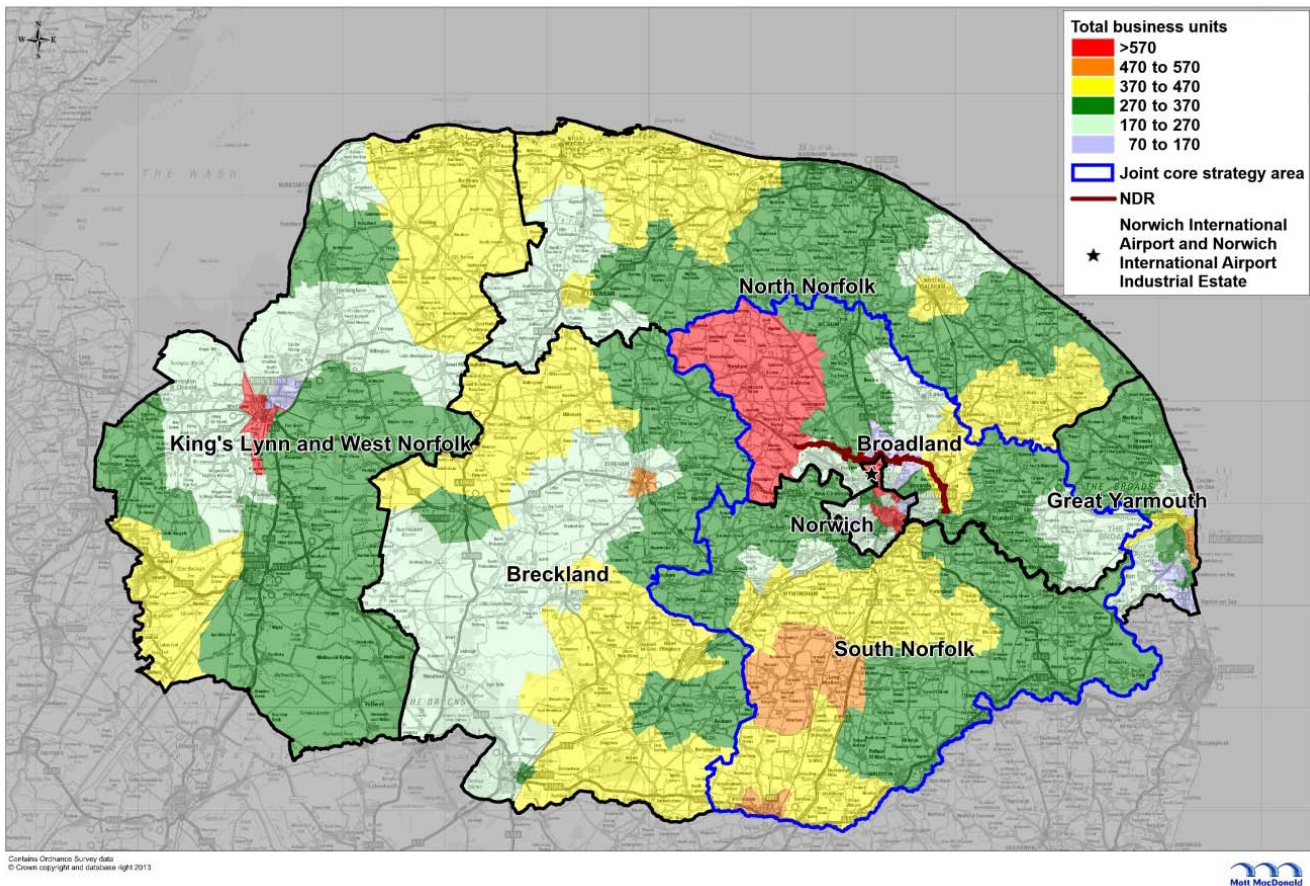
2.6 Businesses

Business units

2.6.1 Business units provide a measure of the number of businesses in an area based on address points for each individual business (so that any business with

more than one address e.g. multiple retailers, banks etc. will be included for each address they have). From the spatial pattern of business units shown in Figure 2.10 below, the importance of Norwich city centre, Norwich International Airport and Norwich Airport Industrial Estate relative to the rest of the county is clear. The alignment of the proposed NDR route passes through some areas to the north of Norwich with relatively low numbers of business units at present, a situation which should alter as the NDR influences business decisions about location and new development sites are opened up. This is certainly the experience of Broadland Business Park which has been very attractive to the market and filled up over time reflecting the shortage of Grade A office space in Norwich; the expectation is that the same process will occur on land made more accessible by the NDR. The comparatively sparse business base to the north of the city should be positively influenced by the NDR as it supports the development process and the improved connectivity it offers encourages businesses to locate on the north side of the city.

Figure 2.10 – Concentration of business units at LSOA level



Source: ONS

2.7 Land and property

Employment land

2.7.1 The Greater Norwich Employment Growth Study (2008)¹¹ provided a comprehensive review of the employment land portfolio and made a series of recommendations that support the NDR proposals and have subsequently begun to be implemented:

- There is a relative lack of a range of available and ready-to-use sites, with the main current opportunities of this kind only at the Broadland Business Park.
- The Norwich Research Park (NRP) is one of the greatest areas of potential and of significance on a regional and national scale. It therefore deserves higher priority in terms of achieving the assembly of land and realisation of infrastructure.
- There is a case for developing a new north city employment hub. This should seek to realise the economic potential of the airport and in the longer-term benefit from the proposed NDR.
- *“In relation to offices the **overall floorspace** requirement is estimated to be in the region of 300,000 sq m. We would recommend this be distributed most obviously as follows:*
 - *Norwich City Centre and the wider central area 100,000 sq m*
 - *Norwich Research Park 100,000 sq m, based on a floorspace plot ratio ‘ of about 1:4.*
 - *Broadland Business Park 50,000 sq m*

For the remaining 50,000 sq m, Arup suggested there are a number of options including:

- *Further space in the city centre and/or*
- *New allocations of business parks associated with housing allocations.*
- *Greater use of Longwater as an office park.”*

2.7.2 Proposals for employment land development and future economic growth are therefore focused on existing locations including the city centre, NRP and Broadland Business Park; in addition, the development of a new north city employment hub with the airport is suggested as a natural locus for development of employment land and future economic growth.

House prices

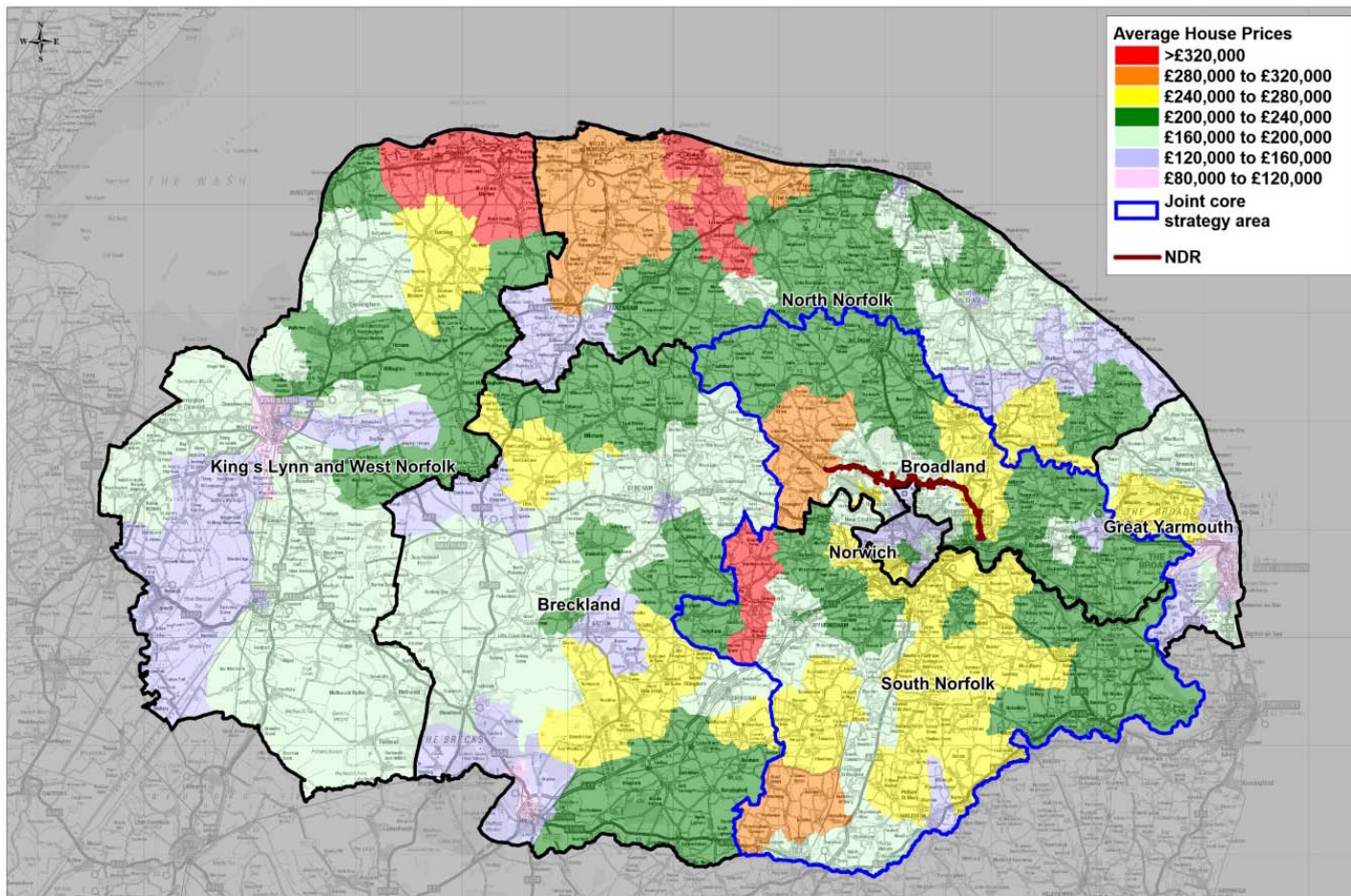
2.7.3 Data on average house prices provide an overview of the relative attractiveness of residential areas which is based on a composite range of factors linked to

¹¹ Commissioned by the Greater Norwich Development Partnership (May, 2008) Greater Norwich Employment Growth and Sites & Premises Study: Ove Arup & Partners Ltd

house type, access to schools, transport connections to employment and leisure opportunities as well as neighbourhood facilities. Connectivity between residential areas and opportunities in the wider travel-to-work-area (and beyond) is one factor involved in determining demand for housing.

- 2.7.4 Drawing on data related to the value of dwelling houses at the point of sale, Figure 2.11 reveals that northern areas of North Norfolk, King's Lynn and West Norfolk have particularly high value in comparison with the rest of Norfolk. There are also pockets of high value density in the north west of South Norfolk. In comparison, the northern parts of Norwich are valued at less than the surrounding area. Indeed, the northern fringes of the city present consistently lower value housing compared to the southern fringes. Improving the connectivity of neighbourhoods to the north of the city should provide a boost to housing demand and drive up property values in the area over time following construction of the NDR.

Figure 2.11 – Average house prices when sold: February 2012 to February 2013



Contains Ordnance Survey data
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 Mott MacDonald

Source: Mott MacDonald calculations¹²

2.8 Summary

2.8.1 The economic baseline characteristics on which the NDR is to have an influence suggest that:

- The northern and north-eastern parts of Norwich are the least affluent and the most deprived parts of the JCS area, with higher concentrations of people that are unemployed.
- Parts of Norfolk to the north of Norwich are relatively less affluent and have lower average house prices than parts of Norfolk to the south of Norwich.
- The long-term trajectory over the next two decades is one of growth as set out in the JCS. NDR has been planned as a critical piece of infrastructure to support delivery of this growth.

¹² Average house prices based on price paid for a house between February 2012 to February 2013, available at : <http://www.landregistry.gov.uk/market-trend-data/public-data> Postcodes were used to identify location points for house sales which were used to allocate each sale to a specific LSOA which then enabled us to derive to derive an average house sale price for each LSOA

- The NDR will create opportunity for employment and housing growth to the north and north-east of Norwich, precisely the area where employment need is greatest and where a surplus of labour is available to meet demand from employers.
- A north city employment hub is recommended with the Airport providing a natural locus for this growth and the NDR acting as facilitator of future growth. The Airport is advancing its planned development through Norwich Aeropark to which the NDR will add impetus in future.

3.1 Policy Framework

3.1.1 This section provides a broad overview of the overarching policy framework in relation to the NDR and the communities it serves. The overview is presented at two spatial scales: national; and sub-regional/ local. We acknowledge that certain “targets” for growth used here are taken from the former Regional Spatial Strategy, however, these have been used in Norfolk as part of applicable Local Development Frameworks and therefore remain relevant. A list of the documents reviewed is set out in Table 3.1 below

Table 3.1 – Policy documents reviewed

National policy documents
<ul style="list-style-type: none"> • Department for Transport, Creating Growth, Cutting Carbon – Making Sustainable Transport Happen, 2011 • National Planning Policy Framework, 2012
Sub-regional and local policy documents
<ul style="list-style-type: none"> • Joint Core Strategy for Broadland, Norwich and South Norfolk, GNDP, 2011 • Joint Core Strategy Annual Monitoring Report, GNDP, 2011/12 • New Anglia Local Enterprise Partnership Business Plan • Delivering Economic Growth in Norfolk – The Strategic Role for Norfolk County Council, 2012/17 • Greater Norwich Economic Strategy 2009/14, GNDP, 2009 • Norwich Area Transportation Strategy , 2004 updated in 2010 • Norwich City Deal, Expression of Interest by Norwich City Council, 2013

3.2 National policy

Department for Transport: Creating Growth, Cutting Carbon - Making Sustainable Local Transport Happen, 2011

3.2.1 The DfT’s White Paper states the Government’s vision for local transport as being *‘for a transport system that is an engine for economic growth, but one that is also greener and safer and improves quality of life in our communities’* (Department for Transport: Creating Growth, Cutting Carbon - Making Sustainable Local Transport Happen, paragraph 1.3, page 11).

3.2.2 The White Paper acknowledges that *“Local transport faces a sustainability challenge - excess delay is costing our urban economies £11 billion per annum, and carbon emissions impose a cost to society of up to £4 billion per annum. The costs to the health of our communities are even greater – up to £25 billion per year on the costs of physical inactivity, air quality and noise, and £9 billion on road traffic accidents.”* (Department for Transport: Creating Growth, Cutting Carbon - Making Sustainable Local Transport Happen, Key Points, page 15).

3.2.3 Sustainable growth is one of the country's biggest challenges. Solutions need to jointly address economic, environmental and community values and aspirations for the future. The transport sector's role in this is hugely important – sustainable means of getting people to work and to services such as education and healthcare providers - as well as to leisure activities and shops, are crucial to quality of life as well as to enhancing people's spending power and choice.

- The White Paper also notes that "*congestion acts as a drag on the economy: a recent study placed the cost of excess delays in urban areas at £10.9 billion per annum (Department for Transport: Creating Growth, Cutting Carbon - Making Sustainable Local Transport Happen, paragraph 2.7, page 16, quoting Cabinet Office Strategy Unit et al., 2009, page 9).*" Similarly, on the supply-side of the economy, "*access to employment, education and healthcare, as well as ending child poverty, all have a key impact on life chances and social mobility, and ultimately on growth.*" (Department for Transport: Creating Growth, Cutting Carbon - Making Sustainable Local Transport Happen, paragraph 2.9).. The White Paper notes (Department for Transport: Creating Growth, Cutting Carbon - Making Sustainable Local Transport Happen, at paragraph 2.10, page 17) that various studies have revealed that: 2-out-of-5 jobseekers say lack of transport is a barrier to getting a job, and 1-in-4 jobseekers said the cost of transport is a significant issue; (Lucas, 2003);
- 6% of 16–24 year olds turn down training or further education because of transport problems; young people in rural areas, and those with learning difficulties and disabilities, are more likely to cite costs of transport as a constraint in pursuing post-16 learning; (Social Exclusion Unit, 2002); and
- In 2008, 44% of workless households did not have a car or van (compared with 22% of all households) (Office for National Statistics, 2008).

National Planning Policy Framework (NPPF), 2012

3.2.4 The Government introduced the National Planning Policy Framework in 2012 as a guide to how the planning system should be implemented in England, suggesting that the purpose of the planning system is to contribute to the achievement of sustainable development. The NPPF identifies three dimensions to sustainable development: economic, social and environmental and advises that "*these dimensions give rise to the need for the planning system to perform a number of roles*" (National Planning Policy Framework, paragraph 7, page 8) which is set out below:

- an economic role – contributing to building a strong, responsive and competitive economy, by ensuring that sufficient land of the right type is available in the right places and at the right time to support growth and innovation; and by identifying and coordinating development requirements, including the provision of infrastructure;

- a social role – supporting strong, vibrant and healthy communities, by providing the supply of housing required to meet the needs of present and future generations; and by creating a high quality built environment, with accessible local services that reflect the community’s needs and support its health, social and cultural well-being; and
- an environmental role – contributing to protecting and enhancing our natural, built and historic environment; and, as part of this, helping to improve biodiversity, use natural resources prudently, minimise waste and pollution, and mitigate and adapt to climate change including moving to a low carbon economy.

3.2.5 The NPPF sets out a series of themes that align with sustainable development. Those that align with the proposals for the NDR and wider growth and development in Greater Norwich are listed below:

- Building a strong, competitive economy (section 1).
- Ensuring the vitality of town centres (section 2).
- Supporting a prosperous rural economy (section 3).
- Promoting sustainable transport (section 4).
- Delivering a wide choice of high quality homes (section 6).

3.3 Sub-regional and local policy

Joint Core Strategy for Broadland, Norwich and South Norfolk, 2011

3.3.1 One of the principal local policy frameworks to emerge in recent years has been the Joint Core Strategy for Broadland, Norwich and South Norfolk adopted in March 2011 (JCS). Following a High Court Challenge part of the JCS was remitted but, supported by appropriate revised evidence, the remitted policies were resubmitted and were subject to public examination in July 2013. The Inspector has subsequently consulted on draft modifications that relate to contingency and clarity rather than the submitted locational policies. As of November 2013 the Inspector’s report is imminent but not yet available. At this late stage the part plan carries substantial weight for the purposes of this report.

3.3.2 The JCS was facilitated by the Greater Norwich Development Partnership (GNDP), and sets out an over-arching strategy for growth across the districts of Broadland, Norwich and South Norfolk. It also identifies key locations for growth and sets out policies to ensure that future development is sustainable.

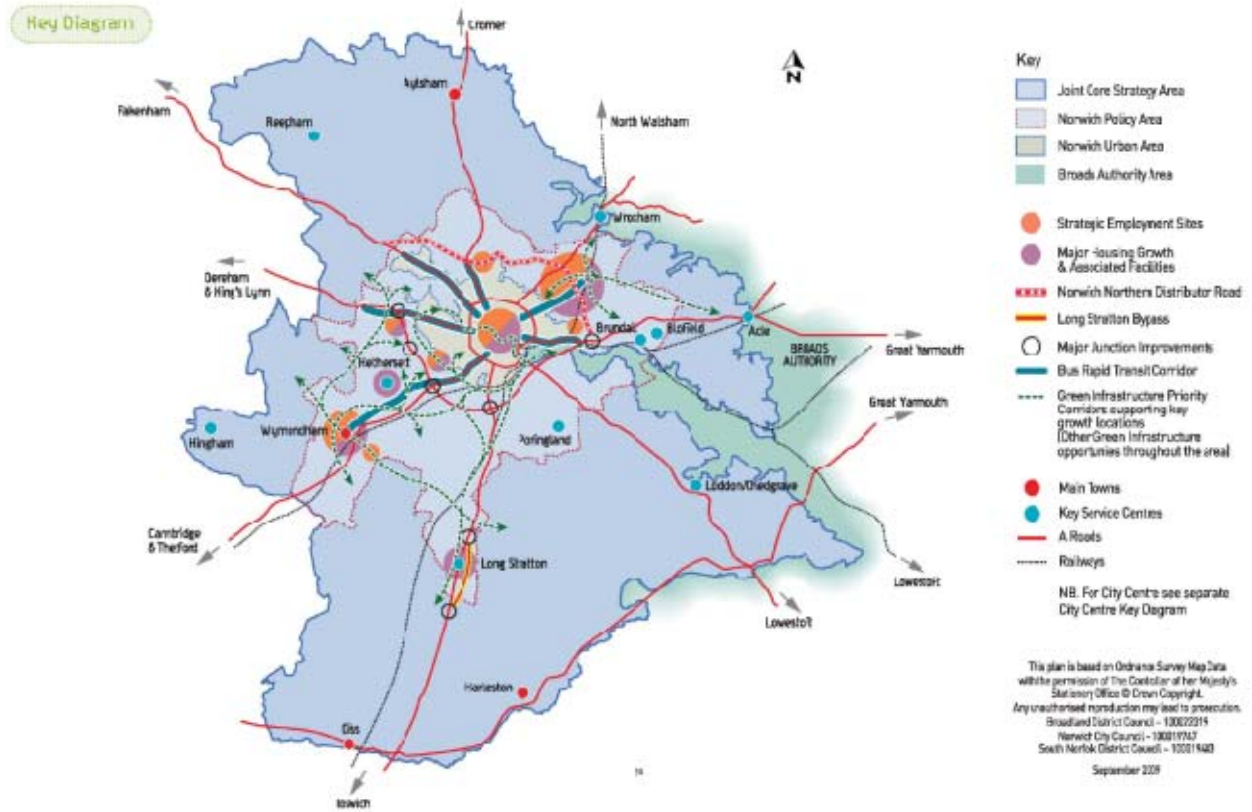
3.3.3 The JCS contains twelve over-riding objectives, which underpin the spatial vision of creating some 36,820 new homes and 27,000 new jobs between 2008 and 2026 in the Greater Norwich area. The recently examined part of the plan proposes a 10,000 dwelling mixed use urban extension into the Catton, Sprowston, Rackheath and Thorpe St Andrew 'growth triangle' to the northeast

of Norwich. The NDR has a role in supporting development in this area and in relation to the following spatial planning objectives of the JCS (Joint Core Strategy, pages 20-23):

- *“To allocate enough land for housing, and affordable housing, in the most sustainable settlements”* (Joint Core Strategy for Broadland, Norwich and South Norfolk Objective 2, page 20)– whereby new housing, employment, and services are planned in such a way that they are grouped together ensuring that the land is used efficiently and community needs are met
- *“To promote economic growth and diversity, and provide a wide range of jobs”* (Joint Core Strategy for Broadland, Norwich and South Norfolk, Objective 3, page 21) - this involves not only safeguarding existing employment sites but also allocating sufficient levels of land to meet the needs of growing businesses and inward investors.
- *“To promote regeneration and reduce deprivation”* (Joint Core Strategy for Broadland, Norwich and South Norfolk, Objective 4, page 21) - growth will be used to bring benefits to deprived neighbourhoods in Norwich and deprived towns, villages and rural settlements in the surrounding area
- *“To make sure people have ready access to services”* (Joint Core Strategy for Broadland, Norwich and South Norfolk, Objective 6, page 21) – the city centre provides a wide range of services and accessibility of the city centre will be maintained and enhanced. Wherever new homes and jobs are developed there will be a need to provide adequate supporting services.
- *“To enhance transport provision to meet the needs of existing and future populations while reducing travel need and impact”* (Joint Core Strategy for Broadland, Norwich and South Norfolk, Objective 7, page 21) - supports the co-location of housing and employment land uses alongside other community and service uses; also supports improved use of public transport, including the introduction of a bus rapid transit (BRT) system and recognises that the state of the strategic road network is fundamental to the health of the local economy.
- *“To encourage the development of healthy and active lifestyles”* (Joint Core Strategy for Broadland, Norwich and South Norfolk, Objective 11, page 23) - giving people better opportunities to make healthy travel choices as part of their daily lives, by providing “safe and direct cycle and pedestrian routes, and orbital bus services, to Broadland Business Park, Rackheath employment area, airport employment areas and to the surrounding countryside” (Joint Core Strategy for Broadland, Norwich and South Norfolk, page 57).

3.3.4 The JCS’ key diagram (incorporating the emerging JCS proposals) is set out in Figure 3.1 below and illustrates the critical importance of the NDR as a piece of strategic infrastructure supporting growth and development to the north and east of Norwich.

Figure 3.1 – JCS Key Diagram

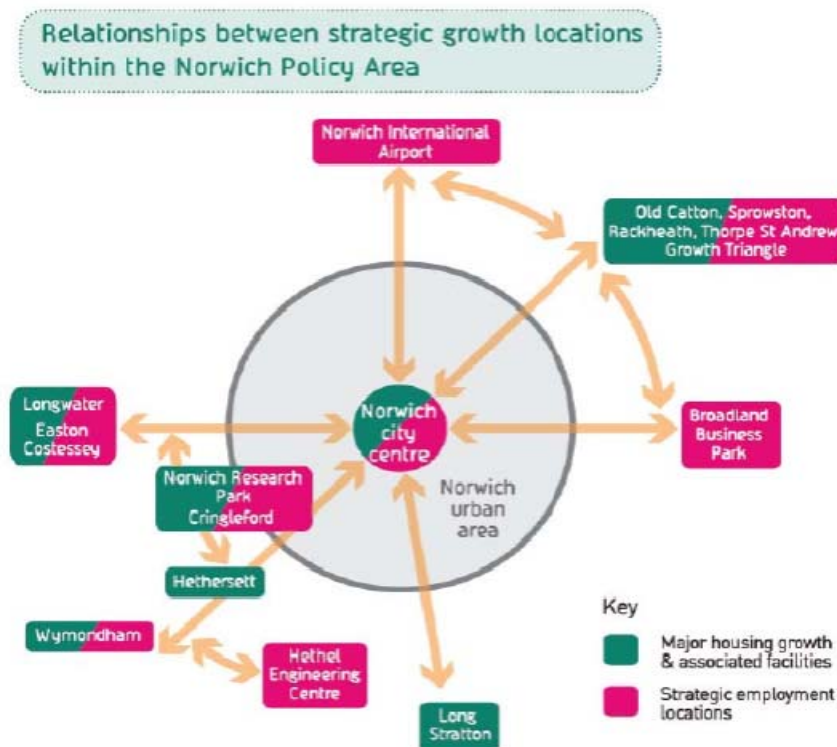


Source: Joint Core Strategy for Broadland, Norwich and South Norfolk, 2011(page 24)

3.3.5 Figure 3.2, below, shows the relationships between strategic growth locations in the Norwich Policy Area (NPA)¹³, which are located around the edge of the city. The NDR would contribute to the provision of connectivity between some of these locations, as is indicated by the arrows forming a quarter circle between Norwich International Airport and Broadland Business Park.

¹³ The Norwich Policy Area is defined by way of a plan in Appendix 4 of the JCS and sits within the JCS area. The NPA provides a focus for planning and co-ordinating Norwich related growth.

Figure 3.2 – JCS Strategic growth locations around Norwich



Source: JCS (page 53), 2011

JCS Annual Monitoring Report, 2011/12

3.3.6 In line with the 2011 JCS, this monitoring report provides an indication of how the GNDP area (also the study area for the purposes of this report) is performing against the objectives set out in the JCS and identifies key target performance against JCS objectives. It states that a number of targets have been met or worked towards, including:

- reduction of carbon emissions;
- proportion of new dwelling development on previously developed land is achieving target;
- improved national retail ranking for Norwich (from 11th to 9th); and
- overall relative deprivation has improved (JCS Annual Monitoring Report, paragraph 1.2, page 2)

3.3.7 In terms of achieving JCS objectives, the following targets remain challenging, arguably as a result of the economic downturn:

- housing completions have been below target since 2008;
- the number of new business start-ups has been below target;
- increased youth unemployment; and

- a reduction in public transport accessibility (JCS Annual Monitoring Report, paragraph 1.3, page 3).

3.3.8 In terms of spatial planning for housing, the majority of new homes will be built in the NPA – 33,000 out of the 36,820 between 2008 and 2026, with the remaining development being allocated to smaller sustainable settlements. Since 2008, net housing completions per annum in the NPA have fallen short of the 1,825 per annum target – 2008/09: 1,193; 2009/10: 923; 2010/11: 910; and 2011/12: 915. However, affordable housing completions in Norwich exceeded target levels in 2011/12 (at 61% actual as against a target of 33%) (JCS Annual Monitoring Report, Table 5, page 16).

3.3.9 In addition to this, the gross employment floor space developed between 2008 and 2012 across all employment types in the JCS area (Broadland, Norwich and South Norfolk) has fluctuated: 27,358 m² in 2008/09; 17,811 m² in 2009/10; 37,707 m² in 2010/11; and 26,914 m² in 2011/12. More specifically, Broadland has had the highest level of gross floor space development for employment at 51,871 m² across all employment types (JCS Annual Monitoring Report, Table 8 page 25).

3.3.10 Improvements to the Postwick Interchange at the A47(T) are “*essential to deliver permitted expansion of the Broadland Business Park and to enable wider developments to the northeast of Norwich*” (JCS Annual Monitoring Report, paragraph 2.1, page 130) where an urban extension is proposed but is dependent on new infrastructure. The planned improvements to the Postwick Interchange have been designed to accommodate the junction of the A47(T) with the eastern end of the proposed NDR.

New Anglia Local Enterprise Partnership (LEP) for Norfolk and Suffolk - Towards a Growth Plan, Consultation Draft, (July 2013)

3.3.11 Following the successful acceptance by Government of the New Anglia Local Enterprise Partnership proposals in 2011, the LEP has identified its areas of focus and has been developing its priorities. Towards a Growth Plan, Consultation Draft states that: “*investment to increase the capacity of the A14 and A47 and other roads is essential to enable growth. The Norwich Northern Distributor Road is vital to unlock the potential of Greater Norwich. To promote more sustainable travel, rail investment is also needed, notably on the Great Eastern Main Line and West Anglia Route to overcome capacity constraints*” (Towards a Growth Plan, Consultation Draft, paragraph 1.13, page 9).

3.3.12 The LEP is fully supportive of the GNDP and its aims which are embodied in the JCS and the Greater Norwich Economic Strategy¹⁴. The NDR is a key element of transport infrastructure and would facilitate delivery by the LEP of the expected growth in housing and employment that the area needs, and has the potential to achieve. It fits with the LEP ambitions to resolve some of the key challenges which are faced by inhabitants of the LEP's area:

- *“Below average skill levels in Norfolk and Suffolk.*
- *Low GVA and wages.*
- *An infrastructure deficit in the road and rail network, both East to West and North to South.*
- *Inadequate utilities infrastructure, which is actively hindering private sector investment.*
- *Poor Broadband coverage compared with most other parts of the country.*
- *Low business start-up numbers compared with national and regional averages.*
- *Significant areas of deprivation in urban, rural and coastal areas.”* (based on New Anglia LEP Towards A Growth Plan, paragraphs 1.13 – 1.22, pages 9-10).

3.3.13 The aims of the New Anglia LEP are:

- *“To ensure New Anglia is nationally and internationally competitive.*
- *To act as a catalyst to achieving sustainable economic growth and tackling barriers where they occur through:*
- *Enabling business start-up and growth.*
- *Developing existing growth sectors, clusters and supply chains.*
- *Championing infrastructure improvements to aid business productivity and the smooth functioning of local labour markets.*
- *Delivering action at the level that is meaningful and works for business.*
- *Facilitating business and local community engagement.*
- *Promoting skills and workforce development.”* (New Anglia LEP Business Plan Presentation, page 2).

3.3.14 The NDR directly addresses the local infrastructure deficit in the Norwich area and would facilitate the growth of 27,000 jobs by linking up key employment sites. It would also open up strategic access to north and northeast of Norfolk which will help address challenges and aims of the New Anglia LEP.

3.3.15 The LEP's aims for development reflect Norfolk County Council's economic growth strategy, identifying the NDR as a key element of transport infrastructure which will help to facilitate the current and forecasted rates of economic,

¹⁴ Greater Norwich Economic Strategy 2009/14, GNDP (2008)

employment and housing growth across northern Norfolk by creating links to key employment and strategic development sites.

Delivering Economic Growth in Norfolk – The Strategic Role for Norfolk County Council, 2012/17

3.3.16 Norfolk County Council (NCC) has produced an economic growth strategy to support Norfolk’s development 2012-17. In its first Priority Theme the strategy states that: *“maintenance of existing road network is critical and the rural nature of the county makes connectivity within and beyond the county a key priority. The Norwich Northern Distributor Route (NDR) (...) is vital to the continued economic success of the Greater Norwich area, also benefiting North Norfolk and Great Yarmouth”* (‘Delivering Economic Growth in Norfolk’ – The Strategic Role for Norfolk City Council, page 4).

3.3.17 Key challenges facing the implementation of this strategy include: addressing infrastructure constraints; securing infrastructure funding; encouraging business start-ups; securing investment from key growth sectors; tackling the mismatch between skills and employability (‘Delivering Economic Growth in Norfolk’ – The Strategic Role for Norfolk City Council, page 3-4).

3.3.18 Construction and operation of the NDR will significantly contribute towards the delivery of the following Priority Themes and Action Plans which are identified within Norfolk’s economic growth strategy (‘Delivering Economic Growth in Norfolk’ – The Strategic Role for Norfolk City Council, paragraph 5.2):

- “To provide support for growth and removing infrastructure constraints” (‘Delivering Economic Growth in Norfolk’ – The Strategic Role for Norfolk City Council, Theme 1 Section 5.2.1, page 14-16) - priorities include:
 - Roads and rail – Infrastructure Plan to define targets (June 2012)
 - Great Yarmouth ‘Third River Crossing’
 - Breckland riverside regeneration
 - West Norfolk – housing creation and College facility regeneration
 - North Norfolk and Norwich Research Park
 - Super-fast broadband - targeted at 30Mbps
- “To help businesses to start up and grow” (‘Delivering Economic Growth in Norfolk’ – The Strategic Role for Norfolk City Council, Section 5.2.2, page 16-20):
 - Business start-up scheme – targeted 400 new start-ups by 2013/14
 - Rural growth network – 1,200 individuals given advice; 400 businesses assisted; 150 new businesses started; 700 jobs created
 - Hethel Engineering Centre – targeted 40,000 ft² Advanced Manufacturing Centre built at Hethel by March 2013

- To improve perceptions of Norfolk's business offer and secure inward investment and growth in key sectors ('Delivering Economic Growth in Norfolk' – The Strategic Role for Norfolk City Council, Section 5.2.3, page 20-22)
 - Develop 'World Class Norfolk' campaign.
 - Work with UK Trade & Investment's Investment Services Team (UKTI IST) and other partners to deliver inward investment.
 - Work with UKTI IST and district partners to deliver Investor Development Programme.
 - Deliver a programme of visits to businesses outside UKTI criteria.
 - Produce a Sector Development Plan.
 - Work with local Councils to maximise offshore energy opportunities.
 - Maximise Enterprise Zone developments – targeted 80 new businesses by 2015.
 - Build on relationships with Essex and Suffolk County Councils.

- "To provide fair access to the public sector" (Delivering Economic Growth in Norfolk' – The Strategic Role for Norfolk City Council, Section 5.2.5, page 24):
 - Tendering opportunities are filtered through Contracts Finder website
 - Annual 'Meet the buyer' event established
 - Procurement process for smaller suppliers is less bureaucratic
 - Remove unnecessary requirements for high level insurance cover
 - Simplify processes for lower-value procurements

Greater Norwich Economic Strategy 2009/14

3.3.19 This strategy sets out the current economic vision and priorities for Greater Norwich to equip the area for facilitating its growth potential.

3.3.20 A number of key challenges to growth for the Greater Norwich area have been outlined in the strategy, and these are significant factors in determining the area's growth potential. These include (Greater Norwich Economic Strategy 2009/14, paragraph 1.51. page 13):

- the provision of sufficient jobs in accordance with population increases;
- a diverse economic base with varied knowledge sectors to create new employment;
- stimulate entrepreneurship, increasing business start-up rates;
- improving international, national and regional connectivity to promote sustainable transport; and
- the development of an appropriate range of employment sites.

3.3.21 As a focus for local growth, the sustained development of Greater Norwich is vital; the NDR development is closely aligned with the following main development objectives within this strategy:

- *“To strengthen the area’s economy, maximise diverse employment opportunities, and ensure that the businesses can flourish”* (Greater Norwich Economic Strategy 2009/14, Objective 1, page 16)– one of the priorities within this objective is to support the growth of the knowledge economy by encouraging key sectors and facilitating the attraction of businesses that can exploit the research potential of the local universities. The sectors identified include engineering, environment, and life sciences
- *“Ensure that the area has the necessary infrastructure and quality of environment to attract and retain investment and support business growth”* (Greater Norwich Economic Strategy 2009/14, Objective 3, page 17)- developing improved and sustainable transport and communications infrastructure to support planned growth and development; maintaining an appropriate supply of suitably located employment sites; and ensuring investment in required public utilities infrastructure.
- *“To raise the profile of Norwich as a high quality place to live, work and visit”* (Greater Norwich Economic Strategy 2009/14, Objective 4, page 17) - if the proposed development were to succeed it would help to develop a stronger image for the area, and act as a catalyst for further investment.

Norwich Area Transportation Strategy (NATS) (2004, updated in 2010¹⁵)

3.3.22 Norfolk County Council’s NATS presents a high level strategy for transport across the county of Norfolk and within Norwich, as well as key short, medium and long term transport delivery methods to realise the area’s growth potential. One of the main objectives of NATS is to ensure that transport services meet the needs of local people, businesses and visitors to support continued sustainability across the area minimising the adverse effect of journeys on people and the built and natural environment. NATS promotes travel choice, recognising the need to maintain the economic health of the Norwich area, and does not propose radical restrictions on vehicular access.

3.3.23 NATS recognises that the major growth in the area is likely to include a major urban extension to the north east of Norwich and growth of Norwich International Airport, and looks to provide the essential infrastructure needed to accommodate this growth, including the NDR.

3.3.24 The strategy identifies the following transport measures:

- a bus rapid transit network;
- improvements to a core bus network as well as integrated ticketing and improved information;
- city centre improvements;
- a package of cycling and walking improvements;
- specific rail service improvements;
- Smarter Choices initiatives; and

¹⁵As part of the development of Norfolk’s Third Local Transport Plan (LTP3), *Connecting Norfolk*, March 2011

- the NDR.

3.3.25 In terms of helping improve business performance; the NDR was highlighted as the most important scheme within NATS. It was demonstrated to be essential in providing the necessary capacity to enable continued improvements for buses, cyclists and pedestrians. When implemented, the NDR will provide relief to key radial routes and therefore additional capacity for the implementation of enhanced priority for buses, cyclists and pedestrians.

Norwich City Deal, Expression of Interest, January 2013

3.3.26 In November 2012 Norwich City Council and the New Anglia LEP were invited by Government to prepare an expression of interest for negotiating a City Deal. This was followed in February 2013 by the Cabinet Office announcing Greater Norwich's inclusion in the second round of City Deals.

3.3.27 In February 2013, the Cabinet Office announced it would work with 20 towns and cities, including the Greater Norwich area, as part of a second wave of City Deals. The first and second wave of deals was presented as an attractive package designed to:

- *“Give cities the powers and tools they need to drive local economic growth;*
- *Unlock projects or initiatives that will boost their economies; and*
- *Strengthen the governance arrangements for each city.”* (The Cabinet Office, Unlocking growth in Cities: City Deals – Wave 1, 2012, page 1).

3.3.28 An expression of interest was submitted to the Cabinet Office on 15 January 2013 following collaborative work involving Broadland, Norwich City, South Norfolk and Norfolk County partners on a plan to develop a Greater Norwich approach. An overview of the Expression of Interest is publicly available¹⁶ and its main objectives are summarised below:

3.3.29 The Expression of Interest sought to bring together the three strands of enterprise and innovation, skills, and infrastructure to exploit the growth potential of the internationally renowned Norwich Research Park (NRP), in order to develop it into a world-class science centre acting as a catalyst for economic growth:

- The intention is to build on private sector investment to expand the NRP to 55ha); such expansion is expected to bring much wider benefits, with the LEP confident a major transformational boost to the NRP will help stimulate growth to the whole Greater Norwich area.

¹⁶ <http://www.norwich.gov.uk/YourCouncil/Partnershipworking/Pages/CityDealForGreaterNorwich.aspx>

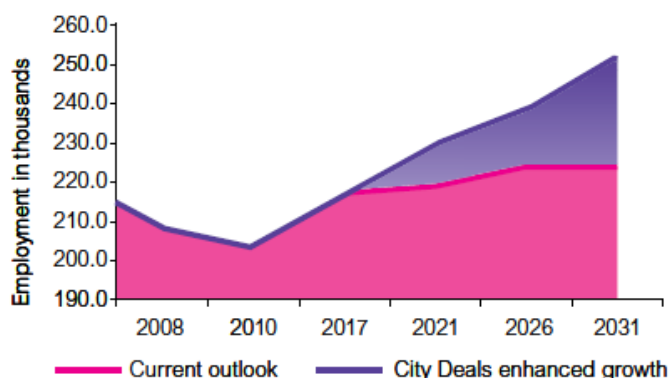
- Hand-in-hand with any major boost to the jobs market is the need for additional homes and infrastructure, including community facilities, transport connections and utilities. The LEP aims to help facilitate delivery of the 37,000 new homes proposed in the JCS.
- By working together and maximising the opportunities for government and private sector funding, as well as using new powers to be granted to the area authorities pursuant to the City Deal, the LEP will be set to accelerate the area's growth, so vital for economic recovery.
- As well as providing additional jobs, the LEP will also seek to play a role in addressing the mismatch, identified by local businesses as a local issue, between job opportunities and skills provision.

3.3.30 The LEP's ambition for the Norwich City Deal is to catch up on the 'lost decade' of lost jobs and output. Dynamic growth at the NRP will act as a catalyst to deliver:

- Accelerated local growth for national economic recovery.
- 40,000 new jobs, which is a major increase over the LEP's pre-recession projection (over a 30% increase) and a significant uplift to its current outlook.
- 37,000 new homes for Greater Norwich.
- 50% increase in knowledge based businesses.
- 30% increase in GVA above trend.
- An international flagship for life sciences enterprises. (paragraph D1, page 09).

3.3.31 The City Deal approach is expected to deliver enhanced jobs growth for Greater Norwich as Figure 3.3, below, indicates.

Figure 3.3 – Norwich City Deal - Greater Norwich Job Growth



Source: Greater Norwich City Deal, Expression of Interest, January 2013, page 3

- 3.3.32 The importance of infrastructure to supporting economic growth in Greater Norwich is reiterated through the City Deal submission. The public sector partners: Broadland District Council, Norwich City Council, Norfolk County Council and South Norfolk Council intend to “create infrastructure to support the expansion and growth of the NRP which in turn will release private sector investment and jobs in housing development to support business and employment growth” (GNCD – EOI, page 9). The JCS proposes that at least 37,000 new homes are to be delivered by 2026 (JCS, Spatial Planning Objective 2, page 20).
- 3.3.33 In recent years, housing growth stalled because of the global economic downturn. This generated a loss of confidence in the housing sector, uncertainty of delivery and lack of access to finance. The City Deal proposal will enable the public sector and its partners to put the JCS back on track post-recession (Greater Norwich City Deal, Expression of Interest, page 9). The benefits of growth are expected to spread across Norfolk and the New Anglia LEP area, through the supply chain, linking for example with the energy focussed Enterprise Zone in Great Yarmouth/ Lowestoft. City Deal objectives have the potential to both deliver and benefit from key infrastructure such as the NDR, A47 improvements and improvements in the Norwich-London rail service.
- 3.3.34 Having successfully passed the selection process, the City Deal partners subsequently engaged with ministers and government departments over a six-month period to negotiate the full scope of the deal for the area. The negotiation document (due to be publicly available in November 2013) is understood to have expanded the proposals to focus on three key locations for growth. In addition to Norwich Research Park, the aviation cluster is to be expanded at Norwich International Airport and a digital creative cluster is to be further developed in the city centre (based around Norwich University of the Arts). Alongside reaching an agreement on the measures required to deliver the ambitious plans for these locations/clusters, the LEP will also be seeking to have a greater influence over how national programmes for investment in skills, jobs, infrastructure and housing can be shaped to benefit the whole of the Greater Norwich area. A final decision will be made by Government in November 2013.
- 3.3.35 Whilst the NDR is to be built on the opposite side of the city to Norwich Research Park, the anticipated growth at Norwich Research Park is expected to give rise to additional growth across the Greater Norwich area. This will require enhanced transport infrastructure and transport connectivity.

3.4 Summary

- 3.4.1 The overarching policy framework for Norfolk, Greater Norwich and the JCS area is oriented towards growth and recognises the importance of infrastructure provision to support the occurrence of growth. An urban extension to the north-east of Norwich would deliver a lot of the growth identified in the JCS and the area around Norwich International Airport has potential for an aviation-related cluster to further develop in that area. The NDR is essential if this growth is to be delivered and, at the micro level, is critical in allowing sites to be brought forward. Consequently, the NDR is critical to the future development of Greater Norwich and to Norfolk's economy.

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4.1 Business Consultation

- 4.1.1 During 2011, Mott MacDonald conducted consultation and engagement work with a range of Norfolk-based businesses. The process of consulting and engaging with the local business community was not intended to be a scientific exercise with a stratified sample used to produce quantifiable results. It was a qualitative exercise designed to gather local nuanced opinion from a range of businesses and business representatives e.g. Chamber of Commerce.
- 4.1.2 In total 39 businesses responded and provided an overwhelmingly positive and supportive response to proposals for the NDR. A summary of the consultation responses received is set out below, together with a number of representative statements from respondents (which have been anonymised for the purposes of reporting at the business community level rather than expressing a series of individual business concerns).

4.2 Summary of comments received

- 4.2.1 The main theme to emerge from respondents' comments was the need for improvement of traffic flow resulting in a reduction in journey time and fuel costs. Other themes included: economic benefits; a reduction in pollution levels; and improved livelihoods of local inhabitants. The following comments illustrate the general sentiment within the business organisations which were consulted:
- "I thoroughly support the bid to Government for funding for the Norwich Northern Distributor Road"
 - "I fully enthusiastically support the introduction of the Norwich Northern Distributor Road"
 - "I would like to show my strong support for the building of the Norwich Northern Distributor Road"
 - "We are pleased to offer our support for the proposed scheme"
 - "Me and my drivers would certainly welcome the NDR"
 - "I am very supportive of the NDR"
 - "I fully support the Norwich Northern Distributor Road bid"
 - "We support the NDR and welcome it"
 - "The construction of the Norwich Northern Distributor Road is the single most important road improvement in Norfolk"
 - "My view is that the NDR is way overdue so I am therefore fully supportive"
- 4.2.2 Furthermore, it was suggested from the business responses received that the NDR will improve traffic flow through and around Norwich and this may have multiple positive knock-on effects for local businesses and residents. Journey times are expected to be reduced which will therefore cut fuel costs and

improve business prospects for businesses located north of Norwich. Businesses such as distribution companies and taxi firms also predicted they would be able to increase productivity and therefore increase turnover following the NDR's construction.

- 4.2.3 Respondents also suggested that the NDR is vital to support the growth of the Greater Norwich and Norfolk area; some respondents predicted that the tourism industry will benefit significantly due to easier access into the city drawing in new visitors and a larger number of customers who currently travel elsewhere. It was suggested that in addition to attracting new clients and customers, new industries, such as the energy sector, could potentially start up in the area. This, in turn, would create more local employment within and around Norwich. Costs for the local councils are also predicted to be reduced due to a reduction in the need for repairs and maintenance of smaller roads that are not designed for the current usage levels, if traffic currently using those roads was redistributed onto the NDR.
- 4.2.4 More direct effects for local inhabitants of Norwich were predicted by some respondents to include a reduction in hazards associated with large vehicles using smaller village roads; it was mentioned in the consultation responses that currently larger vehicles than cars are traveling within close proximity to schools posing risk of accident. Respondents also noted that removing the current high traffic volumes in and around central Norwich is also expected to remove the assumed high noise and air pollution levels away from inhabitants of congested areas.
- 4.2.5 In contrast to the supportive responses; 3 of the 39 consultees expressed negative responses in relation to the NDR. The reasons for such negative responses were linked to opposition to the potential new housing developments associated with the NDR, such as Rackheath eco-town, and respondents said that they felt that damage to the existing countryside could not be justified.
- 4.2.6 In conclusion, a large proportion of respondents consulted (92%) expressed their full support for the NDR and gave varying examples of how the NDR would benefit the local area and/or business growth in that area.

4.3 Summary

- 4.3.1 The consultation responses provide a range of qualitative commentary that is, in the main, favourable to the NDR, and it is clear that the NDR is perceived to be a piece of infrastructure which will simultaneously support the growth of local businesses and encourage local economic development.

5.1 Assessment of the potential Impact of NDR on GVA and Employment

- 5.1.1 This section sets out an assessment of the favourable impact of the NDR on GVA and employment statistics in the study area as a result of development on land where conditions will become more favourable for development once the NDR has been constructed. Development of the various sites considered would, in the absence of the NDR, place greater and greater strain on the existing road infrastructure. Well before the end date (2026) for the JCS, congestion would require a planning-led halt to development.
- 5.1.2 We discuss 'additionality' later in this section, meaning the additional development and employment that would be created with, rather than without, the NDR. Although we consider additionality in relation to each development site identified in the study area, it seems probable that full development at any one site would be possible without the NDR, but that development of all sites would not be possible without the NDR. The judgments about additionality, which have been reached by Mott MacDonald in conjunction with NCC (planning and economic development officers) and those involved in the development and masterplanning of Norwich international Airport and Norwich Industrial Estate, should be read in this context and considered against the relevant policy objectives of the JCS.

5.2 Assessing the Impact

- 5.2.1 Traditional analysis of the benefits of road schemes concentrates on what may be called their 'transport' benefits, such as reductions in commuting times and accidents. Those benefits are monetised in accordance with established principles set out in the DfT's transport analysis guidance ('WebTAG') and the resulting money values, discounted over time, may be compared with the capital cost of the scheme being assessed.
- 5.2.2 In addition to such transport benefits, a road scheme will often enable a particular site to be developed, creating jobs and economic activity on that site. Such benefits have often in the past been excluded from the assessment of road schemes, in the belief that perfectly functioning markets might allow the benefits to arise anyway (though not necessarily in the same locations). But in current economic circumstances markets are manifestly not functioning with

textbook efficiency, and an express component of government transport policy is to support schemes that generate benefits in the form of additional jobs and economic activity, as well as transport benefits, by supporting a transport system “that is an engine for economic growth” (Department for Transport: Creating Growth, Cutting Carbon – Making Sustainable Local Transport Happen, 2011, paragraph 1.3). The Green Book states at paragraph 5.25 that *"In principle, appraisals should take account of all benefits to the UK. This means that as well as taking into account the direct effects of interventions, the wider effects on other areas of the economy should also be considered."*

- 5.2.3 This section of this report sets out an assessment of such wider economic development benefits which are forecast to arise in connection with the NDR.
- 5.2.4 The NDR will facilitate commercial and residential developments that would, at least in part, be unlikely to occur without the NDR, thereby generating increased investment and employment. The NDR will raise the level of employment in the study area, rather than merely bringing about changes in job locations without affecting the level of employment. Even where the NDR would facilitate development on particular sites that would not be possible (on these sites) in its absence, part of that development might potentially have arisen elsewhere in Norwich or the surrounding area: so not all of the gross jobs (i.e. the extra jobs created on the particular sites where development is facilitated by the NDR) will be ‘additional’, and as noted at the start of this section, the primary focus of this report is additionality.
- 5.2.5 The assessment of additionality based on forecasts rather than actual results (an ex ante appraisal) is inevitably more difficult than it is in an evaluation based on historic factual information (ex post evaluation) when occupiers and others can be surveyed about what they would have done in the absence of the intervention. In an ex ante appraisal, which is necessary in the present assessment of additionality for the NDR, the uncertainties inherent in such an assessment mean that a conservative approach should be taken, under which additionality is assessed at the low point of the plausible range. In consideration of this, a judgment has been made in consultation with NCC and (Norwich International Airport and Norwich Industrial Estate), about the extent of additionality attributable to the NDR, and this report is based on that judgment.
- 5.2.6 The NDR is anticipated to have a generally beneficial effect on the economy of Norwich and the JCS area. It will, for instance, improve transport connections between Norwich city centre and the remainder of the county of Norfolk and is

expected to promote city centre development; furthermore, it will substantially improve the connection between Great Yarmouth and Norwich International Airport - respectively the sea and land bases for much southern North Sea offshore energy activity - and thus it will help to promote development in Great Yarmouth as well as Norwich. Benefits realised at some distance from the NDR are, however, less obvious than those at sites on or very close to the NDR, and therefore this report does not seek to quantify additionality in relation to those sites; rather, their existence is noted as providing supplementary justification for the NDR.

- 5.2.7 Where, in closer proximity to the NDR, (quantified) additionality does arise, there are favourable knock-on effects on the local economy, as net additional workers spend part of their wages on local services and as new or larger firms increase their local purchases.
- 5.2.8 The overview of additionality set out above focuses on employment. But jobs vary widely from highly-paid professional jobs to minimum wage jobs. Wages are the main component of GVA, the balance of GVA being essentially profits, rent and interest. GVA is important locally and to national government, because an increase in GVA constitutes economic growth, a primary political objective in the current economic circumstances. It is perhaps especially important in Norfolk where GVA per capita, as was noted earlier (in section 2 drawing on ONS' GVA data), has been declining compared with the national average for a number of years. As well as quantifying multiplier and linkage effects, the approach adopted in this report estimates the effect on GVA of additional job creation in connection with the NDR, on the basis of norms for the industries in which jobs are considered likely to be created: a number of jobs on a retail park will, for instance, make a smaller contribution to GVA than that which would be made by the same number of jobs in a high-tech engineering facility.
- 5.2.9 GVA and employment patterns are likely to remain consistent for many years; once they arise they are likely to persist for several decades. In this report, GVA effects are evaluated over a 30 year period. Because GVA builds up over time (rather than the whole effect being felt at once), the average duration of the business activities generating the GVA, weighted by their discounted value, is some 15 years, which is a conservative estimate of the likely duration of those business activities. Total GVA resulting from a scheme may amount to a very large sum over 30 years, even after the substantial reduction occasioned by discounting at the suggested rate of 6% per annum. But such GVA must be 'earned' by the deployment of labour and capital. If, for instance, a road

scheme yields a discounted total GVA increment of £X over 30 years that is in current, post-recessionary, circumstances a benefit, but a smaller benefit than £X given the requirement to earn the GVA. This report aims to identify the GVA increment. The judgment as to whether that increment, in conjunction with the other benefits (and dis-benefits) of the proposed scheme, justifies the expenditure arising from the scheme's capital cost is a matter for the decision maker.

5.3 Relationship with JCS aspirations for growth

5.3.1 The JCS for Broadland, Norwich and South Norfolk was adopted in March 2011. It provides the essential context for an assessment of the economic impact of the NDR. The JCS is based upon anticipated growth in the economy and population of the UK and their likely implications for Norfolk and for the JCS authorities specifically. Its central targets ('grand challenges') are the provision between 2008 and 2026 of:

- 37,000 additional homes; and
- '27,000 new jobs of all types and levels in all sectors of the economy and for all the workforce.' (Joint Core Strategy, pages 20-23).

5.3.2 The JCS is an integrated strategy. Its objectives need to be taken forward simultaneously. For example, the employment objective is likely to be met only if other JCS objectives such as those for housing and workforce skills and the infrastructure necessary to support them are also met. In this context, the NDR is fundamental to the delivery of the JCS objectives of creating new homes and jobs. As well as facilitating employment and housing development, the NDR is expected to release capacity on the existing road network within Norwich to allow significant improvement to public transport, walking and cycling facilities.

5.3.3 The JCS states (Para 6.19) that '*completion of the Northern Distributor Road is fundamental to the full implementation of this Joint Core Strategy. In particular it is necessary to allow significant development in the growth triangle*', but the JCS also states (Para 7.13) that '*delay to, or non-delivery of, the NDR would not prevent the JCS provision of housing and employment development within the Norwich City and South Norfolk areas*'. However, it does also state (Para 7.14) that '*without the NDR the housing and employment growth in the Broadland part of the NPA cannot all be delivered*'.

5.3.4 The JCS was adopted in 2011, over two years ago, when various development proposals were at an embryonic stage. It is suggested, as a result of subsequent progress, that the split in the JCS between sites in Broadland District that require the NDR to enable them to come forward, and those sites in

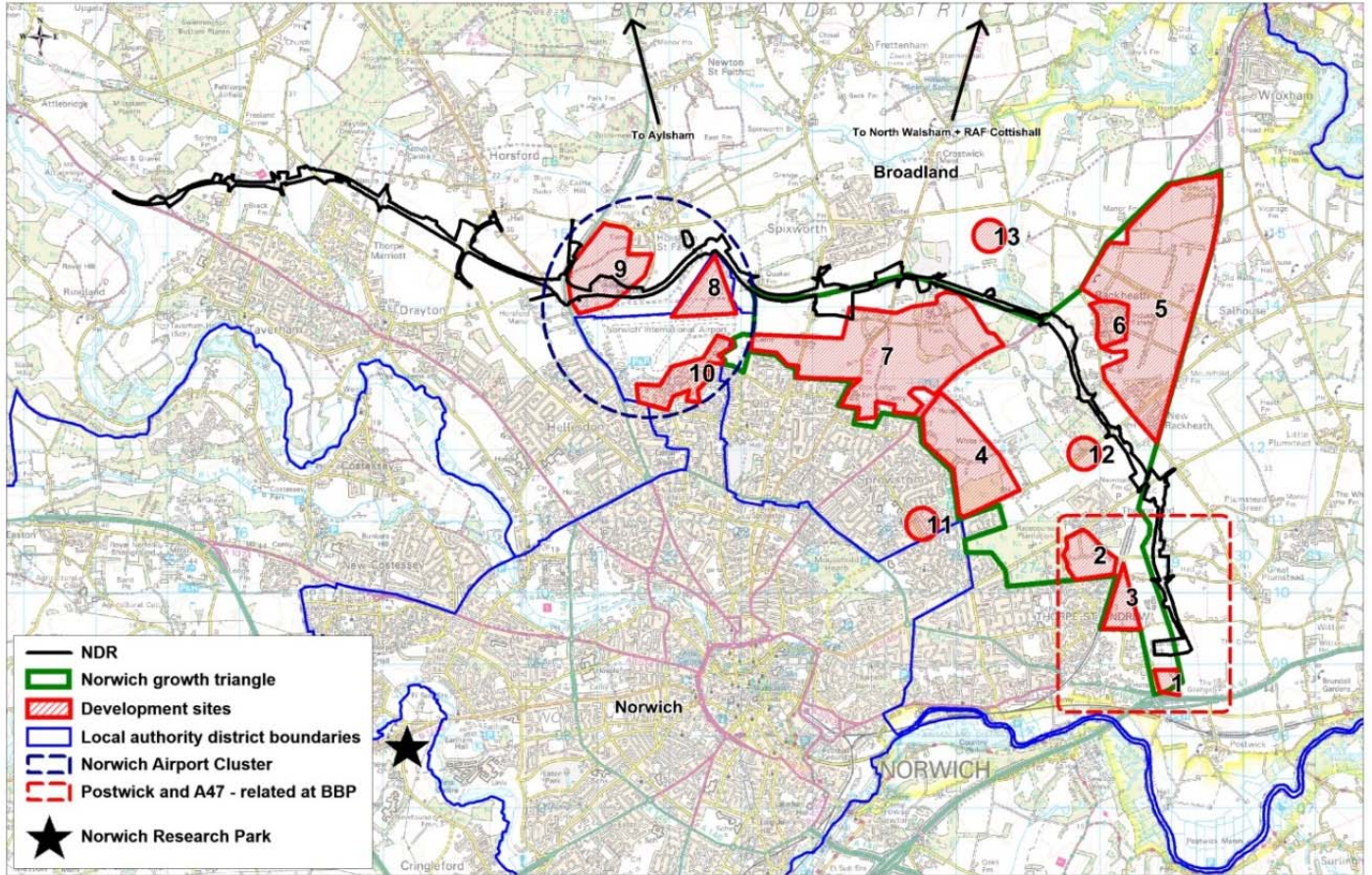
Norwich that do not, whilst remaining essentially valid, requires flexible interpretation in the light of further work on the requirements of the individual sites.

5.4 Development Sites

5.4.1 Through a review of the policy documents in Section 3 and discussion with Norfolk County Council economic development and planning staff, a list was drawn up of key sites where development was at least partly contingent on construction of the NDR. Those key sites form the basis of the impact assessment in the following sub-section of this report and they are shown numbered 1 to 13 on the plan in Figure 5.1 below, where they are also grouped within three sub areas:

- **Postwick** – sites 1, 2 and 3 that are also linked to the Postwick junction and A47 improvements (and which are located within the red dotted rectangular shaped boundary line on the plan).
- **Norwich Growth Triangle** – sites 4, 5, 6, 7 and sites 11, 12 and 13, which are located to the north-east of Norwich and which are included in the JCS as part of the urban extension (These sites (as well as the 3 Postwick sites) are located within the green solid roughly triangular shaped boundary line on the plan). (The Postwick sites are geographically located within the growth triangle boundary but they are identified in the JCS by a separate and separable policy – and were not allocated through the Growth Triangle policy.)
- **Norwich International Airport** – sites 8, 9 and 10, which are adjacent to, or related to, Norwich Airport and its operations (and which are located within the blue dotted circular shaped boundary line on the plan).

Figure 5.1 – Development sites and areas referred to in the economic impact analysis



5.4.2 Further information on each site is contained in Table 5.1 below. It should be noted that sites 12 and 13 are not site specific but relate to broader areas located between Postwick and Norwich International Airport at which development is likely to be influenced by the NDR.

5.4.3 An explanation of the quantitative benefits arising from those 13 sites is included in sub-section 5.5.2. below.

Table 5.1 – Sites included in the economic development impact assessment

Site name	Site description	Comment and JCS Reference
1.) Broadland Gate Business Park	Permission for extension of business park for predominantly B1 uses	Site is linked to Postwick Expansion referred to throughout JCS but particularly Appendix 8 (JCS, p. 146).
2.) Broadland Brook Farm	Permission for 600 dwellings	Site is linked to Postwick Linked to expansion of Broadland Gate Business Park. Expansion referred to throughout JCS but particularly Appendix 8 (JCS, p 146).
3.) Broadland Gate Laurel Farm	Permission for extension of business park for predominantly B1 uses	Site is linked to Postwick Linked to expansion of Broadland Gate Business Park. Expansion referred to throughout JCS but particularly Appendix 8 (JCS, p 146).
4.) Broadland Housing site – Blue Boar Lane	Existing permission, not yet implemented	Site is counted as gross only because it has planning permission in place ahead of the NDR. Site referred to in the JCS (page 56)
5.) Rackheath Ecotown	Planning framework is in place. Detailed planning and phasing still evolving	Part of urban extension Promoting economic growth at Rackheath included in the JCS (Objective 3, page 21).
6.) Rackheath Industrial Estate	Improvements brought forward under influence of NDR and Rackheath	Improvements to existing industrial estate
7.) Beyond Green Developments	Planning framework is in place. 3,500 dwelling mixed-use development. Benefits from resolution to permit, limited to 900 dwellings pre-NDR, with the remaining 2,600 dwellings dependent on the NDR coming forward	Part of urban extension
8.) Norwich Airport (Airport Site 4)	Land adjacent to the airport will be accessed by NDR	Aviation-related cluster – Norwich Aeropark

		Site being brought forward by Norwich Airport though NDR will assist in advancing the development timeframe Promoting economic growth at Norwich International Airport included in the JCS (Objective 3, page 21).
9.) Norwich Airport (Airport Site 3)	Land adjacent to the airport will be accessed by NDR	Aviation-related cluster Promoting economic growth at Norwich International Airport included in the JCS (Objective 3, page 21).
10.) Norwich Airport Industrial Estate	Existing industrial estate being masterplanned to support better use of existing employment land allocation to provide additional space	Aviation-related cluster and general employment uses
11.) Salhouse Road	Land in proximity to airport, NDR and existing employment uses	Aviation-related cluster and general employment uses
12.) Housing in North East Growth Triangle	Sprowston/ Thorpe St Andrew	Not site specific The growth triangle is referred to throughout the JCS including Policy 9 (page 50) and Policy 12 (page 67).
13.) Housing in Broadland part of NPA	Broadland	Not site specific (JCS, Policy 14, page 35).

5.5 NDR economic development benefits

5.5.1 Construction of the NDR will require prior or simultaneous implementation of the Postwick Hub Scheme (PHS). This report considers the effects of the NDR and the PHS schemes together on the economy of Greater Norwich and the wider county. The two schemes will have substantial effects on traffic flows in their immediate vicinity and in the wider city area, and these effects will yield benefits and costs; and the NDR and PHS will, of course, incur capital costs for their construction. The traffic effects and capital costs have been considered in

detail in the report focused on transport economic assessment and are therefore not considered further here¹⁷.

Qualitative benefits

5.5.2 A judgment has been made, drawing on consultation with local experts, that the NDR and the PHS, if implemented, will have wide-ranging, favourable effects on the economy of Norfolk, including favourable effects on Norwich city centre, Great Yarmouth and several settlements north of Norwich. These places are, however, some distance from, or otherwise not closely connected, to the two schemes. This report seeks to describe, rather than to quantify, the likely effects on them of the two schemes. The descriptions are set out below in Table 5.2.

Table 5.2 – NDR qualitative assessment of wider economic benefits

NDR's Influence	Description of qualitative benefit
<ul style="list-style-type: none"> • Strategic infrastructure 	<ul style="list-style-type: none"> • Greater Norwich is on a growth trajectory as the JCS clearly states; the north-east of Norwich is a key location for accommodating that growth yet its infrastructure is widely regarded as insufficient for a modern, growing economy. The introduction of the NDR will bring Norwich's strategic road infrastructure up to the standard of other core and major cities where road infrastructure has been a factor in distributing growth and development spatially. • In areas experiencing growth there can be a risk of the property market overheating if the supply of jobs and homes is not adequately planned for. The JCS sets the planning framework for growth and the NDR is a key strategic step in distributing the growth to north-east Norwich and so mitigating this risk.
<ul style="list-style-type: none"> • Norwich city centre – visitor economy 	<ul style="list-style-type: none"> • If traffic is removed from the city centre it will make the area more attractive as a place to live in, to invest in and to visit. There are likely to be benefits to property and land values as well as increases to visitor numbers over time as the area's attractiveness becomes more widely understood and appreciated. Other historic city centres with heritage and cultural attractions at their core have seen the benefit of removing traffic from the centre: Cambridge, Canterbury, Chester and York are prime examples, and Norwich would benefit from the ambience and attractiveness of a less congested core with the NDR in place • Simultaneously, visitor economy effects will stimulate additional

¹⁷ For further information please refer to the 'NDR – Economic Appraisal Report' which has been submitted as part of the DCO application documentation.

NDR's Influence	Description of qualitative benefit
	<p>consumption leading to job creation over time through multiplier effects as the central area attracts more people, whose dwell time is longer and who spend more money in the process. Increased demand from visitors could lead to an increase in the volume and quality of hotel accommodation in the city centre too, but this will be linked to demand and hotel operators' awareness of the market opportunity in the city.</p> <ul style="list-style-type: none"> • Increased visitor effect and the expenditure it injects into the local economy is often overlooked in terms of economic benefit because the jobs it creates are lower-paid, lower-skilled service sector jobs. This is true, but they are often precisely the type of jobs that many people seek as part of a portfolio approach to employment (i.e. multiple part-time jobs simultaneously) and are accessible to people with lower skills and educational attainment of which there are concentrations to the north of the city and in its northern hinterland.
<ul style="list-style-type: none"> • Norwich – visitor statistics 	<ul style="list-style-type: none"> • Data on the economic impact of tourism for Norwich City, 2010¹⁸ sets out headline figures for volume and value of tourism as at 2010 as follows: <ul style="list-style-type: none"> – Overall value of tourism to Norwich economy £432m – Total tourism-related employment, 7,357 jobs (13.9% of all employment) – Total number of trips 5.2m, of which 4.7m are day trips and 0.5m staying trips • Given the importance of day trips to the Norwich visitor economy, improved connectivity and journey reliability through construction of the NDR will be essential to preserving and growing the volume and value of tourism in future.
<ul style="list-style-type: none"> • Norwich city centre – retail offer 	<ul style="list-style-type: none"> • Norwich remains the primary shopping destination in the East of England according to a variety of published nationwide retail rankings based on varying criteria. For example, Norwich has consistently ranked in the top ten in Javelin Group's Venuescore¹⁹ publication (evaluating each venue in terms of their provisions of multiple retailers). 2013-14 has been the exception (ranked 13th) compared to previous rankings at number 5 and number 9 over the past decade. The city was the only East of England venue in the top ten in the Venuescore 2011-12 survey. This is a great improvement in comparison with its rank of 45 in 1989 (Hillier

¹⁸ Tourism South East (2010) Economic Impact of Tourism, Norwich City 2010 Results

¹⁹ Javelin Group 'Venuescore 2013-14 UK Shopping Venue Rankings'

NDR's Influence	Description of qualitative benefit
	<p>Parker, Shopping Centres of Great Britain, 1990).</p> <ul style="list-style-type: none"> • In 2006 Norwich was reported to generate £1.17 billion of retail spending annually, well ahead of its nearest regional competitors²⁰. The 2011 CACI rankings, which measure total consumer expenditure in retail destinations, place Norwich first in the region and tenth nationwide with £1.18 billion of consumer expenditure spent in the city. Experian's 2008 retail rankings, using a similar measure, placed Norwich thirteenth nationally, down from tenth in 2007, having been overtaken by Liverpool, Cardiff and Westfield (London), all of which have recently seen new retail development²¹. • Overall comparison goods spend in Norwich has risen significantly in the same period, up from £1.14 billion in 2007 to £1.38 billion in 2008. Data from the 2011 CACI Retail Footprint states Norwich has a total retail expenditure of £2.2 billion²². Norwich continues to hold its own as the premier retail destination in East Anglia and improved accessibility for shoppers will assist in preserving its position going forward.
<ul style="list-style-type: none"> • Norwich city centre property market 	<ul style="list-style-type: none"> • Direct cause and effect is difficult to state categorically, but development sites such as Anglia Square and Duke Street in Norwich could benefit from the NDR in an indirect way over time. The NDR would enhance their connectivity with and accessibility from the north, making them a more attractive proposition for investment. Duke Street has benefitted from new development (residential, hotel, car park) completed pre-recession and, in a recovering market over the next few years, the NDR could provide impetus for the remaining sites in the area to be developed. At the same time, there is expected to be an improvement in public transport including the proposed Bus Rapid Transit (BRT), for which capacity on the network is expected to be released by the NDR, and this would also improve connectivity and accessibility. • Anecdotal evidence from NCC's economic development team suggests that when Broadland Business Park was first opened it provided a boost to the city centre commercial office market as property owners in the city centre upgraded their offers to meet the competition from the new premises at Broadland. There is real scope for the same effects to be felt again as development in the NDR Corridor provides renewed impetus for developers and

²⁰ Norwich Local Development Framework, Norwich City Centre Shopping Floorspace Monitor 2006

²¹ Norwich Local Development Framework, Norwich City Centre Shopping Floorspace Monitor 2008

²² Intugroup: 'Norwich, a Top 10 City' (Accessed October 2013
http://www.intugroup.co.uk/media/80466/intu2032_chapelfield_18.02.13.pdf

NDR's Influence	Description of qualitative benefit
	property owners to see it as a catalyst for renewal and upgrade of existing city centre property.
<ul style="list-style-type: none"> Norwich Research Park (NRP) 	<ul style="list-style-type: none"> NRP is clearly a key driver of economic growth for Norwich and the sub-region. The NDR, and the enhanced public transport provision, including cross-city BRT facilitated by the NDR (as explained above), will improve links between the NRP and the north of the city, which will increase the supply of labour able to work at NRP in high skilled and low skilled jobs (this is important as the cost of travel to work is more significant for low skilled jobs and the NDR will help to improve access to the NRP from Norwich's less affluent neighbourhoods). Furthermore, the NDR will make areas to the north of Norwich more accessible as places to live for people working at NRP; this could have a stimulating effect on residential property prices to the north of Norwich which are suppressed compared to areas south of Norwich as illustrated in Section 2. As NRP grows and expands, as articulated in Section 3 (Norwich City Deal), the number of highly skilled and highly paid workers employed there will increase. Based on current patterns of behaviour it is highly likely that these newcomers to the area will seek to live in established higher-value residential areas to the south of Norwich, close to their peers and within easy commuting distance to NRP. This may lead to increased demand and inflated prices in those areas, a situation which could be alleviated through the NDR extending the area of housing search to the north of Norwich, the villages on the urban fringe and market towns in the city's northern hinterland.
<ul style="list-style-type: none"> Great Yarmouth and offshore energy 	<ul style="list-style-type: none"> Great Yarmouth is a centre for the North Sea's growing offshore energy sector industries. Links between Great Yarmouth and Norwich International Airport are important as offshore workers and contractors will be flying to Norwich International Airport from Aberdeen and Amsterdam then travelling on to Great Yarmouth by road, or being helicoptered offshore from the Airport. The offshore sector in the North Sea is set to expand as the Government issues further offshore wind licences. Presently there are about 1,800 turbines planned and this could grow to 3,300 in the future; with this growth there will also be a commensurate increase in workers travelling to and through the area; with the NDR providing part of the road link between Norwich Airport and Great Yarmouth, it will become an important route.
<ul style="list-style-type: none"> Norwich and offshore 	<ul style="list-style-type: none"> As the offshore renewables sector expands there will be demand for office space in the area. Great Yarmouth has disadvantages in

NDR's Influence	Description of qualitative benefit
energy	<p>terms of its office supply which could lead to increased demand for office space in Norwich from firms in this sector. The links between Norwich Airport and Great Yarmouth noted in the point above indicate that the NDR corridor is an ideal place for demand for office space to be met.</p> <ul style="list-style-type: none"> As part of the Northeast Growth Triangle, plans are being progressed by Beyond Green Developments (site 7 in Figure 5.1) for a sustainable urban extension which will provide employment space for environment-related businesses. Demand from offshore firms could be satisfied in this area while such uptake would also reinforce the sustainability credentials of the urban extension. There is already evidence of energy-related businesses being located in the JCS area with Aquaterra (which is involved in the design of offshore structures) employing about 1,200 people and having a base close to the Airport.
<ul style="list-style-type: none"> Aylsham 	<ul style="list-style-type: none"> Aylsham is an attractive market town to the north of Norwich and it will benefit from links to the NDR via the A140 where it will join the NDR west of Norwich International Airport. The Aylsham settlement has capacity for housing growth (c500 dwellings permitted) and its attractiveness will be enhanced by improved connectivity via the NDR to employment opportunities along the NDR corridor, including those at Broadland Business Park, Norwich Airport, Rackheath and NRP. Discussions with NCC's economic development team have referred to a 'Wymondham effect' potentially occurring in Aylsham; that is a repetition of the increase in development activity and property prices which occurred in the settlement of Wymondham, following improvements to the road infrastructure and connectivity with Norwich.
<ul style="list-style-type: none"> North Walsham 	<ul style="list-style-type: none"> North Walsham is an attractive market town to the north of Norwich that will benefit from links to the NDR via the B1150 where it will join the NDR near Spixworth. The 'Wymondham effect' described above for Aylsham is also anticipated to occur at North Walsham though the effects are expected to be less pronounced at North Walsham, which would still be connected to the NDR via a 'B' road or via the A1151 through Wroxham; either way the improved connectivity is notable but less pronounced.
<ul style="list-style-type: none"> Former RAF Coltishall 	<ul style="list-style-type: none"> The former RAF Coltishall site has a prison on site and demonstrates longer-term potential for employment uses, particularly large land-take uses of B2 or B8 category. NCC owns much of the site and has recently completed consultation on future uses. The NDR will improve access and connectivity to/from the

NDR's Influence	Description of qualitative benefit
	site via the B1150 making it more attractive for employment uses.
<ul style="list-style-type: none"> Norfolk tourism 	<ul style="list-style-type: none"> Norfolk's visitor economy is an important sector of the economy and the NDR will improve connectivity for tourists visiting the Norfolk Broads, north Norfolk coast, Great Yarmouth and Norwich as part of a visit. It is difficult to assess the influence the NDR may have on the volume and value of tourism in the area but connectivity within the area will be improved through the NDR and such improved connectivity can reasonably be expected to improve attractiveness of these renowned destinations to visitors. Improved connectivity will also serve to protect Norfolk's position as a visitor destination for all segments of the market. Access to Norfolk will be enhanced through improvements to the A47 and A11 (and the A14), but the NDR will also improve connectivity between Great Yarmouth and areas to the north of Norwich. This could improve day visitor trips to the seaside town from residents and visitors to areas north of Norwich, the Norfolk Broads and the north Norfolk coast. The NDR is therefore integral to the provision of greater intra-County connectivity enabling visitors to move around and between destinations with greater ease avoiding the need to travel through central Norwich unless they wish to.
<ul style="list-style-type: none"> Place making 	<ul style="list-style-type: none"> Northeast Norwich is proposed as a sustainable urban extension, to be brought forward on Ecotown principles (Rackheath (site 5 in Figure 5.1) and the Beyond Green Developments Ltd proposals (site 7 in Figure 5.1) draw on exemplar developments from around Europe (for example Stockholm). The principles underpinning these development proposals seek to ensure that the area will become a fully-functioning extension to Norwich and an exemplar of sustainable urban development. In itself, the area is likely to attract visitors in future who are interested in sustainable urban development and keen to understand the approach taken to this in Norwich. The NDR would be an important piece of infrastructure providing strategic access to these sites, and removal of traffic from the city centre, to allow the sustainable access and high quality environment on which the spatial development of the area is dependent.
<ul style="list-style-type: none"> Place competitiveness 	<ul style="list-style-type: none"> Modern urban economies require a mixed commercial property offer to make them attractive to a broad range of businesses and entrepreneurs. Norwich's property offer has successfully responded to changing demand, for example: <ul style="list-style-type: none"> Broadland Business Park has been a success and renewed impetus is expected to arise from the Postwick junction

NDR's Influence	Description of qualitative benefit
	<p>improvements.</p> <ul style="list-style-type: none"> – In close proximity to Broadland Business Park there are smaller business parks providing B1 accommodation (at Meridian Business Park and St Andrews Business Park) but these premises are full; – One of the development sites being advanced at the Airport (site 8 in Figure 5.1 (Airport Site 4)) is planned to accommodate the operations of KLM Air Livery currently based at Norwich Airport Industrial Estate. KLM Air Livery's move to purpose-built premises will support the Airport's planned expansion and make space available on the Airport Industrial Estate for additional aviation-related firms to move into. – At Norwich Airport new buildings are occupied by Klyne Aviation and Bond Aviation. • The above points indicate there is demand for well-connected B1 office space on Norwich's fringe, and demand from aviation-related businesses to be located in close proximity to the Airport.
<ul style="list-style-type: none"> • Norwich International Airport 	<ul style="list-style-type: none"> • Norwich International Airport currently has about 85,000 offshore helicopter movements per annum which involve workers travelling from Great Yarmouth to the Airport to fly to their offshore sites. Great Yarmouth can only accommodate about one-third of the total demand for helicopter flights by workers needing to fly offshore. The NDR would relieve pressure on the existing network between Great Yarmouth and the Airport and would provide an alternative to Norwich ring road as part of this journey. As the offshore sector grows, so demand for helicopter flights can reasonably be expected to increase too. • Norwich International Airport's catchment area is Norfolk extending into Cambridgeshire and Suffolk. Passengers driving to the Airport from the south will mostly come via the A11 and A140 and presently use the outer or inner ring roads to access the Airport. The NDR would provide an alternative route from the south, accessed via the A47 and Postwick. Passengers travelling from the north and east would also benefit from reduced journey times. • Interventions that can deliver passengers to the Airport more efficiently and reliably can influence airline decisions to operate routes from the Airport in future. KLM is increasing its city hopper flights from Norwich to Amsterdam from three to four per day and improved connectivity for passengers can support this type of growth and sustain it in future.

NDR's Influence	Description of qualitative benefit
<ul style="list-style-type: none"> • Growth 	<ul style="list-style-type: none"> • In a recent PwC report (PwC, Good Growth for Cities, A Report on Urban Economic Wellbeing from PwC and Demos, November 2013), Norwich was ranked tenth of the thirty-nine UK cities included in the Demos-PwC Good Growth for Cities Index (based on an indicator set including employment, health, income, skills, work-life balance, housing, sectoral balance, income distribution, transport and environment. The highest ranking cities were reported as performing relatively well on jobs, income and skills but less well on housing. • The report also noted that <i>“Delivering effective, efficient and sustainable urban infrastructure is essential to provide the city backbone from which economic success and prosperity can grow. With many cities in our index showing red flashing lights for indicators such as housing and transport, and with the UK at 24th place on the World Economic Forum’s league table for infrastructure, it is clear that more needs to be done to deliver and meet the needs of our citizens and businesses. Not only do cities in the UK need to upgrade failing and ageing infrastructure, but as technology drives mobility and connectivity, cities are also seeking to upgrade what they can offer residents and businesses and establish smart city systems that will position them as global leaders. (p23). The NDR is planned in response to this growth agenda.</i>

Quantitative benefits

5.5.3 The quantitative analysis carried out for this report has focused on specific development sites located on or close to the proposed line of the NDR, including the Postwick Hub, as described above in Figure 5.1 and Table 5.1. Some of the sites cannot be developed without the two schemes (NDR and PHS); others will be easier to develop with the two schemes; and two schemes are particularly associated with the PHS (Broadland Gate Business Park and the employment element of Brook Farm/ Laurel Farm) and appear to be contingent on that scheme only. There are development proposals for the sites ranging in detail from outlines to detailed plans. We estimate that collectively the sites could accommodate over 11,000 jobs, which is a substantial proportion of the 27,000 jobs anticipated in the Joint Core Strategy.

5.5.4 The methodology used to quantify economic development benefits arising from these sites in connection with the NDR is summarised below, and a summary of the analysis carried out is followed by discussion of the findings. A summary

table (Table 5.3) is included at the end of this section and is supplemented by the detailed tables of calculations appearing in Appendix A. To facilitate referencing, figures in the text below that are taken from Table 5.3 appear underlined and in ***italic bold***.

5.5.5 One element of the methodology is the conversion of gross effects (such as the jobs actually arising on a particular site) to net effects after allowing for deadweight or non-additionality (that is the possibility that some of the jobs arising would have arisen anyway elsewhere in the study area). The gross to net conversion for each site is based on the site's context and its potential for development, and has been discussed and agreed with NCC Planning and Economic Development officers as well as Norwich International Airport and Norwich Industrial Estate staff. The methodology is also based on the following assumptions:

- Phased job growth over a thirty-year period so that the cumulative build-up of jobs and development can be considered.
- Differentiation between higher and lower GVA employment for each site, based on informed discussion with NCC Planning and Economic Development officers.
- Use of a standard multiplier to determine the composite supply-chain and consumption effects of additional expenditure and economic activity in the area.
- Estimation of the capital expenditure to be injected into the area through the construction period and development of individual sites, and the corresponding extent of employment during development.

5.5.6 The results of this methodology are expressed as net additional jobs, GVA, investment effects at 2034 which is referred to as the steady state year (being the year at which the net additional growth attributable to the NDR is estimated to be fully achieved).

5.5.7 If the NDR and Postwick Hub schemes did not proceed, there would be fewer jobs on the sites, but some of the sites (including at Norwich International Airport and Broadland Business Park) would still accommodate significant employment growth; moreover, without the schemes some jobs that would have been located on sites in the vicinity of the NDR and Postwick Hub schemes would find alternative locations within Greater Norwich. This report suggests that the two schemes (NDR and PHS) will lead to about ***4,358***²³ net additional jobs being created within Greater Norwich by the year 2034. Further detail on the build-up of net jobs is provided at Appendix A (Table A.1, which shows net

²³ We provide exact numbers so that the arithmetic is clear. The inevitable uncertainties mean that these numbers should be regarded as no more than the centrepoints of wider ranges.

jobs figures for the sites shown on Figure 5.1 and listed in Table 5.1). Local expenditure resulting from the newly created jobs and from local purchasing by new or expanded firms will, it is estimated, raise total additional job creation from the **4,358** jobs mentioned above to **5,230** net additional jobs within the study area²⁴.

5.5.8 This report takes as background the JCS and the other relevant documents discussed in Section 3. Such documents are based in turn on forecasts for the national and regional economies and demographic forecasts. Job creation on the sites considered in this report is contingent upon those forecasts and upon other matters covered by the JCS, such as the need for appropriate workforce skills to satisfy employer requirements.

5.5.9 The sites considered in this report will require substantial investment in offices and other workplaces and ancillary facilities and are also forecast to accommodate some 10,000 new dwellings, of which it is estimated that about 7,000 will be additional. This high level of additionality is based on the view of NCC that few of the dwellings could be built in other locations within Greater Norwich in the JCS period to 2026 or in the period to 2034 which this assessment covers. Total additional investment in workplaces is estimated at **£122m**, based upon average investment of £28,000²⁵ for each of the **4,358** jobs; additional investment in housing is estimated at **£700m** (£100,000 per additional dwelling); and the capital cost of construction of the NDR and the PHS is estimated by NCC at **£144m**. These components yield a total of **£966m** of net additional investment during the period leading to steady state in 2034.

5.5.10 The **£966m** of additional investment will require an estimated **8,940** job-years of labour over the period 2014 to 2034, based upon conventional estimates of £100,000 per job-year in housing and commercial building and £200,000 per job-year in road construction. On average over the 21 years this will mean that **426** full-time equivalent workers are employed in construction. As with 'permanent' jobs, expenditure by these workers, and the purchase of supplies locally, will add modestly to the jobs total and the conservative estimate of the composite multiplier (1.2 – see above) used in this Report suggests that there

²⁴ In the absence of detailed information on multiplier and supply chain effects, this report has used a composite multiplier of 1.2, eg the 4,358 additional jobs on the sites in question are assumed to yield 5,230 jobs (4,358 X 1.2 = 5,230) following multiplier and supply chain effects. This figure of 1.2 is prudently low: the English Partnerships Additionality Guide (2008) suggests at its Table 4.8 a composite multiplier of 1.29 for B1/B2/B8 space; and the Department for Business Innovation and Skills (Occasional Paper, Number 1, 'Research to Improve the Assessment of Additionality' October 2009) suggests various numbers in its Chapter 7 on multipliers, but its Table X1 identifies a mean value from research for a sub-regional composite multiplier of 1.25.

²⁵ This figure of £28,000 depends heavily on the types of occupier attracted to the sites. The figure could be much more than £28,000, but in our judgment could not be less. Investment in building costs alone would exceed £28,000 per job reckoned at £1,500 per square metre and 20 square metres per job on average across industries.

will be 85 'multiplier' jobs in the local economy, making **511** (426 x 1.2) investment-related jobs in all, on average in the period 2014-2034. These jobs are assumed to cease once construction is complete on the attainment of steady state in 2034.

5.5.11 The activities briefly summarised above will lead to greater output (GVA) in the local economy. These effects have been assessed over a period of roughly 30 years, to 2047. At 2010 prices, but undiscounted, it is estimated that when steady-state is achieved (2034), local GVA will be **£187m** per annum greater with the schemes than without, as a consequence of the 5,238 additional jobs that will have been created by then. Table 5.3, in conjunction with the more detailed tables in Appendix A, analyses this increase as between additional GVA on the two Postwick sites (**£61m**), additional GVA on other sites (**£95m**), and additional GVA resulting from the composite multiplier (£31m=0.2 x (£61m+£95m)), all totalling **£187m** per annum.

5.5.12 GVA is usually expressed as an annual flow such as the figure of **£187m** per annum mentioned in the previous paragraph. But to compare it with one-off costs - such as the costs of the NDR and the PHS - it is desirable to take the total impact on GVA, summed over a period of years and appropriately discounted. At 2010 prices, discounted to the same year at 6%²⁶ and including multiplier effects, we estimate that additional GVA in total over the period to 2047 will be **£1,099m**, comprising **£916m** arising directly from additional employment at the various sites and a composite multiplier effect of £183m.

²⁶ HM Treasury's Green Book (Annex 6) specifies a social discount rate of 3.5%. But for the commercial activities expected to provide most of the jobs accommodated on the sites considered here, a long term real rate of return on commercial investments is more appropriate and this is generally put at around 6%, as indicated by average return on equities in the UK and USA reported in the authoritative Barclays Equity Gilt study, published annually since 1956.

Table 5.3 – Employment, GVA and investment effects – summary table

Type of Benefit Note that steady state is attained in 2034	Postwick Sites ²⁷	NDR Sites	Total
Primary Effects			
FTE gross jobs on sites listed in the text, in steady state (see Appendix A, Table A.1)	5,000	6,281	11,281
FTE additional jobs on sites listed in the text, in steady state (see Appendix A, Table A.1)	1,667	2,691	4,358
Additional GVA per year in steady state, £m, 2010 prices, undiscounted	61 ²⁸	95 ²⁹	156
Additional GVA from continuing activities in total to 2047, £m, 2010 prices, discounted at 6% (see Appendix A, Table A.5)	378	538	916
Primary Effects plus Multiplier Effects (multiplier value 1.2 – see main text and footnote above)			
FTE net additional jobs in steady state	2,000	3,229	5,230
Additional GVA per year in steady state, £m, 2010 prices, undiscounted	73	114	187
Additional GVA from continuing activities in total to 2047, £m, 2010 prices, discounted	454	646	1,099
Investment Effects			
Gross investment in road construction, £m, undiscounted, total (per NCC)			144
Gross commercial investment, £m, undiscounted, total	140	176	316
Gross housing investment, £m, undiscounted, total at £100,000 per dwelling (see Appendix A, Table A.1 for planned numbers of dwellings)			985
Net investment ³⁰ in road construction, £m, undiscounted, total			144
Net additional commercial investment, £m,	47	75	122

²⁷ The 'Postwick Sites' are Broadland Gate Business Park and Broadland Gate Laurel Farm. They are contingent on the Postwick Hub Scheme but could proceed without the NDR. The 'NDR Sites' are the remaining sites listed in Table 5.1.

²⁸ Postwick Hun Scheme Economic Appraisal Report

²⁹ See Appendix A, Table A.3

³⁰ Note that this is obviously 'additional'.

undiscounted, total at £28,000 per additional job (see main text)			
Net additional housing investment, £m, undiscounted, total at £100,000 per dwelling		700	700
Total net additional investment, £m, undiscounted	47	775	966
Net additional job-years of employment in construction at £100,000 per job year (housing and commercial) and £200,000 (roads)	467	7,753	8,940
Average investment-related employment 2014-2034	22	369	426
Employment through Investment Effects (multiplier value 1.2)			
Average investment-related employment 2014-2034	27	443	511

Note: the final digit in the figures in the Total column may be affected by rounding.

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6.1 Summary

6.1.1 **Note:** Figures in this summary taken from Table 5.3 are underlined and in *italic* bold.

6.1.2 The NDR is a critical piece of infrastructure that is integral to the JCS aspirations for growth. The role of the NDR in supporting Greater Norwich's development is also apparent in the other land-use and economic development policy documents pertinent to the area, and this reinforces the integral role of the NDR. Similarly, the role of Norwich in the East of England economy is also important, particularly in terms of retail provision, tourism and offshore energy but also in providing key centres of economic activity such as Norwich Research Park and Norwich International Airport, all of which are expected to benefit from improved connectivity delivered through the NDR.

6.1.3 NCC currently estimates that construction costs of the NDR and the Postwick Hub will be some **£144m**. There will also be road maintenance and other operational costs during the 30 year period considered here, though they will be much less than the capital costs of construction. It is not the purpose of this report to assess costs in detail, or to combine the benefits considered here with the WebTAG benefits and detailed costs in a full cost-benefit analysis. The purpose of providing headline costs figures in this report is to enable decision makers to contrast the costs with the benefits considered here. The analysis in this report suggests that the quantifiable benefits identified exceed the costs of construction; and the full scale of benefit will be greater as there are also unquantifiable and qualitative benefits that are more difficult to assess precisely, but which are set out in Section 5 above.

6.2 Key economic benefits

6.2.1 The NDR, including the Postwick Hub, will bring the very substantial benefits described in Section 5. As is shown in Table 5.3, they include³¹:

- **4,358** net additional direct jobs arising from the development sites listed in this report;
- when multiplier effects are included this figure (of 4,358) rises to **5,230** net additional jobs that would not otherwise arise in Greater Norwich;
- **£1.099bn** of additional GVA is generated by those **5,230** jobs over some 30 years;

³¹ Exact figures, such as 4,358 jobs, are provided to allow tracking of the arithmetic. They should be regarded as no more than the centre points of wide ranges. For instance, 4,358 jobs might better be regarded as 4,000-5,000 jobs.

- **£966m** of net additional physical investment in roads, infrastructure and housing; and
- an average of **426** construction jobs (rising to **511** when multiplier effects are included) in each of the years until development is complete (estimated at 2034).

6.2.2 The benefits attributed to the NDR are substantial and reflect its potentially important role as strategic infrastructure to underpin economic growth in Greater Norwich over the next three decades and beyond. Moreover, to build on Greater Norwich's growth potential, the city needs an infrastructure that matches those already in place in competitor locations: most UK cities already have, or are implementing, road infrastructure which improves connectivity and links areas of employment opportunity with areas of employment need. The NDR is part of this strategic approach and, if implemented, could deliver benefits to the area's internationally renowned NRP, future inward investors, existing businesses, residents and visitors alike as well as supporting development in key growth sectors.

6.2.3 Simultaneously, there are also a range of qualitative benefits which have been discussed in the previous section. These are important and although they cannot be quantified, they do provide impetus for further economic growth and development in future. For instance; improved access to Broadland Business Park and Norwich International Airport can make development and location at these sites more attractive for businesses; the same is true for improved access and connectivity to the city centre for residents and visitors; and, the importance of reliable journey times between Great Yarmouth and the Airport in order to support the offshore energy sector is increasingly significant as offshore activity increases.

Appendices

Appendix A. Economic impact calculations

Table A.1 – NDR and Development Sites: Gross to Net Calculations for Employment and Dwellings

Sites	Employment				Dwellings		
	Gross Jobs	Gross jobs (Lower jobs/ha)	Additionality	Net jobs	Gross Dwellings	Gross Revised	Net Dwellings
1 Broadland Gate Business Park	3,200	3,200	33%	1,067	-		
2 Broadland Gate Brook Farm	-	-	33%	-	-		
3 Broadland Gate Laurel Farm	1,800	1,800	33%	600	-		
4 Broadland Housing - Blue Boar	-	-			1,223	-	-
NEGT Housing in Sprowston,							
12 Thorpe St Andrew fringe						1,900	1,350
13 Housing in Broadland NPA					2,000	1,000	700
5 Rackheath Ecotown	3,300	2,500	50%	1,250	4,150	3,950	2,800
6 Rackheath Industrial Estate	20	20	50%	10	-		
7 Beyond Green Devts	1,000	800	50%	400	3,520	3,000	2,150
8 Norwich Airport (Airport Site 4)	1,000	1,000	0%	-	-		
9 Norwich Airport (Airport Site 3)	2,000	1,600	60%	960	-		
10 Norwich Airport Industrial Estate	50	50	50%	25	-		
11 Salhouse Rd	311	311	15%	47	-		
	12,681	11,281		4,358	10,893	9,850	7,000

Note: the Gross Jobs in the first column of figures were supplied by NCC. In some cases, they appeared to be greater than could easily be accommodated on the respective sites. As a matter of prudence, the lower figures in the second column of figures were agreed between Mott MacDonald and NCC as the basis for calculations.

Source: Mott MacDonald in conjunction with NCC Planning and Economic Development

Table A.2 – Phasing of Job Creation

Site No.	1	3	1	3	5	7	8	9	10	11	
	BGBP	BGLF	BGBP	BGLF	Rackheath	Beyond Green Devts	Airport Site 4	Airport Site 3	Airport Ind Est	Salhouse Rd	Total
Jobs	Gross*	Gross*	Net b/d	Net b/d	Net b/d	Net b/d	Net b/d	Net b/d	Net b/d	Net b/d	Net b/d
Total	3200	1800	1,067	600	1,260	400	-	960	25	47	4,358
2014	0	0	0	0	0	0	0	0	0	0	-
2015	320	180	107	60	0	0	0	0	0	0	167
2016	320	320	107	107	0	0	0	0	0	0	213
2017	320	320	107	107	0	0	0	0	0	0	213
2018	320	320	107	107	74	24	35	56	1	3	407
2019	320	320	107	107	148	47	70	113	3	5	600
2020	1600	900	533	300	222	71	105	169	4	8	1,413
2021	1760	990	587	330	296	94	140	226	6	11	1,690
2022	1920	1080	640	360	371	118	175	282	7	14	1,967
2023	2080	1170	693	390	445	141	210	339	9	16	2,243
2024	2240	1260	747	420	519	165	245	395	10	19	2,520
2025	2400	1350	800	450	593	188	280	452	12	22	2,797
2026	2560	1440	853	480	667	212	240	508	13	25	2,998
2027	2720	1530	907	510	741	235	200	565	15	27	3,200
2028	2880	1620	960	540	815	259	160	621	16	30	3,402
2029	3040	1710	1013	570	889	282	120	678	18	33	3,603
2030	3200	1800	1067	600	964	306	80	734	19	36	3,805
2031	3200	1800	1067	600	1,038	329	40	791	21	38	3,923
2032	3200	1800	1067	600	1,112	353	-	847	22	41	4,042
2033	3200	1800	1067	600	1,186	376	-	904	24	44	4,200
2034	3200	1800	1067	600	1,260	400	-	960	25	47	4,358
2035	3200	1800	1067	600	1,260	400	-	960	25	47	4,358
2036	3200	1800	1067	600	1,260	400	-	960	25	47	4,358
2037	3200	1800	1067	600	1,260	400	-	960	25	47	4,358
2038	3200	1800	1067	600	1,260	400	-	960	25	47	4,358
2039	3200	1800	1067	600	1,260	400	-	960	25	47	4,358
2040	3200	1800	1067	600	1,260	400	-	960	25	47	4,358
2041	3200	1800	1067	600	1,260	400	-	960	25	47	4,358
2042	3200	1800	1067	600	1,260	400	-	960	25	47	4,358
2043	3200	1800	1067	600	1,260	400	-	960	25	47	4,358
2044	3200	1800	1067	600	1,260	400	-	960	25	47	4,358
2045	3200	1800	1067	600	1,260	400		960	25	47	4,358
2046	3200	1800	1067	600	1,260	400		960	25	47	4,358
2047	3200	1800	1067	600	1,260	400		960	25	47	4,358

* These two columns are replicated from the Postwick Hub Scheme Economic Appraisal Report (April 2013), p25

Note: Table A.2 shows gross figures for the Broadland Gate Business Park (BGBP) and Broadland Gate Laurel Farm (BGLF) to demonstrate consistency with the Postwick Hub Scheme Economic Appraisal Report. It shows net figures (i.e. figures after the deduction of estimated non-additionality (deadweight)) for BGBP and BGLF and for the other sites where job creation occurs. Phasing for BGBP and BGLF is replicated from the PHS Economic Appraisal Report. Phasing for Airport Site 4 is based on discussions with the Airport operator: their view is that the NDR will accelerate job creation but will not affect the final number of jobs on that site, so there are additional jobs in the early years but not in steady state. Phasing at other sites assumes that additional (i.e. NDR-induced) occupancy begins in 2018 and proceeds at a uniform rate until steady state is attained in 2034.

Table A.3 – Analysis of Jobs between High-GVA (£45,000) and Low-GVA (£29,000) jobs at 2011 Prices

Site No.	5	7	8	9	10	11	
	Rackheath	Beyond Green Devts	Airport Site 4	Airport Site 3	Airport Ind Est	Salhouse Rd	Total
% that are high value (balance are low value)	40%	40%	50%	50%	30%	30%	
Average GVA per job, £	35,520	35,520	37,100	37,100	33,940	33,940	
Average GVA per job at 2011 prices, £	34,824	34,824	36,373	36,373	33,275	33,275	
Total GVA by year, £m							
2014	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2015	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2016	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2017	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2018	2.6	0.8	1.3	2.1	0.0	0.1	6.9
2019	5.2	1.6	2.5	4.1	0.1	0.2	13.7
2020	7.7	2.5	3.8	6.2	0.1	0.3	20.6
2021	10.3	3.3	5.1	8.2	0.2	0.4	27.5
2022	12.9	4.1	6.4	10.3	0.2	0.5	34.3
2023	15.5	4.9	7.6	12.3	0.3	0.5	41.2
2024	18.1	5.7	8.9	14.4	0.3	0.6	48.1
2025	20.6	6.6	10.2	16.4	0.4	0.7	54.9
2026	23.2	7.4	8.7	18.5	0.4	0.8	59.1
2027	25.8	8.2	7.3	20.5	0.5	0.9	63.2
2028	28.4	9.0	5.8	22.6	0.5	1.0	67.4
2029	31.0	9.8	4.4	24.6	0.6	1.1	71.5
2030	33.6	10.7	2.9	26.7	0.6	1.2	75.6
2031	36.1	11.5	1.5	28.8	0.7	1.3	79.8
2032	38.7	12.3	0.0	30.8	0.7	1.4	83.9
2033	41.3	13.1	0.0	32.9	0.8	1.5	89.5
2034	43.9	13.9	0.0	34.9	0.8	1.6	95.1
2035	43.9	13.9	0.0	34.9	0.8	1.6	95.1
2036	43.9	13.9	0.0	34.9	0.8	1.6	95.1
2037	43.9	13.9	0.0	34.9	0.8	1.6	95.1
2038	43.9	13.9	0.0	34.9	0.8	1.6	95.1
2039	43.9	13.9	0.0	34.9	0.8	1.6	95.1
2040	43.9	13.9	0.0	34.9	0.8	1.6	95.1
2041	43.9	13.9	0.0	34.9	0.8	1.6	95.1
2042	43.9	13.9	0.0	34.9	0.8	1.6	95.1
2043	43.9	13.9	0.0	34.9	0.8	1.6	95.1
2044	43.9	13.9	0.0	34.9	0.8	1.6	95.1
2045	43.9	13.9	0.0	34.9	0.8	1.6	95.1
2046	43.9	13.9	0.0	34.9	0.8	1.6	95.1
2047	43.9	13.9	0.0	34.9	0.8	1.6	95.1

Note 1: Table A.3 shows additional GVA by year at each of the non-Postwick sites, determined by multiplying the number of additional jobs taken from Table A.2 by average GVA per job as shown in the

fourth row of this Table (A.3). For instance, the 74 jobs at Rackheath in 2018 (Table A.2) are multiplied by £34,824 (A.3) to yield, following rounding, £2.6m of GVA in 2018 (A.3).

Note 2: The 2011 GVA per job figures of £45,000 for high-GVA jobs and £29,000 for low-GVA jobs are consistent with the figures used in the Postwick Hub Scheme Economic Appraisal Report; 2010 figures have been assumed to be 2% lower than in 2011. The proportion of high-GVA jobs at each site is based upon NCC's expectations of the type of occupier to be expected at the various sites. The remaining jobs (i.e. those that are not 'high-GVA') are taken to be low-GVA jobs.

Note 3: GVA for the two Postwick sites is not presented in Table A.3, but in Table A.5

Table A.4 – Discount Factors for GVA

Years	Discount Factors
2010	1.000
2011	0.943
2012	0.890
2013	0.840
2014	0.792
2015	0.747
2016	0.705
2017	0.665
2018	0.627
2019	0.592
2020	0.558
2021	0.527
2022	0.497
2023	0.469
2024	0.442
2025	0.417
2026	0.394
2027	0.371
2028	0.350
2029	0.331
2030	0.312
2031	0.294
2032	0.278
2033	0.262
2034	0.247
2035	0.233
2036	0.220
2037	0.207
2038	0.196
2039	0.185
2040	0.174
2041	0.164
2042	0.155
2043	0.146
2044	0.138
2045	0.130
2046	0.123
2047	0.116

Table A.5 – Discounted GVA, £m

Discounted GVA, £m	Rackheath (5)	Beyond Green Devts (7)	Airport Site 4 (8)	Airport Site 3 (9)	Airport Ind Est (10)	Salhouse Rd (11)	Total
2014	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2015	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2016	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2017	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2018	1.6	0.5	0.8	1.3	0.0	0.1	4.3
2019	3.1	1.0	1.5	2.4	0.1	0.1	8.1
2020	4.3	1.4	2.1	3.4	0.1	0.2	11.5
2021	5.4	1.7	2.7	4.3	0.1	0.2	14.5
2022	6.4	2.0	3.2	5.1	0.1	0.2	17.1
2023	7.3	2.3	3.6	5.8	0.1	0.3	19.3
2024	8.0	2.5	3.9	6.4	0.2	0.3	21.3
2025	8.6	2.7	4.2	6.9	0.2	0.3	22.9
2026	9.1	2.9	3.4	7.3	0.2	0.3	23.3
2027	9.6	3.0	2.7	7.6	0.2	0.3	23.5
2028	9.9	3.2	2.0	7.9	0.2	0.4	23.6
2029	10.2	3.2	1.4	8.1	0.2	0.4	23.6
2030	10.5	3.3	0.9	8.3	0.2	0.4	23.6
2031	10.6	3.4	0.4	8.5	0.2	0.4	23.5
2032	10.7	3.4	0.0	8.5	0.2	0.4	23.3
2033	10.8	3.4	0.0	8.6	0.2	0.4	23.4
2034	10.8	3.4	0.0	8.6	0.2	0.4	23.5
2035	10.2	3.2	0.0	8.1	0.2	0.4	22.2
2036	9.6	3.1	0.0	7.7	0.2	0.3	20.9
2037	9.1	2.9	0.0	7.2	0.2	0.3	19.7
2038	8.6	2.7	0.0	6.8	0.2	0.3	18.6
2039	8.1	2.6	0.0	6.4	0.2	0.3	17.6
2040	7.6	2.4	0.0	6.1	0.1	0.3	16.6
2041	7.2	2.3	0.0	5.7	0.1	0.3	15.6
2042	6.8	2.2	0.0	5.4	0.1	0.2	14.7
2043	6.4	2.0	0.0	5.1	0.1	0.2	13.9
2044	6.1	1.9	0.0	4.8	0.1	0.2	13.1
2045	5.7	1.8	0.0	4.5	0.1	0.2	12.4
2046	5.4	1.7	0.0	4.3	0.1	0.2	11.7
2047	5.1	1.6	0.0	4.0	0.1	0.2	11.0
Total	233.0	74.0	33.0	185.5	4.4	8.2	538.2
Additional GVA from BGBP and BGLF, per Postwick Economic Appraisal Report							378.0
Total							916.2

Note: Table A.5 shows discounted GVA arising from the non-Postwick sites derived by multiplying the GVA figure from Table A.3 by the discount factors in Table A.4. For instance the £22.6m of additional GVA (Table A.3) at Airport Site 3 in 2028 is multiplied by the discount factor of 0.35 for the year 2028 taken from Table A.4 to yield, following rounding, the £7.9m of additional discounted GVA shown in Table A.5. Additional discounted GVA at the two Postwick sites is calculated in the Postwick Economic Appraisal Report as £378m and, in Table A.5, this figure is added to the values from the non-Postwick sites to arrive at the overall total of £916.2m.

Appendix B. Roads and economic growth: a review of literature

B.1 Introduction

B.1.1 Although there is a significant amount of ex-ante appraisal work completed before investment is made in road schemes, the same cannot be said for ex-post appraisal of the benefits of road schemes. A body of international academic research has developed with a focus on assessing the economic benefits of highway infrastructure over long periods and some of this is reviewed here. In England, the Highways Agency produces analysis through its Post Opening Project Evaluation (POPE) process and this body of work is also referred to here.

B.2 Findings from POPE

B.2.1 POPE focuses on major schemes with a capital cost in excess of £10m. Individual POPE studies consider how much a scheme actually cost (outturn cost) compared to predicted costs. These costs include: construction costs, land, preparation and supervision costs. The study also calculates the (ex-post) benefits of the scheme and compares this to the (ex-ante) benefits which were forecast. All of the government's New Approach to Transport Appraisal (NATA) objectives are covered in the evaluation: environment, safety, economy, accessibility and integration. The economy element does not consider the wider economic benefits that may accrue outside the parameters of the transport scheme, at the margins of the infrastructure, so factors such as jobs, productivity and commercial development are not included. Nevertheless, the following summary points are made in regards to major schemes (2002 to 2009):

- The majority of schemes (76%) evaluated to date (2009) had delivered more than £2 of benefit per £1 invested.
- The average net benefit of major schemes ranges from £58m (for schemes evaluated over 30 years) to £79m (for schemes evaluated over 60 years) at 2002 prices (POPE Meta Report, Highways Agency, 2011)

B.2.2 Tables B.1 and B.2 provide a review of the POPE work reflecting on road schemes in the East of England (with some from a slightly wider area) based on POPE reports available on the Highways Agency website.

Table B.1 – POPE 30-year benefits of road schemes within the East of England

East of England Schemes	30 Year Present Value Benefits, £			Benefit Cost Ratio		
	Pre-Scheme Forecast	Actual	Variance	Pre-Scheme Forecast	Actual	Variance
A11 Roudham Heath	£36.2m*	£215m*	N/A	2.3*	4.2*	N/A
A120 Stansted to Braintree	£646.4m	£1215.8m ¹	£569.4m	4.1	12.11	8.0
A14 Rookery crossroads	£8.65m	£13.48m	£4.85m	1.96	2.0	0.04
A14 Haughley New Street to Stowmarket	£91.7m	£70.8m	-£20.9m	13.9	7.5	-6.4
A421 Great Barford	£244.7m	£314.6m	£69.9m	7.9	8.5	0.6
A428 Caxton Common	£104.8m ²	£59.5m ²	-£45.3m ¹	2.92	> 1.42	< -1.52
A43 Silverstone	£317.8m	£163.3m	-£154.5m	4.2	1.4	-2.8
A47 Thorney Bypass	£47.64m	£66.53m	£18.89m	2.48	2.96	0.48
A6 Clapham	£61m	£54m	-£7m	1.6	1.3	-0.3
A6 Rushden	£27.8m	£39.7m	£11.9m	2.6	2.4	-0.2

Source: Highways Agency POPE Major Schemes Summary Reports

Notes: *Not directly comparable

¹Listed as Post Opening Re-forecast, not actual evaluation

²First 10 years impact only.

Table B.2 – 60 year Post Opening Project Evaluation of benefits of road schemes within the East of England

East of England Schemes	60 Year Present Value Benefits, £			Benefit Cost Ratio		
	Pre-Scheme Forecast	Actual	Variance	Pre-Scheme Forecast	Actual	Variance
A10 Wadesmill	£106.6m	£121.1m	£14.5m	4.5	3.01	-1.5
A11 Attleborough	£68.7m	£88.9m	£20.2m	5.4	5.2	-0.2
M1 Junctions 6a to 10 Widening	£2,004.3m	£1,683.6m	-£320.7m	6.9	6.1	-0.8

Source: Highways Agency POPE Major Schemes Summary Reports

B.2.3 As can be seen from Table B.1 and Table B.2, all of the East of England schemes that have been evaluated to date were predicted to generate, and have shown, a considerable net benefit. All have resulted in a positive benefit cost ratio as well.

- B.2.4 The benefits vary in scale depending on the size of the project; and the variance with which forecast and actual benefits differ is relative to this. For example, the A120 Stansted to Braintree scheme was forecast to generate £646.4m worth of benefits over 30 years. After completion, the actual benefits accrued were equal to £1,215.8m (£569.4m more benefits than expected). This translated in the variance of Benefit Cost Ratio (BCR) for that scheme; BCR predicted at 4.1, but after completion recalculated at 12.1 (Highways Agency, POPE A120 Stansted – Braintree, page 3). This is almost a 300% increase in BCR. In comparison, a smaller scale scheme such as the Rushden Bypass, with an actual 30-year present value benefit of £39.7m displayed a much smaller change in BCR; reducing from a forecasted 2.6 to an actual 2.4 (Highways Agency, POPE A6 Rushden – Higham Ferrers Bypass, page 9).
- B.2.5 This change in variance is to be expected, as with the increase in scale of projects, the opportunity for inaccuracies and external influences also increases. It is important to note that in each of these schemes, though there may be differences between the forecast and actual benefits of the scheme, the economic BCR remains positive in each case.

B.3 Integration and Wider Economic benefits

- B.3.1 As mentioned previously, the POPE reports include some ex-post analysis on the integration benefits of a scheme (as one of the government's NATA objectives). The majority of these evaluated schemes comply with regional development and transport objectives. For example, the A6 Rushden scheme *“is broadly consistent with the delivery of key policies within the Northamptonshire Structure Plan and the East Northamptonshire Local Plan”* (Highways Agency, POPE A6 Rushden – Higham Ferrers Bypass, page 9). When asked whether the area is a better place to live following the opening of the bypass, 58% of residents agreed that it was, whilst only 15% disagreed (paragraph 6.43, page 58).
- B.3.2 Similarly, the A421 Great Barford Bypass resulted in the following evaluation: *‘The benefits offered align with key policy objectives set out in the latest Bedfordshire Local Transport Plan and the East Midlands Regional Spatial Strategy’*. These conclusions indicate that such large-scale transport schemes can be implemented in such a way that they complement regional and local transport objectives. In the case of the A120 Stansted to Braintree, the scheme not only delivered on integration objectives but also on wider economic benefits:

“The Essex LTP1 delivery report in particular has demonstrated that the A120 scheme has achieved its objective in terms of the integration objective. The scheme also contributes to other policies including the East of England Plan and the A12/A120 Route Management Strategy.” And “The scheme has provided new employment and regeneration opportunities as stated in the scheme objectives” (Highways Agency, POPE A120 Stansted – Braintree, page 3)³².

B.3.3 The A120 route is not the only scheme that has benefited the local economy beyond simply shorter travel time and increased safety; many have unlocked areas of employment, investment and enterprise; however such successes can be overlooked due to not being included within the monetary post-project evaluations. It is important to take these additional benefits into account as they can significantly impact on a local economy, especially in areas of stalled growth or where prevailing infrastructure acts as a hindrance to investment and trade.

B.3.4 In summary, the POPE reports provide an overview of the economic benefits delivered by road schemes but the evaluation process stops short of considering wider economic benefits. The scale of benefits is therefore likely to be greater than captured in the POPE work and this suggests that wider economic benefit assessment is an important element of the appraisal and evaluation process, though it remains an area of assessment that is generally given less prominence in appraisals.

B.4 Findings from Research Studies

B.4.1 In a study by Gibbons et al (2010)³³ it was noted that evaluation of the benefits of transport improvements has traditionally revolved around the measurement of direct benefits to users. Recent practice has begun to widen the scope to include a broad range of 'wider' economic benefits. These wider benefits (and costs) include spill overs between people and between firms that cause the aggregate benefits to diverge from the sum of the private user benefits (Gibbons et al, 2010:p2). Foremost amongst these measures is agglomeration, though there is a suggestion that the focus on agglomeration leads to localised benefits going undetected (Gibbons et al, 2010:p49).

B.4.2 The finding from this study is related to the potential accessibility changes and agglomeration benefits and there is no convincing evidence that the schemes of

³² Highways Agency: 'POPE of Major Schemes Summary Report – A120 Stansted to Braintree Report'

³³ Gibbons, S., Lyttikainen, T., Overman, H., Sanchis-Guarner, R. & Laird, J. (2010) Evaluating the productivity impacts of road transport schemes: London: Department for Transport

the scale included in this study (including all major road transport improvements between 1998 and 2003) have created any measurable agglomeration benefits of this type. The most likely explanation for this is that the changes in employment accessibility may be too small and geographically localised to generate detectable changes in agglomeration-related productivity (Gibbons et al: 2010, Main Findings).

- B.4.3 Nevertheless, Gibbons et al (2010:p3) suggest that it is only a small conceptual step from the observation that firms are more productive in more integrated and dense economies, to the conclusion that improvements in transport networks could improve productivity. Improvements to the road and rail networks bring firms closer to each other and firms closer to workers in terms of travel times and costs. This closer economic integration exposes firms to greater competition, improving productivity at the macro level, and improves the basis for agglomeration economies arising at the micro level.
- B.4.4 Focusing on the micro level, a study by Matson et al (2006)³⁴ primarily focused on landscape and countryside issues at the settlement level but does consider road by-pass schemes as case studies and provides the following summaries in relation to a review of ex-post evaluation work with a wider economic dimension:
- A27 Polegate Bypass
Too little significance had been given to the role of planned development driving trunk road improvements in the Polegate area. Although pressure for housing, commercial and business development did not feature in the justification of the scheme at public inquiry, they have subsequently taken on central importance in providing the case for further road expansion (Matson et al: 2006, p26).
 - A34 Newbury Bypass
The bypass has enabled edge-of-town development on the old road, most notably Vodafone's HQ. It also appears to have aided further development of industrial and business parks accessed via the old road (Matson et al: 2006, p28).
 - M65 Blackburn Southern Bypass
Local councils now regard widening of the M65 as essential to further industrial development. Blackburn with Darwen Borough Council called for widening between junctions 5 and 6 in their second Local Transport Plan in

³⁴ Matson, L., Taylor, I., Sloman, L. & Elliott, J. (2006) Beyond transport infrastructure: lessons for the future from recent road projects, London: CPRE and The Countryside Agency

order to facilitate the expansion of the Whitebirk site into a strategic regional investment location. This was supported by the North West Development Agency and promoted through the Draft NW Regional Spatial Strategy (Matson et al: 2006, p29).

- B.4.5 The Eddington Report (2006)³⁵ assessed the state of Britain’s national transportation infrastructure and whether problems in the transportation network affected productivity and economic performance. It concluded that major additions to the highway system were not required but that the *“Government should make sustained highway and other investments to improve the transportation network ‘in those places that are important for the U.K.’s economic success”* (The Eddington Transport Study, 2006:58).
- B.4.6 Mera (1973)³⁶ (cited in Lakshmanan (2010)³⁷) carried out the first study which found that public infrastructure—including transport and communications infrastructure— contributes to aggregate private production in ways similar to that of privately supplied inputs and that its impact on productivity could be assessed through the use of the production function framework. He divided Japan into eight regions, and concluded that from 1954 to 1963 (a period of intense reconstruction of the Japanese economy), investments in transport and communication substantially contributed to private production in the manufacturing and service sectors. The output elasticities of 0.35 for the manufacturing sector and about 0.40 for the service sector implied that a 1% increase in infrastructure stocks led respectively to 0.35% and 0.40% increases in the outputs of Japanese manufacturing and service sectors.
- B.4.7 In a far-reaching study completed in the USA by Shatz et al (2011)³⁸ a number of points were identified based on review and meta-analysis of existing studies. A summary of points emerging from the report are set out below:
- *“Highway infrastructure can affect the economy in a number of ways, nearly all of them related to increasing mobility. It can enable producers to reach markets more cheaply and to increase the size of their market area. It can enable workers to choose among a wider array of employment opportunities and to live farther from their workplaces. It can enable producers to have a broader choice of input suppliers. Related to lowering the costs of reaching markets or inputs, it can increase the speed with which producers can reach*

³⁵ Eddington, R. (2006) The Eddington Transport Study. Norwich: HMSO

³⁶ Mera, K., (1973) Regional production functions and social overhead capital: an analysis of the Japanese case, *Regional and Urban Economics*, 3, pp157–186.

³⁷ Lakshmanan, T.R. (2010) The broader economic consequences of transport infrastructure investments, *Journal of Transport Geography*

³⁸ Shatz, H.J., Kitchens, K.E., Rosenbloom, S. & Wachs, M. (2011) Highway infrastructure and the economy. Implications for federal policy. Santa Monica CA: The RAND Corporation

markets or inputs, allowing them to hold lower inventories and carry out just-in-time production.” (Shatz et al., 2011:p15).

- *“Researchers have found that, beyond the value of the interstate system, highway infrastructure has caused positive economic outcomes for those industries that use it more intensively.” (Keeler and Ying, (1988) cited in Shatz et al., (2011:p16)).*
- *“An early study of 28 metropolitan areas from 1980 to 1984 found quite a strong relationship between public capital (which included roadways but also such capital stock as sewerage, water supply, hospitals, and airports) and personal income (Duffy-Deno and Eberts, 1989). The authors found that a 10 percent increase in public investment (the annual spending on public capital) was associated with a 1.13 percent increase in metropolitan area personal income. Furthermore, a 1 percent increase in the public capital stock was associated with a 0.8 percent increase in personal income. They attributed the first effect to the employment and wages stemming from construction, and the second effect to the use of public capital as a productive input and consumption good.” (Shatz et al., 2011:29).*
- *“New interstates built in nonmetropolitan counties between 1969 and 1993 raised earnings in those counties by about 6 percent to 8 percent (Chandra and Thompson, 2000). These results differed by industry. Earnings in nonmetropolitan counties that did not receive interstates fell by 1 percent to 3 percent, again with differences by industries.” (Shatz et al., 2011:30).*
- *“Matching Appalachian counties with non-Appalachian counties, Lynch (2007) found that Appalachian counties served by the Appalachian Development Highway System (ADHS) tended to have statistically significant faster growth from 1969 to 2000 in total income (measured according to place of residence), total earnings (measured according to place of work), population, per capita income, retail trade, and services than their matched, non-Appalachian counties.” (Shatz et al., 2011:32).*
- *“Roads in China contributed strongly to growth of gross domestic product (GDP) per worker and to poverty reduction between 1982 and 1999 (Fan and Chan-Kang, 2008). Although the Chinese built both high-end roads, such as expressways, and low-end roads, such as narrow, single-lane roads, it was actually the low-end roads that made the greatest contributions both to GDP growth and poverty reduction. For example, increasing the length of high-end roads by 10 percent was associated with a 0.34 percent increase in GDP per worker, but increasing the length of low-end roads by the same proportion was associated with a 1.56 percent increase in GDP per worker.” (Shatz et al., 2011:39).*
- *“In an analysis of Indian roads between 1972 and 1993, Hulten, Bennathan, and Srinivasan (2003, as cited in Hulten, 2005) found that a 10 percent increase in national and state highways and district roads was related to a 4.4 percent increase in the level of productivity. In this case, in simplified*

- terms, productivity was estimated as the difference between the growth of manufacturing output and the growth of manufacturing inputs.” (Shatz et al., 2011:39).*
- *“In a study about Spain from 1964 to 1991, Moreno et al. (1997) focused on the link between infrastructure and regional growth. They found that infrastructure (as measured by the value of roads and highways, railways, harbours and maritime signalling, airports, water and sewage facilities, and urban structures) had a positive but modest effect on labour productivity. Whereas an increase in infrastructure of 1 percent was related to a 0.04 percent increase in labour productivity, an increase in private capital of 1 percent was related to a 0.5 percent increase in labour productivity.” (Shatz et al., 2011:39).*
 - *“Cadot, Röller, and Stephan (2005) researched transportation investment (rail, highways, and waterways) in 21 regions in France from 1985 to 1992, analyzing both the extent to which politics influenced public investment and public investment’s relationship with regional domestic product. They found that although politics heavily influenced transportation investment, and although such investment appeared not to be related to where it might be most productive, it still had a positive effect on domestic product.” (Shatz et al., 2011:40).*
 - *“Two papers reported the intriguing result that the quantity of infrastructure may not be the only important issue, or even the most important. Rather, infrastructure in better condition had large and positive effects on growth (Aschauer, 2000) and even outweighed the quantity of infrastructure in growth effects (Hulten, 1996).” (Shatz et al., 2011:41).*

B.5 Summary

- B.5.1 Research has identified positive effects of highway infrastructure on economic outcomes, in particular productivity and output. Broad measures of public infrastructure have a positive and significant effect on economic outcomes and highways have such an effect on productivity and output specifically.

Glossary

ADHS	Appalachian Development Highway System
B1/B2/B8	Development categories: business (including office) / general industrial / storage and distribution
BCR	Benefit Cost Ratio
BGBP	Broadland Gate Business Park
BGLF	Broadland Gate Laurel Farm
DCO	Development Consent Order
BRES	Business Register and Employment Survey
BRT	Bus Rapid Transit
CACI	Company providing marketing solutions and information systems
DfT	Department for Transport
FTE	Full-time Equivalent
GDP	Gross Domestic Product
GNCD – EOI	Greater Norwich City Deal – Expression of Interest
GNDP	Greater Norwich Development Partnership
GVA	Gross Value Added
HQ	Head Quarters
IMD	Index of Multiple Deprivation
JCS	Joint Core Strategy
KLM	Royal Dutch Airlines
LEP	Local Enterprise Partnership
LSOA	Lower Super Output Area
LTP	Local Transport Plan
NATA	New Approach to Transport Appraisal
NATS	Norwich Area Transportation Strategy
NCC	Norfolk County Council
NDR	Norwich Northern Distributor Road
NOMIS	National Online Manpower Information System (Office for National Statistics)
NPA	Norwich Policy Area
NPPF	National Planning Policy framework
NRP	Norwich Research Park
NW	North West
ONS	Office for National Statistics
PHS	Postwick Hub Scheme
POPE	Post Opening Project Evaluation
PWC	PricewaterhouseCoopers
RAF	Royal Air Force
TEN	Transforming Education in Norfolk

UKTI	UK Trade and Investment
UKTI IST	UK Trade and Investment's Investment Services Team
WebTAG	Web-based Transport Appraisal Guidance produced by the Department for Transport

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POPEs

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The Norfolk County Council (Norwich Northern Distributor Road (A1067 to A47(T))) Order

10.4 Consent from the Highways Agency to include Crown Land in the Development Consent Order

Planning Act 2008

Infrastructure Planning

The Infrastructure Planning (Applications: Prescribed Forms and Procedure)
Regulations 2009

PINS Reference Number: TR010015

Document Reference: 10.4

Regulation Number: 5(2)(q)

Author: Norfolk County Council

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1 Key Summary

1.1 Consent has been obtained from the Highways Agency (HA):

1.1.1 to include Crown Land, comprising part of the existing A47 trunk road, in the proposed Development Consent Order for the Norwich Northern Distributor Road (NDR) in order to acquire any third party interests in such land;

1.1.2 to use Crown land temporarily, pursuant to an Agreement between the HA and Norfolk County Council (NCC) under Section 6 of the Highways Act 1980, to enable NCC to carry out works to connect the NDR to the A47(T) at Postwick, including:-

- a) construction and maintenance of the proposed new Postwick bridge over the A47(T);
- b) improving the existing Postwick bridge crossing the A47(T);
- c) improving and signalling the existing Postwick Park and Ride junction on the south side of the A47(T);
- d) carrying out works to close the existing eastbound merge and diverge A47(T) slip roads and subsequently re-opening part of the existing eastbound diverge A47(T) slip road to provide access for non-motorised users between the A47(T) and the A1042 Yarmouth Road (at the Postwick North West roundabout); and
- e) constructing new replacement eastbound merge and diverge A47(T) slip roads.

2 Introduction

- 2.1 This document is submitted in relation to the application for a Development Consent Order by Norfolk County Council to the Secretary of State, under the Planning Act 2008.
- 2.2 The Application is for the Norfolk County Council (Norwich Northern Distributor Road (A1067 to A47(T))) Order, to grant development consent for the construction of a new highway running west to east, to south, between the A1067 Fakenham Road and the A47 Trunk Road at Postwick, including improvements to the existing highway network to the north and north east of Norwich.
- 2.3 This document comprises part of the application documents and relates to Regulation 5(2)(q) of the Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009.
- 2.4 Norfolk County Council (NCC) has included this document in the application as evidence that the Highways Agency (HA) has granted agreement in principle to NCC to use Crown land for the purposes described in section 3 below, in order to facilitate delivery of the proposed NDR.

3 Consent from the Highways Agency

- 3.1 Where the use of land within and adjacent to the existing trunk road highway boundary is necessary for the delivery of the proposed NDR scheme, the areas of land in question have been included within the Development Consent Order. The purpose of this approach is to provide NCC with the opportunity to acquire any existing third party interests that need to be acquired to enable the NDR to be delivered. NCC does not intend to acquire the Secretary of State's interests in such land (which is categorised as Crown land for the purposes of the Planning Act 2008), but only the interests that others may have in such land.
- 3.2 The Highways Agency (HA) has been consulted on this approach and has confirmed that it has no objection in principle to the inclusion in the Development Consent Order for the NDR of land in the ownership of the Secretary of State for Transport, on the basis that NCC does not intend to acquire the Secretary of State's interest in such land.
- 3.3 The HA has also stated that it has no objection in principle to the use by NCC of Crown land to enable NCC to carry out works to connect the NDR to the A47(T) at Postwick. Such works, which are proposed to be carried out pursuant to an Agreement between the HA and NCC under section 6 of the Highways Act 1980, will comprise:
- a) the construction and maintenance of the proposed new Postwick bridge over the A47(T), such bridge to run from the proposed new Postwick North East Roundabout (on the north side of the A47(T)) to the existing Postwick Park and Ride Junction (which will be signalised as part of the works to which the Development Consent Order relates);
 - b) proposed improvements to be made to the existing Postwick bridge which currently crosses the A47(T) (and which runs from the existing Postwick North West Roundabout on the north side of the A47(T) to the existing Park and Ride Junction on the south side of the A47(T));
 - c) proposed signalisation and improvements to be made to the existing Postwick Park and Ride Junction on the south side of the A47(T);
 - d) the carrying out of works to close the existing eastbound merge and diverge A47(T) slip roads and subsequently re-opening part of the eastbound diverge slip road to provide access for non-motorised users between the

A47(T) and the A1042 Yarmouth Road where it joins the Postwick North West Roundabout; and

- e) proposed construction of new merge and diverge eastbound slip roads running from the proposed new Postwick North East Roundabout to the A47(T).
- 3.4 A letter from the Highways Agency confirming its agreement to the above is contained in Appendix A of this document.

4 Appendices

Appendix A – Letter from Highways Agency dated 3 December 2013

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3 December 2013

For the attention of Mr Mark Kemp

Dear Mr Kemp

Norwich Northern Distributor Road – Application by Norfolk County Council for a Development Consent Order under the Planning Act 2008

The Norfolk County Council (Norwich Northern Distributor Road (A1067 to A47(T))) Order

1. Further to previous discussions in relation to the above, I can confirm that the Highways Agency has no objections in principle to:
 - (i) the inclusion of land, known and/or assumed to be in the ownership of the Secretary of State for Transport and categorised for the purposes of the Planning Act 2008 as 'Crown land', within the above mentioned Development Consent Order (DCO), on the basis that Norfolk County Council (NCC) does not intend to acquire the Secretary of State's interests but only the interests that others may have; and
 - (ii) permitting NCC to use Crown land temporarily to enable NCC to carry out the works which are described below:
 - a) construction and maintenance of the proposed new Postwick bridge over the A47, such bridge to run from the proposed new Postwick North East Roundabout (on the north side of the A47(T)) to the existing Postwick Park and Ride Junction (which will be signalled as part of the works to which the Order relates);
 - b) proposed improvements to be made to the existing Postwick bridge which currently crosses the A47(T) (and which runs from the existing Postwick North West Roundabout on the north side of the A47(T) to the existing Park and Ride Junction on the south side of the A47(T));

- c) proposed signalisation and improvements to be made to the existing Postwick Park and Ride Junction on the south side of the A47(T);
 - d) carrying out works to close the existing eastbound merge and diverge A47(T) slip roads and subsequently re-opening part of the eastbound diverge slip road to provide access for non-motorised users between the A47(T) and the A1042 Yarmouth Road where it joins the Postwick North West Roundabout; and
 - e) proposed construction of new merge and diverge eastbound slip roads running from the proposed new Postwick North East Roundabout to the A47(T).
2. The Agency acknowledges that the works described in paragraph 1(ii) above will be carried out by NCC pursuant to the terms of an Agreement between the Agency and NCC under Section 6 of the Highways Act 1980.
 3. In addition to the above, the Agency confirms that it has no objections in principle to the proposed future transfer of land from NCC to the Secretary of State for Transport, in connection with the works described in paragraph 1(ii)(e) above, such land being land on which the proposed new (replacement) eastbound merge and diverge A47(T) slip roads are to be constructed. The Agency acknowledges that the proposed future transfer of such land would only take effect once the land was in the ownership of NCC and the proposed new slip roads had been constructed thereon.
 4. The Agency would expect to be kept fully informed of the detail of any of the requirements mentioned above prior to and following the granting by the Secretary of State of any Development Consent Order in respect of the Norwich Northern Distributor Road.

Yours sincerely



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