



Norfolk County Council

NORWICH WESTERN LINK

Option Assessment Report





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REFERENCES

A47-A1067 Western Link Road Scoping Study (Mott MacDonald, September 2014)

Department for Environment, Food and Rural Affairs, June 2018, Local Authority Carbon Dioxide Emissions Estimates 2016, Statistical Release: National Statistics

Local Model Validation Report, A47 North Tuddenham to Easton, A47/A11 Thickthorn Junction, A47 Blofield to North Burlingham (A47 IMPS2-AMY-NA-ZZ-DO-J-0031) (Highways England, October 2017)

Norwich Western Link Project Technical Report (Mott MacDonald, June 2016)

Norwich Western Link Technical Report (WSP, October 2017)

Road Investment Strategy (Department for Transport, December 2014)

The GB Day Visitor Statistics 2015, Visit Britain

The Marriott's Way Heritage Trail (<http://www.marriottsway.info/>)

Transport Statistics (Department for Transport)

GLOSSARY

Acronym	Meaning
AADT	Annual Average Daily Traffic
AONB	Area of Outstanding Natural Beauty
AQMA	Air Quality Management Area
ATC	Automatic Traffic Count
BCR	Benefit to Cost Ratio
CEMP	Construction Environmental Management Plan
CIRIA	Construction Industry Research and Information Association
CO ₂	Carbon Dioxide
CPO	Compulsory Purchase Order
CWS	County Wildlife Site
DBA	Desk Based Assessment
DfT	Department for Transport
DIADEM	Dynamic Integrated Assignment and Demand Model
DMRB	Design Manual for Roads and Bridges
EAST	Early Assessment and Sifting Tool
EHV	Extra High Voltage
EIA	Environmental Impact Assessment
ES	Environmental Statement
FBC	Full Business Case
FEZ	Food Enterprise Zone
GDP	Gross Domestic Product
GEH	Geoffrey E. Havers
GNDP	Greater Norwich Development Partnership
HER	Heritage Environment Record
HGV	Heavy Goods Vehicle

Acronym	Meaning
HRA	Habitats Regulations Assessment
HSE	Health and Safety Executive
IMD	Indices of Multiple Deprivation
KSI	Killed or Seriously Injured
LDO	Local Development Order
LEZ	Low Emission Zone
LGV	Light Goods Vehicle
LIDAR	Light Detection and Ranging
LLG	Local Liaison Group
LMVR	Local Model Validation Report
LNR	Local Nature Reserve
LPA	Local Planning Authority
LSOA	Lower Super Output Area
LTP	Local Transport Plan
MCC	Manual Classified Count
MRN	Major Road Network
MWG	Member Working Group
NATS	Norwich Area Transport Strategy
NCA	National Character Area
NCN1	National Cycle Network Route 1
NDR	Northern Distributor Road (<i>now named A1270 Broadland Northway</i>)
NIA	Noise Important Area
NIS	Norfolk Insight Statistics
NMU	Non-Motorised User
NNUH	Norfolk and Norwich University Hospital
NO ₂	Nitrogen Dioxide
NPPF	National Planning Policy Framework

Acronym	Meaning
NRTF	National Road Traffic Forecasts
NTEM	National Trip End Model
NWL	Norwich Western Link
NWQ	Norwich Western Quadrant
OAN	Objectively Assessed Need
OAR	Option Assessment Report
OBC	Outline Business Case
OGV	Ordinary Goods Vehicle
ONS	Office for National Statistics
PCU	Passenger Car Unit
PIA	Personal Injury Accident
PRA	Preferred Route Announcement
PRoW	Public Rights of Way
PVC	Present Value of Costs
RIS	Road Investment Strategy
RNR	Roadside Nature Reserve
SAC	Special Area of Conservation
SATURN	Simulation and Assignment of Traffic to Urban Road Networks
SERTM	South East Regional Transport Model
SHMA	Strategic Housing Market Assessment
SOBC	Strategic Outline Business Case
SRN	Strategic Road Network
SSSI	Site of Special Scientific Interest
SuDS	Sustainable Drainage System
TBM	Tunnel Boring Machine
TEMPro	Trip End Model Presentation Program
TEN-T	Trans-European Transport Network



Acronym	Meaning
TUBA	Transport User Benefit Appraisal
UEA	University of East Anglia
VfM	Value for Money
WebTAG	Transport Analysis Guidance
WebTRIS	Highways England Traffic Information System
WFD	Water Framework Directive

1. INTRODUCTION

1.1. PROJECT BACKGROUND

- 1.1.1. Public consultation on the revised Norwich Area Transport Strategy (NATS) in 2003 showed strong support for transport improvements to the north and west area of Norwich. In particular, there was support for a Northern Distributor Road (NDR) extending from the A47 in the west skirting around the northern fringe of Norwich to re-join the A47 at Postwick, in the east.
- 1.1.2. A revised NATS was agreed in 2004, which included the provision of a NDR, with the aim to reduce the impacts of high volumes of traffic and congestion in Norwich. Throughout 2004 and 2005, further consultation was undertaken on a variety of route options for the NDR, including several different options for the western section, between the A47 and the A1067, through the River Wensum Valley.
- 1.1.3. On 19 September 2005, Norfolk County Council's cabinet agreed an adopted route for the NDR, excluding a link between the A47 and the A1067. Early plans to link the A47 (west) to the A47 (east) via the A1067 were not progressed due to environmental concerns regarding the River Wensum and its status as a Special Area of Conservation (SAC), and protection due to its international importance in biodiversity conservation.
- 1.1.4. Since the adoption of the NDR preferred route, there has been sustained local pressure for provision of a Norwich Western Link (NWL) to connect the A47 to the A1067, to ease traffic problems in the local area and enhance strategic connectivity. Following an announcement from the Department for Transport (DfT) and subsequently Highways England¹ (in 2014) of their intention to investigate options to upgrade the A47 between Easton and North Tuddenham to dual carriageway, and following full approval of the NDR (in 2015), Norfolk County Council committed to revisit the feasibility and need for a NWL, whilst also considering wider public transport and non-motorised user (NMU) impacts, and the role of complementary measures to reduce traffic on existing routes.
- 1.1.5. A pre-feasibility study² was completed in June 2016 which reviewed previous work, including a scoping study³ from 2014 which investigated potential NWL route options. The output of the 2016 study included, amongst other aspects, a series of actions to support the next stage of development for a NWL, and these were presented at Norfolk County Council's Environmental, Development and Transport Committee in July 2016.
- 1.1.6. The 2016 study concluded that further work needed to be undertaken to develop a business case and set out a compelling case for the scheme. This included demonstrating that the scheme forms part of a coherent wider strategy, and as such, the report recommended that a local transport

¹ Road Investment Strategy (Department for Transport, December 2014)

² Norwich Western Link Project Technical Report (Mott MacDonald, June 2016)

³ A47-A1067 Western Link Road Scoping Study (Mott MacDonald, September 2014)

strategy be developed to identify local problems, define objectives for the wider area and identify possible measures within the western quadrant of Norwich.

- 1.1.7. A further study⁴, undertaken in October 2017, looked at the potential mitigation of environmental impacts of crossing the River Wensum through a number of crossing options – a bridge (dual carriageway / single carriageway) and a tunnel (dual carriageway / single carriageway). The study resulted in a viaduct option being taken forward as the chosen crossing option on all new link road schemes which cross the River Wensum.
- 1.1.8. This Option Assessment Report (OAR) builds on the previous work undertaken, and provides further evidence of the issues and challenges facing the local area. This report focusses on the need for the scheme, describes the outputs from initial traffic modelling to present the challenges and likely economic benefits associated with a NWL, and explores the potential engineering solutions to identify a number of possible options. These options have then been considered and appraised using the DfT's Early Assessment Sifting Tool (EAST), to identify a shortlist of options to take forward for further appraisal.

1.2. GEOGRAPHICAL CONTEXT

- 1.2.1. Norwich is the county city of Norfolk, and is a key regional centre in the East of England. It is approximately 185km north-east of London, and occupies a strategically significant position within East Anglia. Norwich is directly served by a number of trunk roads, including the A11 (linking Norwich to London, via the M11), and the A47 (linking Norwich to Great Yarmouth and Lowestoft in the east and King's Lynn in the west). Norwich is also served by the A140 (linking Norwich to Cromer in the north and Ipswich in the south, via the A14) and the A146 (linking Norwich to Lowestoft).
- 1.2.2. Norwich is also an important rail node for the East of England, with a mainline link to London and providing connections to coastal locations such as Cromer, Great Yarmouth and Lowestoft. **Figure 1** identifies Norwich in the context of key urban settlements and transport links in the surrounding area.

⁴ Norwich Western Link Technical Report (WSP, October 2017)

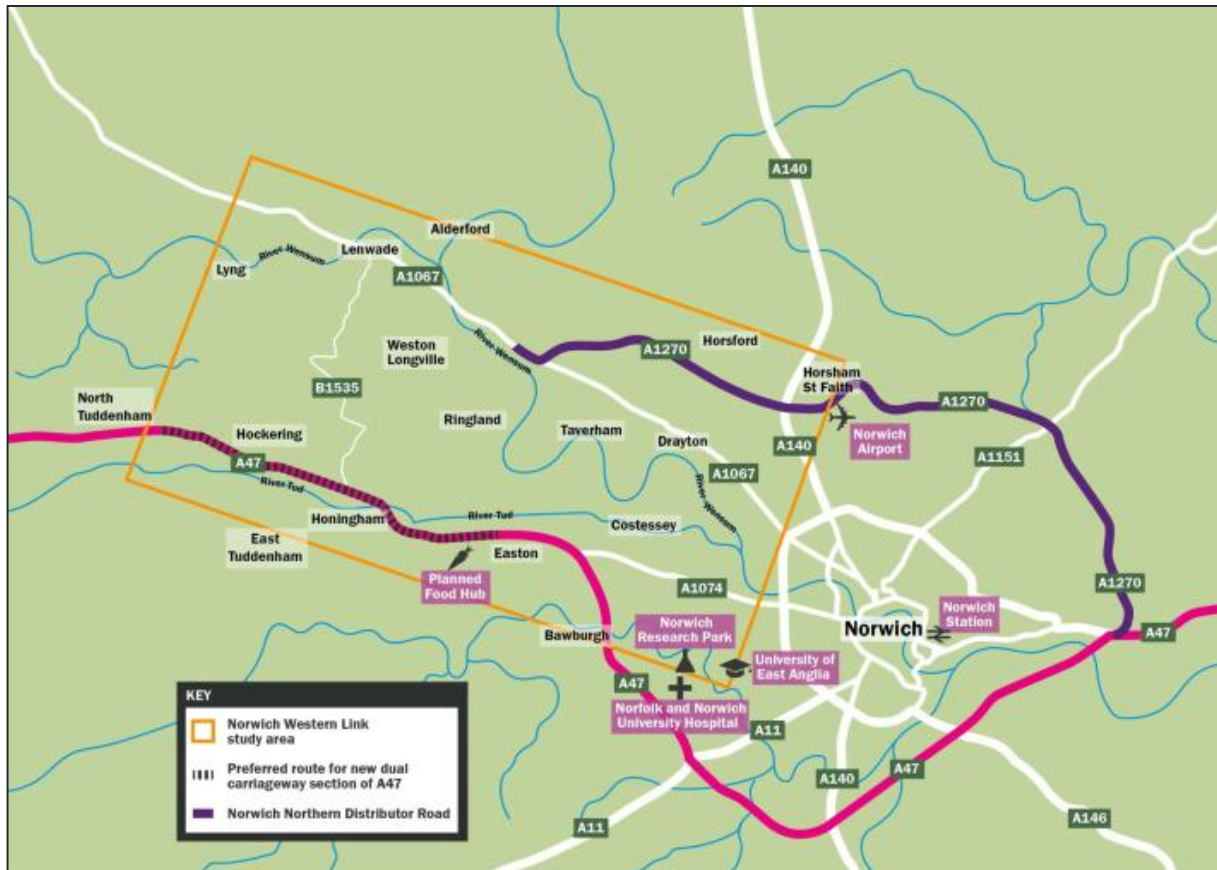
Figure 1– Geographical context of Norwich



1.3. STUDY AREA

- 1.3.1. The city performs a regional role in delivering growth and as a major employment, shopping and service centre, and a focus for transportation. Following the completion of the NDR, which was subsequently designated as an A-Road in the route hierarchy (A1270) and named Broadland Northway, there have been calls to complete the ‘missing link’ between the A47 and A1067.
- 1.3.2. The focus of this study is the north-west area of Norwich, known as the Norwich Western Quadrant (NWQ), as illustrated in **Figure 2**. The broad study area includes the key radial routes of the A47 trunk road, the A1074 (Dereham Road), and the A1067 (Drayton High Road / Fakenham Road).
- 1.3.3. The study area encompasses the western fringe of Norwich and settlements, including; Bawburgh, Marlingford, Honingham, Hellesdon, Drayton, Taverham, Costessey, New Costessey, Ringland, Hockering, Weston Green, Weston Longville, North Tuddenham, Primrose Green, Lenwade, Alderford, Marton, Ugate, Felthorpe, Thorpe Marriot, Horsford, Elsing and Lyng.

Figure 2 – Study area



Source: *About the Norwich Western Link, Location Map (Norfolk County Council)*

1.4. ENGAGEMENT

PUBLIC CONSULTATION

- 1.4.1. Norfolk County Council undertook a non-statutory public consultation, which ran between Tuesday 8 May 2018 and Tuesday 3 July 2018. The purpose of this consultation was to understand people's experience of living in, and travelling through, the area to the west of Norwich. A total of 4,426 website visitors were recorded with 2,327 comments across the platforms used.
- 1.4.2. The results demonstrated that respondents perceive the roads in the area to be unsuitable for the current levels and type of traffic (1,395 respondents), with rat-running (1,103 respondents) and slow journey times (1,001 respondents) also frequently mentioned issues. There was a clear preference for developing a new road between the A1270 and A47 in order to tackle the transport issues highlighted in the area (1,492 respondents). This option was selected more than three times as much as the next most popular option of improving the existing roads (473 respondents).

KEY STAKEHOLDERS

- 1.4.3. Key stakeholders have been actively engaged in the project throughout 2017 and 2018 via a series of Local Liaison Group (LLG) workshops, occurring bi-monthly with Parish Council representatives from within the study area. A group of elected Council Members has also provided guidance to the project via bi-monthly Member Working Group (MWG) meetings. Both the LLG workshops and

MWG meetings have often included other relevant stakeholders as necessary, for example, Highways England and their consultants have attended and provided updates on their A47 Road Investment Strategy (RIS) schemes and modelling work.

- 1.4.4. During 2017, discussions were progressed with Natural England and the Environment Agency to understand the environmental sensitivity of the study area in more detail, and discuss the feasibility of potential options crossing the River Wensum SAC. However, neither Natural England nor the Environment Agency were able to provide meaningful feedback without a potential scheme design to review. An example proposal for one of the potential highway options (albeit this was not considered to be a 'preferred option') was therefore developed by WSP in more detail, purely for illustrative purposes to facilitate these discussions.
- 1.4.5. Options considered in 2017 along the same route alignment included dual and single carriageway bridge and tunnel options. A variety of potential construction techniques were considered at that stage to understand potential environmental effects and pollution risk to the River Wensum SAC.
- 1.4.6. During discussions with Natural England and the Environment Agency in July 2017, specific points were highlighted that were seen as positive contributions to the design:
 - § It was acknowledged that there was no construction upon the river banks which was a key concern from previous consultation
 - § It was welcomed that the embankments and bankseats are not within the floodplain
 - § A significant soffit height of the bridge above the watercourse would reduce the degree of shading that is encountered
- 1.4.7. The meetings also highlighted a range of other issues to be addressed:
 - § Concerns about the potential effects of the tunnel option upon groundwater flow which could compromise the Water Framework Directive (WFD) objective for the groundwater body. This could become a 'showstopper' for this option
 - § Highway runoff is likely to require a high degree of treatment to both remove common highway pollutants, but also to provide adequate emergency provision
 - § It was queried whether salt spray could result in an impact upon the River Wensum and this will require additional assessment
 - § Smaller, thinner piers are preferable from the perspective of flood water attenuation and this should be considered as the design progresses
 - § Greater information on the construction process should be included in any future optioneering
 - § A significant number of species surveys are likely to be required in order to provide sufficient information to inform the assessments
 - § Opportunities for environmental enhancement should be sought
- 1.4.8. An additional meeting was held in October 2018 to provide an update to Natural England and the Environment Agency. Both were supportive of the progress that had been made with the proposals since consultation in 2016 and it is anticipated that a solution that does not materially impact the ecological integrity of the River Wensum SAC is achievable. Continued liaison during the adoption of a preferred alignment will be key to achieving the desired outcome.

1.5. HIGH-LEVEL OBJECTIVES

- 1.5.1. The NWL objectives have been categorised at strategic and local scales. A range of objectives for the scheme have been developed to align with high-level objectives presented in national, regional

and local policy. It is anticipated that the NWL will improve strategic connectivity to growth areas, Norwich International Airport and associated development, while addressing specific local issues in the NWQ related to traffic rat-running and congestion.

1.5.2. The NWL emerging high-level objectives reflect issues and opportunities identified to support the principal aim of a modern and efficient transport system:

- § H1 Support sustainable growth
- § H2 Improve the quality of life for local communities
- § H3 Support economic growth
- § H4 Promote an improved environment
- § H5 Improve strategic connectivity with the national road network

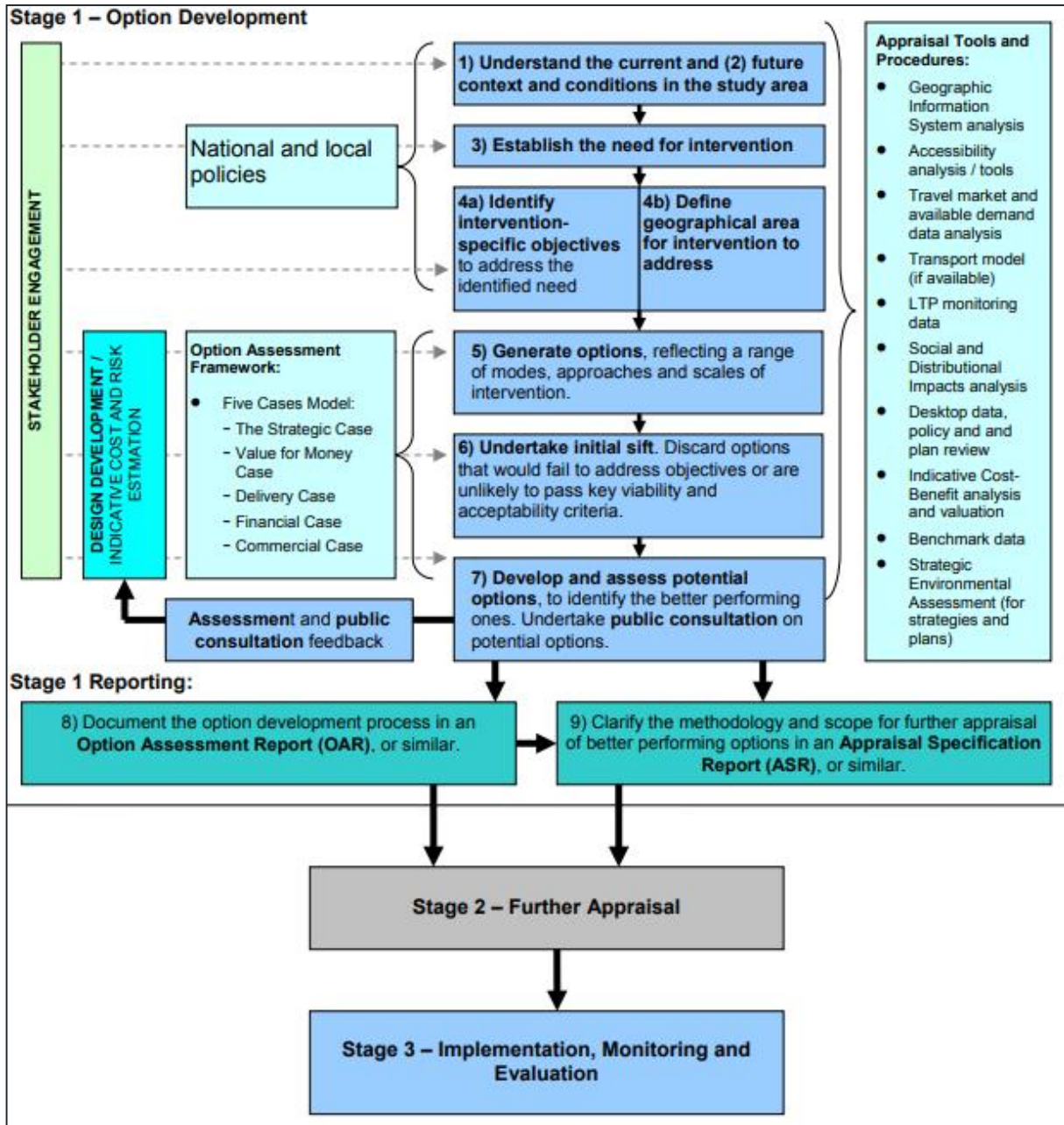
1.5.3. The local specific objectives are outlined in **Section 5.4**.

1.6. METHODOLOGY

1.6.1. The purpose of this OAR is to build on the previous work undertaken, and provide further evidence of the issues and challenges facing the local area. This report focusses on the need for the scheme, describes the outputs from initial traffic modelling to present the challenges and likely economic benefits associated with a NWL, and explores the potential engineering solutions to identify a number of possible options and wider considerations. These solutions have then been sifted to identify the better performing options to be taken forward for further appraisal and public consultation.

1.6.2. The methodology for this study aligns with the DfT's Transport Analysis Guidance (WebTAG). The OAR documents steps 1-7 of Stage 1 of the Transport Appraisal Process – Option Development (**Figure 3**) and forms the output for step 8.

Figure 3 – Stage 1 (Option Development) process



Source: Transport Appraisal Process, Option Development (Department for Transport)

- 1.6.3. This OAR sets out the evidence which demonstrates that the project has been developed from a clear understanding of the policy context, specific transport (and wider policy) challenges and clear objectives. A range of options have been considered, consulted upon, sifted and further developed so that a shortlist of preferred solutions has emerged from a transparent process.
- 1.6.4. This report makes use of a wide range of previous studies and associated technical work to support the Stage 1 (Option Development) process. Reference is made to relevant historical and current policies and strategies to explain the context of the option development, the sifting process, and to

confirm that the solutions described by these policies are appropriate and will offer Value for Money (VfM).

- 1.6.5. New traffic data collected in June 2018 shortly after the final section of the A1270 fully opened to the public (April 2018) has also been reviewed and the evidence base updated to reflect the findings of these interim surveys, albeit it is not clear whether this data reflects 'settled' travel patterns. Further monitoring has been carried out in September and October 2018 (six-months after the A1270 opening), to provide a more certain picture of the A1270 effects in terms of local redistribution of traffic. This new data monitoring was not complete at the time of producing this OAR, but will be taken into account going forward.
- 1.6.6. The previous technical work on the NWL project built upon the former 2012 transport model which informed the development of the NATS and A1270. However, Highways England have recently updated this model to a 2015 base year using new and more detailed mobile phone data from the South East Regional Transport Model (SERTM), for the purpose of assessing their A47 schemes. Due to the proximity of the A47 North Tuddenham to Easton scheme, the detail within the NWQ study area has increased compared with the previous 2012 model. The 2015 model has been further refined by WSP for use in the NWL study, following a review of the 2015 base model to improve the fit to observed data for minor road links within the NWQ.
- 1.6.7. Norfolk County Council are following the guidance contained in the DfT's WebTAG Transport Appraisal Guidance, adopting a three-stage process to develop and seek funding approval for the NWL. The stages of the process are:
- § **Stage 1: Option development** – identifying the need for intervention and the development of options to address a clear set of locally developed objectives and associated outcomes. These have then been sifted to identify the better performing options to be taken on to further detailed appraisal
 - § **Stage 2: Further appraisal** – further option refinement and appraisal of the better performing options to obtain sufficient information to enable decision-makers to make a rational and auditable decision about whether or not to proceed. The focus of analysis will be on estimating the likely performance and impact of intervention(s) in sufficient detail
 - § **Stage 3: Implementation, monitoring and evaluation** – the final stage of the process will involve developing a detailed implementation programme and undertaking post-implementation monitoring and evaluation to determine whether the intended outcomes and objectives have been delivered

1.7. REPORT STRUCTURE

1.7.1. The remainder of this OAR is structured as follows:

- § **Chapter 2** Understanding the current situation
- § **Chapter 3** Understanding the future situation
- § **Chapter 4** Establishing the need for intervention
- § **Chapter 5** Identifying objectives & geographic scope
- § **Chapter 6** Option generation
- § **Chapter 7** Sifting of options
- § **Chapter 8** Delivery
- § **Chapter 9** Development of options
- § **Chapter 10** Next steps

2. UNDERSTANDING THE CURRENT SITUATION

2.1. INTRODUCTION

2.1.1. This chapter provides an understanding of the current situation of the NWQ. It sets out the relevant transportation, economic, planning and environmental policy applicable to the study area, before describing the demographic profile, transport context and current travel demands and levels of service. This chapter also provides an overview of the environmental constraints within the study area.

2.1.2. This chapter forms Step 1 of the Transport Appraisal Process.

Step 1 of the Transport Appraisal Process aims to:

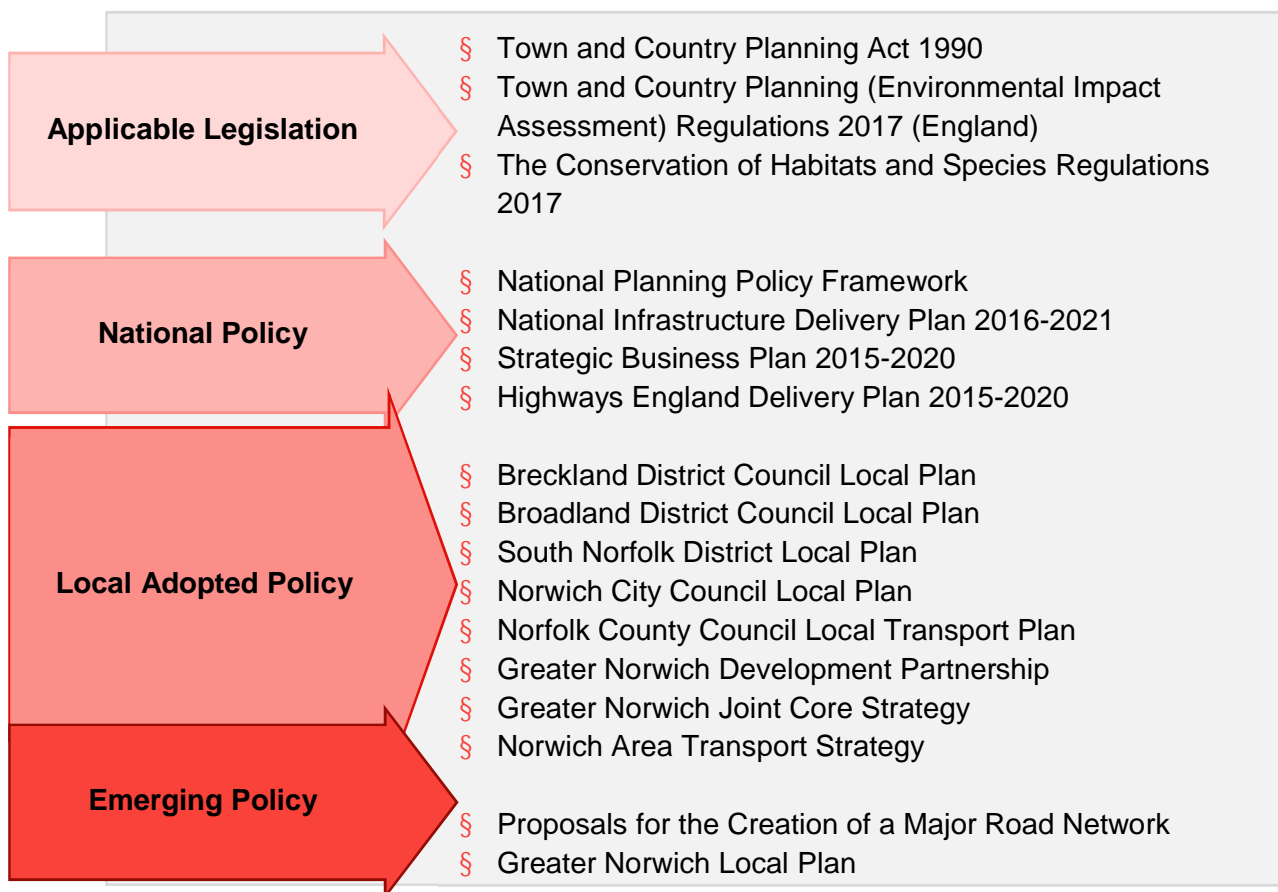
- § Understand current transport and other policy
- § Set out current travel demand
- § Set out current levels of service
- § Identify opportunities and constraints for the NWL

2.2. LEGISLATIVE & POLICY CONTEXT

2.2.1. This section considers the relevant legislation and policy at a national and local level, to identify the key themes and priorities that need to be considered in the development of a scheme, and identification of potential measures for a NWL.

2.2.2. It outlines the legislation that is applicable to the NWL project, before focussing on the national policy set out by central government or government-owned bodies, in which the broad principles of transport infrastructure delivery in England are set out, which will steer the development of intervention options. Adopted local policy and emerging policy are then discussed. **Figure 4** summarises the legislation and policies pertinent to the NWL that are discussed in the subsequent sections.

Figure 4 – Summary of key legislation and policies



APPLICABLE LEGISLATION

Town & Country Planning Act 1990

- 2.2.3. The Town and Country Planning Act 1990 regulates the development of land in England and Wales. The development of a NWL is a scheme that is likely to come under the remit of this Act, as any new highway would constitute ‘development’ (as defined in the Act), and would therefore require planning permission from the relevant authority prior to construction commencing.

Town & Country Planning (Environmental Impact Assessment) Regulations 2017 (England)

- 2.2.4. The development of a NWL is a scheme that is likely to come under the remit of these regulations as a result of the scale of the proposals. The Environmental Impact Assessment (EIA) regulations require any substantial application for planning permission to be accompanied by an Environmental Statement (ES) that assesses the impacts of the project upon the environment. The preparation of the ES and its consideration by the planning authority is a process known as the EIA.
- 2.2.5. These regulations identify, in Schedule I and Schedule II, a variety of projects and developments that require planning permission. Schedule I developments, including new power stations, oil refineries and motorways are projects for which EIA is compulsory, and Schedule II developments are projects for which EIA is not necessarily required, but should be undertaken should the project exceed certain thresholds and have the potential for significant effects upon the environment. Any NWL project is likely to be Schedule II development because it is likely to occupy a footprint of

greater than 1ha in area, thus the potential effects upon the receiving environment need to be adequately considered and assessed by competent assessors. A screening opinion and scoping report will need to be submitted to the planning authority prior to application to define the scope of assessment.

The Conservation of Habitats and Species Regulations 2017

- 2.2.6. The Conservation of Habitats and Species Regulations 2017 (the Habitats Regulations) transpose Council Directive 92/43/EEC, on the conservation of natural habitats and of wild fauna and flora (the Habitats Directive) into UK law. The Habitats Regulations provide for the designation and protection of 'European sites' and the adaptation of planning and other controls for the protection of European sites. Under the Habitats Regulations, competent authorities are required to consider plans or projects and restrict or revoke planning permission where the integrity of the European site would be adversely affected.

NATIONAL POLICY

National Planning Policy Framework

- 2.2.7. The National Planning Policy Framework (NPPF), published by the Ministry of Housing, Communities and Local Government in July 2018, contains the Government's planning policies for England and how these are expected to be applied. The NPPF has a presumption in favour of sustainable development, which is summarised as: *"meeting the needs of the present without compromising the ability of future generations to meet their own needs"*. However, this presumption does not apply in the case of those projects which require appropriate assessment under the Habitats Regulations⁵.
- 2.2.8. The NPPF advises that planning policies and decisions should play an active role in guiding development towards sustainable solutions, and recognises three interlinked dimensions in achieving this; economic, social and environmental. The policies within the framework seek to improve health, social and cultural wellbeing for all, deliver adequate community and cultural facilities and provide services to meet the demand of local people and create a good standard of amenity for all existing and future occupants of land and buildings. Development that takes place under the framework is expected to contribute to the conservation and enhancement of the natural and historic environments as well as prevent development that leads to unacceptable levels of pollution.
- 2.2.9. The NPPF places emphasis on good design which is a key aspect of sustainable development and should contribute positively to making places better for people and should avoid significant adverse impacts which can affect health and quality of life.

National Infrastructure Delivery Plan 2016-2021

- 2.2.10. The National Infrastructure Delivery Plan 2016-2021 (published in March 2016) sets out the Government's plans for economic infrastructure over a five-year period, alongside plans to support

⁵ the Government response to the NPPF consultation indicated that this issue is under review

delivery of housing and social infrastructure. It reflects the Government's commitment to invest over £100 billion by 2020-2021 to drive wider economic benefits, including:

- § supporting growth and creating jobs in the short term as projects are built – especially where public investment is used to attract private investment
- § raising the productive capacity of the economy in the long term as the benefits of new infrastructure are felt; reduced transaction costs; larger and more integrated labour and product markets; and better opportunities to collaborate and innovate
- § driving efficiency – enabling greater specialisation and economies of scale
- § boosting international competitiveness – attracting inward investment and enabling trade with foreign partners

2.2.11. In the East of England, the National Infrastructure Delivery Plan 2016-2021 made reference to the NDR as a key project, connecting the A47 (east of Norwich) to the A1067. The NDR (A1270 Broadland Northway) has subsequently been completed.

Highways England: Strategic Business Plan 2015-2020

2.2.12. In December 2014, Highways England's published their Strategic Business Plan for 2015-2020. The Plan recognises the importance of the Strategic Road Network (SRN) in enabling and supporting economic growth and prosperity, as well as being essential to quality of life across the nation. It states that 98% of UK manufacturers consider the condition of roads on the network to be critical to the potential success of a business, and that 60% of congestion is caused by a general lack of available capacity.

2.2.13. The Performance Specification within the Plan sets out the eight key areas which the Government will measure both the network and company performance:

- | | |
|--|--|
| § Making the network safer | § Achieving real efficiency |
| § Improving user satisfaction | § Keeping the network in good conditions |
| § Supporting the smooth flow of traffic | § Helping cyclists, walkers & other vulnerable users |
| § Encouraging economic growth | |
| § Delivering better environmental outcomes | |

2.2.14. Highways England considers that to improve the capacity and performance of the network, it will be required to modernise, maintain and operate the network, with the desired outcomes of supporting economic growth, a safe and serviceable network, a more free flowing network, an improved environment and a more accessible and integrated network.

2.2.15. Investment in the SRN within the study area will support the Highways England Strategic Business Plan by improving network capacity and resilience and thus support economic growth and productivity.

Highways England: Delivery Plan 2015-2020

2.2.16. Building upon the Strategic Business Plan 2015-2020, the Delivery Plan 2015-2020 provides detail on how Highways England intends to deliver strategic outcomes, measure success, identify goals and plan for the future. The focus of the Plan is on:

- | | |
|----------------------------------|--|
| § Supporting economic growth | § Improved environment |
| § A safe and serviceable network | § An accessible and integrated network |
| § A more free-flowing network | |

- 2.2.17. The Plan recognises the importance of supporting economic growth through the creation of a more free-flowing, integrated and accessible network. Investment in improved connectivity between the A47 and A1067 within the study area would help deliver Highways England's strategic outcomes.

LOCAL ADOPTED POLICY

Breckland District Council Local Plan

- 2.2.18. The Core Strategy adopted in 2009, outlines the vision and overall objectives for development in Breckland up to 2026, and sets out where new housing and other development should be focused. The Site Specific Policies and Proposals Development Plan document (adopted in early 2012) allocates areas of land for different uses to deliver the requirements of the Breckland Core Strategy and thus meet the development needs of the District up to 2026.
- 2.2.19. The requirement for Breckland is to deliver 15,200 homes and 6,000 net new jobs over the period 2001 to 2021. Policy CP 1 indicates that provision is made for the development of at least 19,100 homes and associated infrastructure with the majority to be provided in the larger towns and settlements, including; Thetford, Attleborough, Dereham, Swaffham, Watton, Shipdham, Harling, Swanton Morley and Narborough. A total of 14% (2,716 dwellings) are allocated to 'All other parishes' within the district, with some allocated within the NWL study area at Lyng, Sparham and Bawdeswell.

Greater Norwich Joint Core Strategy

- 2.2.20. The Joint Core Strategy (adopted in 2014) sets out the long-term vision and objectives for the area covering Broadland, Norwich and South Norfolk Councils working together with Norfolk County Council as the Greater Norwich Development Partnership (GNDP). It identifies broad locations for new housing and employment growth and changes to transport infrastructure as well as other supporting community facilities. The Joint Core Strategy states that 37,000 additional homes and 27,000 new jobs are to be provided by 2026.
- 2.2.21. Policy 6 of the Joint Core Strategy, which refers to Access and Transportation, highlights that the transportation system will be enhanced to develop the role of Norwich as a regional transport node, particularly through the implementation of the NATS. It identifies that this will be achieved through:
- § the NDR (A1270 Broadland Northway)
 - § significant improvements to the bus, cycling and walking network, including Bus Rapid Transit on key routes in the Norwich area
 - § enhancing the Norwich Park & Ride system
 - § promoting enhancement of rail services
 - § promoting improvements to the A11 and A47
 - § supporting the growth and regional significance of Norwich International Airport
 - § concentrating of development close to essential services and facilities to encourage walking and cycling
 - § protecting the function of strategic transport routes (corridors of movement)
 - § continuing to improve public transport accessibility to, and between, main towns and key service centres

Greater Norwich Development Partnership

- 2.2.22. Broadland District Council, Norwich City Council and South Norfolk Council are working together with Norfolk County Council to prepare the Greater Norwich Local Plan. The Plan will build on the

long-established joint working arrangements for Greater Norwich, which have delivered the current Joint Core Strategy for the area. The Joint Core Strategy plans for the housing and jobs needs of the area to 2026 and the Greater Norwich Local Plan will ensure that these needs continue to be met to 2036.

- 2.2.23. The Greater Norwich Local Plan will include strategic planning policies and allocate sites for development. It will aim to ensure that new homes and jobs are delivered and the environment is protected and enhanced, promoting sustainability and the effective functioning of the area. To oversee the preparation of the new Local Plan the authorities involved have re-established their joint working arrangements under the Greater Norwich Development Partnership (GNPD).

Broadland District Council Local Plan

- 2.2.24. Broadland District Council's Site Allocations Development Plan Document (adopted May 2016) sets out housing allocations in respective policy areas, some of which are incorporated within the study area. The document refers to the Norwich Policy Area which includes the city of Norwich, part of South Norfolk and part of Broadland District. In Broadland, a number of fringe parishes are defined: Taverham, Drayton, Hellesdon, Old Catton, Sprowston and Thorpe St Andrew. These form part of the Norwich Policy Area and have a combined allocation of between 1,462 and 1,662 new houses.

Norwich City Council Local Plan

- 2.2.25. The Norwich City Council Site Allocations and Site Specific Policies Local Plan (adopted December 2014) demonstrates allocations for a total of 73 sites many of which are for mixed-use development and for housing, with a small number of sites allocated for employment and other uses. Policy 11 of the Greater Norwich Joint Core Strategy covers Norwich city centre, promoting it as the main focus in the sub-region for retail, leisure and office development, with housing and educational development also adding to the vibrancy of the centre. The remainder of the Norwich urban area is covered in Policy 12.
- 2.2.26. The Site Allocations and Site Specific Policies Local Plan allocates 31 sites in the city centre and 42 in the remainder of the city. Most of the sites proposed for development will deliver mixed-use development, which will contribute to the vibrancy of the city centre, strengthen the city's sub-regional role and help deliver targets for new housing and employment. The allocations are sufficient to accommodate 3,124 new houses and flats (927 of these in the city centre, and 2,215 in the remainder of the city) together with an additional 7ha of employment land.

South Norfolk District Local Plan

- 2.2.27. South Norfolk District Council's Site Specific Allocations and Policies Document (adopted October 2015) designates areas of land for particular uses, most notably land to deliver housing, but also for other forms of developments such as employment, recreation, open space and community uses. Policy 10 of the Greater Norwich Joint Core Strategy identifies a list of major new or expanded communities in the Norwich Policy Area, including Easton and Costessey within South Norfolk.
- 2.2.28. Policy EAS 1 and EAS 2 of the Site Specific Allocations and Policies document states that the settlement of Easton has 52.6ha of land allocated for 900 dwellings and associated infrastructure, as well as 1.4ha of land allocated for a new Gymnastics Centre. Costessey has a number of policies within the document (COS 1, COS 2 and COS 3), which outlines an allocation of 29.6ha of land for 500 dwellings and associated infrastructure (with an additional 5.5ha for green infrastructure), and 13.3ha of land allocated for employment uses.

Norwich Area Transport Strategy

- 2.2.29. The NATS, published in 2006, has been prepared by Norfolk County Council, in partnership with Norwich City Council, Broadland District Council and South Norfolk Council. The strategy covers the city of Norwich, its suburbs and the first ring of surrounding villages.
- 2.2.30. The document sets out a transportation strategy for the Norwich area until 2021 to help deliver the growth within the Norwich area and address the problems, such as congestion. The strategy also promotes sustainable travel choices, recognising the need to maintain the economic health of the Norwich area. The NATS includes six strategic themes and objectives which underpin the vision, as outlined in **Table 1**.
- 2.2.31. The NATS Implementation Plan Update was published in 2013 which outlined progress made since 2010 and set out the proposed approach and phasing of future delivery.

Table 1 – NATS transport priorities

Theme	Aim
Accessibility	Promote sustainable modes of travel and encourage reduced car-use through land use policies; reduce social exclusion by improving accessibility for people from poorer, deprived areas to work, shops and medical facilities
Congestion	Minimise congestion and delays for all modes of transport by improving the efficiency of the transport network
Pollution	Reduce carbon dioxide (CO ₂) emission from transport by encouraging sustainable modes of travel and vehicles using fuels derived from renewable sources or waste; minimise noise and vibration and visual intrusion from transport; implement transport solutions that protect open spaces and biodiversity
Safety	Maximise safety and security for everyone; minimise the number and safety of road traffic accidents
Economic viability	Improve the competitiveness of the Norwich area as a retail, tourist and business centre, whilst enhancing its image and maintaining a high-quality environment
Liveability and community	Lower the incidence of crime experienced on the transport system and remove the perception of fear of crime for vulnerable people; protect and enhance residential amenity and minimise community severance

Norfolk County Council Local Transport Plan

- 2.2.32. In 2011, Norfolk County Council published their Local Transport Plan (LTP) 3, which describes the county's strategy and policy framework for delivery up to 2026. It includes six strategic themes and aims which underpin the vision, as shown in **Table 2**.

Table 2 – Norfolk County Council LTP3 transport priorities

Theme	Aim
Maintaining and managing the highway network	<ul style="list-style-type: none"> § Maintaining and managing the higher status roads, where necessary reducing treatments on other roads § Enhancing the community’s role in routine maintenance jobs § Achieving better value by improving targeting and reducing costs § Using network management duty to get the most of highway network to increase journey time reliability § Protecting the environment and responding to the climate change impacts
Delivering sustainable growth	<ul style="list-style-type: none"> § Ensuring that all new development is well located in settlements with a range of services so as to minimise the need to travel § Adequate regard is given to reducing the traffic impacts of growth to negate a detrimental effect on the road network or existing communities § Development is in line with safe, sustainable development, our aims and guidance notes for development management § Ensuring necessary infrastructure to support growth is secured, including a NDR to facilitate economic growth in the Greater Norwich area
Enhancing strategic connections	<ul style="list-style-type: none"> § The A47, part of the Trans-European Transport Network (TEN-T), providing the main east-west road connection and route to the Midlands and north of England § Connections to Norfolk’s gateways, Norwich International Airport and the Ports at King’s Lynn and Great Yarmouth, including a future Third River Crossing for the River Yare § A NDR to facilitate strategic access to north-east Norfolk and Norwich International Airport § The A11, providing the main road connection to London and the south
Reducing emissions	<ul style="list-style-type: none"> § Aiding a shift to a more efficient vehicle fleet through development and facilitation of necessary infrastructure like electric vehicle charging points § Promoting active and healthier travel options for short journeys to schools, services and places of employment § Enhancing integration between different travel modes, particularly at key bus and rail stations and Norwich International Airport § Tackling traffic problems where they are resulting in poor air quality
Improving road safety	<ul style="list-style-type: none"> § Prioritising measures to reduce the number of people killed or seriously injured (KSI) on Norfolk’s roads § Providing education, training and publicity to promote safer travel § Creating a safer environment for travel § Working in partnership with those agencies that share our goals

Theme	Aim
Improving accessibility	<ul style="list-style-type: none"> § Shift towards more demand responsive transport in rural areas § Poor accessibility will be tackled by promoting shared travel options like car sharing § Achieving efficient movement into town and urban centres, favouring short-term parking for car drivers, which benefits the local economy and supports alternative travel options § Providing opportunities for sustainable tourism, recognising the benefit of community and heritage rail lines § Providing accessible transport services § Encouraging alternatives to travel, such as supporting high quality broadband

2.2.33. The Plan highlights that investment in new infrastructure will be focused on a small number of strategic improvements, linked to major housing or economic growth and strategic connections. It was noted that there is a need to ensure necessary infrastructure to support growth is secured, including a NDR to facilitate economic growth in the Greater Norwich area.

2.2.34. Protecting the environment is noted as being important and adequate regard is given to reducing the traffic impacts of growth to negate a detrimental effect on the road network or existing communities. Likewise, promoting active and healthier travel options for short journeys to schools, services and places of employment and tackling traffic problems where they are resulting in poor air quality, is identified.

2.2.35. The Plan notes that studies show that growth within the Norwich area is significantly constrained and that the NDR (A1270 Broadland Northway), running from the A47 in the east at Postwick to the A1067 in the north-west, is vital in helping to unlock development to the north-east of the city and improve connectivity between North Norfolk and the trunk road network.

EMERGING POLICY

Proposals for the Creation of a Major Road Network

2.2.36. In July 2017, the Government published their Transport Investment Strategy, which set out the priorities and approach for future transport decisions. As part of the strategy, the Government committed to creating a Major Road Network (MRN) across England – a designated network reaching all parts of the country. The MRN would form a middle tier of the busiest and most economically important local authority A-Roads, sitting between the national SRN and the rest of the local road network.

2.2.37. A consultation ran from 23 December 2017 to 19 March 2018, outlining the Government’s proposals for this network and seeking views on its core principles, the definition of the network, investment planning, and eligibility and investment assessment. In creating this network, the Government has five central policy objectives:

- § Reduce congestion
- § Support economic growth and rebalancing
- § Support housing delivery
- § Support all road users
- § Support the SRN

2.2.38. The creation of a MRN would allow for dedicated funding from the National Roads Fund to be used to improve the middle tier of our busiest and most economically important local authority A-Roads.

The NDR (A1270 Broadland Northway) is utilised as a case study within the consultation document, in relation to supporting the SRN, with the DfT providing £77.5 million toward the total cost. Schemes similar to the NDR (A1270 Broadland Northway), including the provision of a NWL could be funded from the MRN in the future.

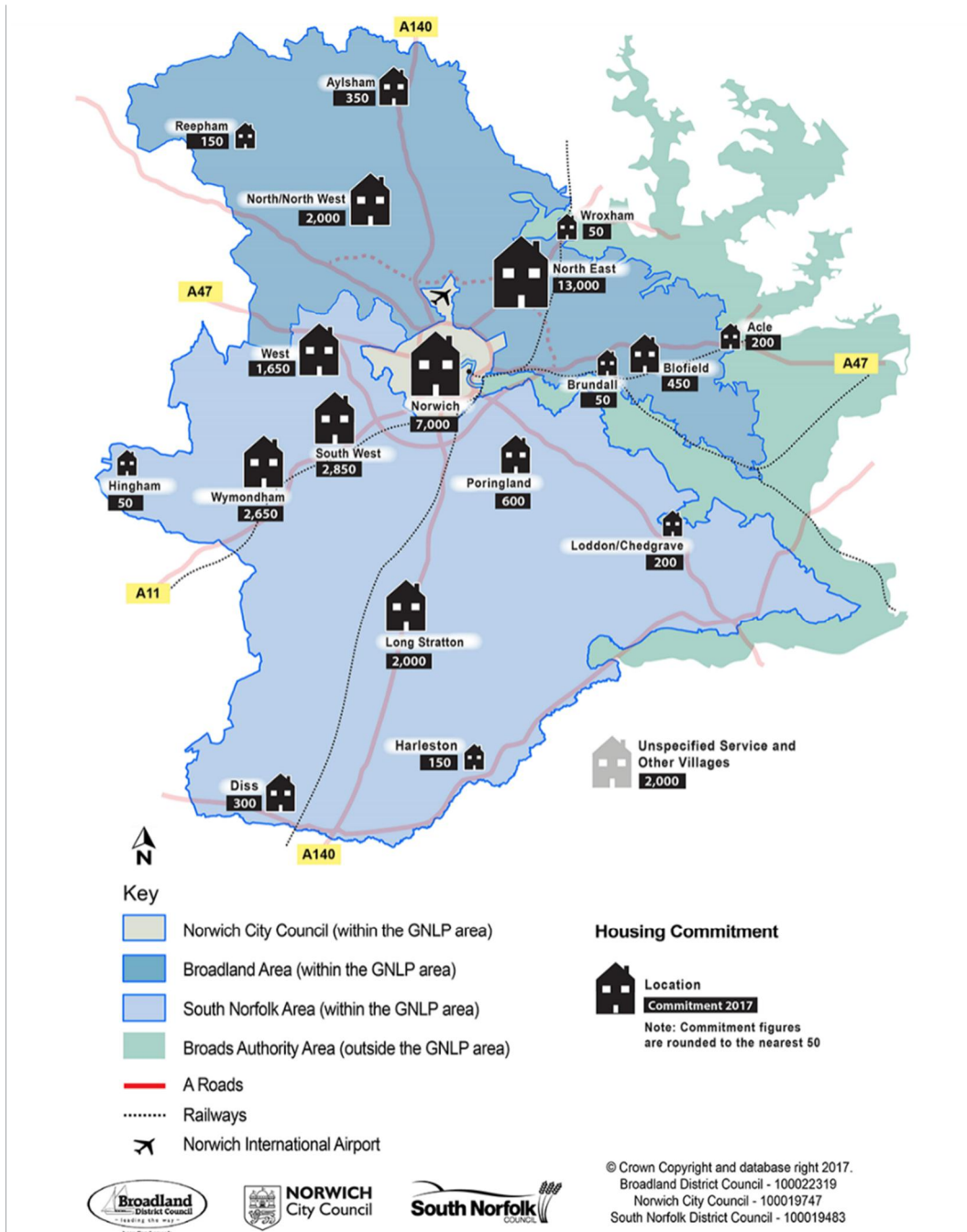
2.2.39. Feedback from the consultation is currently being analysed.

Greater Norwich Local Plan

2.2.40. The Greater Norwich Local Plan (under development) is currently being prepared by Broadland District Council, Norwich City Council and South Norfolk Council, working with Norfolk County Council. The Plan will build on the Joint Core Strategy and focus on housing and job needs up to 2036 with a focus on ensuring new development promotes sustainability.

2.2.41. Paragraph 4.17 of the draft plan indicates that the latest Objectively Assessed Need (OAN) from 2017 to 2036 is approximately 38,988 dwellings and that: *“The City Deal seeks to deliver an additional 13,000 jobs by 2031 on top of the 27,000 jobs planned for in the Joint Core Strategy”*. This results in a total requirement of 30,000 jobs to 2036. The Strategic Housing Market Assessment (SHMA) calculates how many homes would be required in the Greater Norwich Local Plan to support this enhanced growth. A simple recalculation of the SHMA assessment to rebase to 2017 suggests that around 40,700 dwellings are required, of which 80% have been identified as part of existing adopted plans (as shown in **Figure 5**). Beyond this, the new Local Plan seeks to identify further sites for 7,200 new homes to achieve the OAN set out in paragraph 4.17 of the Local Plan.

Figure 5 – Greater Norwich Local Plan baseline committed growth



Source: Greater Norwich Draft Local Plan (page 23)

2.3. EXISTING TRANSPORT CONDITIONS

2.3.1. This section considers the current situation in the study area by reviewing available data sources to provide an understanding of the local population, levels of deprivation, economic activity, land use, transport networks and associated problems. This understanding has been used to highlight key challenges in **Chapter 4**.

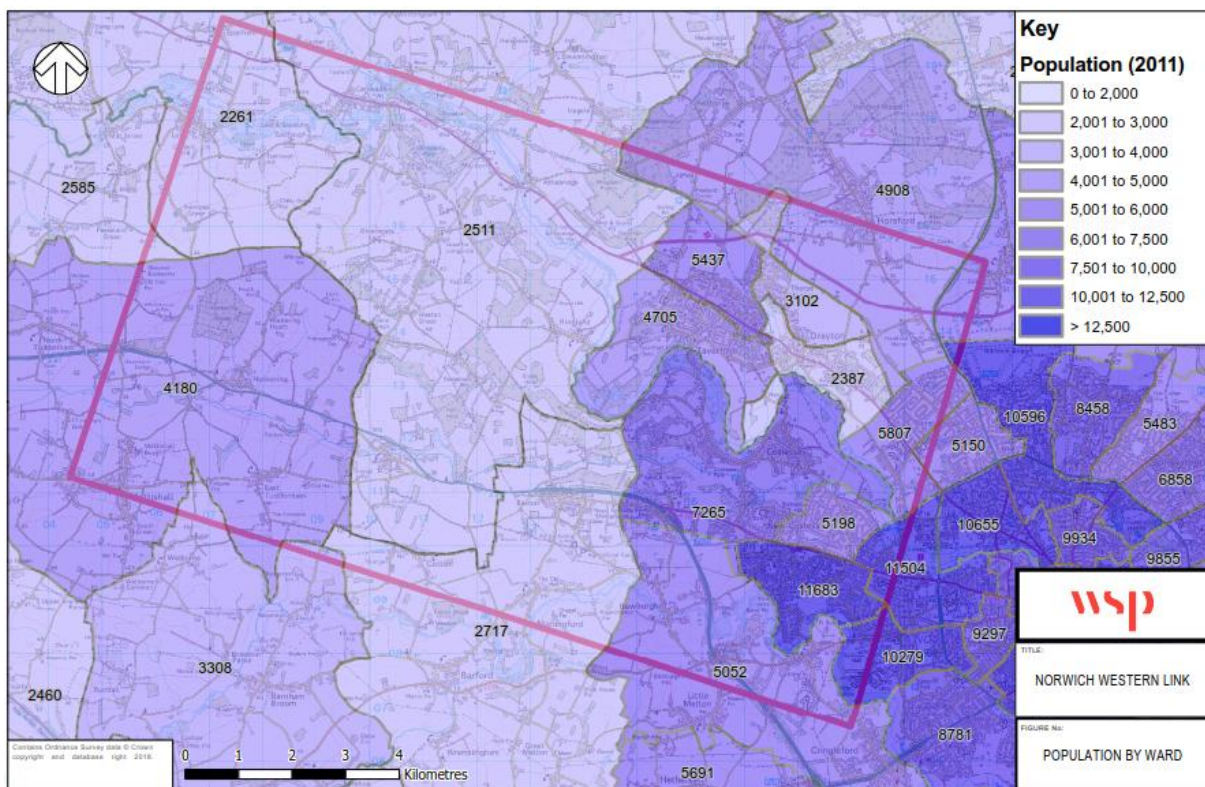
DEMOGRAPHIC PROFILE

2.3.2. To derive statistical information for the study area, the Norfolk Insight Statistics (NIS) and the Office for National Statistics (ONS) databases have been interrogated.

Resident population

2.3.3. The Norwich urban area has a population of around 210,000 and is one of the largest urban areas in the East of England region. The total estimated population in the NWQ is 77,600, as identified in the 2011 Census, however, this number does not include the population of Morton on the Hill and Alderford. **Figure 6** indicates the total population by ward, whilst **Table 3** identifies the top five populated areas within the study area, by age.

Figure 6 – Population by ward



Source: 2011 Census

Table 3 – Top five most populated areas

Location	Total	Age 0-14 (%)	Age 15-64 (%)	Age 65+ (%)
Parish – Costessey	12,463	2,059 (17%)	8,000 (64%)	2,404 (19%)
Residential area – Bowthorpe	11,683	2,377 (20%)	7,978 (68%)	1,328 (11%)
Residential area – North Earlham	11,504	2,299 (20%)	7,902 (69%)	1,303 (11%)
Parish – Hellesdon	10,957	1,336 (12%)	6,548 (60%)	3,073 (28%)
Parish – Taverham	10,142	1,780 (18%)	6,549 (65%)	1,813 (18%)
NWQ study area	77,600	13,246 (17%)	50,183 (65%)	14,171 (18%)

Source: 2011 Census

2.3.4. The 2011 Census data shows that the demographic profile of the area is of an ageing population, with high proportions of its population over 65-years of age. A total of 50,183 persons in the NWQ were economically active (at the time of the census), which equates to approximately 65% of the population of working age (16-64 years of age). This is lower than the East of England average of 72% and the England average of 70%.

2.3.5. **Table 4** provides the trend in total population between 2012 and 2016, and provides a projected estimate for 2041 (based on 2016 mid-year projections). This indicates that the population of South Norfolk and Norwich increased significantly between 2012 and 2016 by 5.6% and 4.5% respectively, whereas the population of the Broadland administrative area increased slower when compared to regional and country rates (1.8% compared with 3.8% and 3.3% respectively).

Table 4 – Population increase between 2012 and 2016 and predicted increase to 2041

Year	Norwich	Breckland	Broadland	South Norfolk	Norfolk	East of England	England
2012	133,900	131,900	125,200	126,000	864,800	5,905,900	53,493,700
2013	135,100	133,000	125,500	127,700	870,300	5,951,900	53,865,800
2014	136,600	134,300	126,000	129,300	877,400	6,017,300	54,316,600
2015	138,100	135,700	126,600	131,200	884,700	6,076,000	54,786,300
2016	139,900	137,100	127,500	133,000	891,700	6,129,000	55,268,100
% Increase	4.5%	3.9%	1.8%	5.6%	3.1%	3.8%	3.3%
2041	156,500	159,400	140,300	160,600	1,002,300	7,068,100	61,952,100
% Increase	11.9%	16.3%	10.0%	20.8%	12.4%	15.3%	12.1%

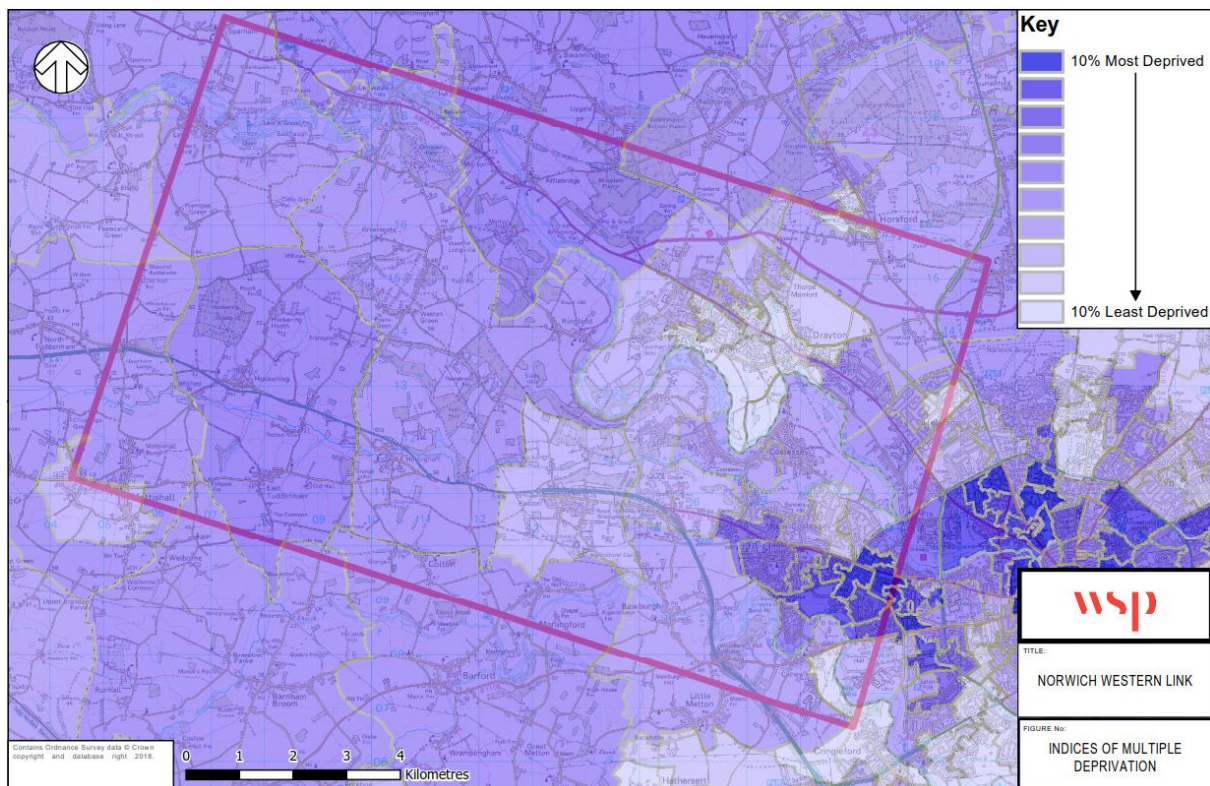
Source: Population Projections (Office for National Statistics)

2.3.6. The population in the Norfolk area (including Norwich, Breckland, Broadland and South Norfolk) is expected to increase by approximately 12.4% over the 25-year period from 2016 to 2041. Of this increase, the 0-14 age group will increase by approximately 3% accounting for 15% of the total population, compared with 16% in 2016. The working group population (15-64 years of age) will increase by approximately 2%, equating to 55% of the total population, reducing from 60% in 2016. The retired population (65+ years of age) will grow by approximately 44%, accounting for 31% of the total population increasing from 24% in 2016. The Norfolk area therefore has an ageing population, with the percentage increase slightly higher than that of the predicted national increase.

Deprivation

2.3.7. The NWQ has two of its Lower Super Output Areas (LSOAs) in the 10% most deprived areas of the country, measured against the Indices of Multiple Deprivation (IMD). The IMD includes various factors influencing the level of affluence in an area including income, employment, education, health, crime, barriers to housing services and the living environment. The areas experiencing the highest levels of multiple deprivation are located west of Norwich and include parts of the Bowthorpe and North Earlham residential areas, as shown in **Figure 7**.

Figure 7 – Levels of multiple deprivation



Source: Indices of Multiple Deprivation (Ministry of Housing, Communities and Local Government)

2.3.8. Higher deprivation exists across the study area when education skills and training indices are considered. The most deprived LSOAs are located south-east in Bowthorpe and North Earlham. Other areas are amongst the 30% most deprived neighbourhoods in the country. The total estimated population in the most deprived wards is approximately 15,800 which accounts for 20% of the NWQ population.

2.3.9. In terms of health deprivation, the study area is less deprived, with some locations within the top 10% least deprived areas nationally. The most deprived location within the study area in terms of health is in the south-east towards Norwich city centre.

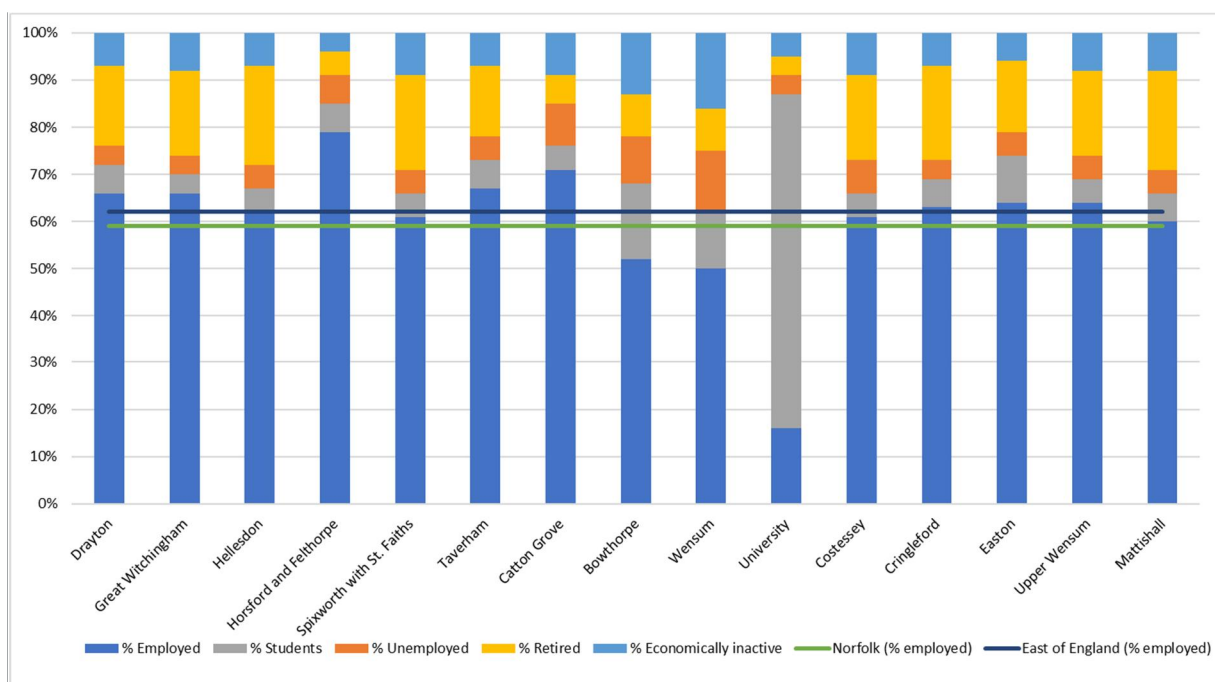
Employment

2.3.10. Norwich is the largest labour market in the region, accounting for approximately 60% of all jobs in Norfolk, and as such, creates large volumes of movements of goods and people. Transport efficiency is a critical component of economic growth nationally and locally. **Figure 8** shows the economic activity of the population aged 16 to 74 within the NWQ, derived from the NIS. The graph includes the percentage of population in employment (including those in full or part-time employment and self-employed), unemployed, in full time education, retired, and economically inactive (including those looking after family or suffering from long-term sickness or disabilities).

2.3.11. Across the study area, the employment rate ranges from 16% around University and 50% in Wensum (located to the south-east and including North Earlham) to 79% in Horsford and Felthorpe located to the north-east. Unemployment rates range from 4% in Cringleford, University, Drayton and Great Witchingham to 13% in Wensum. Apart from the eastern part of the study area (Bowthorpe and North Earlham), the NWQ has higher levels of employment than the surrounding county, region and country as a whole.

2.3.12. As a result of an ageing population within the NWQ, and in order to fill future employment roles, it is expected that employees will have to travel from further afield and will need to journey through the study area to reach these destinations. Therefore, routes within the NWQ can be considered as key desire lines. Key employment centres and potential growth areas, including the Norwich Research Park, the proposed Food Enterprise Zone and Norwich International Airport, could benefit from the introduction of a NWL.

Figure 8 – Economic activity across the study area



Source: Norfolk Insight Statistics

LAND USE

- 2.3.13. The study area has a mixture of land uses, including; rural farmland, parkland, the River Wensum, the River Tud, residential areas (including the relatively new development at Queen's Hills of over 2,000 dwellings), and Longwater Business and Retail Park. The study area also includes the River Wensum Valley and a number of environmental designations including a SAC, designated due to its international importance in biodiversity conservation, and a Site of Special Scientific Interest (SSSI). The environmental constraints of the NWL scheme are outlined in more detail in **Section 2.5**.

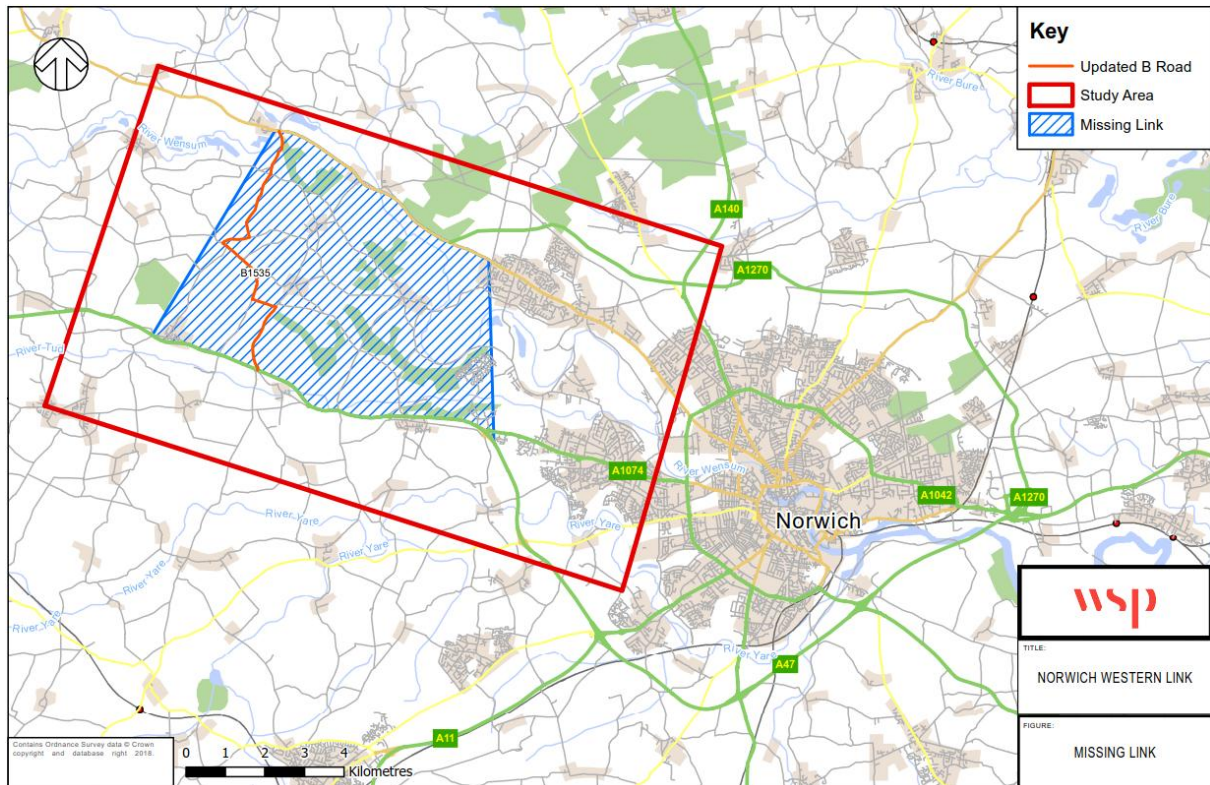
TRANSPORT CONTEXT

Highway network

- 2.3.14. The study area is bounded to the south by the A47 which forms part of the SRN and provides a link from Lowestoft and Great Yarmouth in the east, via Norwich towards King's Lynn, Peterborough and the A1. Just outside of the study area to the south-east, the A47 connects with the A11 which also forms part of the SRN and provides connections from Norwich to Cambridge and London (via the M11). Despite only accounting for 2% of the road network as a whole, the SRN is the most heavily used part, carrying one-third of all traffic and two-thirds of all freight⁶. To the north of the study area is the A1067 which provides a key radial route from Norwich to surrounding residential communities and out to the market town of Fakenham.
- 2.3.15. Within the study area there is a key 'gap' between the A47 and A1067, with a limited number of routes connecting the two. The existing links are rural single carriageway roads and pass through residential areas including Costessey, Taverham, Ringland and Weston Longville.
- 2.3.16. Recently, improvements have been delivered along Sandy Lane, Walnut Tree Lane, Wood Lane, Stone Road and Lyng Road to provide an enhanced link between the A47 and north Norwich for Heavy Goods Vehicle (HGV) movements, primarily to reduce long-standing HGV traffic problems in Hockering. Since the improvements, this route has now been designated as a B-Road (B1535) in the route hierarchy. However, the alignment of the B1535 is constrained by existing property boundaries and consequently includes a number of tight bends.
- 2.3.17. **Figure 9** demonstrates the study area, indicating the B1535 and the key 'gap' between the A47 and A1067 in relation to the newly completed A1270 and the existing A47.

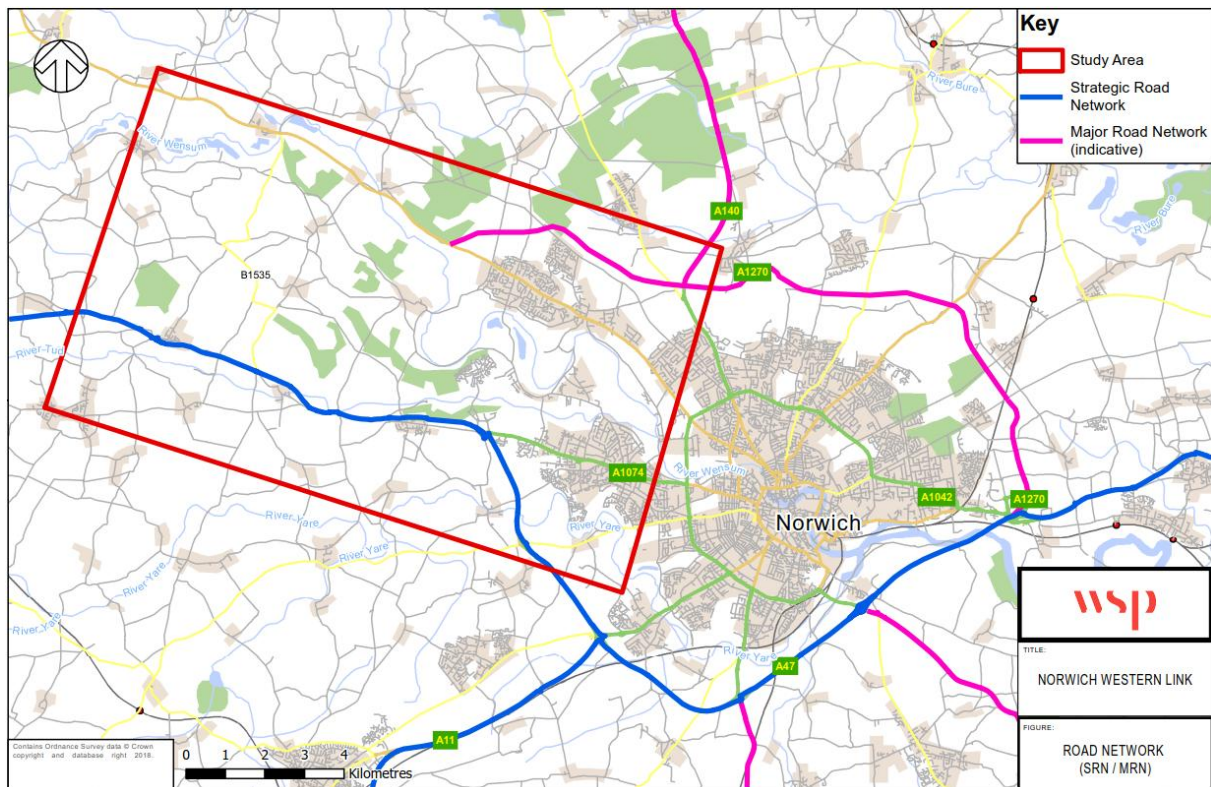
⁶ Transport Statistics (Department for Transport)

Figure 9 – Key ‘gap’ between the A47 and A1067



- 2.3.18. The final section of the A1270, from the A1151 Wroxham Road to the A47 at Postwick, opened on Tuesday 17 April 2018. The A1270 significantly increases network capacity, providing an improved route for trips whilst relieving traffic pressures and congestion on existing routes. However, the lack of a western link reduces the orbital connectivity, and existing traffic issues within the NWQ remain.
- 2.3.19. The A140 and A1270 are indicative MRN routes, connecting to the A47 at the Postwick Hub, as shown in **Figure 10**. A NWL would fill in the missing link between the A47 and A1067 in the west, extending the A1270 to meet the A47 on the west of Norwich. This route would increase orbital connectivity and provide a suitable east-west alternative for vehicles to circumnavigate Norwich to the north, and would be appropriate to form part of the MRN due to its connectivity with the A140, and A47 in the east. The A1270 forming part of the MRN would also relieve pressure from the A1042 and Norwich outer ring road.

Figure 10 – Indicative MRN routes



Source: *Proposals for the creation of a Major Road Network, Indicative Map (Department for Transport)*

National Rail network

2.3.20. Norwich Railway Station is located approximately 8km south-east of the study area, and to the south-east of the city centre. Norwich is generally well placed on the rail network, with Norwich Railway Station located on the Great Eastern Mainline and several secondary railway lines such as the Breckland Line, Bittern Line and Wherry Line. The station is served by two rail operators (Abellio Greater Anglia and East Midlands Trains) providing access to destinations within the Norfolk area as well as further afield. **Table 5** indicates the typical weekday train timetable for Norwich.

Table 5 – Typical weekday train timetable for Norwich Railway Station

Service	Operator	Peak Frequency
Norwich – Ipswich – London Liverpool Street	Abellio Greater Anglia	2 per hour
Norwich – Great Yarmouth – Lowestoft	Abellio Greater Anglia	3 per hour
Norwich – Cromer – Sheringham	Abellio Greater Anglia	1 per hour
Norwich – Ely – Cambridge	Abellio Greater Anglia	2 per hour
Norwich – Nottingham – Manchester – Liverpool Lime Street	East Midlands Trains	1 per hour

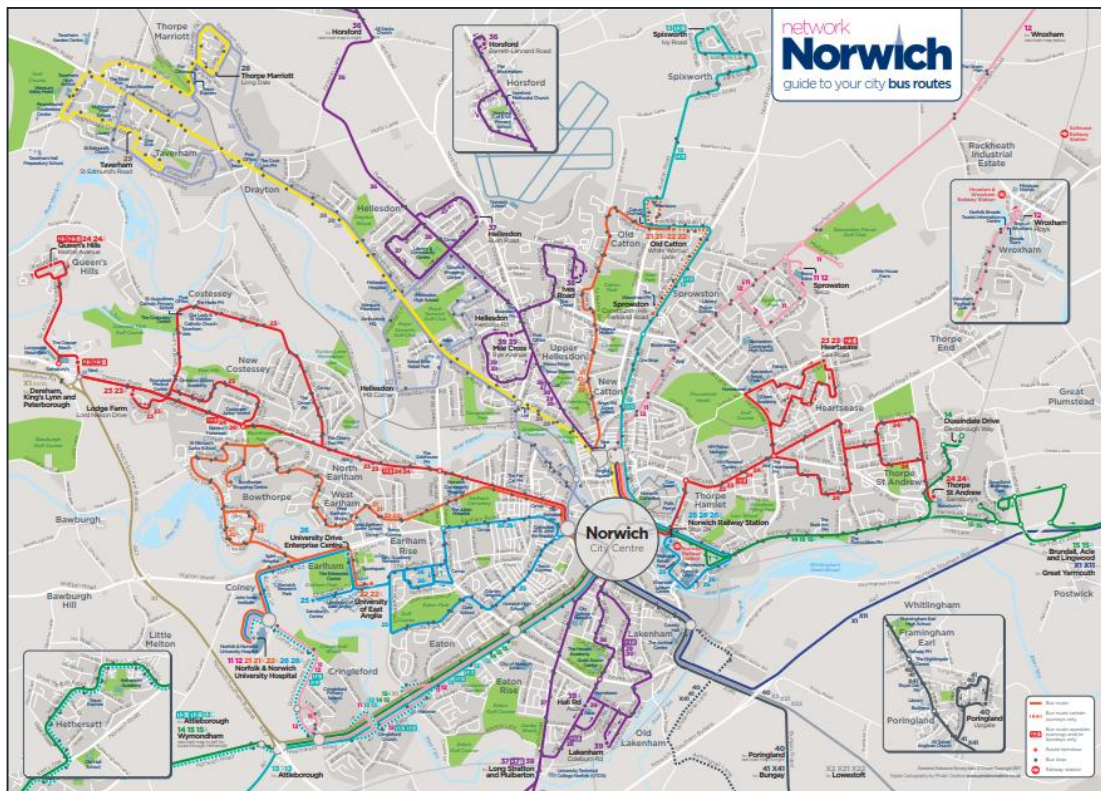
- 2.3.21. The rail network emerges from Norwich in a northerly, easterly and southerly direction, with no connecting stations present within the NWQ, or to key employment locations on the west side of Norwich. Norwich Railway Station can be accessed by bus services from Costessey (Queen's Hills) and Taverham, however, access to the station from more rural towns or villages within the NWQ, located away from the bus routes, is more challenging.
- 2.3.22. Two disused railway lines, running between Norwich and Aylsham (passing through the study area), now form the Marriott's Way – a 42km footpath, bridleway and cycle route, which attracts over 100,000 cyclists, walkers and horse riders every year⁷. Currently, there is no option to travel through the study area via rail, and significant new rail infrastructure would be required at high cost to improve the connectivity between the NWQ, Norwich city centre and key employment locations by rail.

Bus & Coach network

- 2.3.23. The bus network in the study area is largely radial, providing routes to / from Norwich city centre along key corridors. The eastern part of the study area is well connected with Norwich city centre, particularly during the day, due to there being a shorter distance to the city centre. First Bus provides several services connecting Queen's Hills, Easton, Hellesdon, and Ringland with services within and around Norwich city centre (as shown in **Figure 11**). Bus services also operate within the study area connecting residential areas to major employment sites, however there is generally a lack of traditional bus services within the key 'gap', covering areas including, Weston Longville, Weston Green and Ringland. A NWL has the potential to provide for new bus links servicing disconnected villages within the NWQ.

⁷ The Marriott's Way Heritage Trail (<http://www.marriottsway.info/>)

Figure 11 – Bus service routes



Source: Norwich City-Wide Network Map (First Bus)

- 2.3.24. There are bus stops in the NWQ located within walking distance from residential areas, however due to inadequate or limited pedestrian facilities (more detail provided in **Walking Accessibility**) between villages and bus services, access by foot from many residential areas is less viable.
- 2.3.25. **Table 6** shows that there are a number of bus services connecting the NWQ to the north and east of Norfolk, Norwich city centre and locations to the north and east of Norwich. However, the services connecting settlements within the study area with Holt, Cromer, King’s Lynn and Swaffham are limited and infrequent, particularly during weekends.

Table 6 – Typical weekday bus timetable for NWQ

Service	Route	Operator	Frequency
4, 5	Norwich to Swanton Morley	KonectBus	1 per hour
8 Fast	Norwich to Toftwood	KonectBus	2 per hour
Yellow (28 & 29)	Norwich to Thorpe Marriott	First Bus	1-4 per hour
Purple (36, 37, 38 & 39)	Long Stratton to Horsford (via Norwich City Centre)	First Bus	Up to 4 per hour
Red (23 & 24)	Norwich City Centre & Rail Station to Thorpe St Andrew	First Bus	Up to 4 per hour

Service	Route	Operator	Frequency
510	Costessey Park & Ride to Norfolk and Norwich University Hospital	KonectBus	Up to 2 per hour
X1	Norwich to King's Lynn	First Bus	2 per hour
X29	Norwich to King's Lynn	First Bus	1 per hour

Park & Ride

2.3.26. Currently, there are six Park & Ride sites located around Norwich, providing a total of almost 5,000 parking spaces on the urban fringe. Of the six sites, five serve the city centre, as shown in **Figure 12**.

Figure 12 – Park & Ride routes and locations



Source: Network Map (Park & Ride Norwich)

2.3.27. The Costessey Park & Ride is located closest to the NWQ study area, next to the Royal Norfolk Showground; however, this only serves Norfolk and Norwich University Hospital (NNUH) and the University of East Anglia (UEA). As a result, residents of western Norwich or users arriving from the west, would need to use Thickthorn Park & Ride or the Airport Park & Ride sites to access the city centre. The latter results in journeys across the study area.

- 2.3.28. Further transport intervention in the NWQ could benefit existing and potential users of the Park & Ride sites, by improving strategic connectivity to the existing sites, catering for desire lines through the study area and making sustainable travel to central Norwich more convenient and efficient.

Walking accessibility

- 2.3.29. Walking infrastructure in the study area is variable. Within more built up areas, the provision is generally adequate, with footways in place adjacent to the roads. However, away from residential areas, there is limited provision, especially between villages where there is very limited or no facility. Whilst walking could provide a sustainable alternative means for short length journeys, the infrastructure available to do so is extremely limited, and much of the study area is largely inaccessible due to the distances involved and associated journey times.
- 2.3.30. The A47 corridor and Longwater interchange are major barriers to pedestrian access, as no / limited infrastructure is available for users wishing to access local community facilities, such as Saint Peter's Church (Easton) or Saint Andrew Honingham Church, or access shops and services on William Frost Way. The A1067 also creates a barrier to pedestrian access and there are limited opportunities for safe crossing to access shops and services along the corridor.
- 2.3.31. There are numerous Public Rights of Way (PRoW) within the study area, including footpaths and bridleways in Bowthorpe, Costessey, Drayton and Ringland. Pedestrian crossing points are generally on main roads and at key locations and junctions.

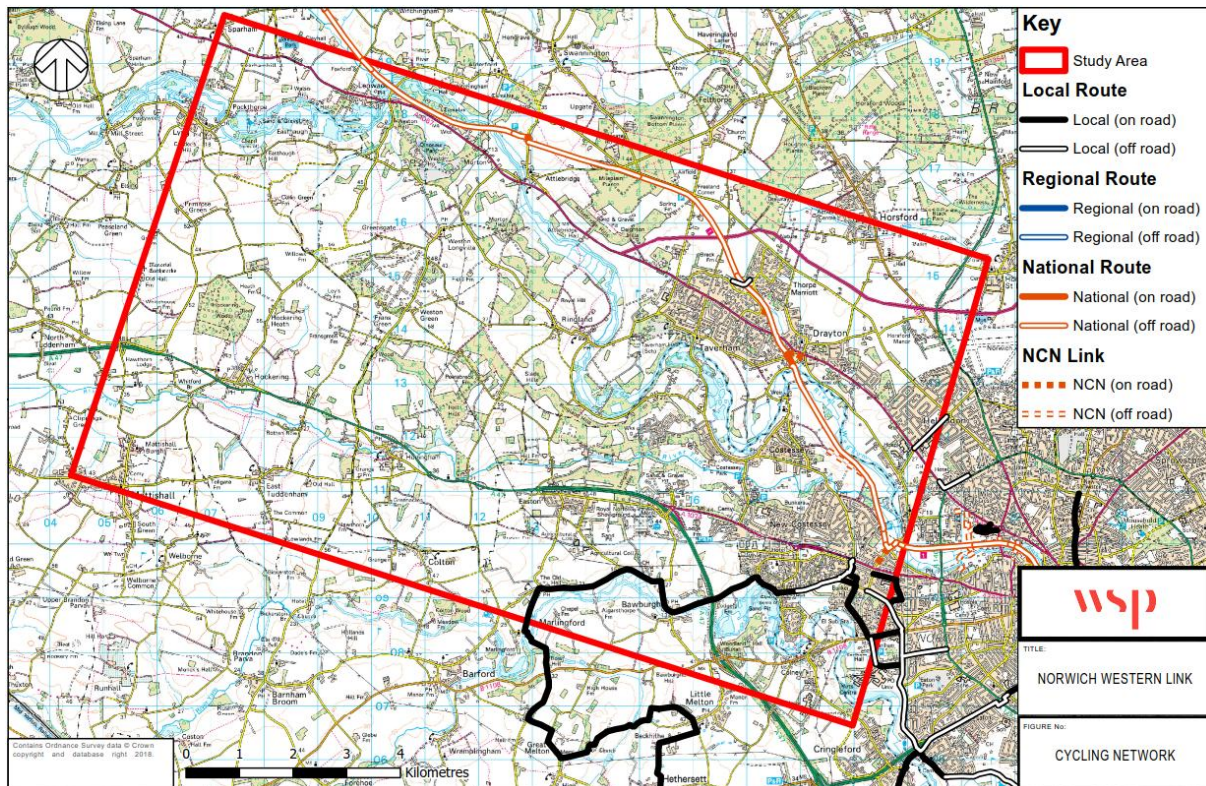
Cycling accessibility

- 2.3.32. Cycling facilities are limited within the study area, with only local (on-road) routes to the south-east and the National Cycle Network Route 1 (NCN1) through the northern extents. The NCN1, also known as The Marriott's Way, is a 42km footpath, bridleway and cycle route, following the alignment of two disused railway lines. The route passes through Norwich city centre, Costessey to the east, through Drayton crossing the A1067 and the A1270, and goes westward towards Lenwade. From there the route goes north towards Reepham and beyond.
- 2.3.33. **Figure 13** shows the NCN1 and the other local cycle routes present within the study area, demonstrating the lack of connectivity and available infrastructure and routes throughout the NWQ. Whilst cycling could provide a sustainable alternative means for short to medium length journeys, the infrastructure available to do so is extremely limited.
- 2.3.34. Elsewhere, the Norwich cycle network is made up of seven colour-coded routes, known as 'Pedalways', which cross the city in all directions, and converge at St Andrews Plain in the city centre. Since 2013, Norwich has been awarded two significant Cycle City Ambition grants from the DfT and, with additional contributions from local partners, the cycle network will see £14.1 million of investment by 2019. The Pedalways in Norwich are as follows:

§ Green	between Bowthorpe and Broadland Business Park
§ Red	between Drayton and Whitlingham (NCN1)
§ Yellow	between Lakenham and Aviation Academy
§ Pink	between NNUH and Heartsease
§ Blue	between Wymondham and Sprowston
§ Orange	Inner circuit
§ Purple	Outer circuit

2.3.35. The first wave of funding saw improvements to the 13km Pink Pedalway and the connections leading to it, creating a higher quality cycle link from the NNUH and UEA, through Norwich city centre, to Heartsease and Broadland. This route crosses through the south-east corner of the study area, but would not provide a significant impact to cycling infrastructure and uptake across the NWQ.

Figure 13 – Cycle network

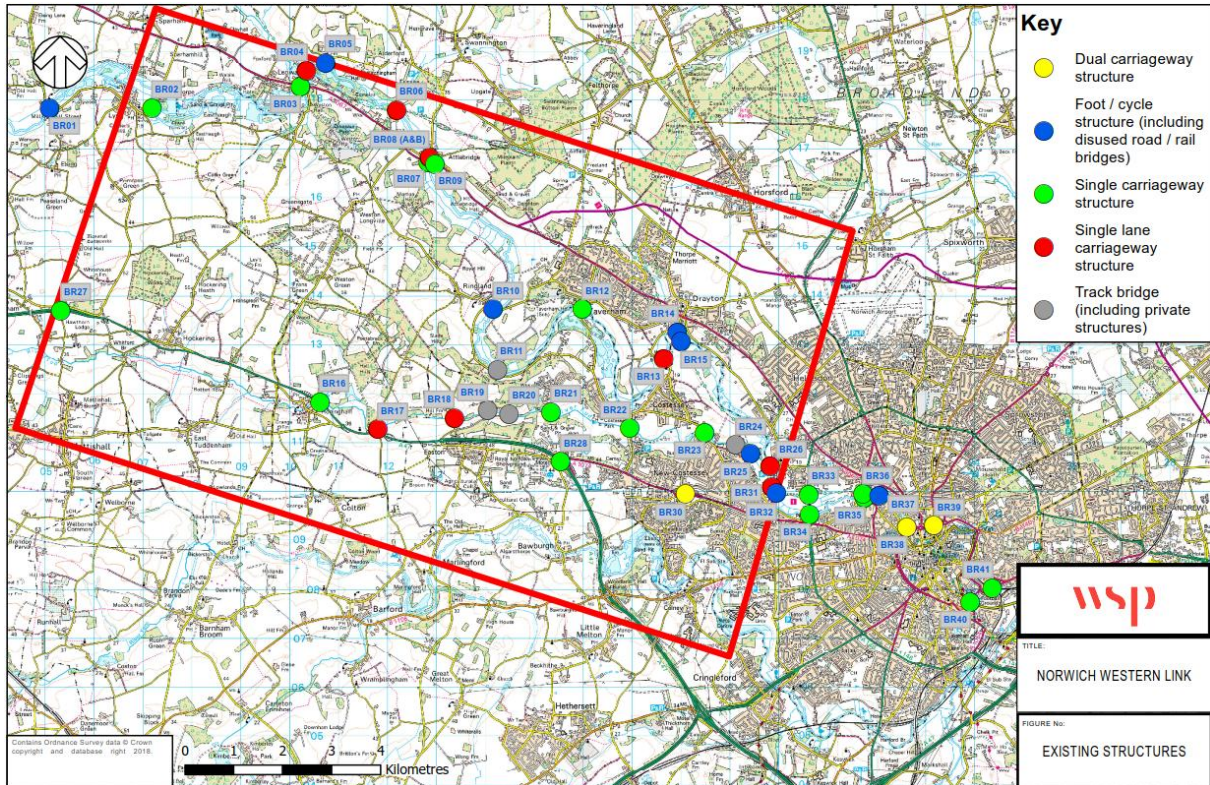


Structures

2.3.36. Within the study area there are numerous existing structures. **Figure 14** indicates the locations of the structures and classifies them into dual carriageway, single carriageway, single lane carriageway, footway / cycleway structures and existing track bridges.

2.3.37. In the central region on the study area, between Hockering, Longwater interchange, Taverham and Attlebridge, there are a limited number of existing structures. Where there are structures, these are for single carriageways and footway / cycleway connections. There are two single carriageway structures at Queen’s Hill and Taverham. The only dual carriageway structure is currently in New Costessey serving the A1074. This demonstrates that, currently, there is limited existing infrastructure in place that could support a new route in the event that a dual carriageway standard road is required.

Figure 14 – Existing structure locations



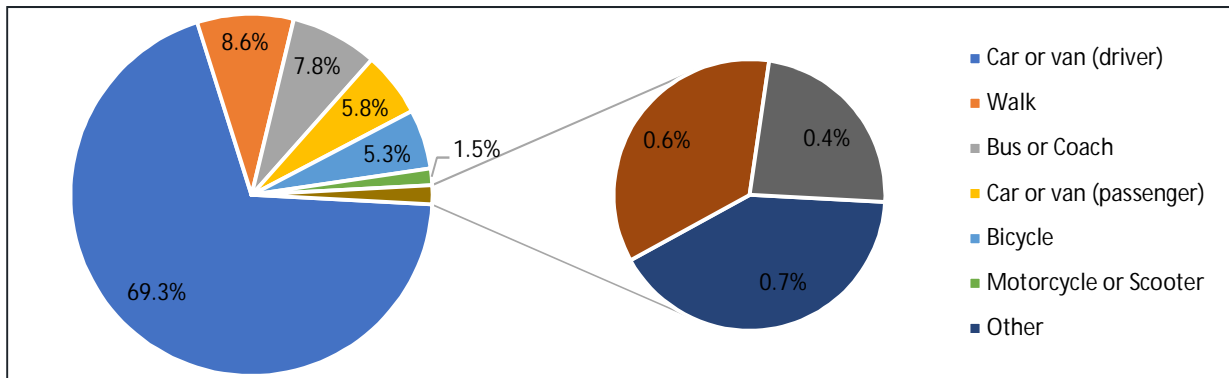
2.4. STUDY AREA TRAVEL PATTERNS

2.4.1. This section considers the current situation in the study area in terms of journey patterns (investigating origin-destination information and key locations with regard to employment and tourism) and behaviours (with regard to mode share and traffic volumes), and highway safety. This understanding has been used to highlight key challenges in **Chapter 4**.

MODE SHARE

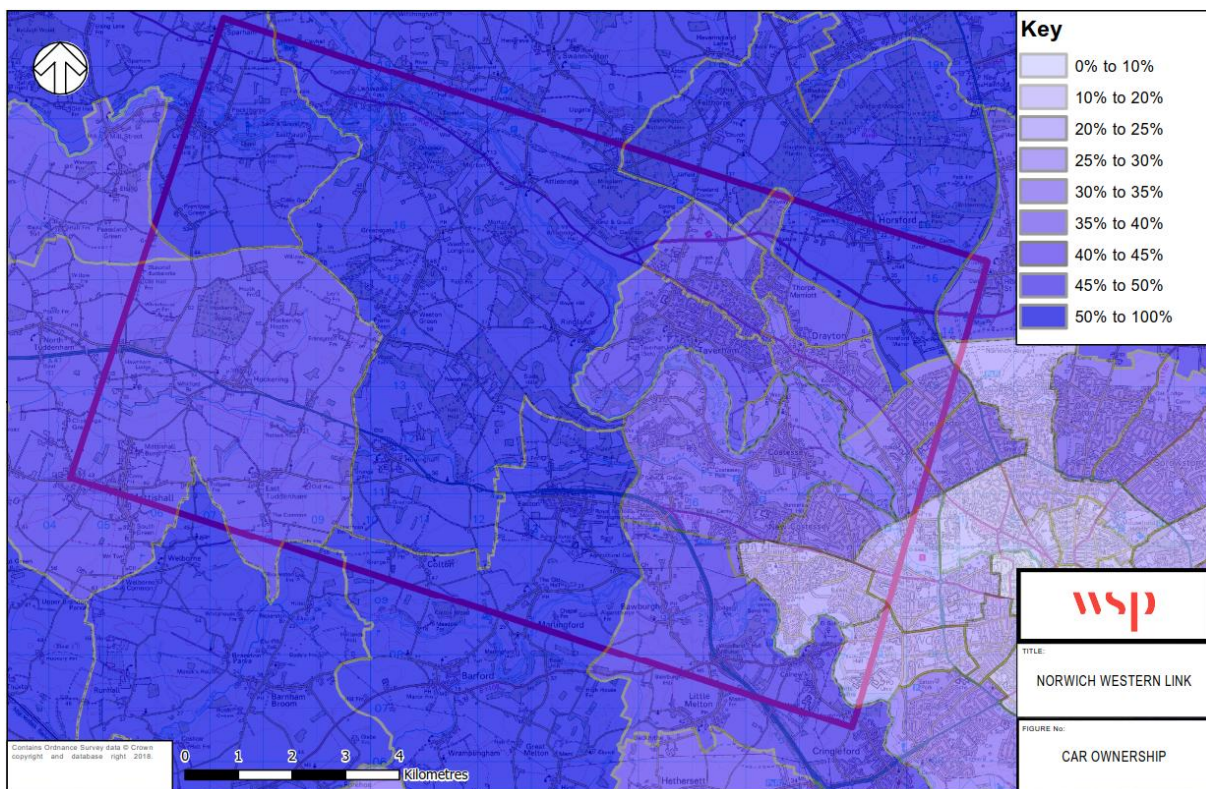
2.4.2. The car represents the dominant mode of travel to work within the study area. **Figure 15** indicates the mode share for all usual residents aged 16 to 74, excluding those who work from home or are unemployed. Approximately three-quarters (75.1%) of residents within the NWQ travel to work by car, as either a driver (69.3%) or a passenger (5.8%), which is supported by the majority of the study area having access to two or more cars (**Figure 16**).

Figure 15 – Modal share for journeys to work



Source: 2011 Census

Figure 16 – Households with two or more vehicles

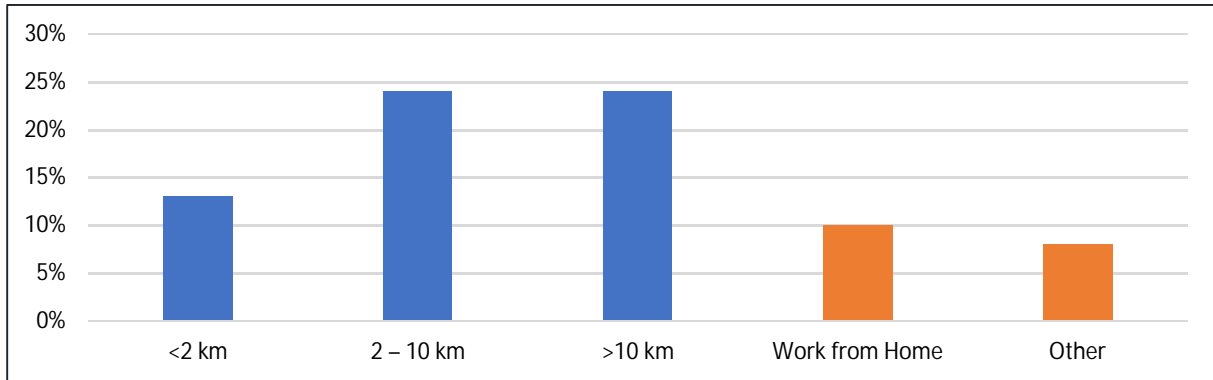


Source: 2011 Census

2.4.3. Much smaller proportions use public transport modes such as bus (7.8%) and train (0.6%) to travel to work. This could be attributable to areas within the NWQ having poor public transport connections to the city centre and / or the distance being too great to use active modes of transport such as cycling and walking. This indicates the need for improved public transport connections between the western areas of the study area to Norwich city centre. The data also highlights the need for improved transport links, due to the volume of journeys undertaken by road and the high percentage of car ownership within the study area.

2.4.4. Whilst the majority of journeys to work are undertaken by car, 37% of journeys are under 10km (**Figure 17**), which suggests a high level of car use is for short journeys, indicating there are potential opportunities for encouraging modal shift away from private car usage to other, more sustainable modes of transport.

Figure 17 – Average distance travelled to work

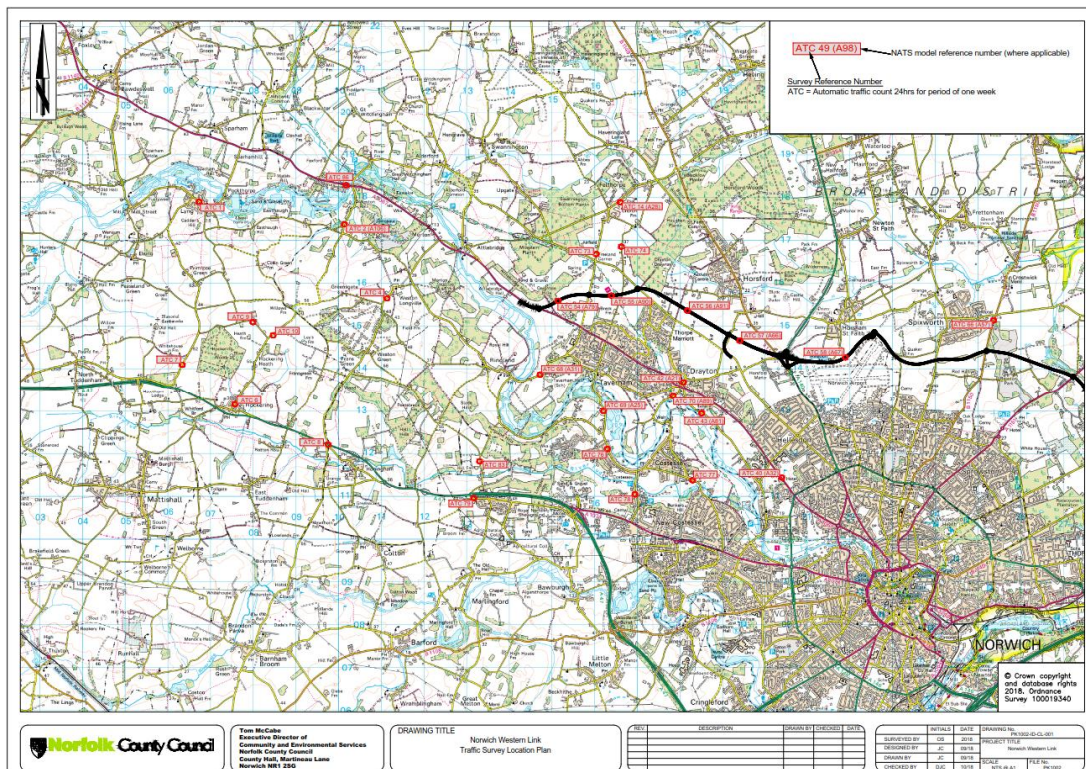


Source: 2011 Census

TRAFFIC VOLUMES

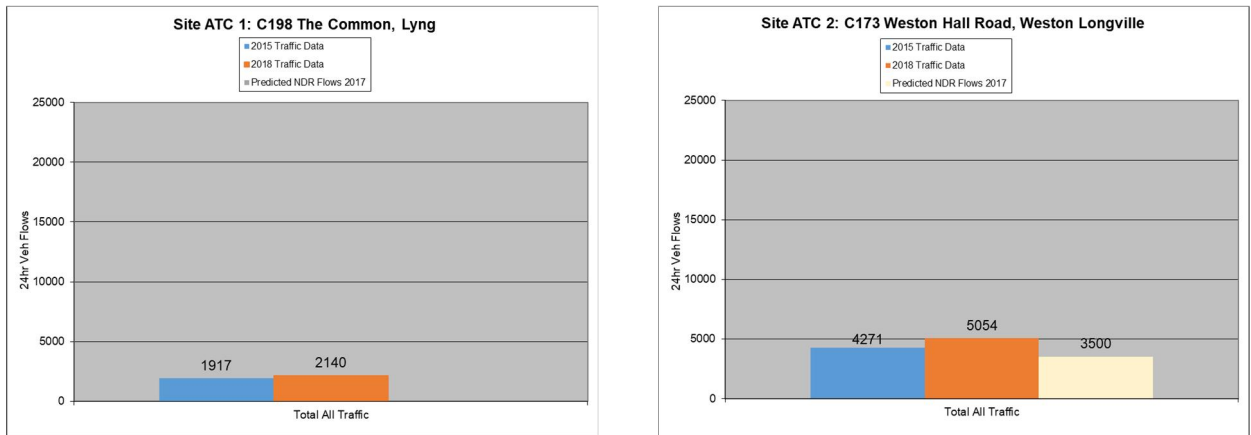
2.4.5. Traffic count data from 2015 and 2018 (after the final section of the A1270 fully opened to the public) has been reviewed, and compared with the predicted 2017 flow from historical modelling. The evidence base has been updated to reflect the findings of these interim surveys. **Figure 18** demonstrates where the Automatic Traffic Counts (ATCs) were undertaken within the study area.

Figure 18 – Survey locations

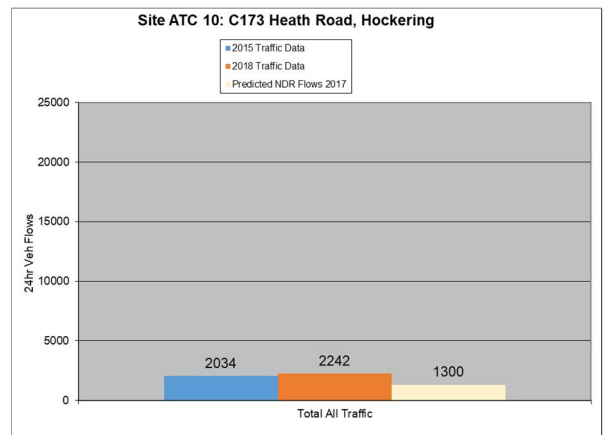
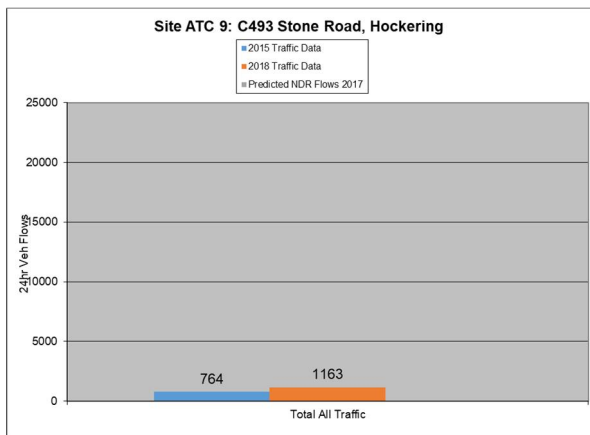
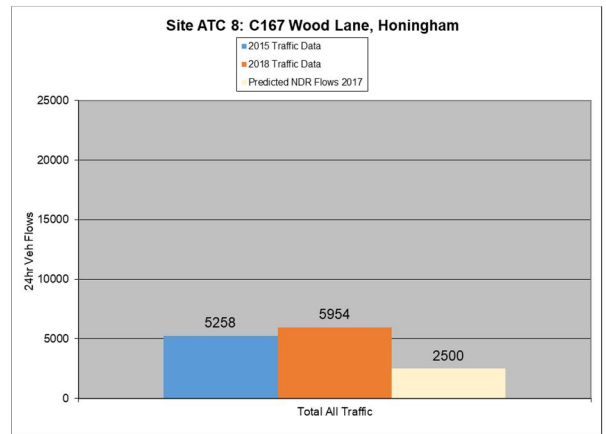
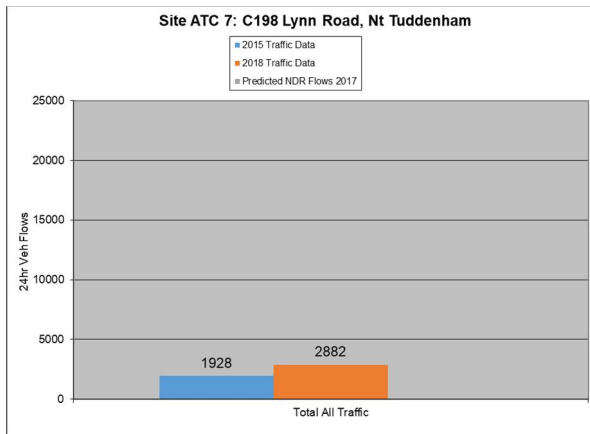
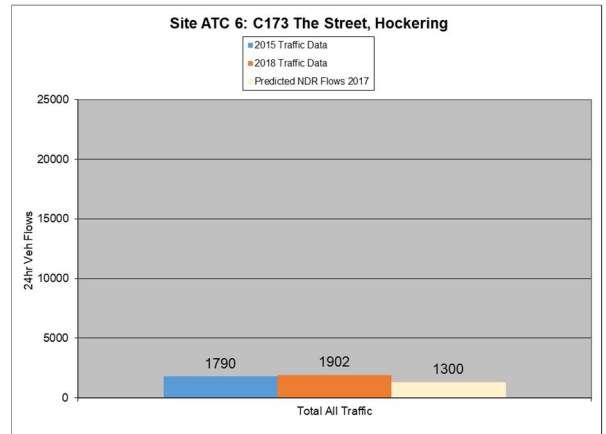
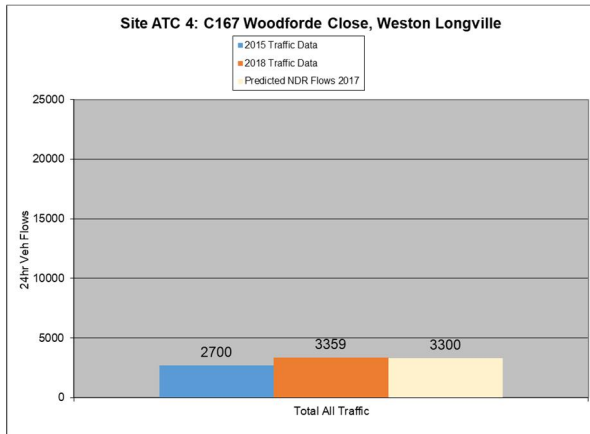


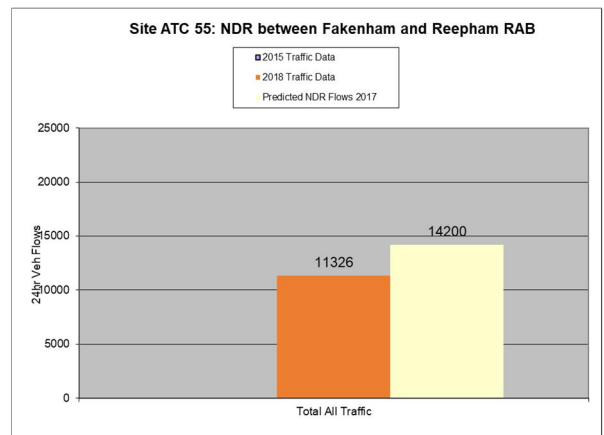
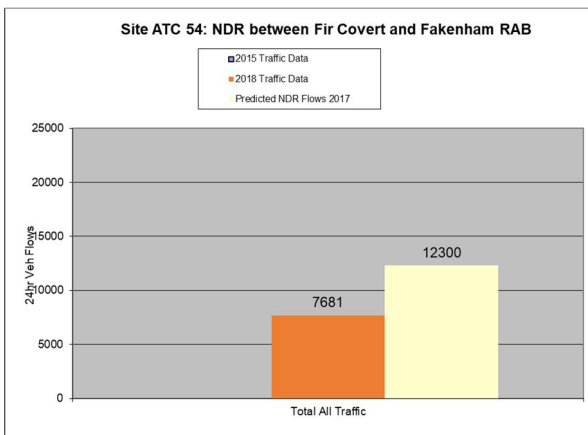
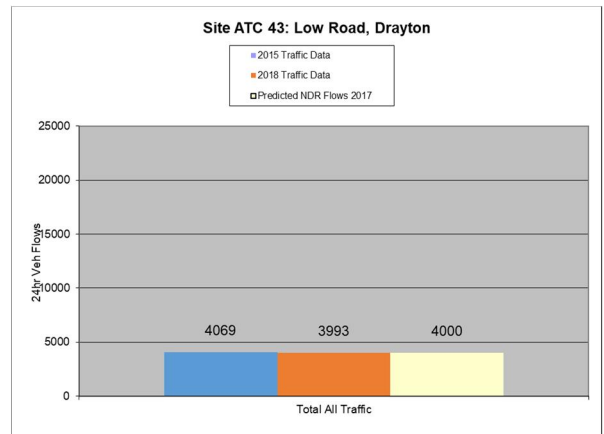
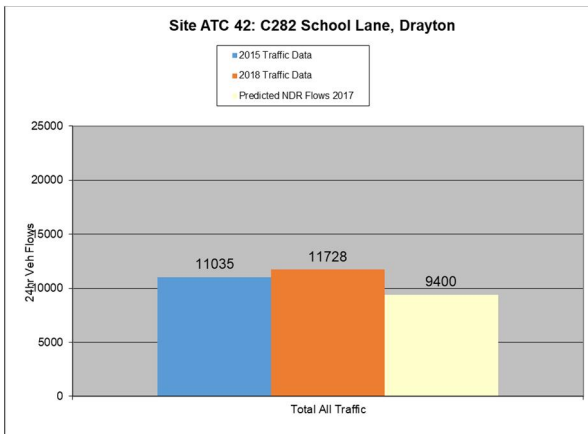
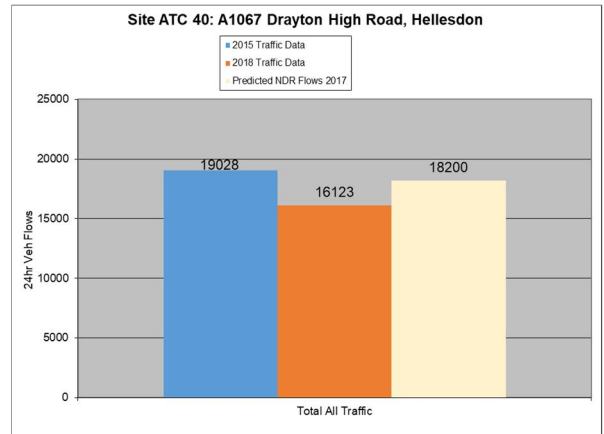
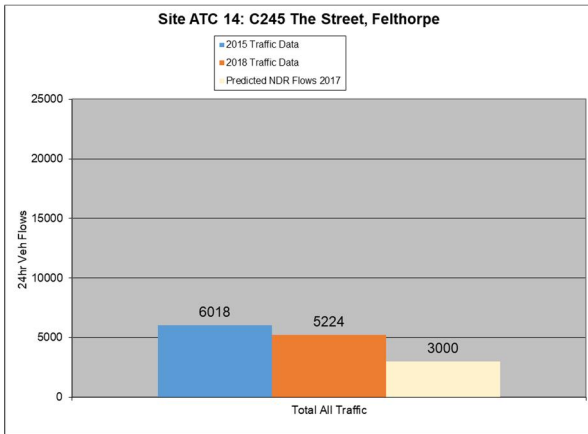
- 2.4.6. **Figure 19** presents a comparison of the 2015 and 2018 traffic flow data, and also the predicted modelled 2017 (forecast) traffic flows from various survey locations⁸. The results provide an early indication of how journeys through the NWQ have changed between the survey periods and the impact of the A1270. Differences between the actual (2018) and forecast (2017) flows reflects the coarse-grained nature of the 2017 model extremities.
- 2.4.7. The 2012 NATS model was developed to assess the impact of the NDR using localised, roadside interview data, collected in 2012. This was the best data available at the time of model development, prior to more widespread availability of more detailed datasets, such as mobile phone data.
- 2.4.8. The 2012 model was developed to reflect traffic patterns around the proposed NDR route and within the core network of central Norwich, so was naturally more focussed on areas east of the current NWL study area with the network and zoning in the west of the model being coarser, with larger zones and only main roads included. It is with this in mind that the following data comparison should be taken into account when comparing the 2017 modelled flows which are based on the 2012 NATS model and the recently collected observed data from the NWL study area.

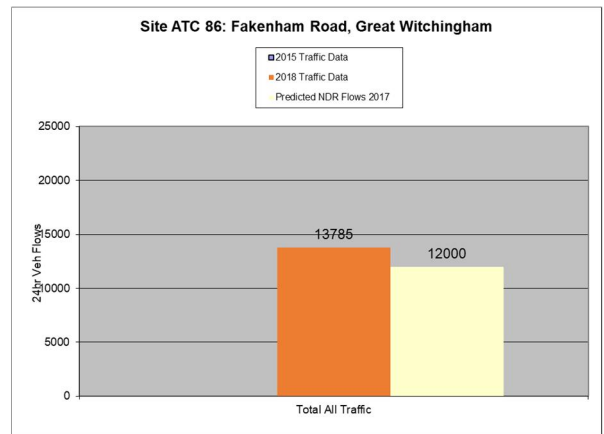
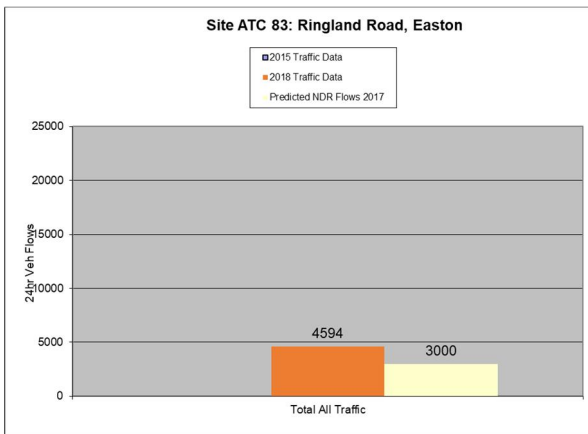
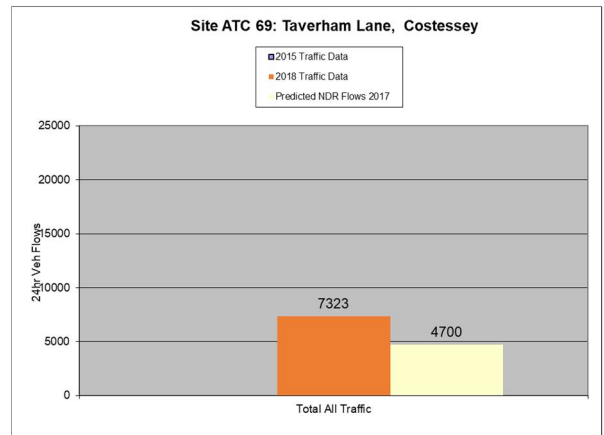
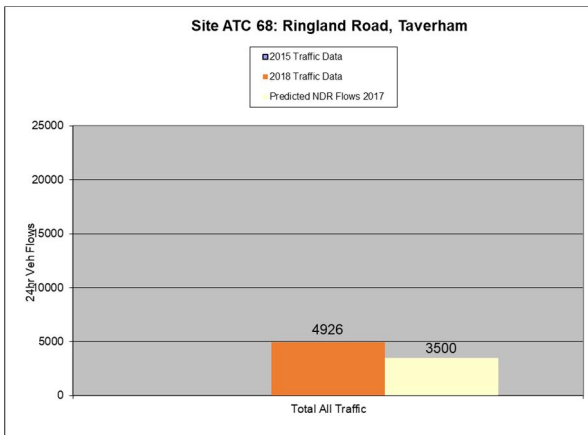
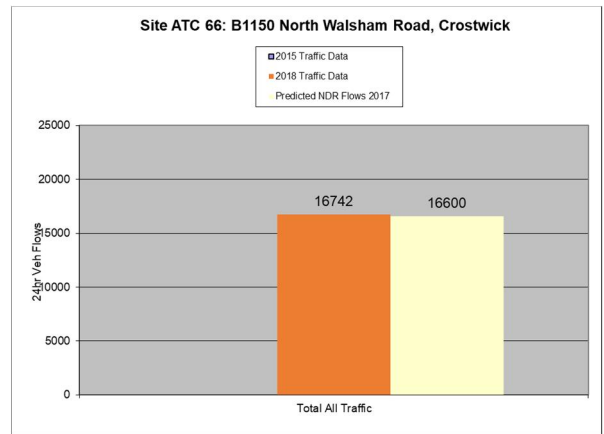
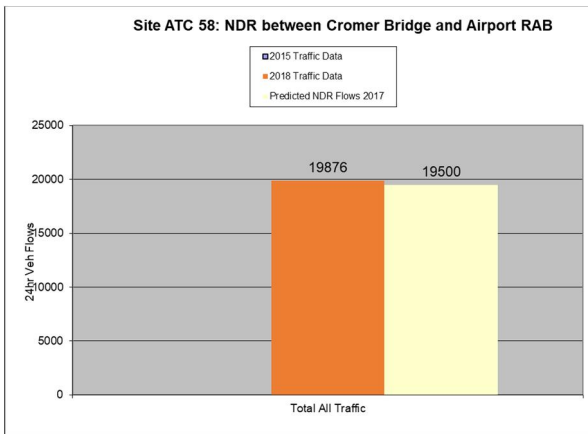
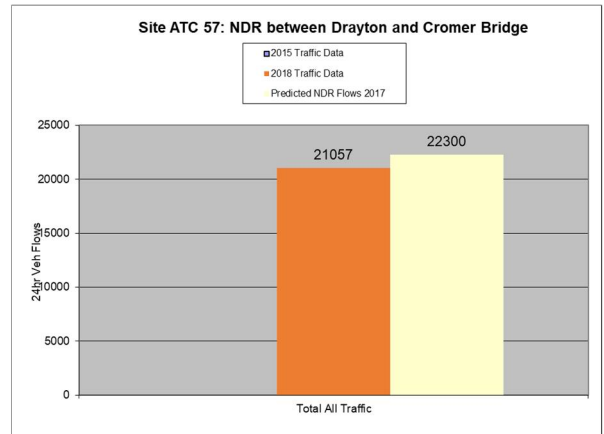
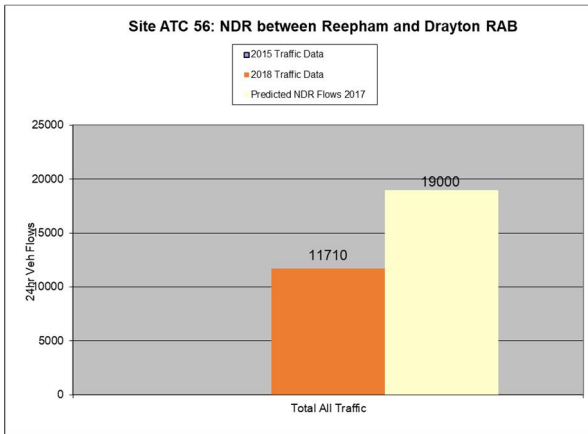
Figure 19 – Comparison of traffic survey data and historic modelling data



⁸ Some data sets are not present on the charts. This is due to either no traffic data being available from 2015, or as no predicted flows for 2017 were produced in the historic model.





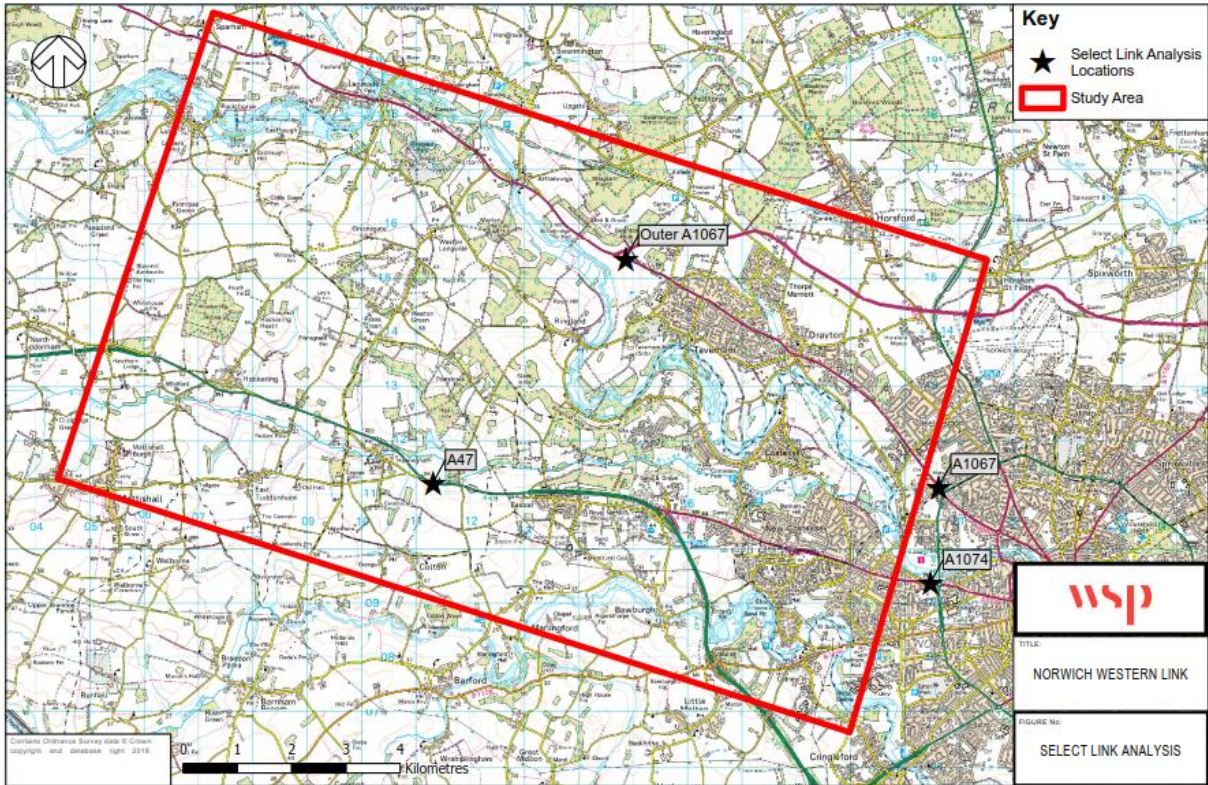


- 2.4.9. Traffic volumes on key links within the study area have generally increased by about 13% between 2015 and 2018 following the opening of the A1270, which indicates increased pressure on the local road network. This supports the results of the public consultation ran by Norfolk County Council between May and July 2018, which identified that the roads in the area are perceived to be unsuitable for the level of traffic, and strong support for the creation of a new road linking the A47 and A1270 as the preferred solution. More details on the public consultation outcome are provided in **Section 6.3**.
- 2.4.10. The traffic surveys indicate that the A1270 is successful in providing a suitable alternative route, particularly for journeys to and from the north of Norwich. In the vicinity of Horsford, the A1270 carries approximately 20,000 vehicles per day, of which 3% is noted to be HGVs. The data also indicates that the A1270 has relieved traffic on the A1067 Drayton High Road, in Hellesdon, by reducing vehicle flow by approximately 2,000 vehicles per day. Therefore, it is envisaged that the introduction of a NWL could significantly reduce the traffic flow on competing parallel routes that are currently being used.
- 2.4.11. More extensive surveys in a greater number of locations are being carried out in September and October 2018, which will provide a broader and potentially more stable picture, of the new road network traffic flows.
- 2.4.12. As part the assessment of the A47 RIS schemes, Highways England updated the 2012 NATS model by:
- § Refining the zoning detail in the west of the NATS model area
 - § Including additional road network where missing links or junctions could potentially distort model access on the A47
 - § Combine model update information from multiple sources to derive a 2015 base year model
- 2.4.13. The model has been rebased using more detailed data including the use of mobile data sets to further develop demand assumptions within the model, while zone disaggregation to better reflect the loading of trips onto the local road network, network auditing around the study area and improved link validation in the study area will further improve the forecasting accuracy of the model.
- 2.4.14. The 2015 Highways England NATS model has been updated by:
- § Refining the zoning detail in the west of the NATS model area
 - § Including additional road network to provide greater accuracy of local roads between the A27 and A1067 to better inform traffic patterns in the Norwich Western Link study area
 - § Using localised 2015 ATC data the 2015 NATS model has been recalibrated to better reflect 2015 flows on those minor roads linking the A47 and A1067.

ORIGINS & DESTINATIONS

- 2.4.15. A select link analysis has been performed on the 2015 base Simulation and Assignment of Traffic to Urban Road Networks (SATURN) model, to understand the origins and destinations of vehicles within the study area, and determine whether a NWL could impact upon the routes currently used. Four locations on strategic routes have been selected for this purpose, labelled as 'Outer A1067', 'A1067', 'A1074' and 'A47' on **Figure 20**. At each location, an analysis has been undertaken for each direction, for the morning peak only.

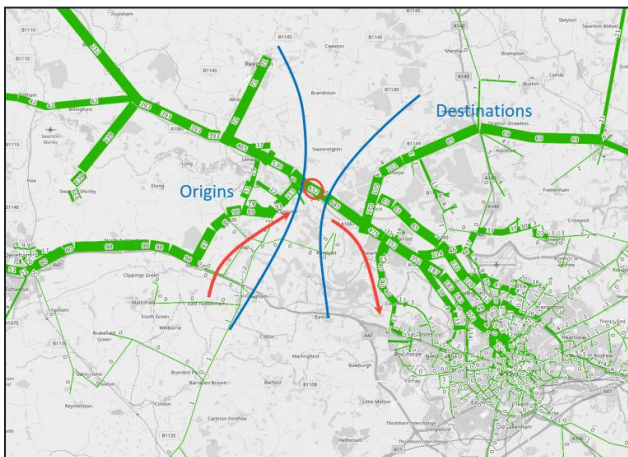
Figure 20 – Select link analysis location map



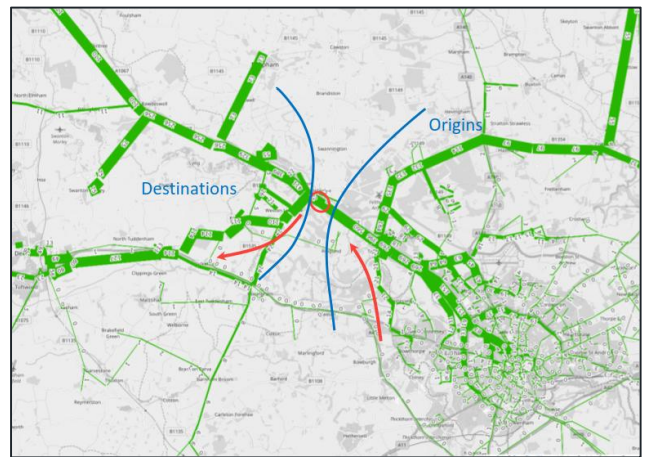
2.4.16. The following sections indicate the flow that travel through the specified link from different origins and destinations. The red arrows display the trips that could potentially benefit from the construction of a new road link in the study area. The SATURN plots shown in **Figure 21** do not include the A1270, as it did not open fully until 2018. These figures can also be found within **Appendix A**.

Figure 21 – Origins and destinations from different nodes

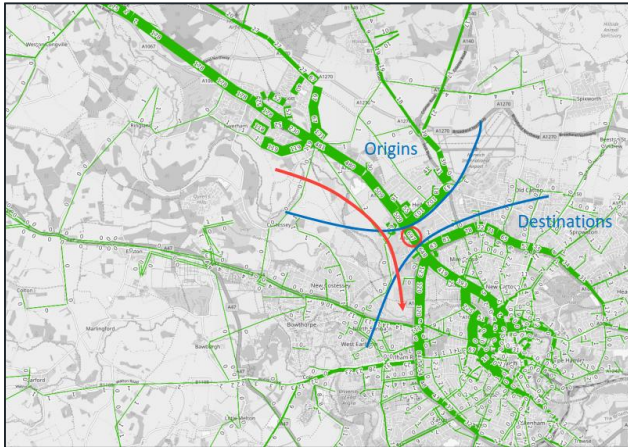
Outer A1067 (eastbound)



Outer A1067 (westbound)



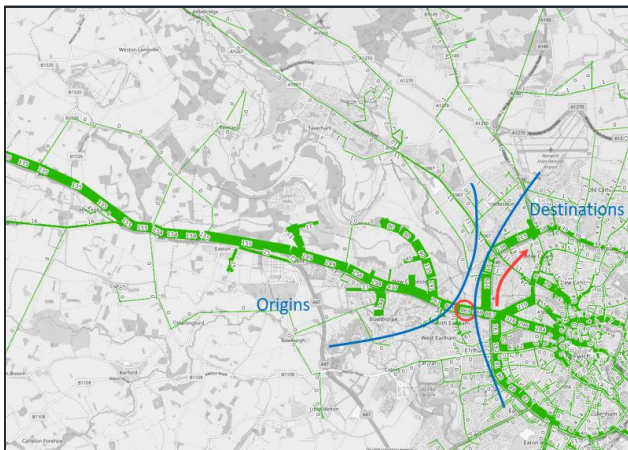
A1067 (eastbound)



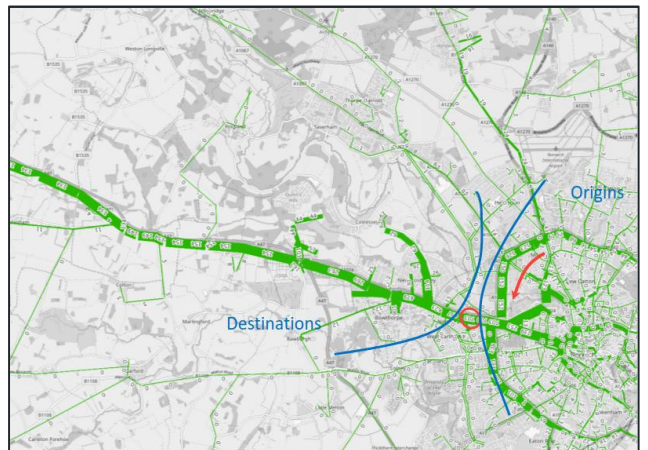
A1067 (westbound)



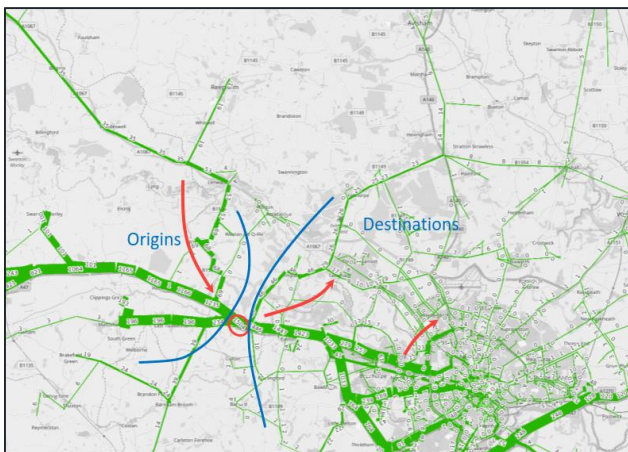
A1074 (eastbound)



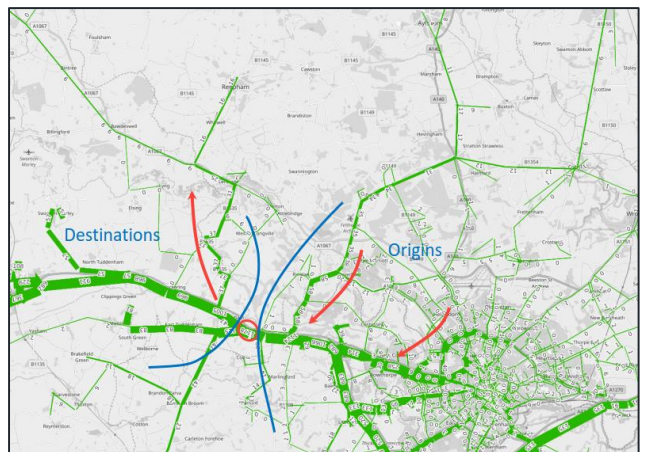
A1074 (westbound)



A47 (eastbound)



A47 (westbound)



Outer A1067

- 2.4.17. From the origin-destination output for the outer A1067 node near Attlebridge, there is a large number of vehicles that could benefit from the introduction of a NWL. In the eastbound direction, many trips utilise the newly designated B1535 to transfer from the A47 to the A1067 and continue to a destination to the north of Norwich. There are also some trips that divert through the study area via Taverham and Costessey to reach destinations to the south of Norwich. In the westbound direction the same trips could utilise a NWL.

A1067

- 2.4.18. The origin-destination output for the A1067 node near Hellesdon demonstrates that in the eastbound direction, there is a large number of trips that have a destination to the south of Norwich, and as such, use the A140 outer ring road to make the journey. A NWL could potentially attract trips off the A1067 and route them south before reaching the city, thus relieving pressure on the outer ring road. In the westbound direction, the origins of trips passing through the A1067 node are from the south and south-west, which have to use the outer ring road to access destinations to the north and north-west. The trips with destinations to the north-west could benefit from a NWL, by taking a more direct route and avoiding the Norwich ring road.

A1074

- 2.4.19. From the origin-destination output for the A1074 node east of Costessey, there is potential for a significant proportion of trips to benefit from a NWL. Eastbound trips that originate from the A47 have a key destination in the north of, or to the north of Norwich. Vehicles use the outer ring road to complete this journey, therefore the introduction of a NWL may attract trips from the A1074 helping to reduce current congestion. In the westbound directions, the trips originating from the north-east of Norwich, which utilise the outer ring-road and the A1074 to get to destinations along the A47 may utilise the A1270 and NWL to avoid Norwich city centre.

A47

- 2.4.20. The origin-destination output for the A47 node near Honingham demonstrates that eastbound trips have origins from the A47 but also from the A1067 to the north-west via the B1535. Destinations of the trips on the network tend to be to the south of Norwich, but also some to the north which utilise routes through Costessey and Taverham. The trips that currently use the B1535 to access the south of Norwich would benefit from the NWL and those that use routes through the surrounding villages and the inner ring road to reach destinations in the north and centre of Norwich may also benefit from the introduction of a NWL in addition to the A1270. This would subsequently relieve the local road network and potentially part of the inner ring-road traffic. In the westbound direction the reverse is evident, and as such, trips would benefit in both directions from an NWL.

KEY LOCATIONS

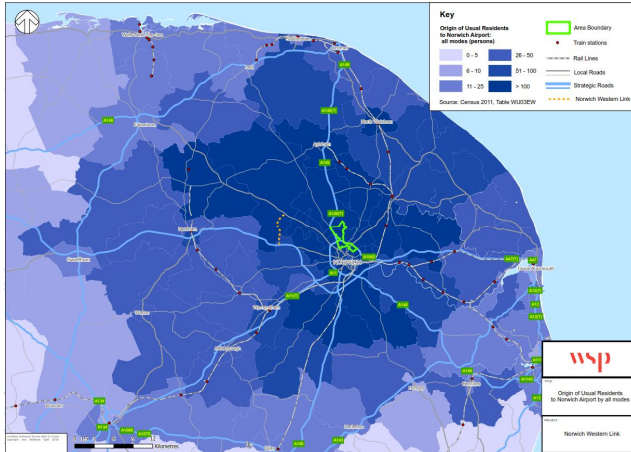
- 2.4.21. Key local facilities, services and retail areas are located towards Norwich city centre, close to the main population centres, and more dispersed to the west of the study area which is more sparsely populated. Education sites are spread throughout the study area serving the main residential sites. The main campus of UEA is located at the eastern edge of the study area, alongside the NNUH, Norwich Research Park and Easton & Otley College.

Employment

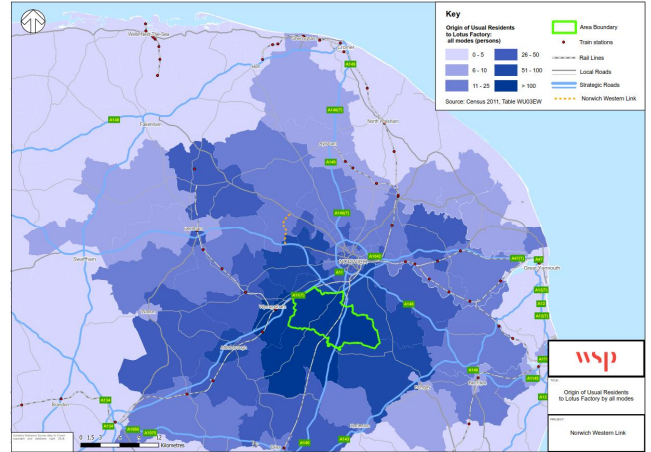
2.4.22. Using census journey to work data, the origins of usual residents to various employment centres across the study area has been analysed, and is shown in **Figure 22**. This demonstrates that for key employment sites across the wider study area there is potential for a NWL to assist with commuter journeys made by car. These figures can also be found within **Appendix B**

Figure 22 – Origins of usual residents to various employment locations

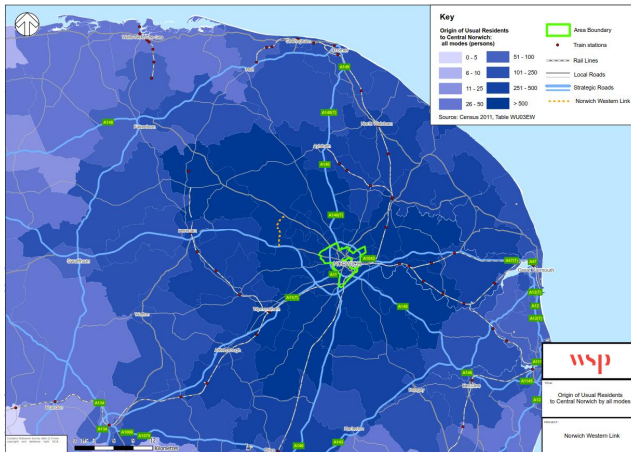
Norwich International Airport



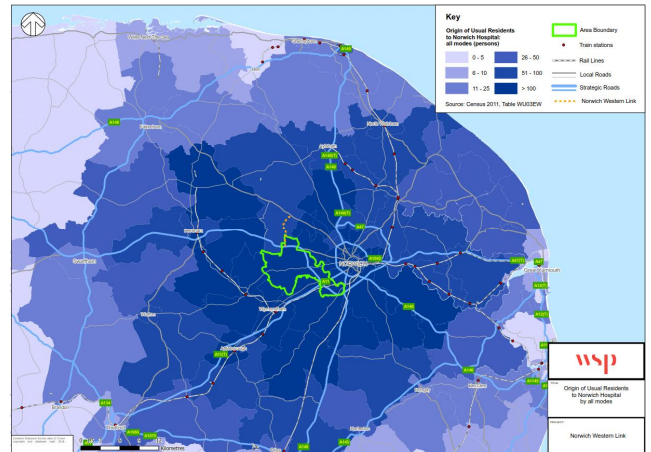
Lotus factory



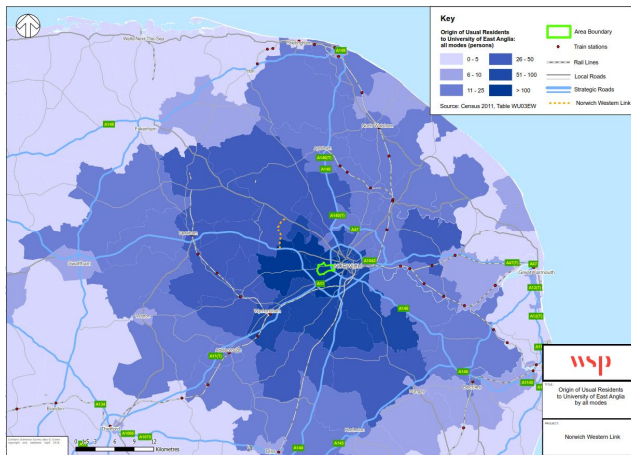
Norwich city centre



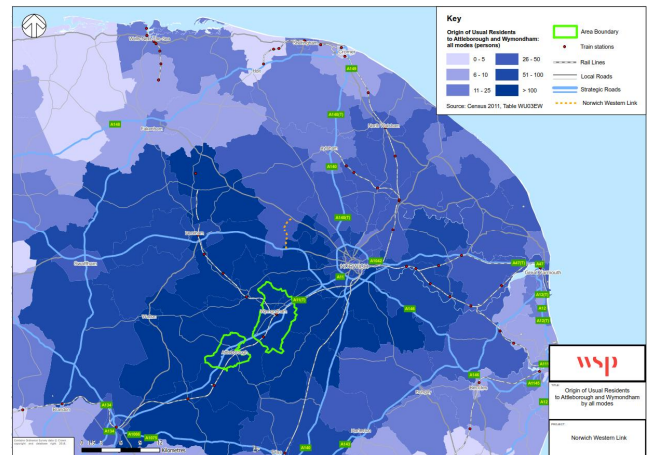
NNUH



UEA



Attleborough / Wymondham



2.4.23. In particular, the census data indicates that many commuter journeys have potential desire lines through the NWQ, which, dependant on whether their location of work is to the north or south of the city, could benefit from a NWL. In addition, key workplaces such as NNUH, UEA, Norwich Research Park, Norwich airport and further afield location such as Attleborough / Wymondham, attract a large proportion of journeys to work from the NWQ, and could benefit from a NWL, avoiding the need to use the local road network, or the outer ring road of Norwich to access the A11 heading south-west out of the city.

Tourism

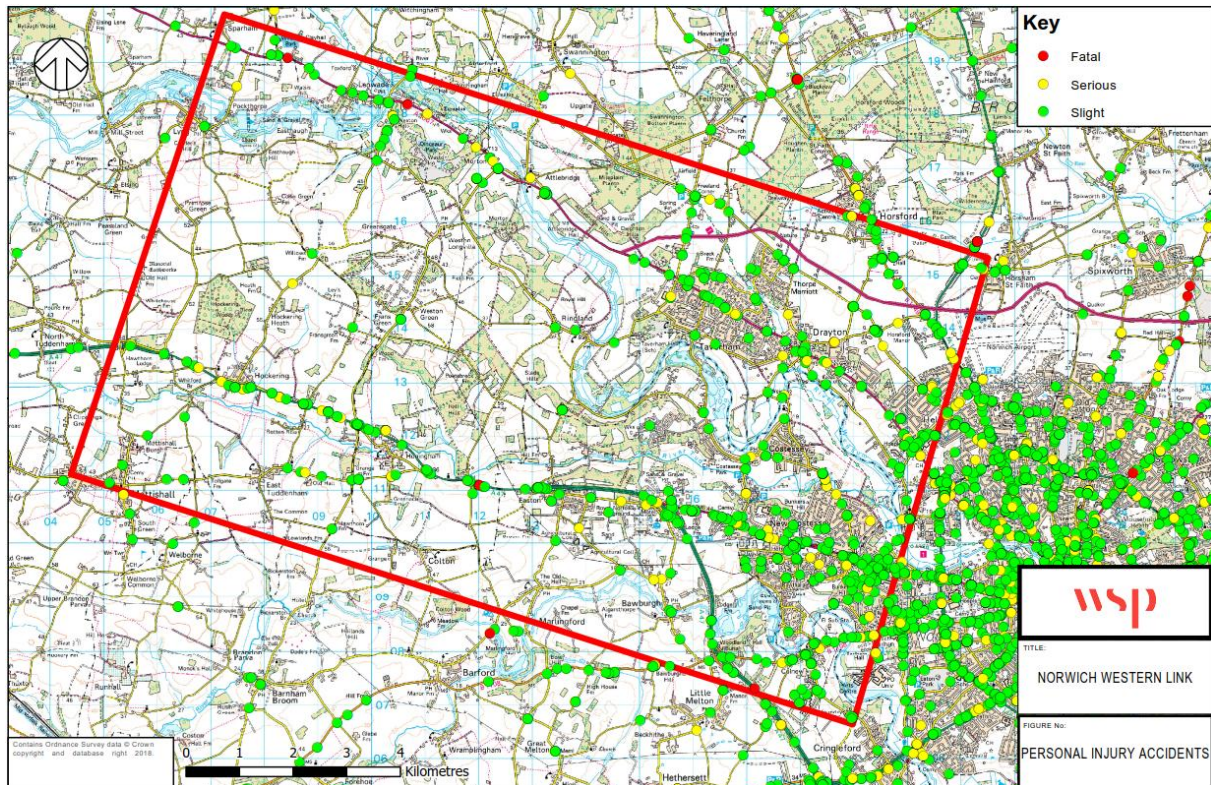
2.4.24. Norwich is a gateway to the Norfolk Broads and the North Norfolk coastline. North Norfolk, on average, attracts 5.86 million visitor days per year, worth approximately £117 million to the local economy⁹. Across England, cars were by far the most popular mode of transport with 862 million tourism day visits using this method (66%), followed by 216 million using public transport modes (17%). Applying national percentages, approximately 3.87 million visitor days are made by car to North Norfolk, many of which will use the SRN in and around Norwich. The introduction of a NWL may relieve pressure on the road network in and around Norwich and improve connectivity and accessibility to the east coast.

HIGHWAY SAFETY

2.4.25. Within the study area, between 2011 and 2015, there have been a number of recorded road traffic accidents resulting in personal injury (the data excludes “damage-only” accidents). The Personal Injury Accidents (PIAs) are shown in **Figure 23**, which demonstrates that the accidents are primarily along the main arterial routes to or from Norwich city centre. Due to the data available, it should be noted that the A1270 has not been included within this analysis.

⁹ The GB Day Visitor Statistics 2015 (Visit Britain)

Figure 23 – PIAs in the study area 2011-2015



2.4.26. **Table 7** looks at the frequency and number of casualties related with the different severity levels of the accidents. During the five-year period from 2011 to 2015, there were 663 recorded collisions within the study area, involving 898 casualties. Of these, 9% (77) were pedestrians, 10% (90) were cyclists, and 8% (72) arose from accidents involving motorcycles. The following sections looks at the pattern of accidents on key sections within the study area.

Table 7 – Severity and casualties of accidents in study area 2011-2015

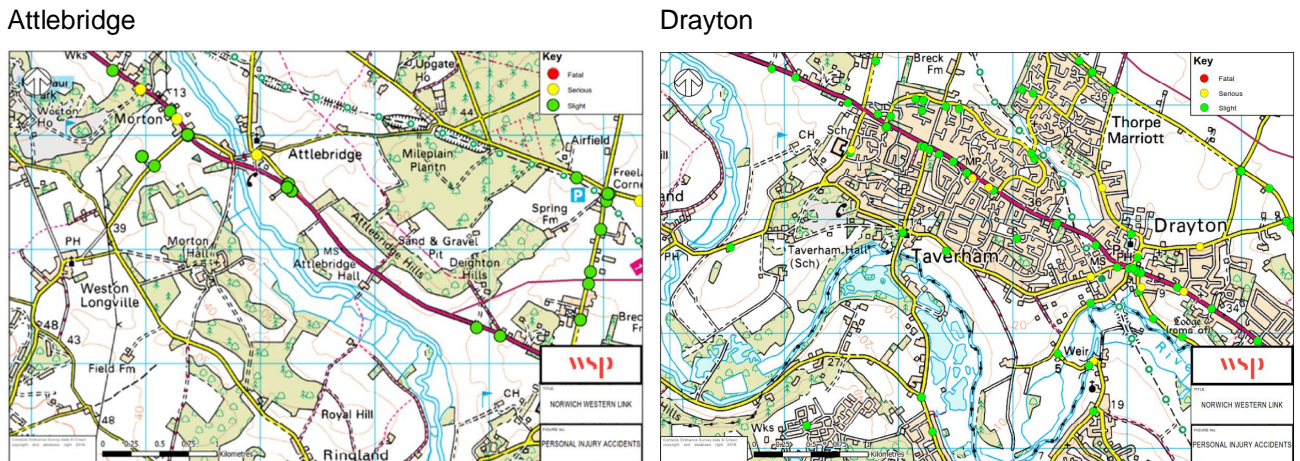
Severity	Collisions	Casualties
Fatal	8	10
Serious	109	120
Slight	546	768
Total	663	898

A1067

2.4.27. **Figure 24** shows the accident record between 2011 and 2015 along the A1067 from Drayton to Morton. The A1067 between the A1270 and Morton demonstrates a relatively low collision rate, with a small cluster of slight accidents occurring at the A1067 / Old Fakenham Road junction. The existing route (Marl Hill Road) connecting the A1067 to the A47 via Weston Longville demonstrates only two slight accidents over the time period.

2.4.28. Through Taverham there are significantly more accidents, but the majority are slight, with a small proportion of serious accidents. The other alternative route to the A47 through Taverham displays only three slight accidents. The introduction of a NWL has the potential to improve safety on the local road network between the A1067 and A47 and may reduce the accident rate along the A1067 through Taverham by transferring a proportion of trips onto the NWL and avoiding trips having to use the outer ring road as part of a longer strategic journey.

Figure 24 – PIAs along the A1067; Attlebridge & Drayton



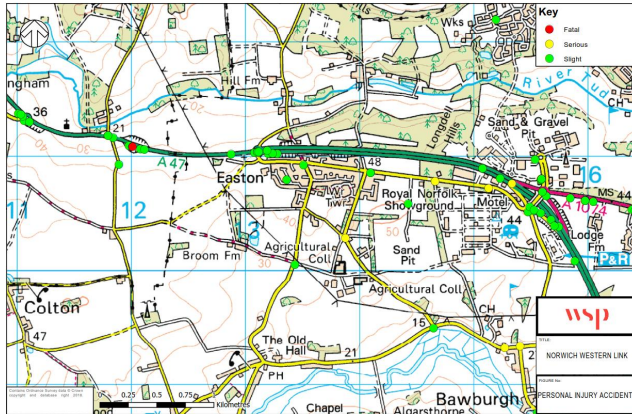
A47

2.4.29. **Figure 25** shows the accident record between 2011 and 2015 along the A47 from Easton to the A1074 through New Costessey. The A47 between the Longwater interchange and the Taverham Road junction demonstrates a cluster of accidents where the A47 restricts to single carriageway. Prior to the Taverham Road junction the A47 exhibits a fatal accident. The Highways England A47 North Tuddenham to Easton scheme, commits to upgrading the A47 to dual carriageway standard, with a key objective of the scheme being to improve road safety for all road users. The introduction of a NWL, in addition to the Highways England RIS scheme, is unlikely to cause a worsening impact on the current accident rates. The existing local road network that would be used for trips between the A47 and A1067 does not exhibit any accidents.

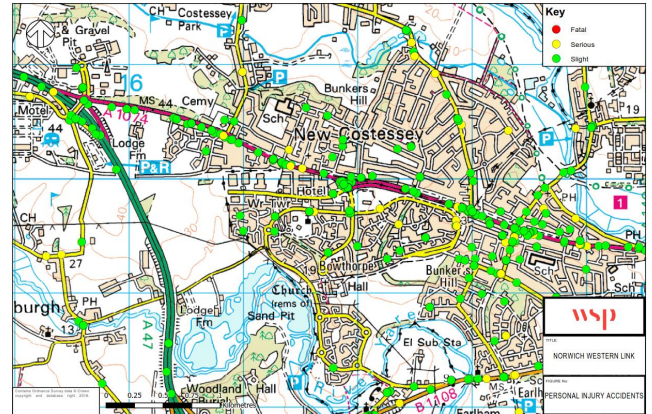
2.4.30. The A1074 through New Costessey demonstrates a significant number of slight accidents, with particular clusters occurring at junctions (for example Longwater Lane, Wendene and Norwich Road). There is also a significant cluster of accidents (slight and serious) at the Longwater interchange. The introduction of a NWL has the potential to improve safety on the road network, and may reduce the accident rate along the A1074 through New Costessey by transferring a proportion of trips onto the NWL, and avoiding trips having to use the outer ring road as part of a longer strategic journey, with particular destinations to the north of Norwich.

Figure 25 – PIAs along the A47 / A1074

Easton



New Costessey



2.5. ENVIRONMENTAL CONSTRAINTS

2.5.1. Early plans to link the A47 (west) to the A47 (east) via the A1067 were not progressed due to environmental concerns, and potential effects upon the River Wensum SAC (and SSSI). Since the adoption and completion of the A1270, there has been sustained local pressure for a NWL to ease perceived traffic problems in the local area and enhance strategic connectivity. Combined with Highways England’s intention to upgrade the A47 to dual carriageway between North Tuddenham and Easton, Norfolk County Council committed to revisit the feasibility and need for a NWL. Norfolk County Council is progressing the NWL project on the basis that a crossing of the River Wensum is compatible with the indicative proposals already provided to Natural England and the Environment Agency.

CONSTRAINTS

2.5.2. The study area covers some 13,713ha, and the relevant environmental constraints have been shown in **Figure 26**, however, it does not necessarily identify all the constraints that have informed the study and assessment of options in subsequent chapters of this report. For example, the Norwich City Centre Air Quality Management Area (AQMA) and the majority of the Noise Important Areas (NIAs) are not within the study area that has been created, however, they are important environmental constraints, and may be affected (positively or negatively) with regard to the various options which include improvements to existing roads. The extent of the AQMA and NIAs within the immediate surroundings of Norwich city centre have been shown in **Figure 27**.

2.5.3. The key environmental constraints within the NWQ are discussed by topic in the following sections.

Figure 26 – Environmental constraints in the study area

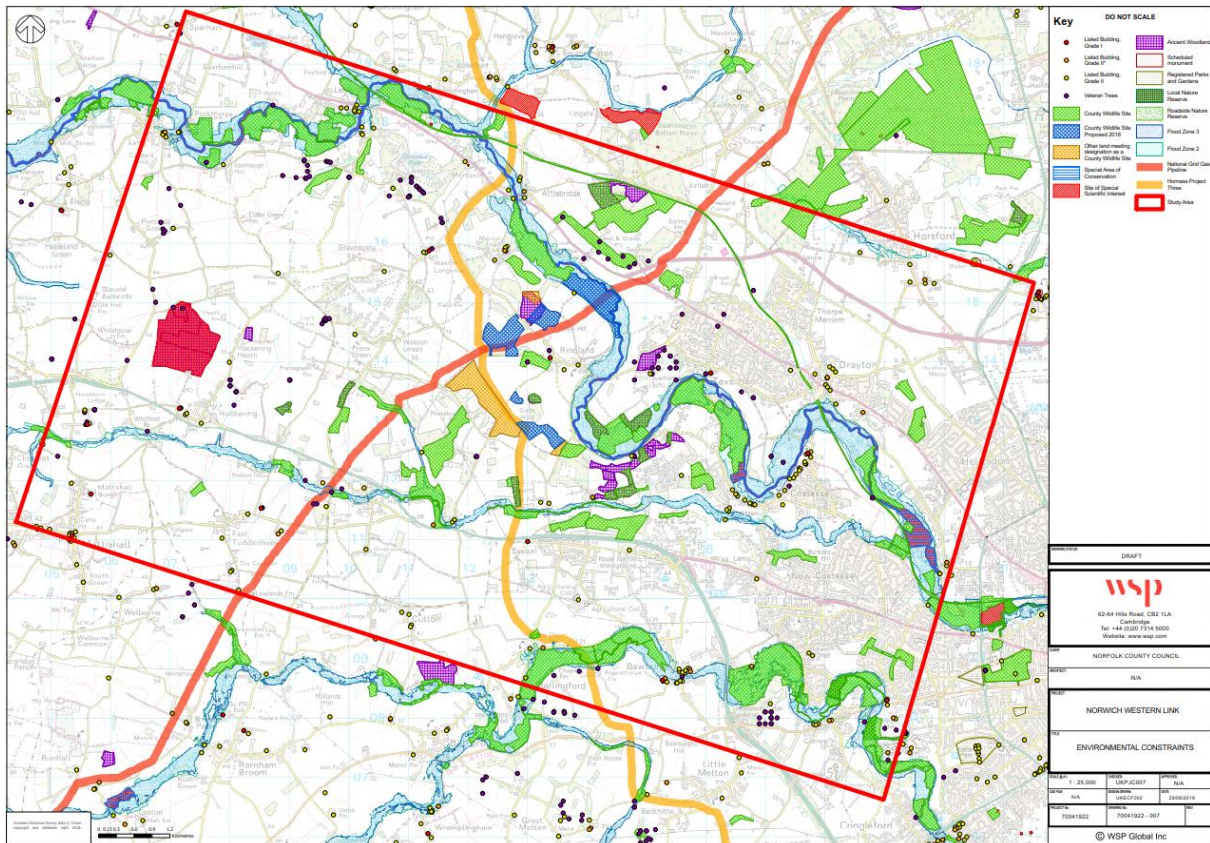
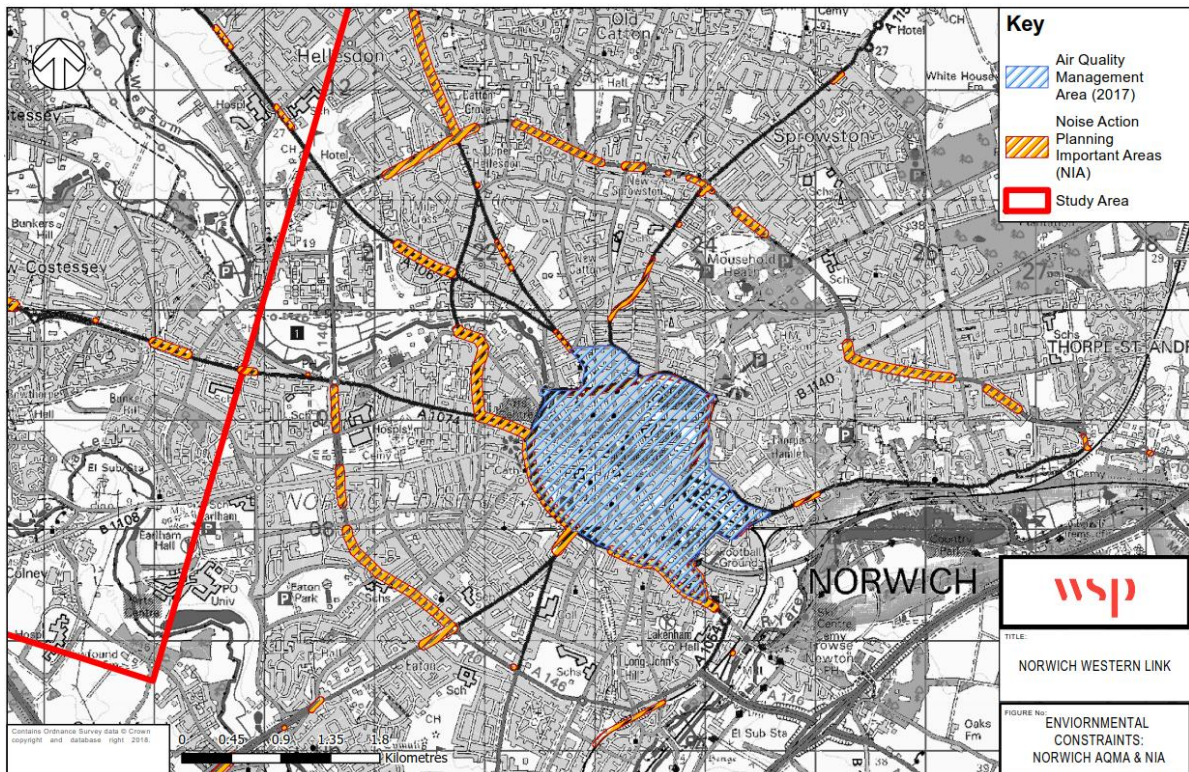


Figure 27 – Norwich city centre AQMA and NIA environmental constraints



Air quality

- 2.5.4. The main source of air pollution within the study area is likely to be from road traffic emissions. The vast majority of the study area falls outside of an AQMA. The closest AQMA is west of the study area, within the Norwich City Centre area, known as the Central Norwich AQMA. It was declared an AQMA for nitrogen dioxide (NO₂) in 2012.

Noise

- 2.5.5. The existing major sources of traffic noise in the study area are likely to be associated with the A47 and A1074 to the south, and the A1067 to the north, along with the newly opened A1270. There are three NIAs along the A47, five along the A1074, 11 along the A1067 and several in Norwich city centre.

Greenhouse gases

- 2.5.6. In 2016 the East of England region released 33 million tonnes of CO₂ into the atmosphere, of which 47% was from the transport sector¹⁰. Even though total CO₂ emissions in the region decreased by 5% in 2016 compared to 2015, transport emissions increased by 2%.
- 2.5.7. To reduce greenhouse gas emissions, Norwich City Council partnered with Norfolk County Council to introduce a Low Emission Zone (LEZ). The LEZ was introduced using an innovative approach through obtaining a Traffic Regulation Condition via the area Traffic Commissioner to regulate vehicle emissions and buses. An engine switch-off policy is being introduced within the LEZ to restrict idling of vehicles in October 2018. Other measures are also in place including the encouragement of eco-driving to minimise fuel consumption.

Landscape / townscape

- 2.5.8. There are no statutorily designated sites for landscape, such as Areas of Outstanding Natural Beauty (AONB) or National Parks, within the study area. As the scheme progresses, further investigation and LVIA (Landscape and Visual Impact Assessment) will be carried out in relation to the local landscape setting of a proposed NWL.
- 2.5.9. The closest large settlement to the study area is Norwich itself, however the study area encompasses a relatively rural landscape with small settlements and isolated dwellings. Therefore, the baseline conditions for townscape as an environmental constraint are likely to be negligible.

Historic environment

- 2.5.10. Within the study area there are a number of statutorily designated archaeological and built heritage assets. There is a total of 186 listed buildings, of which 12 are Grade I, 19 Grade II* and 155 Grade II and a total of nine Scheduled Monuments.
- 2.5.11. The River Wensum Valley geology includes areas of natural sand and gravel which, along with the riverine topography, provide an indication of suitability for early settlement due to the preference for

¹⁰ Department for Environment, Food and Rural Affairs, June 2018, Local Authority Carbon Dioxide Emissions Estimates 2016, Statistical Release: National Statistics

well-drained gravels close to predictable resources provided by rivers. The study area therefore has high potential for archaeological deposits, the value and integrity of which, is likely to be insufficiently understood to inform an assessment at this stage.

Biodiversity

- 2.5.12. In the wider area there are a range of ecological resources that may be affected by the proposals. These include designated sites of ecological interest as well as species that are protected by law, or otherwise of particular nature conservation importance.
- 2.5.13. Sites at a distance from the proposals may also be at risk from indirect effects. Within the immediate area of the scheme options, the most significant ecological site is the River Wensum SAC / SSSI. Four further sites of European importance at a greater distance from the scheme options will also require consideration in a Habitats Regulations Assessment (HRA) for the proposals. The immediate area of the scheme options contains three further nationally designated sites: Hockering Wood SSSI, Bowthorpe Marsh Local Nature Reserve (LNR) and Earlham Park Woods LNR.
- 2.5.14. This area also includes 75 CWSs and five Roadside Nature Reserves (RNR). These sites include a wide range of habitat types of value for different ecological resources, including areas of Ancient Woodland and Veteran Trees as well as wetland and marsh associated with the River Wensum and River Tud floodplain, mature woodland and grassland. The area supports a diversity of wildlife including the protected species otter, water vole, great crested newt, Norfolk hawk, Desmoulin's whorl snail, and ten species of bat including barbastelle, as well as rare plant species including fen pondweed *Potamogeton coloratus*, opposite-leaved pondweed *Groenlandia densa*, large yellow-sedge *Carex flava* and tubular water-dropwort *Oenanthe fistulosa*.

Water environment

- 2.5.15. There are two watercourses which are designated as 'main rivers' within the study area which could be impacted upon; these are the River Wensum and the River Tud. There is a Flood Zone 3 area (1 in 100 or greater annual probability of river flooding) surrounding the River Wensum, and scattered areas of designated Flood Zone 2 (between a 1 in 100 and 1 in 1000 annual probability of river flooding) and Flood Zone 3 around the River Tud. The River Wensum and River Tud form part of the Wensum Operational Catchment and are monitored under the WFD. Both rivers are heavily modified, and according to the 2016 Cycle Two Assessment, both rivers have an overall environmental classification rating of 'moderate'. There is also a minor unnamed watercourse near the Foxburrow Plantation, which is partially within a Flood Zone 3 area.

KEY CHALLENGES

- 2.5.16. The key environmental challenges affecting the NWL study area and potential mitigation measures are outlined in **Table 8**.

Table 8 – Environmental challenges

Challenge	Description	Mitigation
River Wensum SAC / SSSI	<ul style="list-style-type: none"> § Needs to demonstrate no adverse effects on the integrity of the River Wensum SAC. 	<ul style="list-style-type: none"> § Get a good understanding on the areas of the River Wensum that are at particular risk and sensitive to change. This can be done by consulting with county ecologists as well as statutory bodies such as Environment Agency and Natural England. § Avoid the options that are close to, or cross, where there are designated species and habitats.
Surface water runoff	<ul style="list-style-type: none"> § Highway runoff into the River Wensum. Attenuation of this runoff to the greenfield runoff rate will require lagoons, swales, which all require land. 	<ul style="list-style-type: none"> § Structural best management practices and appropriate mitigation measures outlined in the Construction Environmental Management Plan (CEMP) will be required and will reduce significant impacts of runoff into the river. § Collaboration of design engineers, flood modellers and the water team to provide innovative mitigation to reduce the potential significant impacts of highway runoff. § Creation of a Drainage Strategy to incorporate pollution prevention measures.

Challenge	Description	Mitigation
Archaeological deposits	<ul style="list-style-type: none"> § Unknown archaeology present along the river corridor leading to potential impacts on archaeological features and the setting of heritage assets along the river corridor. § Land access for surveys along the river corridor. § Considerable cost that can be incurred. 	<ul style="list-style-type: none"> § Construction and demolition will need to be carried out with relevant mitigation and best practice guidance in mind. § Options that run through or close to built heritage structures should consider moving the route to avoid these buildings or other options should be considered. § Pre- construction surveys / excavation works potentially should be undertaken to reduce the risks of construction or demolition of unknown archaeology. § Detailed and dynamic risk assessments for the access of the land close to the river corridor need to be prepared and should be ongoing throughout land access along the river. § Consultation with local / county archaeologist to gain a better understanding of the setting of potentially unknown heritage and archaeology.
Flooding	<ul style="list-style-type: none"> § The options which cross the River Wensum and/or the River Tud will cross Flood Zone 3 areas. The risk will be that these areas will be at high risk of potential flooding. Therefore, the challenge is to produce crossing of the rivers which will not be affected by flooding or make the flood risk more significant. 	<ul style="list-style-type: none"> § A Flood Risk Assessment will be required which will outline the potential mitigation and flood compensation land that will be required. § Design team to work closely with the water team to ensure appropriate crossings of the rivers spanning the flood zone are considered as part of the design of the NWL. § Temporary flood mitigation to be considered during construction.
Protected species	<ul style="list-style-type: none"> § Particularly bats. Land access may be an issue for some surveys. Timing of all of the surveys at an appropriate time of year and ensuring sufficient data capture will be important. 	<ul style="list-style-type: none"> § Regular discussions with NE and the NCC county ecologist to keep them abreast of the surveys, findings and emerging likely mitigation.

Challenge	Description	Mitigation
Air Quality	<p>§ A new road in a rural location will introduce a pollution source into an area with relatively unpolluted air. The challenge is to identify through the application that the benefits outweigh the disbenefits and to keep any increases as low as possible.</p>	<p>§ Good site practice and mitigation will reduce the effects of dust and particulate matter during construction.</p> <p>§ Quantitative modelling and assessment of the potential air quality impacts once the NWL is in use will give a better understanding of whether the benefits of a new route in a rural area will reduce the air quality pollution in the areas where there is currently congestion and a build-up of traffic closer to the city centre.</p>
Landscape and visual	<p>§ A new link will potentially contribute to a loss of agricultural land, field boundaries, hedgerows and some woodland due to the rural nature of the study area. The challenge is to ensure that the route does not cause significant loss of tranquillity and sense of place of the area and to ensure suitable mitigation is provided.</p>	<p>§ Appropriate mitigation to reduce the conflict in the landscape character as a result of the new route through it will be required.</p> <p>§ Screening vegetation and landscape bunds could reduce some visual effects.</p> <p>§ Combined mitigation between landscape and other environment specialists may help take into account multiple potential impacts.</p> <p>§ Good design incorporated within the scheme proposals.</p>
Built heritage	<p>§ The options pass in proximity to Listed Buildings and all options could impact upon the setting of these built heritage assets.</p>	<p>§ Consider the appropriate setting of the particular Listed Building at an early stage in scheme design.</p> <p>§ Undertake appropriate desk based and field surveys to understand the nature of any Listed Building affected.</p> <p>§ Incorporate landscaping in the form of bunds and suitable planting into locations where the setting of a Listed Building is adversely affected.</p> <p>§ Make use of photomontages to inform the assessment (accompanying the planning application) of setting and liaise with English Heritage as appropriate with regard to the location of these photomontages and the scope of the assessment.</p>

3. UNDERSTANDING THE FUTURE SITUATION

3.1. INTRODUCTION

- 3.1.1. This chapter outlines the external factors that will shape the NWQ and network operation into the future. It sets out the future growth in terms of housing and employment, before presenting the future investment within the transport system. It then sets out the modelling and forecasting that has been undertaken to inform the NWL study.
- 3.1.2. This chapter forms Step 2 of the Transport Appraisal Process.

Step 2 of the Transport Appraisal Process aims to understand:

- § Future land uses and policies
- § Future changes to the transport system
- § Future travel demands
- § Future level of service
- § Opportunities and constraints

3.2. FUTURE BASELINE

HOUSING & EMPLOYMENT

- 3.2.1. The Greater Norwich Local Plan (under development) builds upon the Joint Core Strategy and focuses on housing and job needs up to 2036 with a focus on ensuring new development promotes sustainability.

Housing

- 3.2.2. Paragraph 4.17 indicates that from 2017 to 2036 there is a OAN for approximately 38,988 dwellings. Recalculating the SHMA to rebase to 2017, suggests that to support this growth in housing, the Greater Norwich Local Plan will be required to provide 40,700 dwellings. Existing adopted local plans account for 80% of this growth, therefore the new local plan seeks to identify sites for a further 7,200 homes.
- 3.2.3. In the adopted Broadland Local Plan, a number of fringe parishes are defined: Taverham, Drayton, Hellesdon, Old Catton, Sprowston and Thorpe St Andrew. These form part of the Norwich Policy Area and have a combined allocation of between 1,462 and 1,662 new houses.
- 3.2.4. Within the study area, the Easton / Costessey area has also been identified as a major growth location within the South Norfolk adopted Local Plan, with plans to accommodate 1,500 new dwellings and enhanced local services. The Easton / Costessey area is also a prime location to accommodate some of the 1,800 units in the Norwich Policy Area that the Joint Core Strategy does not attribute to a particular settlement.
- 3.2.5. Further development and consultation on potential site options for the Greater Norwich Local Plan is ongoing and will eventually lead to formal allocation of sites for housing for the period up to 2036.

Employment

- 3.2.6. The draft Greater Norwich Local Plan also indicates that The City Deal seeks to deliver an additional 13,000 jobs by 2031 on top of the 27,000 jobs planned for in the Joint Core Strategy, resulting in a total requirement of at least 40,000 jobs to 2036.

- 3.2.7. Broadland District Council has progressed a Local Development Order (LDO) to help facilitate a Food Enterprise Zone (FEZ). The FEZ is located to the west of Easton village and just south of the existing A47. FEZs are a government initiative introduced by the Department for Food, Environment and Rural Affairs, with the aim to:
- § Enhance rural development through the growth of food businesses in a particular location, be it producers, processors, retailers and / or manufacturers
 - § Encourage greater collaboration between food and farming businesses, and even encourage links to research and education institutions, in order to develop the domestic food and farming sector
 - § Allow local decision making, particularly for planning and development
 - § Attract inward investment
- 3.2.8. The LDO is being progressed to provide planning permission and allow greater flexibility for new business-related development to locate within the site. The proposed LDO was considered at Broadland District Council's Cabinet meeting on 23 May 2017, where it was agreed to be adopted subject to the outcome of a Screening Direction from the Secretary of State and a Section 106 obligation. This process has now concluded and the LDO has been made.
- 3.2.9. When complete the FEZ is expected to provide 3,000-5,000 jobs and host multiple businesses with a range of complementary uses connected to the agri-food sector.

COMMITTED TRANSPORT IMPROVEMENTS

- 3.2.10. Highways England (HE) is the Government company charged with operating, maintaining and improving England's motorways and major A-roads which comprise the SRN. The HE Road Investment Strategy (RIS) sets out the Government's clear, long-term strategic vision for the SRN and provides longer-term funding certainty in a number of defined periods. The first RIS period covers 2015-2020.
- 3.2.11. As part of the RIS, the East of England was acknowledged as an area in need of investment, with 17 major road schemes identified as requiring investment. It was recognised that the A47 has a number of congestion hotspots, particularly around Norwich and other cities and town on the route, which result in delays and concerns regarding road safety. This, combined with development growth predicted along the A47, has resulted in the inclusion of the A47 corridor improvements programme within the RIS. This includes six schemes, two of which are of particular relevance to the NWL project:
- § **A47 North Tuddenham to Easton:** a new dual carriageway to the south and north of the existing road, with two new junctions – a roundabout at Berry's Lane / Wood Lane, and a roundabout at Blind Lane / Taverham Road. Due to these additions to the side roads, the Easton roundabout will be removed. These improvements will better connect side roads into the new dual carriageway (**Figure 28**)
 - § **A47 / A11 Thickthorn junction improvements:** the scheme consists of constructing two link roads connecting the A11 south to A47 east via three underpasses (under the A11, the A47 westbound and the A47 eastbound).

Figure 28 – A47 North Tuddenham to Easton preferred route and junction locations



3.2.12. Elsewhere in the study area, a number of schemes are also being brought forward for the local road network, which seek to be address local issues, and are not generally of a scale which will influence the way in which the NWL is used. **Table 9** outlines the schemes that have been included within the future year scenarios.

Table 9 – Local committed transport improvements

Scheme	Description	Status
Dereham Road / Old Palace Road	Junction improvement	Complete (2015)
Grapes Hill	Bus lane	Complete (2015)
Cleveland Road	Conversion to two-way	Complete (2015)
Chapel Field North	Bus and access only	Complete (2015)
Bethel Street	Closure of Little Bethel Street	Complete (2015)
St Stephens Street / Surrey Street	Removal of general traffic	Complete (2015)
Plumstead Road	Development link – Broadland Business Park to Plumstead Road	Planning permission approved – expected completion 2021

Scheme	Description	Status
Salhouse Road	New road through new housing estate connecting Wroxham Road to Salhouse Road	Under construction – expected completion 2017
Tuckswold Roundabout	Improvements to the Barrett Road approach crossing facilities and 30mph on Hall Road	Complete (2015)
Norwich Research Park	Junction improvement on B1108 / Hethersett Lane junction including signalisation	Complete (2015)
Westlegate	Fully pedestrianised	Complete (2015)
Longwater Improvements	Free flow slip from A1074 westbound onto A47(T) eastbound and part signalisation of the south dumbbell roundabout	Not likely until after 2021
John Lewis Thorn Lane	Car park entrance changes allowing all movements and closure of Thorn Lane at Ber Street	Complete (2015)
Thickthorn and Roundhouse roundabout improvements	Thickthorn and Roundhouse developer's schemes	Expected completion 2021
Longwater Dereham Road	Free flow left-turn from William Frost Way and widening of Dereham Road between Longwater roundabout and Lodge Farm 2 housing estate	Complete (2015)
Dereham Road widening	Widening to two lanes in each direction between Lodge Farm 2 housing estate access and Longwater Lane junction	Under construction – estimated completion 2021
Golden Ball Street	Golden Ball Street and Farmers Avenue (top end) two-way	Complete (2015)
Red Lion Street	Removal of general traffic from Red Lion Street (as a consequence of other schemes)	Complete (2015)
Postwick Interchange	Junction improvements	Complete (2015)
NDR (A1270)	New dual carriageway road	Complete (2018)
Dereham Road / Guardian Road	Roundabout improvements	Complete (2018)

3.3. ENVIRONMENTAL CONDITIONS

- 3.3.1. It has been assumed, in the absence of any information to the contrary, that the baseline environment will not change significantly between now and the submission of an NWL planning application.

3.4. MODELLING & FORECASTING

SCOPING

- 3.4.1. Highways England updated the NATS transport model for use in the assessment of their RIS schemes for the A47. Specifically, in relation to the NWL scheme, the Highways England A47 schemes included the A47 North Tuddenham to Easton scheme and the A47 / A11 Thickthorn junction improvements.
- 3.4.2. The existing NATS models consists of a highway assignment model developed in SATURN, which is endorsed by the DfT and approved by central government.
- 3.4.3. Highways England updated the NATS SATURN model for the assessment of proposed A47 schemes with the aim to maintain consistency with the existing NATS model. Where possible, the same approach was adopted as for the 2012 rebase¹¹. Highways England refined and adjusted the NATS model to represent a more current base year situation (2015) and achieve better functionality for representing the likely operation and impacts of the proposed A47 schemes. The Local Model Validation Report (LMVR) details the development of the updated NATS model.
- 3.4.4. The NATS model has the following time periods:
- § Morning peak hour (AM) 08:00-09:00
 - § Average inter-peak hour (IP) 10:00-16:00
 - § Evening peak hour (PM) 17:00-18:00
- 3.4.5. The highway assignment model groups traffic into 'user classes'. These segmentations differentiate between the characteristics of road users, both in terms of their use and their physical attributes. HGVs, for example, are physically larger than cars, and therefore take up more road space per vehicle. The user classes are summarised as follows:
- § User Class 1: Cars used for Employers Business
 - § User Class 2: Cars used for Commuting
 - § User Class 3: Cars used for Other purposes
 - § User Class 4: Light Goods Vehicles (LGVs)
 - § User Class 5: HGVs
- 3.4.6. In order to reflect more recent traffic patterns within the study area, the updated Highways England NATS model has been used as the starting point. This has been further updated for use in the NWL study as detailed in the following sections.

¹¹ Local Model Validation Report, A47 North Tuddenham to Easton, A47/A11 Thickthorn Junction, A47 Blofield to North Burlingham (A47 IMPS2-AMY-NA-ZZ-DO-J-0031) (Highways England, October 2017)

BASE YEAR MODEL

Data sources

- 3.4.7. Data has been utilised from ATC and Manual Classified Counts (MCC) undertaken by Norfolk County Council, and from Highways England's Traffic Information System (WebTRIS), which are shown in **Table 10**.

Table 10 – Base year model data sources

Location	Direction	Date	Type
Marl Hill Road, Attlebridge	Northbound / Southbound	October 2015	ATC
Paddy's Lane, Attlebridge	Northbound / Southbound	October 2015	ATC
Breck Lane, Attlebridge	Northbound / Southbound	October 2015	ATC
Rectory Road, Attlebridge	Eastbound / Westbound	October 2015	ATC
Sandy Lane, Attlebridge	Northbound / Southbound	October 2015	ATC
The Common, Lyng	Eastbound / Westbound	October 2015	ATC
Honingham Road at Weston Longville	Northbound / Southbound	October 2015	ATC
Heath Road at Hockering	Northbound / Southbound	October 2015	ATC
B1535 (Wood Lane)	Northbound / Southbound	October 2015	ATC
Heath Road (Stone Road and Ley's Lane)	Northbound / Southbound	October 2015	ATC
Lynn Road, Attlebridge	Northbound / Southbound	October 2015	ATC
Stone Road, Attlebridge	Northbound	October 2015	ATC
Arm A: Porters Lane	Northbound / Southbound	May 2018	MCC
Arm B: A1067 Norwich Road	Eastbound / Westbound	May 2018	MCC
Arm C: B1535 Western Hall Road	Northbound / Southbound	May 2018	MCC
Arm D: A1067 Fakenham Road	Eastbound / Westbound	May 2018	MCC
A47 between A1074 and B1110	Eastbound / Westbound	October 2015	WebTRIS
A47 between B1147 and B1110	Eastbound	October 2015	WebTRIS
A47 between B1110 and B1147	Northbound	October 2015	ATC

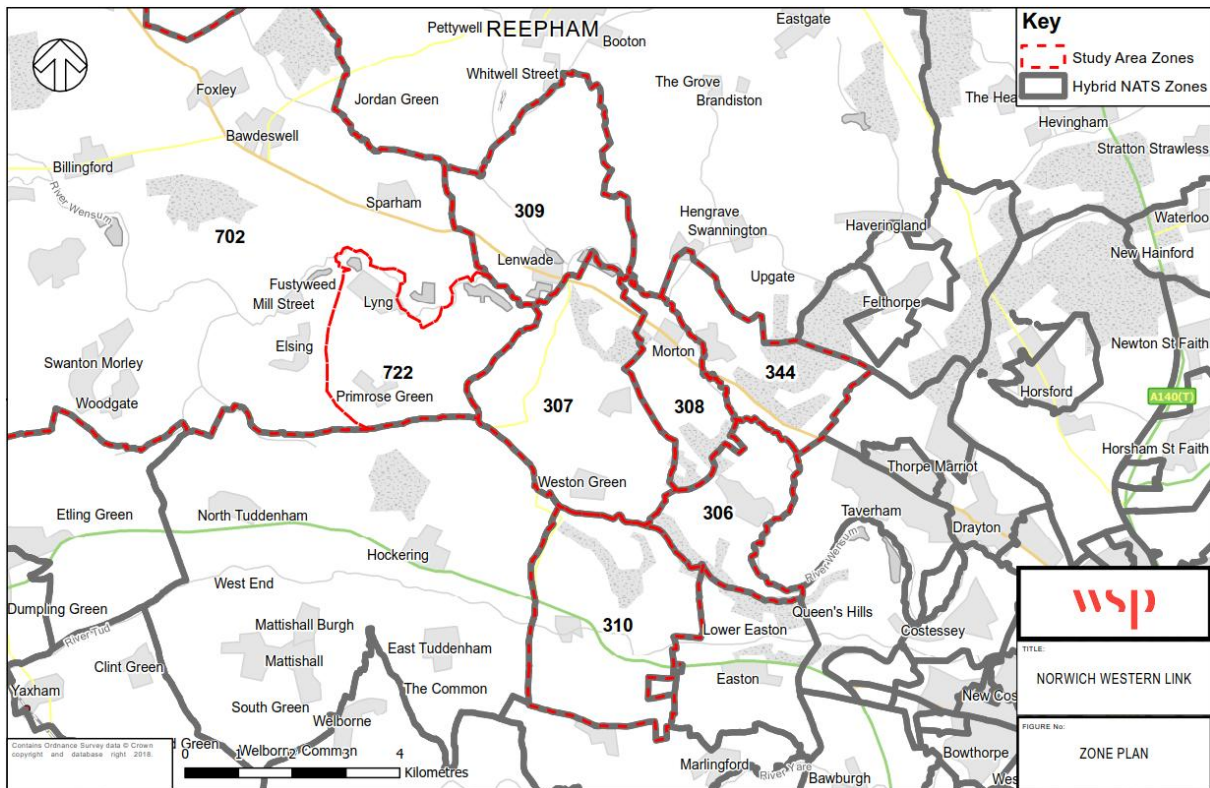
Zoning system

- 3.4.8. Traffic loads onto the model network from zones via centroid connector links. The centroid zone connectors in the NATS model within the NWL study area have been reviewed and refined to more realistically represent the way in which traffic joins the minor road network, prior to accessing

strategic roads. As far as possible, specific access roads from residential and commercial areas have been used as a basis for connecting zones to the network via centroid connectors.

- 3.4.9. The zoning system has been revised, with local zones within the NWL study area dis-aggregated to better reflect the local area and to allow for more accurate loading of existing traffic onto the local road network. The previous zoning system and the updated zoning system are shown in **Figure 29**.

Figure 29 – Zoning system



Network model

- 3.4.10. The local model network and zone connectors have been updated to better reflect the local road network.

Assumptions

- 3.4.11. SATURN has been used for highway assignment modelling, operating with a fixed demand matrix approach rather than variable demand at this stage of the project. SATURN is jointly developed by the Institute for Transport Studies, University of Leeds and Atkins. It is a recognised modelling tool, used to inform DfT and other strategic transport projects. As a ‘conventional’ traffic assignment model it can deal with local, large conurbation, regional or even national models thus making it an appropriate tool for the modelling of traffic in the NWQ.

Calibration

- 3.4.12. Calibration of the NWL transport model involves ensuring the model represents the on-site observed conditions by adjusting model inputs and parameters. The process involves examination of the network, checking for errors, and improving the performance of the model in terms of comparisons with observed data. Calibration statistics will be presented using the DfT’s WebTAG criteria.

3.4.13. Calibration is undertaken for the four main components of the model:

Network	Route Choice	Trip Matrix	Assignment
---------	--------------	-------------	------------

3.4.14. Each of the tasks above is linked with each other and it is often a combination of all that are required to address each problem identified by the calibration process.

3.4.15. A localised model calibration and validation exercise has been undertaken using the observed count information detailed previously in **Table 10** alongside an updated 2015 base year model (network and zoning).

Network calibration

3.4.16. During the network building process, the following activities were undertaken:

- § Review of the network coding warnings produced by the SATURN program SATNET
- § Network distance and speed checks
- § Review of junction approaches and saturation flows
- § Detailed review of the coding of complex junctions
- § Exclusion of neighbouring turning counts from the validation spreadsheet

Route choice calibration

3.4.17. At various stages of model development, the minimum cost routes for a range of selected origin-destination pairs should be plotted and checked for plausibility. Modelled route choice depends on:

- § Zone size
- § Network structure
- § Centroid connectors
- § Trip matrix accuracy
- § Representation of speeds and delays
- § Junction coding accuracy

3.4.18. Where routes were found to be implausible one or more of the above aspects have been adjusted.

Trip matrix calibration

3.4.19. As part of the trip matrix calibration it is essential to validate the trip matrices by comparing assigned flows with traffic counts with the Geoffrey E. Havers (GEH) statistic used to compare observed and assigned flow. The statistic uses the following formula to calculate a value for the difference between observed (M_E – survey data) and modelled (M_G – SATURN flow) traffic flow:

$$GEH\ Statistic = \sqrt{\frac{(M_E - M_G)^2}{0.5(M_E + M_G)}}$$

3.4.20. The GEH statistic takes account of the fact that when traffic flows are low, the percentage difference between observed and modelled flow may be high but the significance of this difference is small and conversely, a small percentage difference on a large base might be important. A GEH value greater than 10 indicates that closer attention is required, as the match between observed and modelled flows is poor, while a GEH less than five indicates a good fit. The aim is to achieve at least 85% links and turns with a GEH less than 5 as specified in Unit M3.1 of the DfT’s WebTAG.

3.4.21. The following sections set out the comparison of the modelled flows and observed flows.

Assignment calibration

3.4.22. Unit M3.1 of the DfT's WebTAG also specifies the following flow validation criteria for links and turns:

- § Individual flows within 100 vehicles per hour for flows less than 700 vehicles per hour in more than 85% of cases
- § Individual flows within 15% for flows between 700 – 2,700 vehicles per hour in more than 85% of cases
- § Individual flows within 400 vehicles per hour for flows greater than 2,700 vehicles per hour in more than 85% of cases

3.4.23. The subsequent model outputs are assessed in compliance with the criteria outlined above.

MODEL CALIBRATION / VALIDATION

3.4.24. In updating the NATS model and to provide confidence in the robustness and accuracy of the forecast models, a full audit process was undertaken to calibrate and validate the 2015 base year model in line with current guidance Unit M3.1 of the DfT's WebTAG. The results of the calibration and validation are shown in **Figure 30**.

3.4.25. The results show that the model has achieved a high-level of calibration and validation across all time periods.

Figure 30 – Calibration and validation results

Criteria and Measure			Acceptability Guideline			AM Peak												
						ALL						CAR						
						Calibration			Validation			Calibration			Validation			
						Total Counts	Meet Criteria	%	Total Counts	Meet Criteria	%	Total Counts	Meet Criteria	%	Total Counts	Meet Criteria	%	
Observed	Flow Criteria																	
	Modelled																	
< 700 vph	±100 vph	> 85 % of links																
700 - 2,700 vph	±15%	> 85 % of links																
> 2,700 vph	±400 vph	> 85 % of links																
GEH Criteria																		
GEH Statistic for individual links < 5		> 85 % of links																
GEH Range																		
GEH < 2																		
GEH < 4																		
GEH < 6																		
GEH < 8																		
GEH < 10																		
GEH < 5																		
			ALL			CAR												
			Calibration		Validation		Combined		Calibration		Validation		Combined					
			11	69%	0	0%	11	29%	11	69%	8	36%	19	50%				
			12	75%	17	77%	29	76%	11	69%	17	77%	28	74%				
			14	88%	21	95%	35	92%	14	88%	20	91%	34	89%				
			15	94%	22	100%	37	97%	14	88%	22	100%	36	95%				
			16	100%	22	100%	38	100%	16	100%	22	100%	38	100%				
			13	81%	20	91%	33	87%	14	88%	18	82%	32	84%				

Criteria and Measure			Acceptability Guideline			Interpeak												
						ALL						CAR						
						Calibration			Validation			Calibration			Validation			
						Total Counts	Meet Criteria	%	Total Counts	Meet Criteria	%	Total Counts	Meet Criteria	%	Total Counts	Meet Criteria	%	
Observed	Flow Criteria																	
	Modelled																	
< 700 vph	±100 vph	> 85 % of links																
700 - 2,700 vph	±15%	> 85 % of links																
> 2,700 vph	±400 vph	> 85 % of links																
GEH Criteria																		
GEH Statistic for individual links < 5		> 85 % of links																
GEH Range																		
GEH < 2																		
GEH < 4																		
GEH < 6																		
GEH < 8																		
GEH < 10																		
GEH < 5																		
			ALL			CAR												
			Calibration		Validation		Combined		Calibration		Validation		Combined					
			12	75%	0	0%	12	32%	12	75%	10	45%	22	58%				
			14	88%	19	86%	33	87%	14	88%	21	95%	35	92%				
			15	94%	22	100%	37	97%	15	94%	22	100%	37	97%				
			16	100%	22	100%	38	100%	16	100%	22	100%	38	100%				
			16	100%	22	100%	38	100%	16	100%	22	100%	38	100%				
			14	88%	22	100%	36	95%	14	88%	21	95%	35	92%				

Criteria and Measure			Acceptability Guideline			PM Peak												
						ALL						CAR						
						Calibration			Validation			Calibration			Validation			
						Total Counts	Meet Criteria	%	Total Counts	Meet Criteria	%	Total Counts	Meet Criteria	%	Total Counts	Meet Criteria	%	
Observed	Flow Criteria																	
	Modelled																	
< 700 vph	±100 vph	> 85 % of links																
700 - 2,700 vph	±15%	> 85 % of links																
> 2,700 vph	±400 vph	> 85 % of links																
GEH Criteria																		
GEH Statistic for individual links < 5		> 85 % of links																
GEH Range																		
GEH < 2																		
GEH < 4																		
GEH < 6																		
GEH < 8																		
GEH < 10																		
GEH < 5																		
			ALL			CAR												
			Calibration		Validation		Combined		Calibration		Validation		Combined					
			11	69%	0	0%	11	29%	11	69%	6	27%	17	45%				
			13	81%	17	77%	30	79%	12	75%	15	68%	27	71%				
			15	94%	21	95%	36	95%	14	88%	20	91%	34	89%				
			15	94%	22	100%	37	97%	15	94%	22	100%	37	97%				
			15	94%	22	100%	37	97%	15	94%	22	100%	37	97%				
			14	88%	20	91%	34	89%	14	88%	17	77%	31	82%				

BASE YEAR (2015) ANNUAL AVERAGE DAILY TRAFFIC

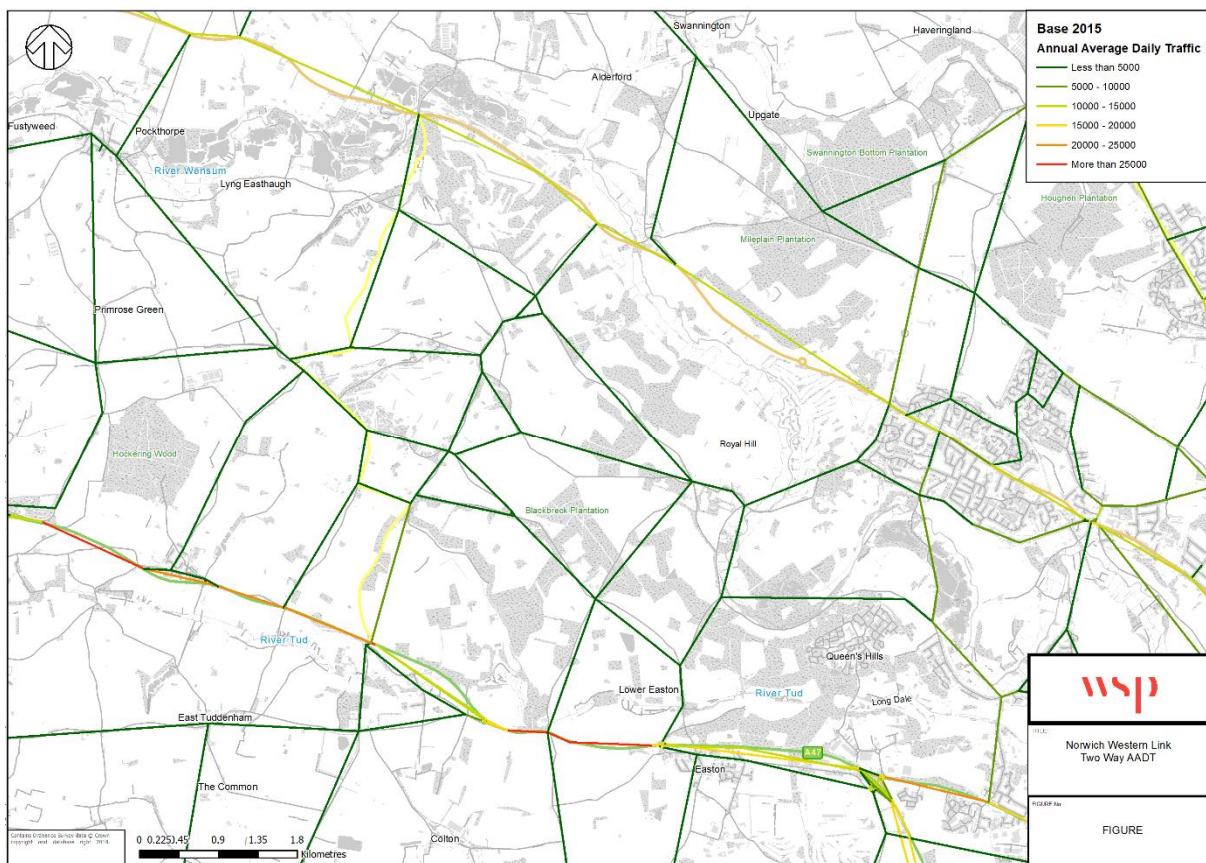
3.4.26. Annual Average Daily Traffic (AADT) flows have been produced from the 2015 base year peak hour models (AM peak, inter-peak and PM peak). **Table 11** shows flows on certain points on the network rounded to the nearest 1,000 vehicles. **Figure 31** provides a plot for the 2015 AADT.

Table 11 – Base year AADT (2015)

Location	2015
A47 west of Sandy Lane (2-way)	25,000

Location	2015
A47 east of Wood Lane (2-way)	26,000
Former A47 west of Taverham Road	1,000
B1535 Wood Lane	6,000
Total on other existing North-south routes through study area (Taverham Road, Lyng Road, Honingham Road & Ringland Road)	7,000
A1067 Attlebridge to A1270	14,000

Figure 31 – AADT (2015) Base year



FUTURE YEAR MODEL

3.4.27. The following forecast years have been identified:

- § 2025: Opening year
- § 2040: Design year
- § 2050: Horizon year

Development growth

- 3.4.28. The updated traffic forecast models include local development and infrastructure which is classified as ‘Near Certain’ or ‘More than Likely’. This includes developments and schemes which have planning permission or are going through the planning process.
- 3.4.29. For each of the modelled peak hours the base year validated matrix was used as a starting point.
- 3.4.30. Background traffic growth for cars has been obtained from the Trip End Model Presentation Program version 7.2 (TEMPro), a software tool that provides projections of growth over time based on outputs from the National Trip End Model (NTEM). NTEM takes into account changes in population, employment, car ownership and trip rates to forecast the growth in trip origins and destinations. NTEM version 7.2 datasets were published on 1 March 2017 and are the latest available set of forecasts at the time the forecast models will be updated
- 3.4.31. Growth for LGVs and HGVs has been obtained from the National Road Traffic Forecasts (NRTF) published by the DfT (September 2018). These growth rates have been applied to each region depending on the NWL zone location.
- 3.4.32. At this stage a ‘core’ central growth scenario has been developed with District wide demographic growth constrained to the top totals within TEMPro version 7.2 and in the absence of an adopted Local Plan beyond 2026 as the new Local Plans applicable to the study area are still emerging. TEMPro and NRTF factors have been assigned to each base year model zone with the origin and destination totals for each base year zone increased appropriately. This is in accordance with WebTAG methodology where forecasting needs to consider time periods beyond adopted policy. Sensitivity testing will be carried out at the SOBC stage for a wider range of growth scenarios. However, at this stage a TEMPro-based approach is considered to be robust as the housing growth assumptions within TEMPro exceed those set out within the relevant Local Plans.
- 3.4.33. The forecast year origin and destination totals were then used to furnish the base year matrix to generate a matrix for the forecast year peak hour which represented background growth in traffic. Furnishing is a process by which the matrix is balanced in order to meet targets totals for origins and destinations. Since both trip ends are factored, the process is referred to as being doubly-constrained.
- 3.4.34. As land use developments are a source of uncertainty, the total growth predicted by the forecast model is to reflect the total growth predicted by TEMPro in order to be consistent with national and regional planning policy. Unadjusted TEMPro factors at district level, have been effectively used as a constraint on the forecast matrix.
- 3.4.35. A summary of the percentage change in matrix totals by user class for each modelled year and time period compared to the 2015 base scenario is shown in **Table 12**.

Table 12 – Growth in matrices by user class 2015-2050

User class	2025			2040			2050		
	AM	IP	PM	AM	IP	PM	AM	IP	PM
Car Employers Business	8%	7%	8%	20%	18%	19%	29%	25%	27%

User class	2025			2040			2050		
	AM	IP	PM	AM	IP	PM	AM	IP	PM
Car Commuting	7%	7%	6%	19%	21%	18%	28%	30%	25%
Cars Other	18%	17%	14%	41%	39%	34%	54%	52%	45%
LGV	15%	15%	15%	38%	38%	38%	50%	50%	50%
HGV	3%	3%	3%	11%	11%	11%	17%	17%	17%
TOTAL	11%	13%	10%	28%	31%	26%	38%	42%	36%

Forecasting scenarios

3.4.36. Updated forecast year 2025, 2040 and 2050 networks have been produced with the core growth demand matrices. These are the 'Do Nothing' scenarios for 2025, 2040 and 2050, that is without NWL infrastructure. The 2025, 2040 and 2050 forecast year models have been produced for the following 'Do Nothing' network scenarios:

- § Highways England A47 North Tuddenham to Easton scheme assumed to include at-grade junctions with the A47
- § Highways England A47 North Tuddenham to Easton scheme assumed to include grade-separated junctions with the A47

At-grade junctions

3.4.37. AADT flows have been produced from the 2025, 2040 and 2050 forecast year peak hour models (AM peak, inter-peak and PM peak) and **Table 13** shows flows at key locations on the network rounded to the nearest 1,000 vehicles.

Table 13 – At-grade 'Do Nothing' AADT changes

Location	2015-2025	2015-2040	2015-2050
A47 west of Sandy Lane (2 way)	+6,000	+11,000	+12,000
A47 east of Wood Lane (2 way)	+6,000	+12,000	+13,000
Former A47 west of Taverham Road	+1000	+6000	+13,000
B1535 Wood Lane	+3,000	+5,000	+7,000
Total on other existing north-south routes between A47 and A1067 (Taverham Road, Lyng Road, Honingham Road & Ringland Road)	+4,000	+6,000	+11,000
A1067 Attlebridge to A1270	+3,000	+5,000	+7,000

3.4.38. With at-grade junctions, the A47 (west of Sandy Lane) is forecast to increase by 11,000 vehicles per day by 2040. On the A47 (east of Wood Lane) modelled traffic is forecast to increase by 12,000

vehicles per day by 2040. The A1067 is forecast to increase by 5,000 vehicles per day by 2040 between Attlebridge and the A1270. The existing routes between the A47 and A1067 are also predicted to show increases in traffic of approximately 6,000 vehicles by 2040 (this includes Lyng Road, Ringland Road, Honingham Road and Taverham Road). This would be nearly double the existing total flow on these routes. The existing B1535 would experience an additional 5,000 vehicles per day by 2040. There is predicted to be a large increase in modelled flow on the former A47 west of Taverham Road which is likely to be influenced by traffic from additional development in the A47 corridor.

3.4.39. AADT plots for the ‘Do Nothing’ including at-grade junctions are shown in **Figure 32**, **Figure 33** and **Figure 34**.

Figure 32 – AADT (2025) ‘Do Nothing’: at-grade

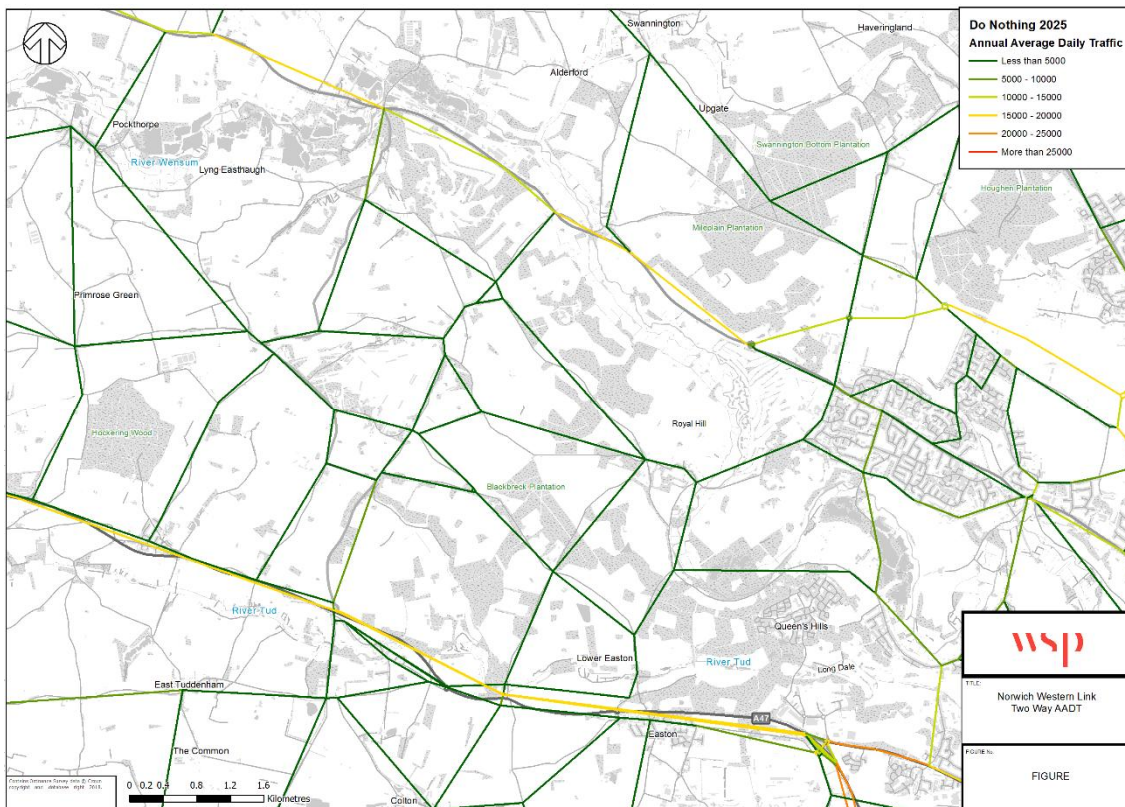


Figure 33 – AADT (2040) ‘Do Nothing’: at-grade

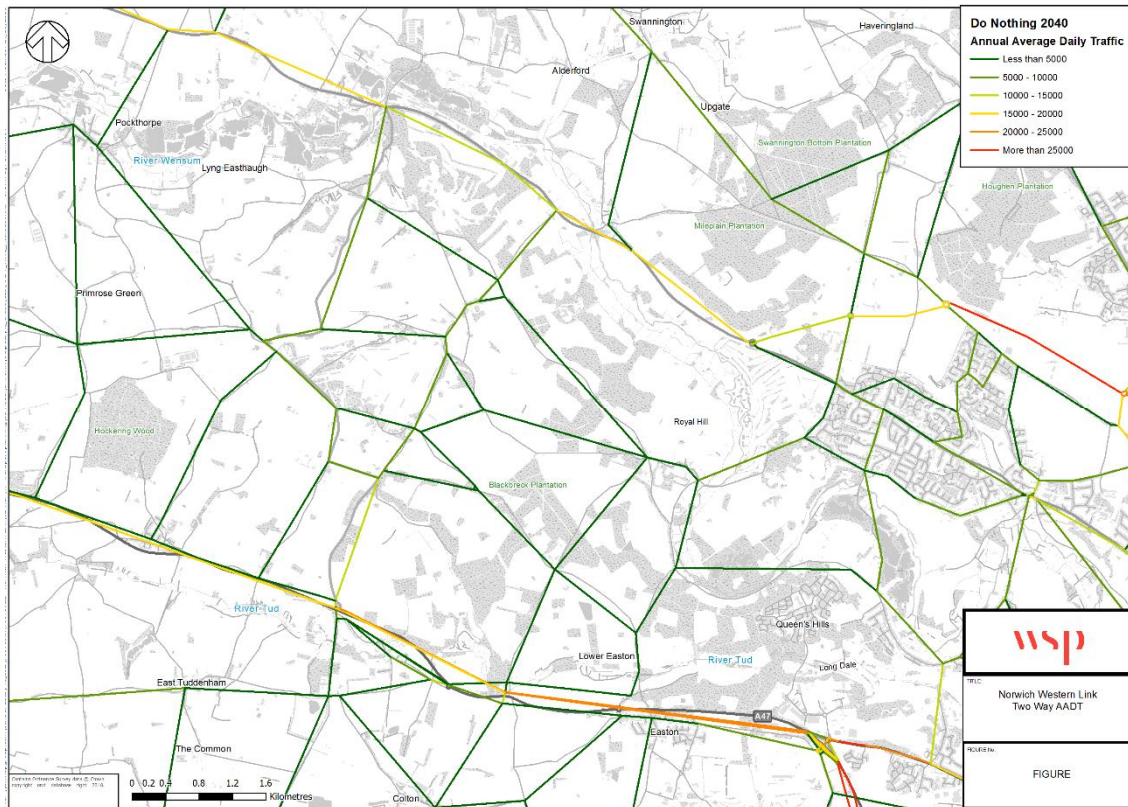
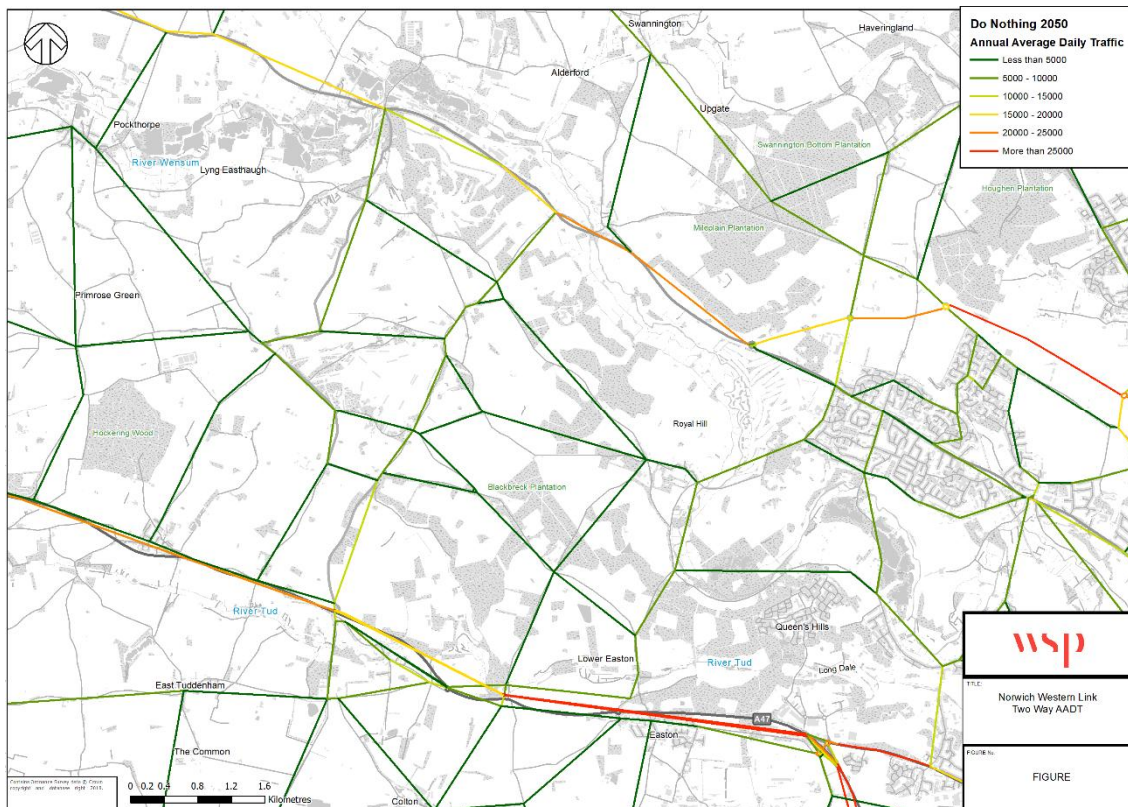


Figure 34 – AADT (2050) ‘Do Nothing’: at-grade



Grade-separated junctions

3.4.40. AADT flows have been produced from the 2025, 2040 and 2050 forecast year peak hour models (AM peak, inter-peak and PM peak) and **Table 14** shows flows at key locations on the network, rounded to the nearest 1,000 vehicles.

Table 14 – Grade-separated ‘Do Nothing’ AADT changes

Location	2015-2025	2015-2040	2015-2050
A47 west of Sandy Lane (2 way)	+5,000	+12,000	+14,000
A47 east of Wood Lane (2 way)	+5,000	+11,000	+16,000
Former A47 west of Taverham Road	+1,000	+5,000	+13,000
B1535 Wood Lane	+2,000	+3,000	+6,000
Total on existing North-south routes through study area (Taverham Road, Lyng Road, Honingham Road & Ringland Road)	+4,000	+6,000	+9,000
A1067 Attlebridge to A1270	+3,000	+6,000	+7,000

- 3.4.41. With grade-separated junctions, the A47 (west of Sandy Lane) is forecast to increase by 12,000 vehicles per day by 2040. On the A47 (east of Wood Lane) modelled traffic is forecast to increase by 11,000 vehicles per day by 2040. The A1067 is forecast to increase by 6,000 vehicles per day by 2040 between Attlebridge and the A1270. The existing routes between the A47 and A1067 are also predicted to show increases in traffic of approximately 6,000 vehicles by 2040 (this includes Lyng Road, Ringland Road, Honingham Road and Taverham Road). This would be nearly double the existing total flow on these routes. The existing B1535 would experience an additional 3,000 vehicles per day by 2040. There is predicted to be a large increase in modelled flow on the former A47 west of Taverham Road which is likely to be influenced by traffic from additional development in the A47 corridor.
- 3.4.42. AADT plots for the ‘Do Nothing’ including grade-separated junctions are shown in **Figure 35**, **Figure 36** and **Figure 37**.

Figure 35 – AADT (2025) ‘Do Nothing’: grade-separated

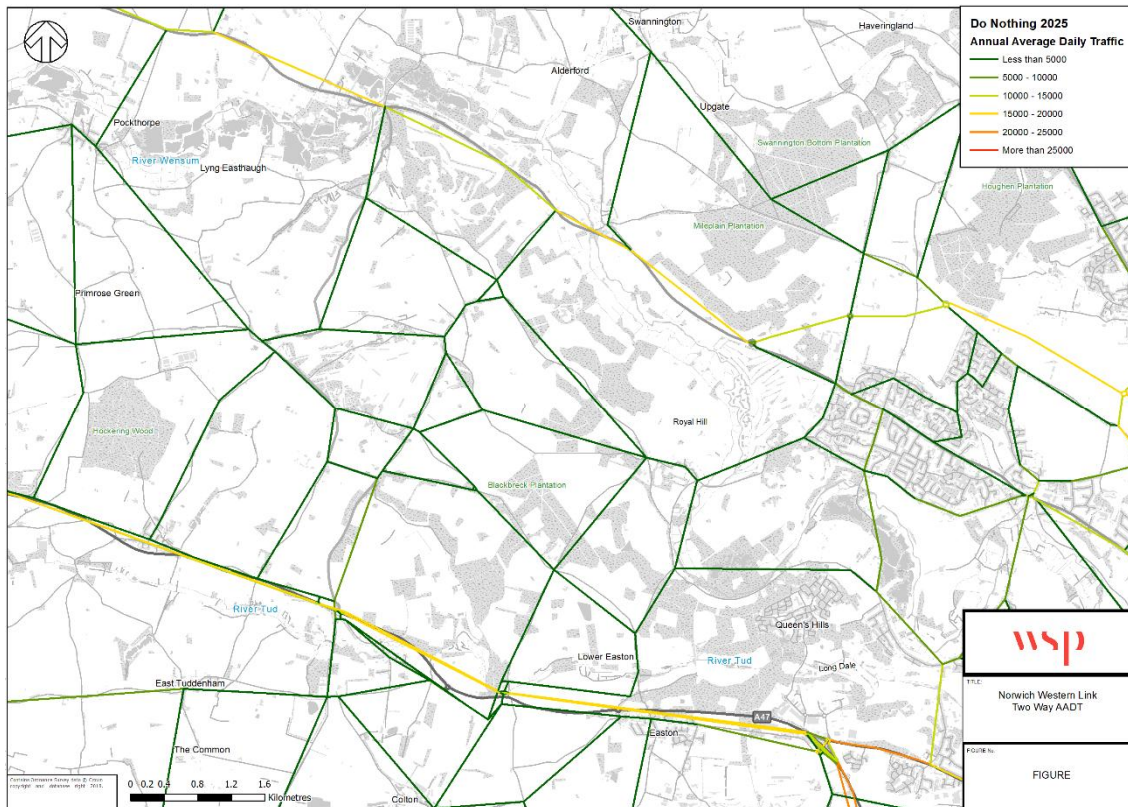


Figure 36 – AADT (2040) ‘Do Nothing’: grade-separated

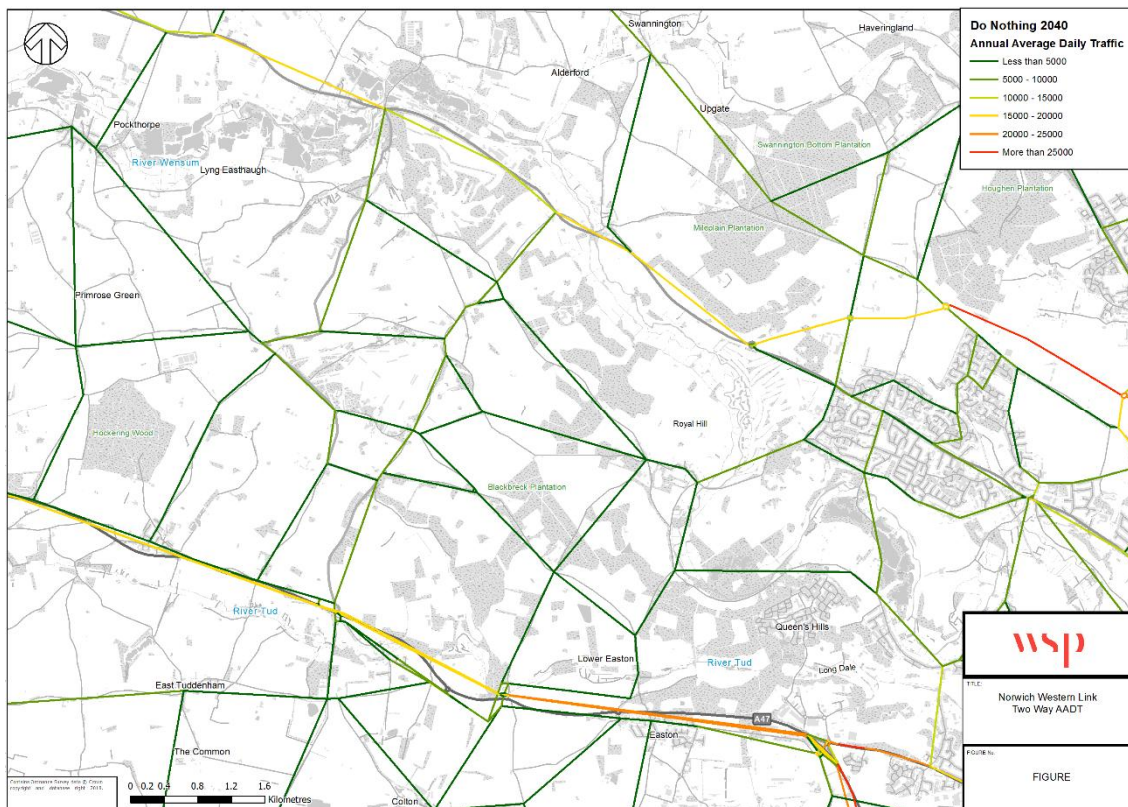
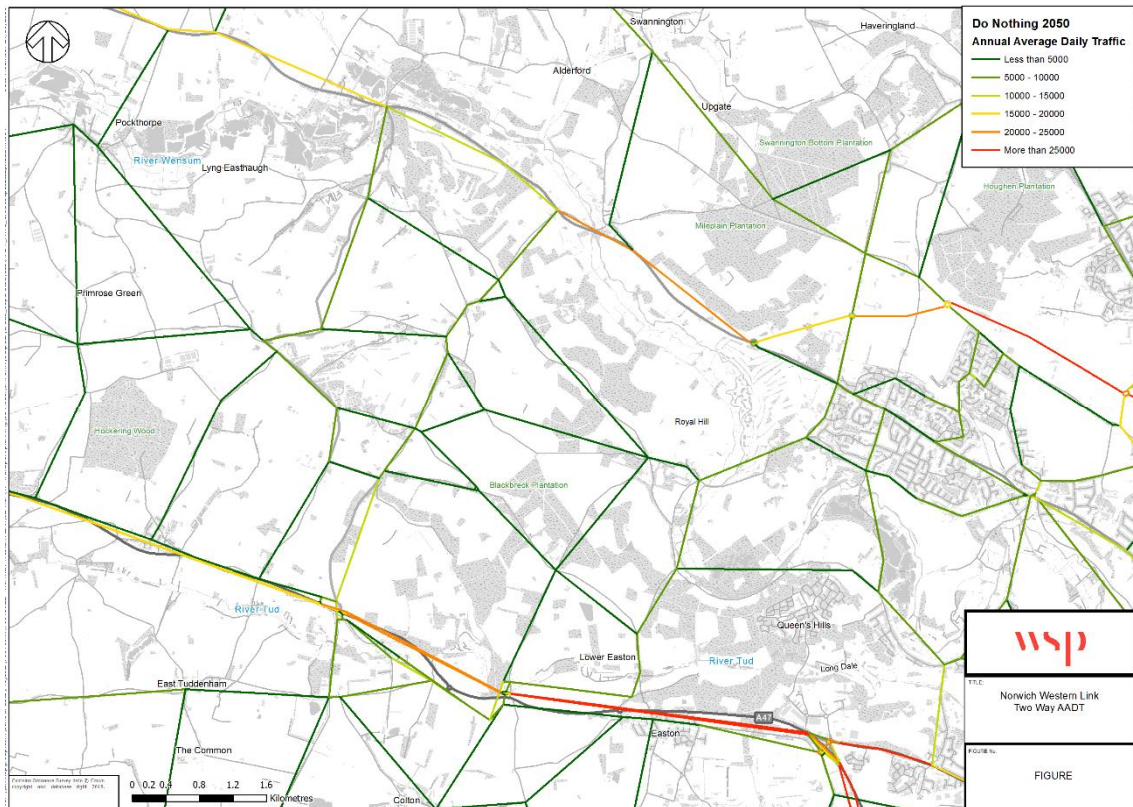


Figure 37 – AADT (2050) ‘Do Nothing’: grade-separated



4. ESTABLISHING THE NEED FOR INTERVENTION

4.1. INTRODUCTION

- 4.1.1. This section establishes the key issues within the NWQ and the subsequent need for intervention in the study area. It summarises the current and future transport-related problems and their underlying causes. The identification of problems and issues builds upon the evidence presented in previous chapters, from previous studies and from scheme-specific analysis work.
- 4.1.2. This chapter forms Step 3 of the Transport Appraisal Process.

Step 3 of the Transport Appraisal Process aims to establish the need for intervention:

- § Current transport-related problems
- § Future transport-related problems
- § Underlying causes

4.2. SUMMARY OF EXISTING SITUATION

DEMOGRAPHICS

- 4.2.1. The total estimated population in the NWQ is 77,600 (excluding Morton on the Hill and Alderford). The study area has an ageing population with high proportions over 65-years of age, and a lower than average economically active proportion compared to the region. The population in the Norfolk area is expected to increase by approximately 12.4% over the period from 2016 to 2041, of which 2% is growth in the working population (15-64 years of age) and 44% is growth in the retired population (65+ years of age).
- 4.2.2. The NWQ has two of its LSOAs (Bowthorpe and North Earlham) in the 10% most deprived areas of the country, measured against the IMD. Higher deprivation exists across the study area when education skills and training indices are considered with some areas within the 30% most deprived areas in the country. However, in terms of health deprivation, the study area is less deprived, with some locations within the top 10% least deprived areas nationally.
- 4.2.3. Norwich is the largest labour market in the region, accounting for approximately 60% of all jobs in Norfolk. The employment rate ranges from 16% (University) to 79% (Horsford and Felthorpe). Unemployment rate ranges from 4% (Cringleford, University, Drayton and Great Witchingham) to 13% (Wensum). Apart from the eastern part of the study area (Bowthorpe and North Earlham), the NWQ has higher levels of employment than the surrounding county, region and country as a whole.

Demographic challenges:

- § A significant increase in population, particularly of elderly residents, is likely to generate additional pressure on the transport and community infrastructure.
- § The overall study area has varying levels of deprivation, which results in a complex mix of differing local needs and challenges. Locations to the west of the study area have higher deprivation with regard to education, skills and training, suggesting inadequate transport provision for access to key areas / services.
- § Levels of employment / economic activity varies across the study area, therefore implementing measures to support economic activity and growth, may vary between communities.

TRANSPORT CONTEXT

- 4.2.4. Within the study area there is a key gap between the A47 and A1067, with a limited number of routes connecting the two, with those that do passing through residential areas. Improvements to local roads have been implemented to resolve long standing HGV traffic problems in Hockering, however there is still existing pressures on the local road network.
- 4.2.5. Norwich Railway Station is located approximately 8km south-east of the study area. Norwich is well placed on the rail network, however there are no connecting stations present within the NWQ. Two disused railway lines, passing through the study area, now form the NCN1.
- 4.2.6. The bus network in the study area is largely radial, providing routes to / from Norwich city centre along key corridors connecting residential areas to major employment sites. The eastern part of the study area is well connected with Norwich city centre, due to its proximity. There are a number of services connecting the NWQ to the north and east of Norfolk and Norwich, however, other services are limited and infrequent.
- 4.2.7. The Costessey Park & Ride is located closest to the NWQ study area; however, this only serves NNUH and UEA, therefore residents of the NWQ would undertake trips through the study area to access alternative Park & Ride sites.
- 4.2.8. Walking infrastructure in the study area is variable, with built up areas having footways adjacent to the highway. Rurally, there is limited provisions – with PRowS through a number of villages. The A1067, A47 and Longwater interchange are currently major barriers to pedestrian access, as no / limited infrastructure is available for users wishing to access local community facilities, shops and services.
- 4.2.9. Cycling facilities within the study area are generally limited to the urban fringe and Norwich city centre. Seven Pedalways crossing the city in all directions, and converging at St Andrews Plain, are being funded to improve connections and provide a higher quality cycle network. The study area also includes the NCN1, a 42km footpath, bridleway and cycle route utilising the disused railway line.
- 4.2.10. In the central region of the study area, between Hockering, Longwater interchange, Taverham and Attlebridge, there is a limited number of existing structures that could support a potential NWL. The majority of structures between the A47 and A1067 are single lane carriageway or footway / cyclepath structures. The only dual carriageway structure within the study area is currently in New Costessey serving the A1074.

Transport context challenges:

- § Limited connections exist between the A47 and A1067, reducing the orbital connectivity of the A1270, and creating pressure on the existing single carriageway roads – especially for HGV movements.
- § There are no railway connections within the study area, and significant infrastructure would be required to improve the rail network within the NWQ, therefore increasing pressure on the highway network.
- § There are limited direct bus connections between the NWQ and other towns / major services within Norfolk. Limitations of the Costessey Park & Ride service is likely to generate trips through the study area.
- § There are inadequate pedestrian facilities between villages and to services outside of built-up areas. The existing facilities are perceived as unsafe due to high volumes of traffic.

- § Cycling facilities are located to the east of the study area, within the urban fringe of Norwich. To the west of the study area there are limited connections, increasing pressure on the highway network.
- § Within the study area there is a limited number of existing structures that could support a potential NWL and therefore significant infrastructure will be required to provide for the standard needed.

TRAVEL PATTERNS

- 4.2.11. The car represents the dominant mode of travel to work within the study area, even though 37% of journey to work trips made by car are under 10km. Approximately three-quarters of residents within the NWQ travel to work by car, with much smaller proportions using public transport. The majority of the study area has access to two or more cars.
- 4.2.12. Traffic volumes on key links within the study area have generally increased by about 13% between 2015 and 2018 following the opening of the A1270. The A1270 carries approximately 20,000 vehicles per day, approximately 3% of which is HGVs, and relieves traffic on the A1067 Drayton High Road by removing around 2,000 vehicles per day.
- 4.2.13. There is a large concentration of commuters journeying to Norwich city centre, NNUH and other wider locations, such as Attleborough / Wymondham, from and through the NWQ. These trips could benefit from a NWL by avoiding the need to use the local road network, or the outer ring road of Norwich to continue on more strategic journeys. Origin-destination data demonstrates that trips could be potentially removed from these networks and be attracted onto a NWL.
- 4.2.14. During the five-year period from 2011 to 2015, there were 663 recorded collisions within the study area, involving 898 casualties, of which, 77 were pedestrians, 90 were cyclists, and 72 included motorcyclists. The introduction of a NWL has the potential to improve safety on the local road network between the A1067 and A47, and may reduce the accident rate along the A1067 and A1074 by transferring a proportion of trips onto a NWL, avoiding the need to use the outer ring road as part of a longer strategic journey.

Travel pattern challenges:

- § There is high car dependence and ownership which puts pressure on local transport networks, despite a high number of journeys being short. There is potential to encourage modal shift.
- § Increasing traffic volumes causes increased pressure on the highway network. A NWL could relieve congestion on the local road network and reduce rat-running, as is evident along the A1067.
- § There is a high volume of traffic movement through the study area, with origin-destination data showing that a NWL could serve as a commuter link for the city centre, NNUH and other locations along the SRN.
- § There were 663 accidents within the study area, eight of which were fatal, and nearly one-fifth involved NMUs. A NWL scheme could help address safety issues at accident hotspots.

LOCAL ENVIRONMENT

- 4.2.15. The study area has a mixture of land uses, including: rural farmland, parkland, residential areas and business and retail areas. The study area also includes the River Wensum and a number of environmental designations. The closest AQMA is the Central Norwich AQMA. There are three NIAs along the A47, five NIAs along the A1074, 11 along the A1067 and several in Norwich city centre.

There is a total of 186 listed buildings, of which 12 are Grade I, 19 Grade II* and 155 Grade II and a total of nine Scheduled Monuments. The study area has high potential for archaeological deposits. The most significant ecological site is the River Wensum SAC / SSSI. The study area also includes 75 CWSs and five RNRs. There are two watercourses which are designated as 'main rivers' within the study area (the River Wensum and the River Tud), which are in a Flood Zone 3 area.

Local environment challenges:

- § There is a mixture of land uses that will require a wide-ranging approach to ensure appropriate engagement is undertaken with local communities, stakeholders and land owners.
- § The study area is environmentally sensitive, and designated sites will need to be considered when implementing any transport infrastructure within the study area.

4.3. SUMMARY OF FUTURE SITUATION

FUTURE BASELINE

Housing and employment

- 4.3.1. The Greater Norwich Local Plan indicates that from 2017 to 2036 there is a OAN for approximately 38,988 dwellings. In Broadland, a number of fringe parishes forming part of the Norwich Policy Area have a combined allocation of between 1,462 and 1,662 new houses. The Easton / Costessey area has also been identified as a major growth location, with plans to accommodate 1,500 new dwellings and enhanced local services. Further development of the Greater Norwich Local Plan is ongoing and will eventually lead to formal allocation of sites for housing for the period up to 2036.
- 4.3.2. The draft Greater Norwich Local Plan also seeks to deliver a total of 30,000 jobs by 2031 (including the 27,000 jobs planned for in the Joint Core Strategy). Broadland District Council has progressed a LDO to help facilitate a FEZ to the west of Easton village and south of the existing A47. When complete the FEZ is expected to provide 3,000-5,000 jobs and host multiple businesses with a range of complimentary uses connected to the agri-food sector.

Transport improvements

- 4.3.3. As part of the RIS, the A47 was recognised as having a number of congestion hotspots, particularly around Norwich. The A47 North Tuddenham to Easton scheme is for a new dual carriageway, with two new junctions – a roundabout at Berry's Lane / Wood Lane, and a roundabout at Blind Lane / Taverham Road. Elsewhere in the study area, a number of schemes are also being brought forward for the local road network, which seek to be address local issues, however they are not generally of a scale which will influence the way in which a NWL is used.

Future baseline challenges:

- § Significant housing and employment growth is anticipated across the study area which will increase pressure on the local and strategic road network. The impact of this growth needs to be fully understood and considered within appraisal of a NWL.
- § Individual local and strategic improvements to the road network will assist with capacity issues, however transport related problems within the NWQ will persist into the future without intervention.

MODELLING & FORECASTING

- 4.3.4. The traffic forecast models include local developments which have planning permission or are going through the planning process. Background traffic growth has been applied using TEMPro and NRTF factors for each of the forecast years (2025, 2040 and 2050). By 2025 HGV movements across the network are forecast to have grown by up to 17%. This is likely to exacerbate issues on the local road network between the A1067 and A47, resulting in increased severance, congestion and safety concerns for local residents.
- 4.3.5. AADT flows for the 2025, 2040 and 2050 forecast year models have been produced, assuming at-grade junctions with the A47 North Tuddenham to Easton scheme and grade-separated junctions.
- 4.3.6. With at-grade junctions, the A47 is forecast to increase by 11,000 vehicles per day (west of Sandy Lane) and 12,000 vehicles per day (east of Wood Lane) by 2040. The A1067, between Attlebridge and the A1270 is forecast to increase by 5,000 vehicles per day by 2040. The existing routes between the A47 and A1067 (including Lyng Road, Ringland Road, Honingham Road and Taverham Road) are also predicted to show increases in traffic of approximately 6,000 vehicles by 2040. This would be nearly double the existing total flow on these routes. The existing B1535 would experience an additional 5,000 vehicles per day by 2040. There is predicted to be a large increase in modelled flow on the former A47 west of Taverham Road which is likely to be influenced by traffic from additional development in the A47 corridor.
- 4.3.7. With grade-separated junctions, the A47 is forecast to increase by 12,000 vehicles per day (west of Sandy Lane) and 11,000 vehicles per day (east of Wood Lane) by 2040. The A1067, between Attlebridge and the A2170 is forecast to increase by 6,000 vehicles per day by 2040. The existing routes between the A47 and A1067 (including Lyng Road, Ringland Road, Honingham Road and Taverham Road) are also predicted to show increases in traffic of approximately 6,000 vehicles by 2040. This would be nearly double the existing total flow on these routes. The existing B1535 would experience an additional 3,000 vehicles per day by 2040. There is predicted to be a large increase in modelled flow on the former A47 west of Taverham Road which is likely to be influenced by traffic from additional development in the A47 corridor.

Traffic modelling challenges:

- § HGV movements are forecast to have grown by 17% by 2050. This is likely to exacerbate issues on the local road network, increasing severance, congestion and safety concerns.
- § Existing routes between the A47 and A1067 are forecast to increase by up to 6,000 vehicles per day by 2040, which is nearly double the observed base flow.
- § West of Taverham Road, there is expected to be a large increase in modelled flow due to traffic generated from additional development within the A47 corridor.

5. IDENTIFYING OBJECTIVES & GEOGRAPHIC SCOPE

5.1. INTRODUCTION

- 5.1.1. This chapter sets out the geographical area of impact (the 'study area') and high-level and specific objectives for the NWL project. The objectives have been developed by considering the key themes identified from analysis of policy and strategy documents, identifying challenges for the study area from reviewing baseline and future conditions and through engagement with stakeholders and the public.
- 5.1.2. In developing the objectives, it was anticipated that the NDR (A1270) would be open and that the A47 would be upgraded to dual carriageway between Easton and North Tuddenham, as despite these significant and necessary improvements a number of local and strategic challenges remain in the NWQ.
- 5.1.3. This chapter is in line with Step 4a and Step 4b of the Transport Appraisal Process.

Step 4a of the Transport Appraisal Process is based on an understanding of the following:

- § The current situation
- § The future situation
- § The need for intervention

Step 4b of the Transport Appraisal Process is based upon:

- § An understanding of the geographical scope of the current travel market and key origins and destinations
- § An analysis of the geographical extent of the current and future transport problems and underlying drivers

5.2. DEFINING THE STUDY AREA

- 5.2.1. The focus of this study is the north-west area of Norwich, known as the Norwich Western Quadrant (NWQ) as illustrated previously in **Figure 2**. The broad study area includes the key radial routes of the A47 trunk road, the A1074 (Dereham Road), and the A1067 (Drayton High Road / Fakenham Road).
- 5.2.2. The study area encompasses the western fringe of Norwich and settlements, including; Bawburgh, Marlingford, Honingham, Hellesdon, Drayton, Taverham, Costessey, New Costessey, Ringland, Hockering, Weston Green, Weston Longville, North Tuddenham, Primrose Green, Lenwade, Alderford, Marton, Upgate, Felthorpe, Thorpe Marriot, Horsford, Elsing and Lyng.

5.3. HIGH LEVEL OBJECTIVES

- 5.3.1. The high-level objectives for the NWQ have been established with particular consideration of the key themes emerging from the review of national and sub-national policy and strategy. They have been presented to, and discussed with, the MWG and LLG and are currently as follows:
- § H1 Support sustainable growth
 - § H2 Improve the quality of life for local communities
 - § H3 Support economic growth
 - § H4 Promote an improved environment

§ H5 Improve strategic connectivity with the national road network

5.3.2. There was a general agreement at the meetings that the project objectives broadly met the identified problems identified and need for intervention, as outlined in **Chapter 4**.

5.4. SPECIFIC OBJECTIVES

5.4.1. The specific objectives for the NWQ have been developed to both support the high-level objectives and respond to the local challenges identified and need for intervention, as outlined in **Chapter 4**. They have been presented to, and discussed with, the MWG and LLG and are currently as follows:

- § S1 Reduce congestion and delay, and improve journey time reliability, on routes through the study area
- § S2 Improve network resilience and efficiency of the strategic and local transport network
- § S3 Reduce the number of Heavy Goods Vehicles using minor roads
- § S4 Make the transport network safer for all users (including Non-Motorised Users)
- § S5 Encourage modal shift to more sustainable modes of transport
- § S6 Provide traffic relief (and reduce noise & emissions) within residential areas
- § S7 Enable improved accessibility to existing and new housing and employment sites
- § S8 Improve emergency response times
- § S9 Improve access to green space
- § S10 Not affect the ecological integrity of the River Wensum SAC
- § S11 Contribute to the improved health and well-being of local residents
- § S12 Improve connectivity and accessibility to Norwich International Airport, Norwich Research Park and Norfolk & Norwich University Hospital

6. OPTION GENERATION

6.1. INTRODUCTION

- 6.1.1. This chapter documents the range of measures, or intervention options generated, that are likely to achieve the objectives and outcomes identified in **Chapter 5**. It documents how the long list of possible interventions was developed, with regard to historical options, in conjunction with key stakeholders and taking into consideration the Specific objectives.
- 6.1.2. This chapter is in line with Step 5 of the Transport Appraisal Process.

Step 5 of the Transport Appraisal Process is based on the following:

- § Options identified in previous studies
- § Options identified through stakeholder engagement

6.2. HISTORICAL OPTIONS

- 6.2.1. Various transport studies have been undertaken previously by Norfolk County Council to help identify the measures needed to support the planned growth and address existing problems within the county. The key studies, relevant to the NWL and encompassing the NWQ, and the potential options identified within the studies are outlined in **Table 15** in chronological order.

Table 15 – Summary of historical studies and options

Study	Purpose and main conclusions
Norwich Northern Distributor Road Stage 2 Scheme Assessment Report (Mott MacDonald, February 2005)	This report drew together information relating to the route options for the NDR to enable a decision to be made on a preferred route. The report concluded that, whilst the western routes provided a very good Benefit to Cost Ratio (BCR), the environmental impacts of the routes significantly diminished the VfM, in line with government guidance. Most of the impacts noted related to the landscape and ecology of the section of road between the A47 and the A1067 across the River Wensum.
A47-A1067 Western Link Road Scoping Study (Mott MacDonald, September 2014)	This report provided a preliminary assessment of western corridors for a new link between the A47 and A1067, and investigated potential route options for a NWL, including a public transport option (creation of an orbital route between Taverham and NNUH). The report concluded that further work should focus on the Red, Blue, Orange and Green options (or any variants), and the Purple and Brown options with associated measures to achieve the specific objectives.
Norwich Western Link Project Technical Report (Mott MacDonald, June 2016)	This report provided a high-level summary of the types of options that could be considered at the option long list stage, some of which could be taken forward for more detailed appraisal or combined with other options to enhance their benefits. The report provided potential options incorporating highway and traffic management measures, walking and cycling improvements, public transport enhancement, and development of green infrastructure / open spaces.
Norwich Western Link Technical Report (WSP, October 2017)	This report looked at the potential mitigation of environmental impacts of crossing the River Wensum through a number of crossing options – a bridge (dual carriageway / single carriageway) and a tunnel (dual carriageway / single carriageway). The study resulted in a viaduct option being taken forward as the

Study	Purpose and main conclusions
	chosen crossing option on all new link road schemes which cross the River Wensum.

- 6.2.2. During 2017, discussions were progressed with Natural England and the Environment Agency to understand the environmental sensitivity of the study area in more detail, and discuss the feasibility of potential options crossing the River Wensum SAC. However, neither Natural England nor the Environment Agency were able to provide meaningful feedback without a potential scheme design to review. An example proposal for one of the potential highway options (albeit this was not considered to be a ‘preferred option’) was therefore developed by WSP in more detail, purely for illustrative purposes to facilitate these discussions.
- 6.2.3. Following discussions with the Environment Agency during 2017 / 2018 and a study¹² of proposed mitigation measures, it is anticipated that a solution that does not materially impact the ecological integrity of the River Wensum SAC is achievable.
- 6.2.4. Discussions with Natural England and the Environment Agency highlighted specific points that they saw as positive contributions to the design, this include that there was no construction upon the river banks which was a key concern from previous consultation; that it was welcomed that the embankments and bankseats are not within the floodplain; and that a significant soffit height of the bridge above the watercourse would reduce the degree of shading that is encountered.
- 6.2.5. In terms of moving forward the meetings also highlighted a range of other questions which the study would seek to address, including concerns about the potential effects of the tunnel option upon groundwater flow, the degree of Highway runoff treatment, the impact on the Wensum of salt spray and the thickness of piers and information on the construction process would all need careful consideration to address concerns.
- 6.2.6. It was agreed that a significant number of species surveys are likely to be required in order to provide sufficient information to inform the assessments; and Opportunities for environmental enhancement should be sought.
- 6.2.7. In summary, both Natural England and the Environment Agency were supportive of the progress that had been made with the proposals since consultation in 2016 and it is anticipated that a solution that does not materially impact the ecological integrity of the River Wensum SAC is achievable and that continued liaison during the adoption of a preferred alignment will be key to achieving the desired outcome.

¹² Norwich Western Link Technical Report (WSP, October 2017)

TUNNELLING OPTIONS

Type and constructability

- 6.2.8. Construction of a tunnel to carry a NWL underneath the River Wensum was considered as part of the 2017 Technical Report¹³. A cut-and-cover tunnel was discussed as the simplest option from an engineering point of view, however, it could sever or significantly impact groundwater flows within the floodplain of the River Wensum, contrary to the WFD, and may therefore not be acceptable. Such construction would also sever water bodies associated with, and adjacent to, the main course of the River Wensum where it meanders, which, whilst not shown as being included within the SAC or SSSI, would potentially affect them.
- 6.2.9. Other forms of tunnel construction could include a bored tunnel or a mined tunnel. A bored tunnel would use a Tunnel Boring Machine (TBM), which has a high mobilisation and set-up costs, typically ranging from around £15-£20 million per TBM. This is likely to significantly affect the cost effectiveness of a tunnel solution. A bored tunnel would need to be deeper to provide sufficient cover to the tunnel 'ring', hence the ramps emerging from the tunnel would need to be longer, extending the cutting a significant length beyond the portals.
- 6.2.10. A mined tunnel (excavated without removing the overlying rock or soil) would achieve the benefit of buried construction whilst avoiding the high costs associated with a TBM, but excavation beneath the water table in soft granular materials or chalk is typically challenging for this form of construction. A depth of cover less than required for a bored tunnel may be possible, however, this depends on the particular ground conditions.

Alignment and layout

- 6.2.11. A tunnel would need to extend below the ground for the full extent of the floodplain before emerging, to avoid flooding in the tunnel as well as reducing flood storage capacity within the floodplain itself. It would then require relatively long ramps before reaching the existing ground level, due to the limit on the gradients, accentuated by the local valley topography, which means that the ramps end up 'chasing the hillside' and increase in length compared to a solution where the surrounding ground is flat. Once beyond the floodplain and at a point where the risk of floodwater entering the tunnel is sufficiently low, the tunnel structure could end with the route beyond in cutting.
- 6.2.12. On the north side of the River Wensum, the length of ramp required means that a direct at-grade junction with the A1067 is unlikely to be possible, as the new link road would not have reached ground level by then. Alternatively, the link road would have to continue beneath the A1067 before turning and joining it from the north instead. This would involve major works to the A1067, in addition to the tunnelling works, resulting in additional land take requirements and a significant increase in project costs. It appears the likely depth of tunnel required and maximum highway gradients provide sufficient grounds to discount this.

¹³ Norwich Western Link Technical Report (WSP, October 2017)

Cost

- 6.2.13. Cost estimates from the 2017 Technical Report¹⁴ need to be reviewed in light of any recommendations from expert advice required in relation to tunnelling methodology and impact on the aquifer. It is anticipated that the cost of a tunnel scheme will increase in a greater proportion than that of a bridge scheme, which may remain similar. This would increase the cost differential between the tunnel options and bridge options. A tunnelling scheme, which had been found to represent poor VfM, would become even less cost effective.

Outcome

- 6.2.14. The outcome of the previous work led to the conclusion that a tunnel solution should be discounted due to potential severance of the groundwater table, high cost, high maintenance and lack of space between the River Wensum and the A1067 creating in a longer distance and reduced transport benefits. Following the recommendations from the 2017 report, tunnelling options have not been included within this OAR.
- 6.2.15. Alternatively, previous work has demonstrated that a bridge, which is sufficiently elevated to minimise shadowing effects on species and habitats beneath, could potentially be made to be acceptable, with adequate pollution control in place and mitigation to protect the downstream watercourses. An appropriate assessment would be required under the Habitats Directive Regulations to demonstrate that any proposed solution crossing the River Wensum would not cause significant effects on the River Wensum SAC.

6.3. ENGAGEMENT

PUBLIC CONSULTATION

- 6.3.1. Norfolk County Council undertook a non-statutory public consultation, which ran between Tuesday 8 May 2018 and Tuesday 3 July 2018. The purpose of this consultation was to understand people's experience of living in, and travelling through, the area to the west of Norwich.
- 6.3.2. A number of events were held throughout the consultation period, and feedback from local residents and businesses was gathered using two web-based portals supplied by Commonplace. Of the two websites, one was designed to collect people's views (Initial Views questionnaire) on general transport issues and the other to pinpoint transport issues on a 'heat map'.
- 6.3.3. The top 10 most frequently identified transport issues within the area, are outlined in **Table 16**. The results demonstrate that respondents perceive the existing roads in the area to be unsuitable for the current levels of traffic and subsequently slow journey times were also a frequently mentioned issue. In association with this rat-running was the second most perceived issue.

¹⁴ Norwich Western Link Technical Report (WSP, October 2017)

Table 16 – Public consultation most frequently identified transport issues in the area

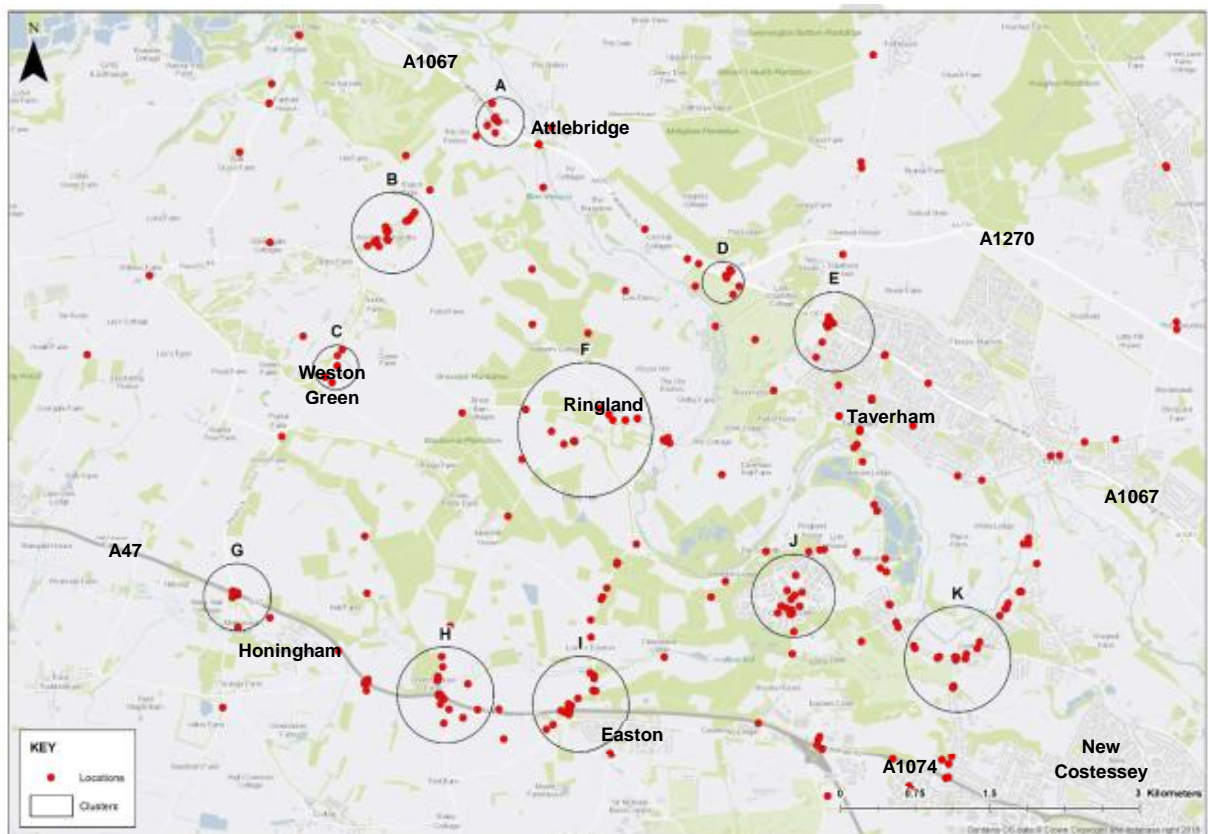
Rank	Issue	Frequency
1	Roads not suitable for the level of traffic	1,395
2	Rat-running	1,103
3	Slow journey times	1,001
4	Rural congestion	776
5	Inappropriate use by HGVs	737
6	Road safety	711
7	Poor journey reliability	585
8	Poor cycling network	423
	City-centre congestion	
9	Poor walking routes	322
10	Public transport options	318

6.3.4. This question was supported by the transport issues ‘heat map’, which clearly indicates areas of concern on the existing road network, especially congestion and perceived inappropriate road use patterns for the type of roads available. **Figure 38** demonstrates where comments were ‘pinned’, and have subsequently been clustered into groups. The following indicates the range of comments within each cluster:

- § **Cluster A** (8 comments): respondents stated that the roads were narrow and that rat-running was an issue. Concerns regarding safety were also raised with respondents feeling that a NWL should not connect to the A1067 at this location
- § **Cluster B** (17 comments): respondents reported that the traffic calming measures in Weston Longville are dangerous and the lower speed limit is not obeyed. Rat-running, congestion and the road being unsuitable for the level of traffic were perceived as a major issue. Respondents also commented on the lack of pedestrian facilities
- § **Cluster C** (8 comments): traffic and speeding issues were raised in relation to Weston Green, along with a lack of access to public transport
- § **Cluster D** (7 comments): HGVs and tractors were noted to cause congestion at the A1067 / A1270 junction. Many believe that this location is where a NWL should tie-in, however, one comment indicated that creating a road south from this location would cause irreparable damage to River Wensum
- § **Cluster E** (12 comments): respondents indicated that the A1067 / Fir Covert Road junction is not suitable for the level of traffic. Respondents solutions included a roundabout or to have traffic signals

- § **Cluster F** (26 comments): Rat-running and traffic were raised as an issue at Ringland. The road is also considered narrow and dangerous due to speeding. Respondents requested more provision for NMUs
- § **Cluster G** (15 comments): comments here related to the dangerous nature of turning movements, however, there were numerous comments regarding the Highways England RIS scheme
- § **Cluster H** (19 comments): This area (A47 / Taverham Lane junction) is perceived unsuitable for current traffic levels, particularly HGVs. Subsequently respondents felt a NWL should not connect at this junction, with some respondents suggesting the closure of this junction
- § **Cluster I** (18 comments): comments indicated that Ringland Road is not suitable for usage by HGVs and that rat-running is an issue. The junction is also perceived as dangerous and there is a need for signage to stop HGVs turning into Ringland Hills.
- § **Cluster J** (13 comments): respondents indicated that the road (Sir Alfred Munnings Road) is not suitable for the level of traffic, and the single carriageway is not suitable to support the housing developments (Queen’s Hill). An additional exit from the developments was suggested
- § **Cluster K** (19 comments): pollution was noted as an issue, with specific reference to the proximity of St Augustines Catholic Primary School. Congestion and inappropriate HGV movements were also noted

Figure 38 – Public consultation transport issues heat map



6.3.5. **Table 17** provides the top 10 options selected by respondents for the type of option to be explored to address the existing transport issues. There was a clear preference for developing a new road between the NDR (A1270) and A47 in order to tackle the transport issues highlighted in the area.

This option was selected more than three times as much as the next most popular option of improving existing roads. The full consultation report produced by Commonplace for Norfolk County Council can be viewed at **Appendix C**.

Table 17 – Public consultation options to explore

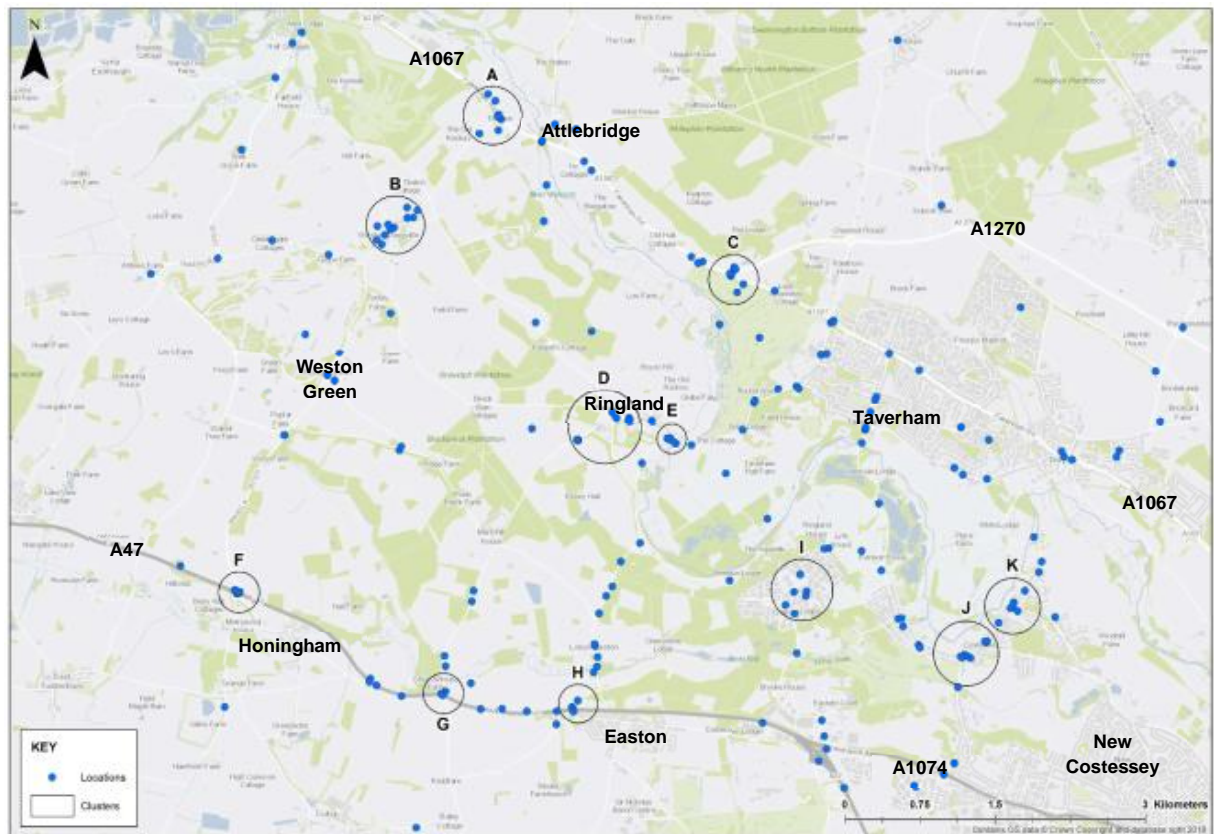
Rank	Option	Frequency
1	New road linking the NDR to the A47	1,492
2	Improving existing roads	473
3	Improving public transport	312
4	Improving cycling routes	299
5	New cycling route linking the NDR to the A47	276
6	Traffic calming on existing routes	206
7	Better walking routes	177
8	New walking route linking the NDR to the A47	136
9	Other	30
10	Do nothing	27

6.3.6. The geographic feedback annotated by respondents within the Commonplace portal also informed a suggested improvement ‘heat map’. This indicates where respondents felt improvements were required and gave them the opportunity to provide suggestions and alternative measures to address their perceived transport issues. **Figure 39** demonstrates where comments were ‘pinned’, and have subsequently been clustered into groups. The following indicates the range of comments within each cluster:

- § **Cluster A** (9 comments): within the Morton on the Hill area there was a contrast of opinion. One respondent felt that a NWL should connect with the A1067 at this location, whereas other respondents were of the opinion that this was too far west to solve the identified issues (particularly rat-running)
- § **Cluster B** (12 comments): issues such as rat-running and congestion were noted at Weston Longville, and as such, many comments were supportive of a link road to bypass the parish
- § **Cluster C** (8 comments): respondents commented that the A1067 / A1270 junction is where a new link road should start, however, comments were received in relation to the potential environmental impact on the River Wensum
- § **Cluster D** (28 comments): comments within this cluster support the construction of a link road to reduce traffic and congestion. Suggestions included greater public transport, pedestrian and cycling options within the Ringland area
- § **Cluster E** (5 comments): comments included within this cluster demonstrated that HGVs are an issue on Ringland Road between Ringland and Taverham

- § **Cluster F** (9 comments): supportive comments for a link road starting at the A47 / B1353 junction, with particular emphasis on the requirement for the new link to be a dual carriageway. Some comments suggested a roundabout or flyover junction to provide the best capacity
- § **Cluster G** (3 comments): comments within this cluster indicated that the A47 / Taverham Road junction should be closed, except for local access
- § **Cluster H** (5 comments): congestion and rat-running during peak hours was noted as an issue at Easton, subsequently support for the construction of a new link road was evident to alleviate these issues
- § **Cluster I** (6 comments): issues at Queen's Hill are related to the volume and flow of traffic. Comments suggested the introduction of traffic signals or upgrading to a roundabout, creating an additional layby for buses, to avoid queueing at the bus stops
- § **Cluster J** (9 comments): comments highlighted that West End / Longwater Lane is too narrow and not suitable for the levels of traffic in this location, subsequently support for a new link road connecting to Costessey was suggested
- § **Cluster K** (7 comments): issues noted at The Street, Costessey, included rat-running and the dangerous environment created from traffic calming measures and parked cars. Support for a new link road to reduce traffic and resulting congestion in residential areas was noted, with concern being raised that the impact of a new link road would be less if it was situated further west

Figure 39 – Public consultation location improvements heat map



KEY STAKEHOLDERS

- 6.3.7. Key stakeholders have been actively engaged in the project throughout 2017 and 2018 via a series of LLG workshops occurring bi-monthly with Parish Council representatives from within the study area. A group of elected Council Members has also provided guidance to the project via bi-monthly MWG meetings. The meetings with both the LLG and MWG have often included other relevant stakeholders as necessary, for example Highways England and their consultants have attended and provided updates on their A47 RIS schemes and modelling work.
- 6.3.8. Key stakeholders were invited to respond to the public consultation, in a formal capacity, in order to understand their position, and views on the necessity of a NWL. A total of 15 written responses were received from public bodies or organisations in direct response to the consultation. A summary of their responses, including their overall position, is detailed in **Table 18**.

Table 18 – Public consultation key stakeholder response summary

Organisation	Position	Summary
Breckland Parish Council	Support	The Council believe a NWL is of key importance, as traffic congestion is having a negative impact on local industry. Furthermore, the council mention how a NWL will remove HGVs from local roads, providing a positive impact to local residents.

Organisation	Position	Summary
Broadland District Council	Support	The Council strongly recognises the benefits a NWL would have for the local community and people visiting the area. The Council also believe a NWL will reduce rat-running through smaller villages, and result in an overall positive outcome.
Easton & Ringland Estates	Oppose	Easton & Ringland Estates expressed concerns in relation to the impact of a NWL on the River Wensum SAC, affecting landscape, ecological and habitat characteristics that passes through Easton and Ringland estates. The organisation suggests that the NWL is built further west to avoid this.
Cringleford Parish Council	Support	The Council have stated a NWL will have a positive impact on the parish and wish to see a new road connecting with the A47 west of Easton, easing traffic congestion for local residents. However, the Council is concerned about the River Wensum SAC, as a conservation site, stating that the protection of wildlife habitats is of utmost importance.
East Winch Parish Council	Support	The Council supports the principle of a NWL, however, they have outlined some concerns, such as the proximity to the city of Norwich. The Council also noted that additional local road improvements are needed, for example improvements to the crossroads at Necton.
Great Yarmouth Borough Council	Support	The Council believe a NWL will have a positive impact on the local economy and wider county, bringing further investment to the City. The Council acknowledges the environmentally sensitive area of the project, but it believes with careful planning and consideration a NWL can be successfully implemented.
Green Party	Oppose	The Green Party expressed opposition due to the location of the scheme and the presence of the River Wensum SAC, believing a NWL would cause adverse harm. The Green Party also believe a NWL would increase carbon emissions surrounding the route and, with the financial cost of such a project, the public should be focussed on more sustainable modes of transport.
New Anglia Local Enterprise Partnership (LEP)	Support	The LEP outlines that the new link will help deliver the economic strategy for Norfolk and Suffolk, will improve connectivity to centres of excellence and will enhance the quality of life for residents in the area.
NNUH	Support	NNUH state that the improved infrastructure will make the hospital more accessible, in particular to residents living in North Norfolk.
Norwich Friends of the Earth	Oppose	Friends of the Earth outlined a number of concerns, including; the location (in regard to the presence of the River Wensum SAC), the reasoning, cost, air quality and the impact on climate change.
Road Haulage Association Ltd (RHA)	Support	The RHA encourages the project as it would reduce journey times, improve air quality and assist in the economic growth of Greater Norwich. Ideally, the RHA would like a dual carriageway solution linking the A47 and A1067. The RHA also requested purpose-built overnight parking facilities for lorries along the proposed link road.
South Norfolk Council	Support	The Council believe the infrastructure initiative supports the growing local economy.

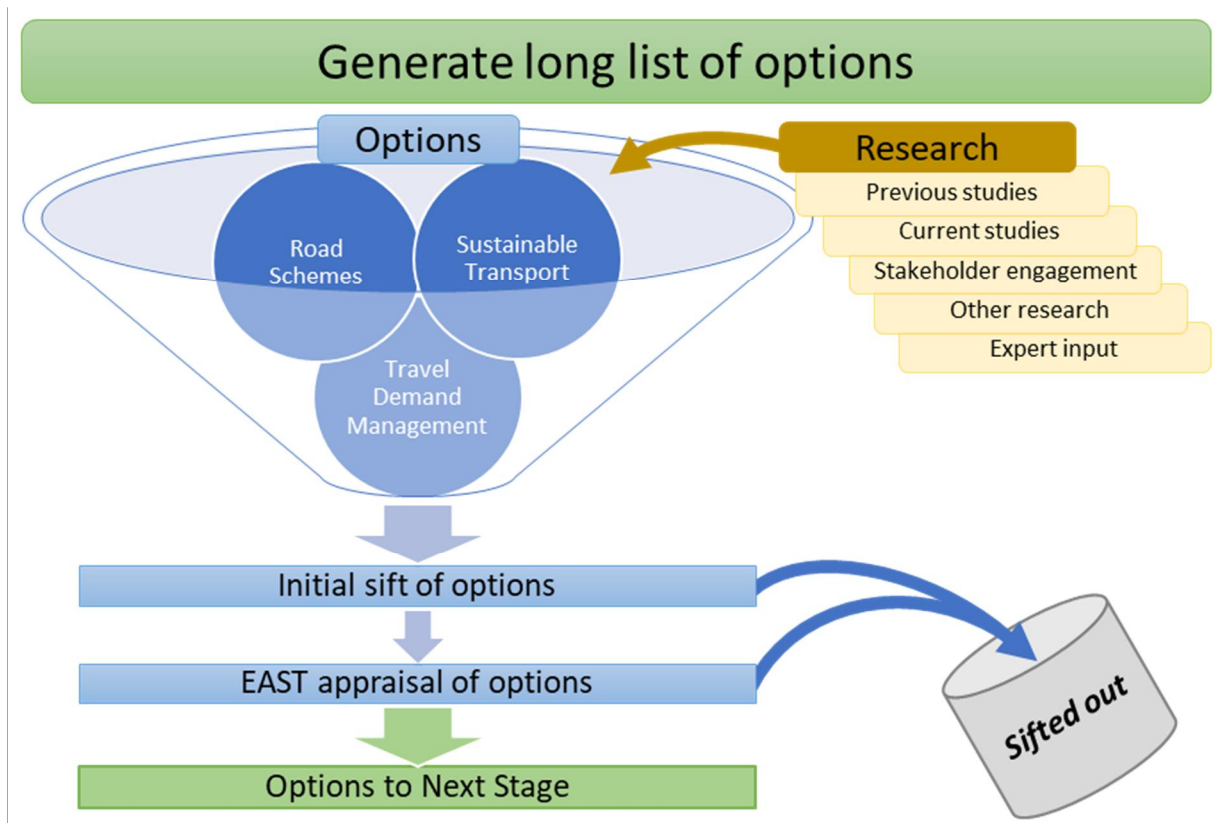
Organisation	Position	Summary
The Friends of North Norfolk	Oppose	The Friends of North Norfolk opposed the principle of a NWL, due to the harm that will be caused to the River Wensum and the overall financial cost of the project.
THQ Hunter	Support	THQ Hunter support the principle of a NWL, however, they required more information, particularly; a map of the proposed route, whether the Great Yarmouth Third River Crossing is on schedule and information on the public consultation.
Wensum Valley Alliance	Oppose	The Wensum Valley Alliance outlined a number of concerns, including; the location (in regard to the presence of the River Wensum SAC), the reasoning, cost, air quality and the impact on climate change.

6.3.9. Consultants acting on behalf of a number of landowners in the central part of the study area also responded to the public consultation highlighting the presence of potentially sensitive ecological receptors within their land extents, and highlighting that new CWS are likely to be designated due to their ecological significance.

6.4. OPTIONS LONG LIST

6.4.1. Given the study requirement to consider interventions across all modes throughout the study area, it was imperative that a broad approach was taken. A wide range of options have been generated, covering a range of travel modes, approaches and scales of option as a potential means of addressing the specific objectives. **Figure 40** illustrates the approach by which options have been identified and sifted.

Figure 40 – Approach to generating options and sifting



6.4.2. The option generation process led to an initial long list of 82 options (listed in **Appendix D**), which encompassed a wide range of possibilities that spanned scale, transport modes and geography. The long list included both infrastructure and non-infrastructure interventions and improvements. A number of categories were created, within which each intervention was placed, as shown in **Table 19**.

Table 19 – Long list categories and number of interventions

Category	Number of interventions
New link highway options	44
Network improvement schemes	8
Demand management	3
Active travel	8
Information	3
Freight	3
Public transport options	12
Do nothing	1
Total	82

- 6.4.3. New link highway options have been developed based upon alignments from previous studies, identified gaps in the network, connections with the A47, engineering constraints and the physical and environmental constraints. Where possible, the alignments aim to avoid these constraints. Network improvement schemes were identified based upon existing network constraints. These options provide an opportunity to tackle congestion and improve reliability through upgraded link and junction capacity schemes.
- 6.4.4. In an effort to tackle demand based issues, a number of demand management, freight and improved information schemes were identified. These schemes seek to address issues related to rat-running, safety, severance and connectivity. Active travel and public transport options were also developed to encourage modal shift and reduce private vehicle trips on the existing road network.

7. SIFTING OF OPTIONS

7.1. INTRODUCTION

7.1.1. This chapter indicates how the long list of potential options were scrutinised and sifted using the DfT's EAST. It describes the EAST process and nested structure, before detailing the outcome of the assessment, including the discarded options that fail to address the specific objectives, or fail against feasibility assessment areas.

7.1.2. This is in line with Step 6 of the Transport Appraisal Process.

Step 6 of the Transport Appraisal Process, involves the following:

- § Undertaking an initial sift of the long list of options using the EAST
- § Processing or discarding options based on the EAST

7.2. APPRAISAL METHODOLOGY

EAST

7.2.1. The 82 options were subjected to the EAST process as is good practice when preparing a Transport Business Case. EAST, the DfT's decision support tool, was adopted as the primary mechanism for evaluating options against a number of assessment areas relevant to the decision-making process. It is intended to quickly summarise and present evidence in a consistent format on how options perform and compare.

7.2.2. The EAST has been designed to assess and compare all types of transport-related options, packages, strategies and plans, across all modes and geographies. Its flexibility allows options to be considered at the early stages of development. Questions are arranged to be consistent with the DfT's Transport Business Case principles, based around the best practice five-case model approach. The five cases and the elements within them that EAST considers are shown in **Table 20**.

Table 20 – Elements of EAST and assessment scoring

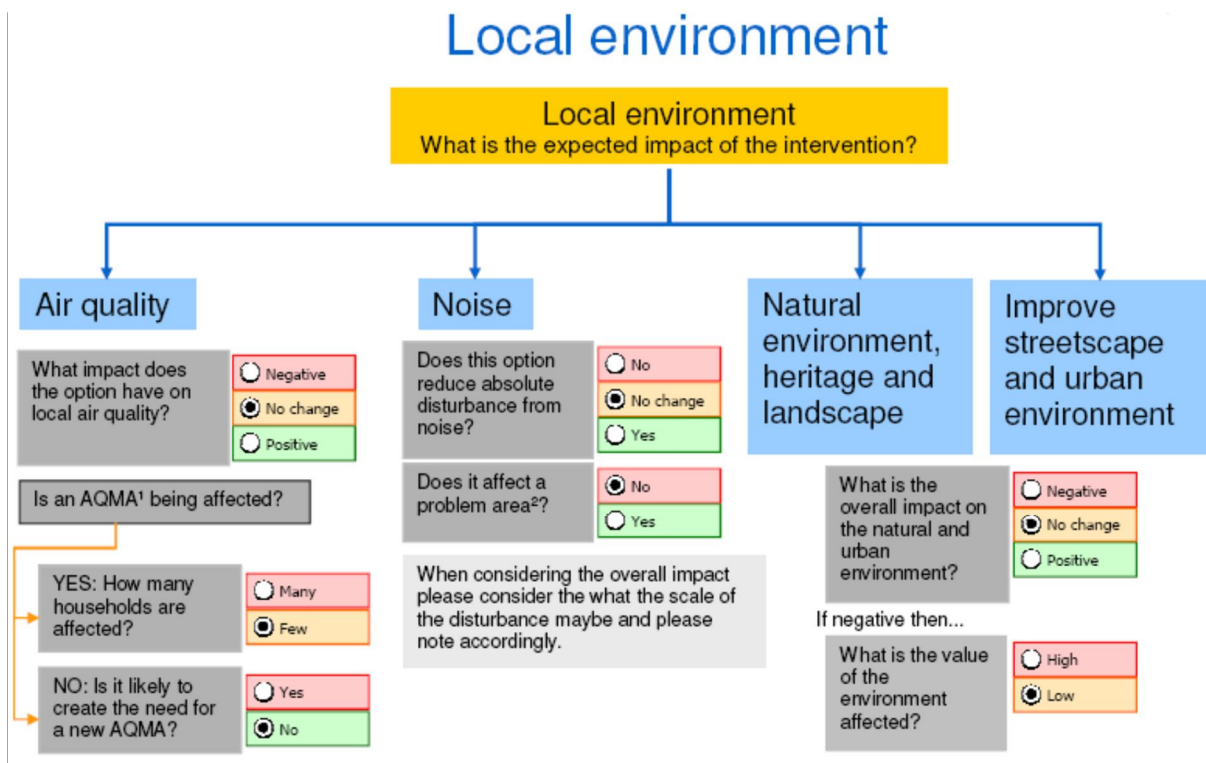
Element	Assessment Area	Scoring
Strategic	§ Scale of impact against specific objectives	1 (small) – 5 (significant)
	§ Fit with High-level objectives	1 (poor) – 5 (excellent)
	§ Degree of consensus over outcomes	1 (little) – 5 (majority)
Economic	§ Economic growth	1 (small) – 5 (significant)
	§ Socio-distributional impacts and the regions	1 (small) – 5 (significant)
	§ Local environment	1 (small) – 5 (significant)
	§ Well-being	1 (small) – 5 (significant)
	§ Expected Value for Money (VfM)	1 (small) – 5 (significant)
	§ Environmental criteria	1 (very high; >4) – 5 (poor; <1) 1 (large adverse) – 7 (large beneficial)
Managerial	§ Implementation timetable (years)	Short 1-2; Medium 3-8; Long 8+
	§ Public acceptability	1 (low) – 5 (high)
	§ Practical feasibility	1 (low) – 5 (high)

Element	Assessment Area	Scoring
	<ul style="list-style-type: none"> § Quality of supporting evidence § Key uncertainties 	1 (low) – 5 (high) 1 (low) – 5 (high) Qualitative
Financial	<ul style="list-style-type: none"> § Affordability § Capital cost (£m) § Overall cost risk 	1 (not affordable) – 5 (affordable) 1 (£0) – 9 (£250-£500) 1 (high risk) – 5 (low risk)
Commercial	<ul style="list-style-type: none"> § Flexibility of options § Funding source § Income generated 	1 (static) – 5 (dynamic) Qualitative Yes / No

ENVIRONMENTAL CRITERIA

- 7.2.3. Due to the highly sensitive nature of the proposed study in terms of environmental considerations (see **Section 2.5**), an additional environmental appraisal has been undertaken to support the EAST assessment. The EAST matrix for each of the options is included within **Appendix E**, whilst the environmental appraisal is included within **Appendix F**.
- 7.2.4. The EAST challenges environmental matters within the Economic Case assessment, on the four parameters of air quality, noise, natural environment and streetscape, as shown in **Figure 41**. The EAST promotes an assessment of options to determine primarily whether they result in a negative impact, no change or a positive impact, which therefore limits the extent to which the assessment can differentiate between the relative environmental impacts of different options.

Figure 41 – Local environment guidance (default button selection) within the EAST



Source: *Early Assessment and Sifting Tool (EAST) Spreadsheet (Department for Transport)*

- 7.2.5. Given that any new highway construction across the River Wensum is likely to have negative impacts upon an environment of high value, there would be virtually no distinction between many options from an environmental perspective using the EAST methodology alone, as the categories are quite coarse and some include more than one topic which may lead to misleading results. Therefore, the EAST methodology has been supplemented and expanded to include additional environmental topics with the application of a scoring system that has allowed greater differentiation between options.
- 7.2.6. Each of the 82 options have been considered using a seven-point scale which is consistent with the DfT's WebTAG approach at later stages in the assessment process, and in other aspects of the Strategic Outline Business Case (SOBC) stage. The options appraisal has also expanded to consider a total of seven environmental topic areas which is consistent with later stages of the business case process and broadly compatible with the topic areas within Volume 11 of the Design Manual for Roads and Bridges (DMRB).
- 7.2.7. The additional environmental topics areas assessed and the seven-point scale are shown in **Table 21**.

Table 21 – Environmental assessment topics and seven-point scale

Additional environmental topic areas	Seven-point scale
Air quality	1 – Large adverse
Noise	2 – Moderate adverse
Greenhouse gases	3 – Slight adverse
Landscape / townscape	4 – Neutral
Biodiversity	5 – Slight beneficial
Cultural heritage	6 – Moderate beneficial
Water environment	7 – Large beneficial

7.2.8. Environmental receptors have been identified under each topic in order to make an assessment against each topic heading. In the interests of proportionality, and taking into account the broad nature of the corridor options, receptors were limited to high value receptors, such as;

- § International, European and national designations
- § Local communities
- § Areas that currently exceed environmental limits (such as AQMAs)
- § Important environmental resources (such as listed buildings and main rivers)

7.2.9. A high-level desk-based assessment of potential impacts was undertaken for each environmental topic, based primarily on the presence or absence of receptors within, or in proximity to, each corridor or option. Given the broad nature of the options and level of detail available at this stage, this was considered a proportionate assessment of these options.

7.2.10. For each option, an overall score and associated key environmental risks and benefits / opportunities were identified, assuming that a high degree of surface water / pollution control and mitigation using best practice measures are included within the scheme design. For example, it has been assumed that highway runoff would be managed through a Sustainable Drainage System (SuDS), designed in accordance with Construction Industry Research and Information Association (CIRIA) guidance, and discharged at the ‘greenfield’ runoff rate which is the Environment Agency’s basic requirement for new infrastructure with potential to increase flood risk. However, less routine mitigation measures, such as the use of low noise surfaces, have not been assumed within the assessments.

7.2.11. The broad findings are discussed within the economic case – **Section 7.5**, and have been split into a discussion of the effects on the option categories outlined previously in **Table 19**.

7.3. OPTION PERFORMANCE

7.3.1. The following sections set out how the options performed against each assessment area within the five-case model.

- § **Section 7.4** – Strategic case assessment
- § **Section 7.5** – Economic case assessment

§ **Section 7.6** – Managerial case assessment

§ **Section 7.7** – Financial case assessment

§ **Section 7.8** – Commercial case assessment

7.4. STRATEGIC CASE ASSESSMENT

7.4.1. The strategic case determines if a project is needed, either now or in the future. This element of the sifting process allows the appraisal of scheme options against a set of identified problems. Objectives addressing the identified issues, developed from both local and strategic levels, are used in order to measure the likely scale of success of the various options. In order to understand the likely performance of the options against each objective, a scale considering the ability of the option to address the objective has been utilised, as shown in **Table 22**.

Table 22 – Scale of option performance against objectives

Score	Description
1	Unlikely to address the objective and may result in a negative impact
2	Slightly / partially address the objective having a modest overall impact
3	Moderately / somewhat addresses the objective having a reasonably significant impact
4	Significantly / largely addresses the objective
5	Fully addresses the objective

ASSESSMENT AGAINST SPECIFIC OBJECTIVES

Objective 1:

Reduce congestion, delay and improve journey time reliability on routes through the study area.

Desirable outcomes:

Decreased peak hour journey time; reduction in delay for bus users.

7.4.2. The new link highway options would be expected to significantly address this objective as a single carriageway option or fully address the objective as a dual carriageway option. These options would be expected to make a significant contribution towards the reduction of congestion and delay and improved journey time reliability. Both single carriageway and dual carriageway options would be expected to bring extra capacity to the transport network and provide more efficient routing, while directly enabling economic growth, including unlocking the potential housing and job growth.

7.4.3. Freight and public transport options are likely to moderately / significantly address this objective, as options within these categories contribute to a reduction in vehicle trips on the network. With freight options, increased knowledge of the network and guidance, in terms of network availability for different vehicle and journey types, would help alleviate HGV rat-running, whilst improved public transport options can have a more significant impact in terms of modal shift.

7.4.4. Network improvement schemes and options to improve information are generally expected to moderately address this scheme objective. Improved information options allow improved decision-making by individuals subsequently reducing localised rat-running. Improvements to public transport information may encourage modal shift resulting in a reduction of private vehicle trips, whilst network

improvement schemes improve the network efficiency. However, the impact of both these types of options is limited as they do not directly address capacity issues in a robust manner.

- 7.4.5. Demand management and active travel options were judged to have a minimal impact on congestion, delay and journey reliability therefore only slightly addressing this objective. Whilst active travel would help to encourage modal shift, the impact would be limited due to the rural nature of the study area and the distances travelled. Demand management would alleviate congestion and traffic conditions achieving benefits on a localised basis, but would likely transfer trips elsewhere on the network.

Objective 2:

Improve network resilience and efficiency of the strategic and local transport network.

Desirable outcomes:

Reduced journey times on the road network; reduced occurrence of severe congestion.

- 7.4.6. Improved network resilience would be best delivered through the provision of additional network capacity in the form of alternative route options. Therefore, the new link highway options are deemed to significantly address this objective as a single carriageway option or fully address the objective as a dual carriageway option. These options would increase capacity, improve route options and improve connectivity across the study area.
- 7.4.7. Improved information options, including updating the digital road map (Option 53), would significantly address this objective as they are considered to have a significantly beneficial impact in terms of network resilience by providing drivers with improved routing information. However, in comparison, public transport information options would only slightly address this objective. Network improvement schemes would be expected to moderately address this objective, although they do not directly address capacity issues in a robust manner.
- 7.4.8. Demand management and active travel options have little scope in terms of improving network capacity, routing or traffic flow and were therefore considered to have little impact on network resilience. As such, these options only slightly address this objective. Freight and public transport options would have between a minor and moderate beneficial impact on addressing network resilience and efficiency.

Objective 3:

Reduce the number of Heavy Goods Vehicles using minor roads.

Desirable outcomes:

Reduced HGV usage on minor road network impacting journey times and safety, locally.

- 7.4.9. The provision of a high-standard new link highway between the A47 and the A1067 / A1270 is expected to significantly reduce HGV movements currently seen on the local road network, thus significantly / fully addressing this scheme objective. A safer and quicker routing option will decrease the attractiveness of minor road routes for commercial purposes. This would also be the case for network improvement schemes, which would reduce journey times and increase the attractiveness of existing routes.
- 7.4.10. Freight options considered within the long list, would be expected to significantly address this objective of reducing the numbers of HGVs. Option 68 (lorry management strategy) and Option 67 (the provision of improved freight route intelligence) would focus directly on the removal of HGVs from local roads, while Option 66 (the provision of a sustainable urban distribution centre) would

focus on placing freight on smaller, more sustainable, delivery fleet with enhanced routing to reduce overall movements and minimise empty running.

- 7.4.11. Demand management, public transport and active travel options are unlikely to address, or only slightly address this objective, and are likely to have only a minimal impact on reducing HGV movements on minor roads due to the lack of impact upon HGV route choice in relation to the local road network.

Objective 4:

Make the transport network safer for all users (including Non-Motorised Users).

Desirable outcomes:

Reduced accidents and severity of injury.

- 7.4.12. The new link highway options and freight options would significantly address this objective on safety by drawing additional traffic and HGV movements away from local roads, reducing both vehicular and pedestrian-vehicle conflict. The provision of a high-standard new link would lead to a reduction in the accident rate and severity on the overall road network due to higher standard links. Network improvement schemes would also, in general, significantly address this objective by providing improvements for all forms of transport with new crossings, improved links and junctions.

- 7.4.13. Demand management options would reduce the frequency and severity of accidents, especially in the case of reduced speed limits (Option 42), however the potential ability of these options to address this objective is limited, as trips would be transferred elsewhere on the network. Public transport options, while improving conditions for users would produce only a limited opportunity to address this objective.

Objective 5:

Encourage modal shift to more sustainable modes of transport.

Desirable outcomes:

Increased use of non-private vehicular transport including public and non-motorised transport modes.

- 7.4.14. As would be expected, the provision of both public transport and active transport options would significantly to fully address this objective. The level of impact is dependent on the individual scheme, as some would see a more pronounced modal shift than others. Information options, relating to public transport systems, also significantly address this objective, as they provide increased choice and improve public perceptions of public transport.
- 7.4.15. While new link highway options and network improvement schemes are not expected to directly encourage modal shift, indirectly the removal of private vehicle trips from the local road network will improve the environment for active travel and increase connectivity with improved journey times and accessibility for buses, thus slightly to moderately addressing this objective.
- 7.4.16. Demand management schemes will reduce trips on rural roads and in these locations, encourage active travel as an alternative to private vehicles. However, with the reassignment of private vehicles to other parts of the network the ability to address the objective is limited. Freight options are expected to have little direct impact in terms of encouraging modal shift, but indirectly will provide an improved environment for active travel, therefore slightly addressing this objective.

Objective 6:

Provide traffic relief (and reduce noise & emissions) within residential areas.

Desirable outcomes:

Reduction of trips, and associated noise and emissions, through reassignment of trips.

- 7.4.17. New link highway options are expected to significantly address this objective in terms of providing traffic relief and subsequent reduction in noise and emissions within residential areas. The ability of network improvement schemes to deliver traffic relief and a reduction in noise and emissions is limited to the location of the individual option and in particular, to what extent the options are routed through existing urbanised / residential areas. Information options, especially updating the digital road map (Option 53), and freight options would have between a moderate and significant opportunity to address this objective by providing routing options for drivers encouraging the use of non-residential routes.
- 7.4.18. Active travel options and public transport options would only address the objective to a slight to moderate degree, by offering motorists an alternative option to the car and encouraging modal shift. However, any impact would be limited by the potential numbers who would shift mode. Demand management options would provide a robust option for removing traffic from specific locations, however traffic would simply be reassigned elsewhere on the network increasing traffic, noise and emissions in other locations, resulting in only a slight ability to address this objective.

Objective 7:

Enable improved accessibility to existing and new housing and employment sites.

Desirable outcomes:

Improved access to existing and new housing and employment locations.

- 7.4.19. Dependent on the route and location, it is envisaged that new link highway options will significantly address this objective, in terms of improved access to housing and employment. Some options, typically those further west, are located further away from future housing and employment zones, and would therefore produce a more moderate opportunity to address this objective. Freight options would also significantly address this objective by improving access to employment zones, reducing HGV movements on residential roads subsequently improving access for drivers and NMUs to residential areas. Improved information options were considered to provide a slight to moderate opportunity to address this objective.
- 7.4.20. Public transport options, which focus on improved services, and network improvement schemes will only slightly to moderately address this objective producing only a slight to moderate beneficial impact on the ability of patrons and road users to access existing and new residential and employment sites. Demand management options would be unlikely to address this objective and may result in a negative impact.

Objective 8:

Improve emergency response times.

Desirable outcomes:

Reduced congestion and improved overall journey times on the road network.

- 7.4.21. New link highway options are likely to significantly or in some cases fully address this objective. The provision of a new high-standard link, which can be utilised by emergency vehicles, and through the reduction of traffic on existing routes, would significantly improve emergency response times in the west of Norwich. Network improvement schemes and freight options would produce a moderate

opportunity to address this objective due to the associated improvement in journey times, and to some extent capacity, and through the reduction of freight movements on the network.

- 7.4.22. Active travel, improved information and public transport options are likely to have a limited ability to address the objective of improving emergency vehicle response times. While these options have the potential to remove private vehicles from the road network by encouraging modal shift, they are limited in terms of the number of potential users.
- 7.4.23. Demand management options are unlikely to address this objective and may produce a negative impact, by potentially reducing the number of routes available to vehicle users resulting in increased congestion in other locations.

Objective 9:

Improve access to green space.

Desirable outcomes:

Increased and improved access to green spaces including the River Wensum Valley.

- 7.4.24. New link highway options are likely to have between a moderate to significant ability to address this objective, improving access to green spaces, such as the Norfolk Broads. A new link would also remove traffic from the existing network, which combined with additional supplementary measures, may improve access to green spaces in the River Wensum Valley. Improved information, whilst not providing additional routes of services, will also improve access to green space by increasing awareness, therefore moderately addressing this objective.
- 7.4.25. Network improvement schemes will provide additional capacity and relief to the existing network; however, they fail to directly provide new additional routes, subsequently limiting the potential to connect people to green spaces. Therefore, these options only provide a moderate ability to address this objective. Demand management options are limited in their ability to address this objective, and may in some cases, such as directional traffic management schemes (Option 43), have a small negative impact by increasing journey length and reducing access to green space.
- 7.4.26. While freight options are likely to remove trips from the network, there is likely to be little benefit or impact in terms of improved access to green space.

Objective 10:

Not affect the ecological integrity of the River Wensum SAC.

Desirable outcomes:

Does not materially impact the ecological integrity of the River Wensum SAC.

- 7.4.27. New link highway options are considered to be potentially environmentally negative in relation to the River Wensum SAC. Following discussions with the Environment Agency during 2017 and a study¹⁵ of proposed mitigation measures, it is anticipated that a solution that does not materially impact the ecological integrity of the River Wensum SAC is achievable. Network improvement schemes would moderately address this objective.

¹⁵ Norwich Western Link Technical Report (WSP, October 2017)

7.4.28. Active travel and demand management options would be expected to significantly address this objective, by encouraging modal shift and impacting upon route choice. Improved information options and some public transport options, such as a light rail (Option 59), would moderately address this objective. However, public transport options which do not directly impede on the River Wensum, and freight options, would significantly contribute to retaining the ecological integrity of the River Wensum SAC, therefore largely addressing this objective.

Objective 11:

Contribute to the improved health and well-being of local residents.

Desirable outcomes:

Provides a contribution directly or indirectly to the well-being of local residents.

7.4.29. New link highways options would likely have a moderate ability to address this objective. It is assumed that there would be an improvement in access to a range of health care facilities, while an expected reduction in emissions in residential areas would reduce associated health concerns.

7.4.30. All other option categories are expected to have a significant to major ability to address this objective, in relation to improved health and well-being of local residents, with active travel and public transport options scoring highly.

Objective 12:

Improve connectivity and accessibility to Norwich International Airport, Norwich Research Park and Norfolk & Norwich University Hospital

Desirable outcomes:

Provide greater accessibility to Norwich International Airport, Norwich Research Park and NNUH.

7.4.31. Some of the public transport options are expected to significantly address this objective. The proposed new bus route connecting Dereham, Hellesdon and Norwich International Airport (Option 74) specifically tackles this objective and scores highly. Other public transport options would have slightly less impact and are deemed as only slightly to moderately addressing this objective. The ability of the new link highway options to address this option was dependant on the location of the route. While some are deemed to address the option to a significant level, others perform less well. This tends to be where routes were located further to the west of the study area, where it is assumed a lower impact would be achieved than for options located more centrally or to the east.

7.4.32. Network improvement schemes are not envisaged to have as significant an effect as new highway links and would be assumed to moderately address this objective. Demand management options would be unlikely to address this objective and may result in a negative impact, as these options reduce existing accessibility and connectivity through reduced speeds and route options.

ASSESSMENT AGAINST HIGH LEVEL OBJECTIVES

Objective 1:

Support sustainable growth

Desirable outcomes:

Provides improved access to future housing and additional capacity on the network to cope with forecast demands.

7.4.33. Network improvement schemes would be expected to perform relatively well through improved journey times and reliability on the network reducing congestion and adding additional capacity for future development.

- 7.4.34. Demand management does not perform well in terms of supporting sustainable housing growth, and may even negatively impact housing growth within the western quadrant through reassignment of trips on to already congested networks.
- 7.4.35. Active travel and public transport options contribute to supporting sustainable housing in the western quadrant by providing alternative modal options to potential new housing which may encourage housing through increased travel options and improved environment.
- 7.4.36. Improved Information and freight options provide slight to moderate impact in terms of support of sustainable housing in the western quadrant though improved routing and information.

The improved connectivity and accessibility of the New Highway link options will significantly address the objective through new routeing and drawing traffic away from existing routes while improving accessibility and connectivity for new housing. In general, options located to west of the study area do not provide as significant a role as those options located in the central and eastern parts of the study.

Objective 2:

Improve the quality of life for local communities.

Desirable outcomes:

Increased accessibility and integration of the transport network on a strategic scale.

- 7.4.37. New link highway options and network improvement schemes generally performed well in relation to the potential to address the objective to improve the quality of life for local communities. As a result of increased access to services, goods and employment opportunities based on reduced journey time and improved routing the proposed new highway options performed well. While some health concerns and severance issues do exist, overall there was deemed to be a significant beneficial impact on the quality of life for residents.
- 7.4.38. Active travel, improved information (particularly for public transport) and public transport options generally performed well due to the associated health benefits from increased activity, reduced emissions and improved access to goods services and employment.
- 7.4.39. Freight options provided a moderate beneficial impact due to the reduction in severance of communities with the removal of HGVs from local roads, this improves air quality and reduces the severity of vehicular to vehicular and vehicle to pedestrian accidents. The lowest performing category in relation to the improvement of life for local communities was demand management. While some benefits would be expected in localised areas, existing issues it is thought would simply transfer into dis-benefits in other communities and it was considered that these options would only slightly address the objective.

Objective 3:

Support economic growth.

Desirable outcomes:

Provides infrastructure and support to economy to help encourage future investment.

- 7.4.40. New link highway options and network improvement schemes significantly to fully address this objective, due to the strong link between improved access, connectivity, reliability, resilience and reduced congestion and journey times and improved economic performance. Options to the west of the study area did not perform as well as options located in the east and central locations which provide more direct routing to industry.

- 7.4.41. Improved information options would support economic growth by delivering efficiency to the transport network and allowing improved decision-making. Freight options performed well when assessed against this objective due to the associated benefits in terms of industry stemming from improved efficiency, reduced journey times and more efficient decision-making, leading to improved productivity.
- 7.4.42. Public transport options performed relatively well and would be assumed to moderately to significantly address this objective. This is due to improved access, connectivity journey times from the perceived removal of trips from private vehicles transferring to public transport alternatives. Active travel options contribute a slight beneficial impact to increased productivity and improved health. Demand management schemes did not perform well as there is a general lack of improvement in terms of economic growth, furthermore some negative impacts may occur for local business and private individuals.

Objective 4:

Promote an improved environment

Desirable outcomes:

Limits impacts on the natural environment of future increased network demand.

- 7.4.43. New highway link options generally produce a moderate level of performance in terms of protection and enhancement of the natural environment. The Norfolk County Council Norwich Western Link Technical Report (2017) investigated potential mitigation options. The bridge options selected for further consideration allow relatively long span lengths, whilst reducing the number of piers within the flood plain of the River Wensum. The provision of a viaduct type structure incorporates a clear span over the river and its banks, and both the Environment Agency and Natural England have been supportive of the progress that had been made with the potential options, having regard to previously registered concerns and are willing to continue to consider proposals and advise on impacts and mitigation should further work be undertaken.
- 7.4.44. Network improvement schemes will have only a limited impact on the provision of, and protection of, the natural environment. Where land is required these options fail to address the objective altogether and possibly may produce some negative impacts, however the specific objectives include the reduction of HGV and private vehicle rat-running through environmentally sensitive rural areas.
- 7.4.45. Active travel and public transport options perform relatively well through the reduction of emissions associated with modal shift. Freight options would significantly address the objective through the removal of trips through sensitive areas.
- 7.4.46. Improved information options would be expected to significantly address the objective to support the environment, associated with improved routeing and choice for users and through the ability to inform decisions in order to produce less impact on specific areas. There is also a lack of infrastructure associated with the improved information options.

Objective 5:

Improve strategic connectivity with the national road network.

Desirable outcomes:

Improves and increases access to and connectivity of the national road network.

- 7.4.47. New highway link options located within the central and eastern sections of the study area generally provide the most direct access between the A47 and the A1270, significantly improving the

connectivity with the SRN. These options would provide the most the beneficial impact overall significantly addressing the objective, followed by options located further west.

- 7.4.48. Network improvement schemes and public transport options were deemed to provide moderately address the objective, while other option categories would produce a small impact and only slightly the address the objective.

7.5. ECONOMIC CASE ASSESSMENT

- 7.5.1. In line with the Treasury’s Green Book, *Appraisal and Evaluation in Central Government*, the EAST aims to identify, at a high level, the nature and extent of all the economic, environmental and social impacts of options.

ECONOMIC GROWTH

- 7.5.2. The economic growth criteria have been derived from the specific economic and transport issues of the local and wider transport network. The criteria cover the connections to key locations within the study area, as well as the network criteria in terms of resilience, reliability and capacity.

Economic growth criteria:

- § Connection to the airport
- § Connection to new or existing housing
- § Connection to Norwich Research Park
- § Connection to Norfolk Broads
- § Connection to FEZ
- § Journey time improvements
- § Network resilience
- § Network reliability
- § Network capacity

Measures:

- § Improved access to the various destinations for all modes
- § Improved journey times on the local and wider network
- § Improved resilience of the transport network
- § Improved journey time reliability
- § Provision of sufficient network capacity for future development and economic growth

- 7.5.3. New link highway options perform well overall, and would be assumed to have either a significantly or largely address the economic growth criteria depending on the individual route and capacity of the link. The proposed freight options also performed well as they generally provide increased accessibility to the economic areas of interest while improving network reliability.
- 7.5.4. Active travel would be expected to provide some positive impact to economic growth, but, should be considered as part of a package of measures to provide a greater benefit. The remaining option categories (improved information, network improvement schemes and public transport) would, in general, produce a moderate beneficial impact in terms of addressing the various economic growth criteria. However, in the case of individual options some perform significantly better than others.

WELLBEING

- 7.5.5. Wellbeing considers many criteria, covering the physical wellbeing of individuals (in terms of health and safety), and the personal wellbeing (in relation to the accessibility of the individual to goods, services and other individuals).

Wellbeing criteria:

- § Severance
- § Terrorism
- § Crime
- § Reduced KSI
- § Enabling people to enjoy access to a range of goods and services, people and places

Measures:

- § Reduced severance for pedestrians and cyclists
- § Decreased vulnerability to terrorism
- § Potential to reduce crime
- § Ability to improve safety
- § Improved access

- 7.5.6. New highway link options generally performed well through improved access to goods and services, and through the reduction in the number and severity of accidents in relation to the high-standard links and junctions associated with the options. Demand management, active travel, information, freight and public transport options generally performed to a moderate degree in terms of addressing the wellbeing criteria, due to the mixed overall performance. Demand management options performed poorly against a number of categories including severance, where reassignment of trips would increase severance on the network and at individual locations.
- 7.5.7. Due to the location of the proposed options, it was expected that there would be a very limited impact in terms of terrorism and all options were deemed to perform accordingly.

SOCIO-DISTRIBUTIONAL IMPACTS

- 7.5.8. Social and distributional impacts consider the effects of options on severance, accessibility, security, accidents, user benefits and personal affordability, considering vulnerable groups such as the elderly, disabled and children. The aim of the social distribution element of the EAST is to identify how impacts of the proposed options are distributed across society, both in terms of location within a specific region, and in relation to various groups within society. The impacts of the scheme options in relation to these criteria can be both negative and positive.

Social-distributional impact:

- § Reduced severance
- § Reduced accidents
- § Benefits for vulnerable groups
- § Regeneration across vulnerable areas
- § Re-balancing of wealth across areas

Measures:

- § The socio-distributional assessment follows a similar scoring methodology as other criterion:
1 (significantly negative impact) to;
5 (significantly positive impact)

- 7.5.9. New link highways options were found to perform with a range of performance from slight to significant, dependent on location. In general, they provided improved accessibility for groups with access to a car, but performed less well in terms of groups with no access to car. New links would reduce severance related to rat-running, improving conditions for NMUs, but may increase severance for those impacted by the individual route. Reduced accidents would be expected due to the higher standard links. These options provide limited benefit for elderly, disabled and low-income groups and children in general. Improved access to businesses would help to encourage employment and address perceived economic imbalances.
- 7.5.10. Network improvement schemes generally produced a moderate performance with improved severance associated with improved junctions. However, increased severance occurs where there is upgrading to dual carriageway from existing single lane links. Public transport option also performed

well – providing positive benefits against all criteria, with the exception of rebalancing of wealth, where no impact was considered the likely outcome. The active travel options would produce an overall neutral / moderate benefit with high level of performance considered regarding severance and accidents but a weaker performance in relation to vulnerable groups such as the elderly.

- 7.5.11. Demand management options were considered to provide a neutral to slight benefit, with beneficial impacts in terms of reduced noise air quality severance locally, but more negative impacts occurring on the network.

ENVIRONMENTAL CRITERIA

Air quality

- 7.5.12. Following the route appraisal, the new highway link options presented would largely result in a moderate adverse impact upon air quality, although the widening of the inner ring road, which is within the Central Norwich AQMA, is considered to lead to large adverse impacts.
- 7.5.13. Although the new highway link infrastructure would be located in close proximity to isolated and small numbers of residential dwellings, it is unlikely that the offline routes will lead to a breach of the national air quality objectives. Apart from the widening of the inner ring road, all the new highway link options are not expected to lead to a deterioration of air quality. However, the extent to which there would be a significant improvement in air quality due to a fall in traffic could only be determined through detailed dispersion modelling using traffic data. Hence the assessment has not assumed that this would be the case. New public transport options, such as bus orbital and light rail services are likely to lead to a slight beneficial impact on air quality due to the potential improvement resulting from modal shift away from private car use.
- 7.5.14. Several of the online options are road improvements which could lead to reduced congestion along the routes. Although reducing congestion could reduce localised air pollution, more vehicles will be passing along the route and in the absence of detailed design information and traffic data, the impacts on air quality cannot be further categorised at this stage. Therefore, at this early assessment stage, the impacts are assessed to be no greater than slightly adverse. All other online options, which will not affect current traffic flow, are expected to have a neutral impact on air quality.

Noise

- 7.5.15. The assessment has concluded that the new highway link options would result in a no greater than moderate adverse impact upon noise levels. The new highway link options, would require the construction of new road infrastructure which would run through rural areas. These options would be in close proximity to some isolated dwellings, thus introducing a new source of traffic noise to the rural area. However, no option will pass adjacent to a large number of properties and any new highway link option is likely to have a corresponding decrease in traffic elsewhere in the study area, and hence a traffic noise reduction adjacent to these routes. Other major infrastructure public transport options involve the development of offline busways to increase public transport provision. These options are likely to lead to a shift in noise levels away from the original route to the new busway leading to new noise sources. Therefore, as this is a new noise source in the area, the potential impact is likely to be moderate adverse.
- 7.5.16. A large proportion of the other non-new highway link options will not require additional infrastructure and are not expected to increase or decrease traffic flows or congestion to the extent that the change in traffic noise would be noticeable. Therefore, NIAs and nearby noise sensitive receptors

are unlikely to be significantly affected and the effects upon noise levels are considered to be neutral. However, some of the proposed demand management options will involve increased bus frequencies on existing bus routes. This potential increase in traffic noise is unlikely to lead to additional traffic flows that exceed the DMRB threshold for assessment (a 10% change in HGV flow) and therefore effects upon noise have been largely concluded as neutral.

Greenhouse gases

- 7.5.17. Following the option assessment, the new highway link options are expected to alter the current flow of traffic to the west of Norwich. At this stage, it is unknown whether this will lead to any significant changes in congestion and average speeds. None of the new highway link options include any new development; therefore, any additional traffic is unlikely to be significant and consequently would result in a no greater than slight adverse impact upon greenhouse gas concentrations. Moreover, new public transport options in the form of bus orbital and light rail services are likely to lead to a slight beneficial impact on greenhouse gas emissions due to the modal shift from private car use to public transport.
- 7.5.18. Several of the network improvement schemes, could lead to reduced congestion due to the road improvements. Although reducing congestion could reduce localised greenhouse gas concentrations, there is also the potential for this to result in an increase in vehicle volumes. Therefore, in the absence of detailed design information and traffic data, the impacts on greenhouse gas concentrations are assessed at this early stage to result in a no greater than slight adverse effect. Where an option is unlikely to significantly affect current traffic flow the option is expected to have a neutral impact on greenhouse gases.

Landscape / townscape

- 7.5.19. The assessment of landscape / townscape effects has been undertaken for each option as appropriate to its location. For example, a new highway link to the west of Norwich would require a landscape assessment and, as no townscape features are present, this is left blank within the appraisal spreadsheet. Those urban options, such as widening of the inner ring road, have undergone a townscape appraisal only. Where both landscape and townscape issues are present, the most appropriate has been chosen using professional judgement as to which will be most influenced. This ensures that two scores are not provided and an option inappropriately penalised or rewarded.

Landscape

- 7.5.20. The majority of the options fall within the National Character Area (NCA) 78: Central North Norfolk, which is characterised by a gently undulating rural landscape where arable land is enclosed by winding lanes and hedgerows interspersed with woodland, heath and river valleys. The land uses of the new highway link options are classified as predominately arable, grassland and woodland with smaller areas of rough grazing and residential development. These classifications are defined by data taken from the digital land utilisation survey. The land through which these new highway link options will pass, is largely rural and therefore there will be some loss of woodland, agricultural land, field boundaries and hedgerows. Within the surrounding area of the proposed options there are a number of visually sensitive receptors which will include: small settlement areas and scattered dwellings, non-residential buildings such as schools, Listed Buildings, and public access areas.
- 7.5.21. Following the route appraisal, one option (Option 13), which will be running through predominately rural land, is expected to result in a large adverse impact upon landscape. This is due to the

significant loss of agricultural land, hedgerows and loss of recreational grounds. Other new highway link options are likely to result in a no greater than a moderate adverse impact upon landscape receptors, some loss of woodland, agricultural land, field boundaries and hedgerows common to all new highway link options. Several of the options cut across the River Wensum and River Tud which is a moderately sensitive landscape due to its recreational value and scenic character. The rail public transport options are also likely to have significant effects on landscape character and views, as the route is currently well concealed with screening vegetation and the options may lead to clearance of vegetation and disuse of a public right of way and part of a National Cycleway Route.

- 7.5.22. Several of the options are network improvement schemes and will not require additional infrastructure and therefore are not expected to exceed a slight adverse impact upon the landscape with most options resulting in a neutral impact. Amendments to tolled routes, highway widening, junction and crossing improvement options are expected to lead to a slight adverse impact upon landscape in the absence of further detail on the improvements and locations of these options. Other demand management, active travel, information and freight options that don't include improvements or new cycleways or bus routes, are likely to lead to a neutral effect on landscape as they are not expected to lead to any significant changes to landscape character or lead to deterioration of the existing view.

Townscape

- 7.5.23. The closest large settlement to the study area is Norwich itself, however the majority of the options are routed through a relatively rural landscape with small settlements and isolated dwellings. Therefore, the baseline conditions for townscape as an environmental constraint are likely to be negligible. Some of the options include improvements to the existing road and bus routes, where these have impacts on the intensification of highway infrastructure this can lead to adverse effects on townscape. However, in most cases the majority of the impacts will be on the landscape rather than townscape and therefore impacts will be negligible.
- 7.5.24. The new highway link options are likely to lead to a negligible effect on Townscape receptors as they are located in the more rural area west of Norwich. The public transport options that involve new railway lines and bus lanes may lead to an adverse impact on townscape as these will involve new routes and may increase congestion and crowdedness in the city centre.
- 7.5.25. Options 45 and 56 require widening of major roads (inner ring road and outer ring road) and therefore they will lead to a moderate adverse impact on townscape character and views from properties along the road boundary. This will be due to loss of vegetation, footway narrowing and intensification of the highway infrastructure such as additional signage, lighting and further hard surfaces.

Historic environment

- 7.5.26. Within the study area are a number of statutorily designated archaeological and built heritage assets. The assessment has been informed by the proximity of these assets and through an identification of their value. Options within the urban area of Norwich apply a 100m buffer for the identification of designated heritage assets whereas those options in the rural areas apply a 500m buffer due to the longer views (and hence the potential impacts upon the setting of these assets).
- 7.5.27. The historical designations assessed include Scheduled Monuments, Listed Buildings, Registered Parks and Gardens and Local Planning Authority (LPA) Conservation Areas. Within the study area

there are a total of 186 listed buildings, of which 12 are Grade I, 19 Grade II* and 155 Grade II and a total of nine Scheduled Monuments.

- 7.5.28. The Wensum Valley geology includes areas of natural sand and gravel which, along with the riverine topography, provide an indication of suitability for early settlement due to the preference for well-drained gravels close to predictable resources provided by rivers. The study area therefore has high potential for archaeological deposits the value and integrity of which is likely to be insufficiently understood to inform an assessment at this stage.
- 7.5.29. A cultural heritage Desk Based Assessment (DBA) accompanies this options appraisal (0) to identify the known areas of likely archaeological deposits that is available from the Heritage Environment Record (HER) held by Norfolk County Council. However, at this stage, the HER has not informed the options appraisal due to the considerable uncertainty with regard to the exact location of some heritage assets. The information has therefore been compiled to identify the degree to which archaeological resources are present and to inform the development of any future planning application.
- 7.5.30. Following the options appraisal, the new highway options and the light rail and very light rail option will be routed through relatively rural landscape interspersed with villages and isolated dwellings. The greatest impact on cultural heritage will be a large adverse impact from the light rail option due to its proximity to a Scheduled Monument (Wayside Cross) which is at the Boundary Road / Drayton Road junction. The majority of the new highway options have various listed buildings within a 500m buffer which may be adversely affected by the proposed route development. The resulting impact is therefore likely to be slight or moderate adverse depending on the number of listed buildings within the buffer surrounding the new highway option and whether it lies within an LPA conservation area or LPA archaeological priority area. For example, Option 6 (Blue Route 2) results in a slight adverse impact as there are only two listed buildings within the 500m buffer area, whereas, Option 3 (Brown Route) results in a moderate adverse impact as there are 10 listed buildings within the 500m buffer area including two Grade I and one Grade II*.
- 7.5.31. The majority of the network improvement schemes, demand management, active travel, information, freight and public transport options require infrastructure improvements, increase in bus frequencies, and improvements to NMU links. The options where further information and detail on improvements are unknown such as their location and the extent of any widening or other improvement activities, have been assessed as slight adverse. This is because there is uncertainty as to the distance from designated sites. For those options where more detail is known, and therefore a more accurate appraisal can be undertaken, if the location is not within the relevant buffer area of any designated sites then the impact on cultural heritage is likely to be neutral. When no engineering works are proposed as part of the option, then it has likewise been assumed that a neutral impact on cultural heritage is likely.

Biodiversity

- 7.5.32. The route option appraisal has identified that the majority of the new highway link options involve a new road through a rural landscape. New highway link routes will, in many cases, require a new crossing over the River Wensum SAC / SSSI as well as causing fragmentation, loss and severance to the surrounding arable fields, hedgerows, woodland and grassland. However, it is anticipated that a solution that does not materially impact the ecological integrity of the River Wensum SAC is achievable. New cycling link routes are also likely to lead to habitat loss of the some CWSs which

are adjacent to proposed cycle routes. New bus lines and rail lines will lead to a moderate adverse impact, again due to severance of various habitats and local wildlife sites such as Marriott's Way CWS and associated habitats.

- 7.5.33. The majority of the other options do not require any additional infrastructure and are predominantly improvement works to existing roads, bus and NMU links. Therefore, the majority of these options lead to a neutral significance on biodiversity with some resulting in a slight adverse impact. The very light rail option, tolled routes and existing route improvements will result in a slight adverse impact due to the potential for some habitat loss due to widening or crossing over the River Wensum SAC / SSSI. All other options are likely to lead to a neutral effect on biodiversity due to no anticipated changes to biodiversity or no habitat loss or gain.

Water environment

- 7.5.34. The route options assessment has identified that the new highway link options would result in a greater than moderate adverse impact upon the water environment. The new highway link options, which require the construction of new bridges over waterbodies, namely the River Wensum and River Tud, are likely to result in a moderate adverse impact on the water environment. This assessment is based upon the assumption that no alterations to the river's geomorphology is expected for these options and that supporting bridge structures would be located outside of the river channel.
- 7.5.35. However, any additional infrastructure provides a pathway for highway run-off to enter the watercourses; the resulting run-off could result in a deterioration of water quality in both surface water and groundwater if a high level of mitigation were not to be provided. There is also an increased risk of pollution from accidental spillages on the highway as well as the potential impacts of shadow upon the water course.
- 7.5.36. The majority of the network improvement schemes, demand management, active travel, freight and public transport options do not require any additional infrastructure, they are simply improvements and measures to increase efficiency within the existing road network. These options have no tangible beneficial or adverse effect on the water environment because the degree of additional infrastructure is negligible and, where the options promote a modal shift away from private car use, there is no information available on the change in traffic flows that is likely to occur. Where an online option aims to increase vehicle flow and numbers, this will only result in a maximum impact of slight adverse on the water environment.

7.6. MANAGERIAL CASE

- 7.6.1. The managerial case, sometimes known as the delivery case, ensures that the project is deliverable through the appraisal of the scheme options against implementation timetable, practical feasibility, public acceptability and supporting evidence. These criteria are scored using a 5-point-scale. Further information is provided in the form of key risks which considers revenue funding, land constraints, environmental constraints, and public and stakeholder support. A further category related to the strategic utilities has been included in order to consider any likely feasibility issues.

Managerial criteria:

- § Implementation timetable
- § Practical feasibility
- § Public acceptability
- § Supporting evidence

Measures:

- § Project time scale
- § Feasibility of project
- § Likely acceptability of general public to option
- § Provision and quality of supporting evidence

- 7.6.2. Overall the new link highway options performed relatively well due to the level of supporting evidence in place and a high level of public acceptability, while some new link options had not been previously modelled, or costed, similar existing new link options in terms of alignment from previous studies could be used to derive estimates. Project timescales were set between 3-8 years, though scores differed in terms of feasibility associated with route impact. Network improvement schemes also performed relatively well due to the strong level of public support to address network issues within the NWQ. Implementation and feasibility differed significantly dependent on the option.
- 7.6.3. Public transport and active travel options have not been modelled, however evidence from similar projects exist, and while public acceptability was significantly lower than highways options, some degree of public support does exist.

STRUCTURES

- 7.6.4. The long list of options proposed for the NWL was reviewed and existing structures located along potential routes were identified in order to understand feasibility of routes from a structural perspective. These were then reviewed alongside each relevant option to assess their suitability from a geometry and compliance stand-point, and, where inspection records or load ratings were available, from a structural strength and durability point of view. The results are presented in **Appendix G** (these results are preliminary only, pending the outcome of further searches for bridge records from Norfolk County Council databases).
- 7.6.5. The long list of options was reviewed again, this time to identify new major structures that would be required. An indicative length was given for each structure based on the width of the flood plain (defined by Flood Zone 3) at the location of the proposed route; however, as this is a high-level exercise only and the final length would depend on the actual route location and more detailed flood modelling, this is subject to adjustment as the options are rationalised and further developed. Where a significantly different length could be required by amending the proposed route slightly, this has been noted.
- 7.6.6. A highways review has also been carried out considering potential connection opportunities and constraints on A1067 Fakenham Road, focussing on the section of route between Marl Hill Road and the new A1270 roundabout where the A1270 meets A1067. The A47 route is being upgraded and potential highway options have been aligned to tie into the future A47 junctions expected to be located at Berry's Lane with Wood Lane and Taverham Road with Blind Lane based on latest information published by Highways England in September 2018. The key conclusions of the A1067 review are:
- § East of the existing A1067 bridge over the river, it is considered likely that environmental considerations in respect of the river and existing land-use considerations (for example, the golf course) are factors that would need to be taken into account in determining an optimum location, or locations, for a new junction with NWL.

- § Purely from a highway design and NWL / A1270 'whole route' perspective, the addition of a fourth arm for a NWL onto the existing A1067 / A1270 roundabout is an option that has merit in terms of further investigation. It is possible that some local realignment of the existing roundabout and approach arm geometry may be necessary in order to accommodate a fourth arm. However, by having a connection directly into this roundabout would significantly reduce the impacts of a NWL on the A1067.
- § Further west the section of interest for siting a new junction is the section to the west of the river bridge at Attlebridge, up to the junction with Marl Hill Road. It should be noted, however, that the existing A1067 bridge over the river at Attlebridge is only wide enough to accommodate a single carriageway and should the design year / forecast flows indicate that a dual carriageway is required then a new / replacement structure would need to be provided for this wider cross-section
- § An option that would appear to be worthy of further investigation would involve the provision of a new, offline, roundabout south-west of the A1067 and approximately 200m south-east of Marl Hill Road. The existing sweeping right-hand bend of the A1067 on the westbound approach to the Marl Hill Road junction would appear to lend itself to achieving an acceptable tie-in to such a roundabout.
- § A three-arm roundabout connecting a NWL to the A1067 should be investigated initially. An additional arm, connecting a locally realigned Marl Hill Road into the roundabout, could be considered however it is understood that this may not be economically viable due to nearby utility apparatus. This would require further investigation
- § Another issue to consider as part of a roundabout proposal is that it would be important to ensure that measures to deter through-traffic / rat-running along The Street in Attlebridge were considered. Otherwise, there is a risk that traffic wishing to stay on the A1067 in either direction could use this route to avoid the roundabout at times in the event that congestion arises on the approach to the new junction.
- § From a brief desk-top assessment of the existing alignment of this western part of the A1067, there are no particular horizontal or vertical highway geometry constraints that would restrict the siting of a new junction with a NWL other than:
 - § A location approximately 800m north-west of the A1067 / A1270 roundabout, where the A1067 has a staggered junction with two minor farm accesses and there are farm buildings immediately south-east of this location adjacent to the A1067. This location is not recommended for siting a new junction on the A1067
 - § The area in the vicinity of the existing Y-junction of the A1067 with Old Fakenham Road, approximately 470m south-east of the river bridge at Attlebridge, is also not recommended for siting a new junction on the A1067

7.7. FINANCIAL CASE ASSESSMENT

- 7.7.1. The financial case provides evidence on the affordability of the options. This section appraises the various options based on, where evidence is available, affordability, which takes into context any available budget and budget period. Some options may, depending on cost, be immediately affordable within the present financial period while others will require specific funding regimes.
- 7.7.2. Cost itself is entered as a criteria and a high-level cost value has been entered for each option – that is, streams of costs occurring over the appraisal period are discounted to a standard base year allowing benefits in the future to be compared with project costs. Risks associated with costs are

measured where possible, which refers to the level of evidence available with costs at this stage of the scheme.

Financial criteria:

- § Affordability
- § Capital cost
- § Overall cost risk
- § Flexibility of option

Measures:

- § Can only be assessed against available budget
- § 1 (£0) to 9 (£250-£500 million)
- § Risk associated with scheme cost variation
- § How flexible is the option, can it change, close, be amended during design and on completion?

- 7.7.3. Cost have been obtained from a number of sources, for new highways options, costs for previously costed options taken from previous studies have been used as a basis. For new link options which are not taken from previous studies, costs have been derived from similar options which had been costed in previous studies. Additional costs have been added in order to take account of the additional costs of the proposed viaduct for all options which cross the Wensum.
- 7.7.4. Public transport options have been costed based on experience from similar schemes as is the case for demand management, information and active travel scheme options.
- 7.7.5. Lower costing schemes generally scored higher with the financial case assessment, as such new link highway options and significant infrastructure schemes, such as the offline busway (Option 61) performed less well than relatively more modest schemes.

7.8. COMMERCIAL CASE ASSESSMENT

- 7.8.1. The commercial case provides evidence of the viability of a project or proposal and the procurement strategy that will be used to engage that the market is set out and appraised. Flexibility of the option is scored based on to what extent the option can be scaled up or down, how easy it would be to stop once it has been put into operation and how easily the scheme can be amended. Further to the scoring of the flexibility of the option any information available at this stage in relation where funding is likely to come from and what income if any will be generated by the scheme.
- 7.8.2. New link highway options in terms of routing were generally considered flexible at this stage, as there is ability to stop a scheme before construction, however significant costs associated with these options limited the overall performance in the commercial assessment. Packages relating to existing public transport services performed relatively well due the increased flexibility and presumed affordability.
- 7.8.3. More detailed costing of the options will be developed as the scheme progresses, in accordance with the DfT’s WebTAG.

7.9. SIFTING OF OPTIONS

- 7.9.1. This section sets out to describe the sifting process and the methodology used to appraise the proposed options in order to derive a suitable shortlist to carry through for further appraisal. The initial sifting was undertaken in two stages in order to identify which options should not be progressed and shortlisted, and which should be discounted at this stage.

ROUND 1 SIFTING

- 7.9.2. The first stage involved the removal of options which failed to perform at least as well as the “Do Nothing” option when compared against all assessment criteria. The “Do Nothing” option includes no

new infrastructure developed to meet future demand specifically in relation to this study. It does however include the A47 North Tuddenham to Easton scheme to be undertaken by Highways England, the committed development as provided by Norfolk County Council, and the A1270 complimentary measures. These features are considered future base and have been included in all scenarios.

- 7.9.3. Performance scoring was derived from the EAST, where individual scores were given against each of the criteria within the assessment cases and environmental assessment for each option. These scores were combined and unweighted, giving equal regard to each of the cases, allowing an indication of option performance. A decimal score of between a minimum of 0 and a maximum of 1 was calculated for each of the assessment cases with a combined overall maximum score of six available. Those options that performed worse than the “Do Nothing” option were discounted.
- 7.9.4. After the Round 1 sift, a total of 34 options remained, including 22 new link highway options, five network improvement schemes, three active travel options, three public transport options and a freight option.
- 7.9.5. At this stage, it was also decided that new single carriageway highway link options would be omitted from the study. These options were discounted on the basis that dual carriageway options will produce the most robust assessment in consideration of potential land take, costing and environmental concerns. It should also be noted that dual carriageway options, in general, provide more benefit in terms of increased capacity and therefore network resilience, improved journey time and associated economic benefit and safer design. In terms of the current issues with HGV movements the increased speed limit for HGVs on dual carriageways as opposed to single carriageways would significantly improve chances to attract HGVs and reassign away from local rat running routes.
- 7.9.6. Discounting the single carriageway options removed a further eight options, resulting in a total of 26 options after Round 1. The remaining options were subsequently recategorised into “Non-Highway Options”, “New Link Highway Options” and “Existing Link Upgrade Options”. While single carriageways have been discounted at this stage, during later appraisal stages within this study, that for any dual carriageway option short listed, the equivalent single carriageway option may be re-emitted to the process, if necessary.
- 7.9.7. The 26 options and their respective performance scores against all the assessment cases are provided in **Table 23**. The “Do Nothing” option scored 3.61.

Table 23 – Options (after Round 1 sift) with respective performance scores

Category	Option	Score
Non-Highway Options	§ Option 39: Improvements to existing junctions	3.63
	§ Option 40: Signing and lining improvements	3.91
	§ Option 41: Signal improvements	3.69
	§ Option 44: New / improved crossing points	3.71
	§ Option 49: Improvements to existing bus services (28, 29 and X29)	3.66
	§ Option 50: Improvements to existing bus services (23, 23A and 24)	3.66
	§ Option 55: Promote cycling schemes	3.74
	§ Option 58: Mobility as a service scheme	3.62
	§ Option 68: Lorry management strategy	3.74
	§ Option 74: New bus route connecting Dereham, Hellesdon and Norwich Airport	3.85
New Highway Link Options	§ Option 2: A1067 Attlebridge to A47 west of Honingham, 2014 Purple (1A), dual	3.73
	§ Option 4: A1067 Attlebridge to A47 west of Honingham, 2014 Purple (2A), dual	3.78
	§ Option 6: A1067 Attlebridge to A47 west of Easton, 2014 Brown, dual	
	§ Option 8: A1067 (west of A1067 / A1270 junction) to A47 west of Easton, 2014 Red, dual	3.77
	§ Option 10: A1067 (east of A1067 / A1270 junction) to A47 west of Easton, 2014 Blue (1), dual	3.67
	§ Option 12: A1067 / A1270 junction to A47 west of Easton, Blue (2), dual	3.67
	§ Option 16: A1067 / A1270 junction to A47 / A1074 Longwater Interchange, 2014 Orange (2), dual	3.62
	§ Option 20: A1067 / A1270 junction to A47 / A1074 Longwater Interchange, 2014 Orange (4), dual	3.62
	§ Option 28: North Tuddenham via Attlebridge, 2018 Road Alignment (1), dual	3.68
	§ Option 30: A47 Honingham to Attlebridge (1), 2018 Road Alignment (2), dual	3.73
	§ Option 32: A47 Honingham to Attlebridge (2), 2018 Road Alignment (3), dual	3.67
	§ Option 70: Purple Line (2018 public consultation), dual	3.78
	§ Option 72: Blue Line (2018 public consultation), dual	3.73
	§ Option 80: Pink Line (2018), dual	3.82
Existing Link Upgrade Options	§ Option 75: Black Line (2018 public consultation) existing route – single carriageway upgrade	3.81
	§ Option 76: Black Line (2018 public consultation) existing route – dual carriageway upgrade	3.92

Comparison against specific objectives

- 7.9.8. In order to understand how the remaining options performed with regard to the specific objectives, and their subsequent use in tackling the identified issues and need for intervention within the NWQ, performance scores were calculated for each of the remaining options.

- 7.9.9. For each of the 12 specific objectives the likelihood of each option addressing the objective was scored on a scale of 1 (unlikely to address the scheme objective) to 5 (fully addresses the scheme objective). These scores were thereafter added together and an overall percentage produced.
- 7.9.10. The 26 options and their respective scores in addressing the specific objectives are provided in **Table 24**. The “Do Nothing” option scored 27%.

Table 24 – Options (after Round 1 sift) with scores against specific objectives

Category	Option	Score
Non-Highway Options	§ Option 39: Improvements to existing junctions	68%
	§ Option 40: Signing and lining improvements	62%
	§ Option 41: Signal improvements	45%
	§ Option 44: New / improved crossing points	52%
	§ Option 49: Improvements to existing bus services (28, 29 and X29)	60%
	§ Option 50: Improvements to existing bus services (23, 23A and 24)	60%
	§ Option 55: Promote cycling schemes	48%
	§ Option 58: Mobility as a service scheme	57%
	§ Option 68: Lorry management strategy	62%
	§ Option 74: New bus route connecting Dereham, Hellesdon and Norwich Airport	68%
	New Highway Link Options	§ Option 2: A1067 Attlebridge to A47 west of Honingham, 2014 Purple (1A), dual
§ Option 4: A1067 Attlebridge to A47 west of Honingham, 2014 Purple (2A), dual		82%
§ Option 6: A1067 Attlebridge to A47 west of Easton, 2014 Brown, dual		80%
§ Option 8: A1067 (west of A1067 / A1270 junction) to A47 west of Easton, 2014 Red, dual		85%
§ Option 10: A1067 (east of A1067 / A1270 junction) to A47 west of Easton, 2014 Blue (1), dual		83%
§ Option 12: A1067 / A1270 junction to A47 west of Easton, Blue (2), dual		85%
§ Option 16: A1067 / A1270 junction to A47 / A1074 Longwater Interchange, 2014 Orange (2), dual		85%
§ Option 20: A1067 / A1270 junction to A47 / A1074 Longwater Interchange, 2014 Orange (4), dual		85%
§ Option 28: North Tuddenham via Attlebridge, 2018 Road Alignment (1), dual		75%
§ Option 30: A47 Honingham to Attlebridge (1), 2018 Road Alignment (2), dual		78%
§ Option 32: A47 Honingham to Attlebridge (2), 2018 Road Alignment (3), dual		78%
§ Option 70: Purple Line (2018 public consultation), dual		80%
§ Option 72: Blue Line (2018 public consultation), dual		80%
§ Option 80: Pink Line (2018), dual		80%

Category	Option	Score
Existing Link Upgrade Options	§ Option 75: Black Line (2018 public consultation) existing route – single carriageway upgrade	63%
	§ Option 76: Black Line (2018 public consultation) existing route – dual carriageway upgrade	70%

ROUND 2 SIFTING

- 7.9.11. The lower score achieved by the non-highways options, in most cases, indicates that individually they would be less likely to achieve the specific objectives unless part of a wider package. For this reason, it was decided that the remaining non-highway link options would be carried through as potential schemes which could be packaged up with the shortlisted highway options at a later stage. This would be done to provide the best scheme in relation to addressing all of the specific objectives.
- 7.9.12. The new highway link options were taken forward because they perform significantly better against the specific objectives. However, a further sifting exercise was required to further refine the remaining 16 options down to a shortlist of the best performing options which could be taken forward for further detailed appraisal.

New highway link options

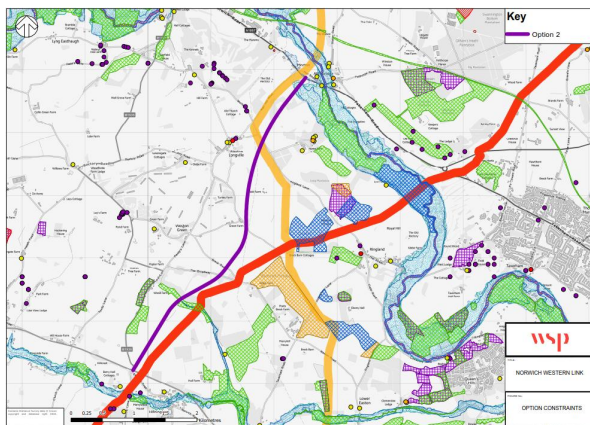
- 7.9.13. A review of the new highway link options was undertaken looking at those which were competing geographically (on broadly similar alignments) to remove options that performed less well than directly competing alignments. **Figure 42** shows the alignment of the competing new highway link options and the associated constraints within the study area.
- 7.9.14. Option 4 did not perform as well as Option 2, which has a similar alignment. Compared with Option 2, Option 4 crosses the strategic gas main and has a significant impact on a CWS, intersecting it on two separate occasions. In addition, Option 4 connects to the A47 at Honingham, which does not align with the proposed Highways England A47 RIS scheme. For these reasons Option 4 was discounted.
- 7.9.15. A review of Option 6 found that it did not perform as well as the other options, and it was subsequently discounted. This was due to the alignment running adjacent to the extra high voltage (EHV) pylons for the longest distance. This would impact the feasibility and cost of implementation of this option, due to building within close proximity of the EHV pylons and the associated risks. In addition, Option 6 also has the biggest impact on CWS, severing a large CWS in two.
- 7.9.16. Option 10 and Option 12 were discounted due to the cost of the proposed crossing of the River Wensum for these options which would also be significant due to challenging levels. Furthermore, these options run adjacent to the River Wensum for a significant distance, resulting in a greater potential to pollute the watercourse and increased risk. Furthermore, both options are likely to have significant commercial impact affecting the overall scheme cost and could also impact upon project timescales with potential legal constraints.
- 7.9.17. Option 16 and Option 20 would have similar issues to Option 10 and Option 12 with regard to the River Wensum crossing and the alignment being adjacent to the water course for a significant

length, offering more opportunity for pollution during construction. The topography along these routes would also be more challenging due to the steeper valley sides and substantial level differences. These options also connect to the A47 at the Longwater interchange and would drive significant traffic through the Longwater junction, potentially exacerbating existing congestion issues. In addition, through the Longwater Business Park and due to recent development, there may be feasibility issues providing a dual carriageway. Option 16 is also noted as potentially impacting upon Ancient Woodland. As such, both Option 16 and Option 20 were discounted.

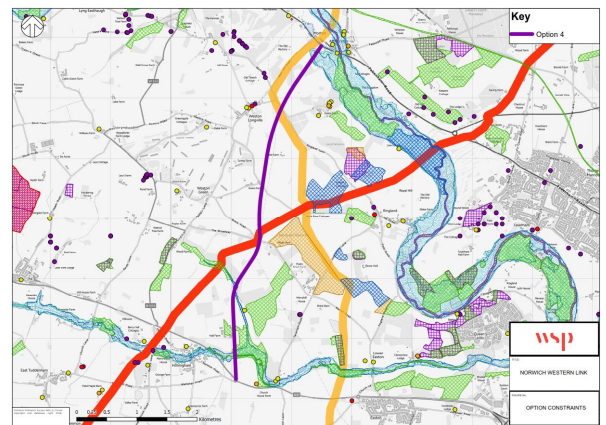
- 7.9.18. Option 28 has the longest alignment of the retained options, and intersects the A47 west of Hockering, which does not align with the Highways England A47 RIS scheme. It was considered likely to attract fewer trips than options located further east, as demonstrated by traffic modelling. Subsequently, this option would be less likely to support the specific objectives, and was considered less likely to deliver an acceptable BCR and gain wider public support, thus discounted.
- 7.9.19. Option 30 was discounted as it is likely to affect more properties than the other similar options, as it passes close to settlements and within proximity to many farm buildings. This option also runs directly underneath the EHV pylons, which may impact the feasibility and cost of implementation of this option, due to the pylons being immovable. There are also potential issues with the proposed alignment of Option 30. The proximity to Wood Lane near the junction with The Broadway is likely to result in severance of the road network and directly impact upon farms and the connectivity between dwellings and land.
- 7.9.20. Option 32 would cross the strategic gas main on two separate occasions, increasing overall scheme cost and risk. As a result, this option was discounted.
- 7.9.21. Option 70 was discounted due to the alignment crossing the strategic gas main and Orsted Cable route at their intersection, which would likely result in significant cost and risk to the project. In addition, the alignment of this option is reliant on an existing stretch of Taverham Road between residential properties and near listed buildings.
- 7.9.22. Option 72 was compared closely with Option 8 due to the similar alignment of the routes. When comparing the two options it was noted that Option 72 ran adjacent to the Orsted Cable route for a significant length which would increase associated risk of impact. The alignment of Option 72 is also longer in length by approximately 600m leading to higher associated construction costs and potentially less journey time benefits. In terms of topography, the alignment of Option 8 was also noted as having a slightly less significant height variation over the entire length of the route. While its alignment was similar to Option 8, Option 72 performed worse in relation to engineering constraints and was therefore discounted.
- 7.9.23. From the review of competing new highway link options, it was decided that the following options would be taken forward for further analysis:
 - § Option 2: A1067 Attlebridge to A47 west of Honingham, 2014 Purple (1A), dual
 - § Option 8: A1067 (west of A1067 / A1270 junction) to A47 west of Easton, 2014 Red, dual
 - § Option 80: Pink Line (2018), dual

Figure 42 – New highway link options and study area constraints

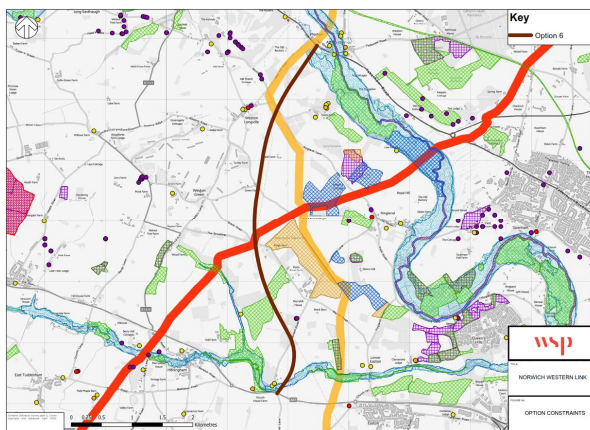
Option 2



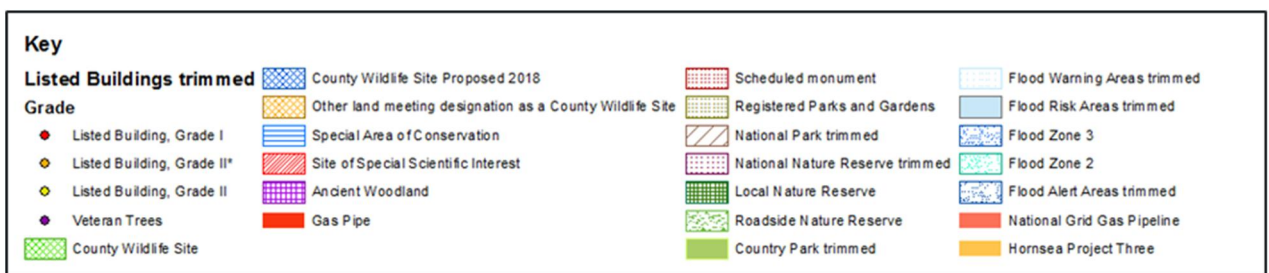
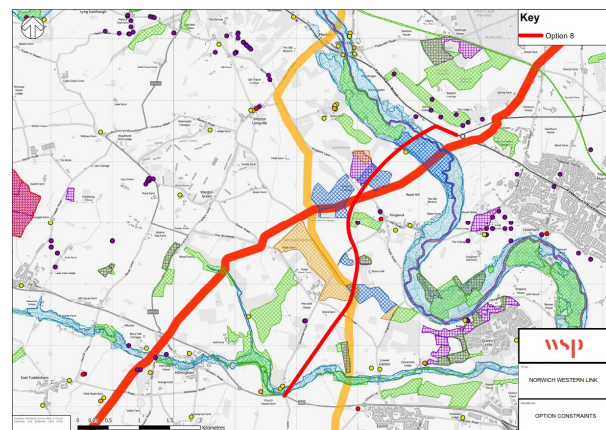
Option 4



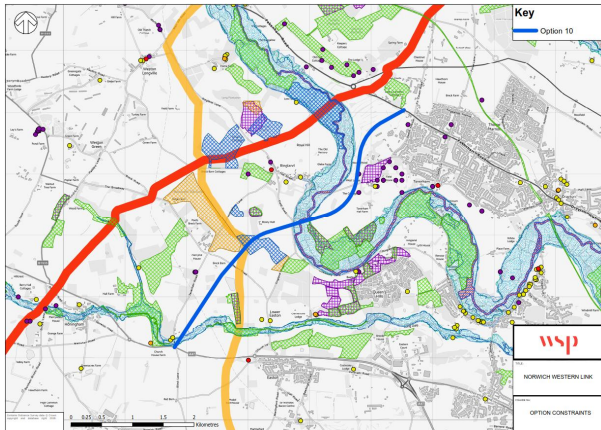
Option 6



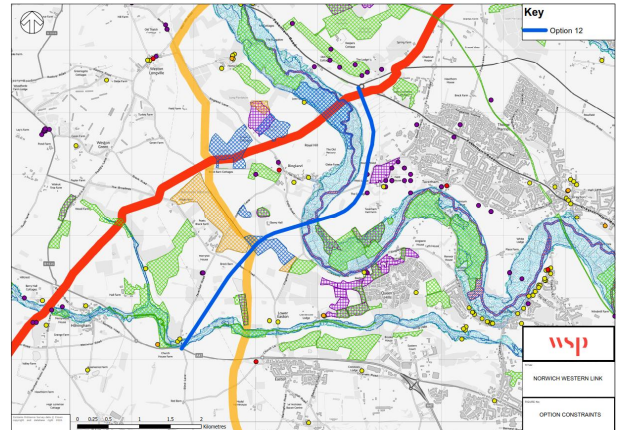
Option 8



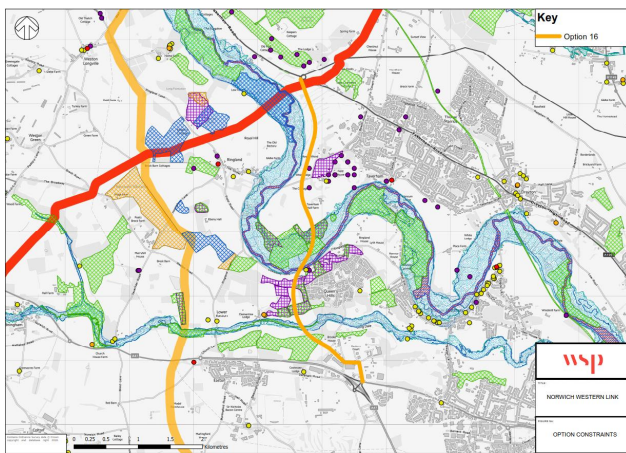
Option 10



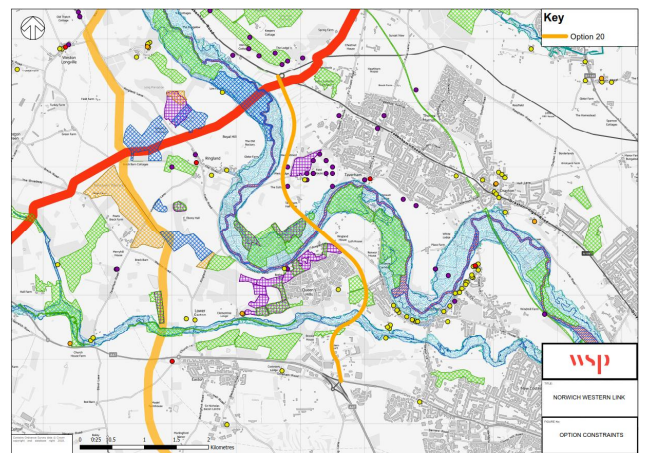
Option 12



Option 16

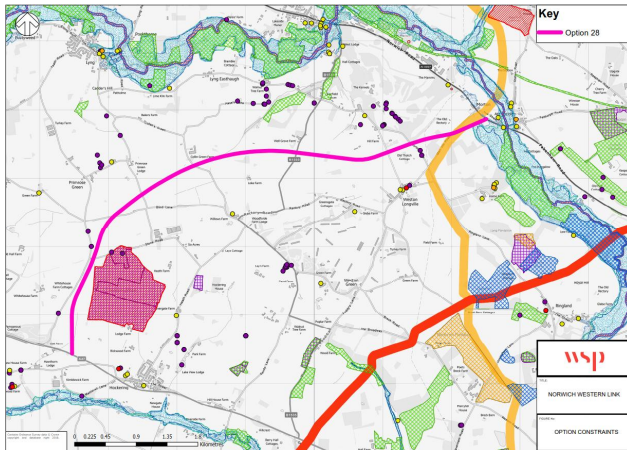


Option 20

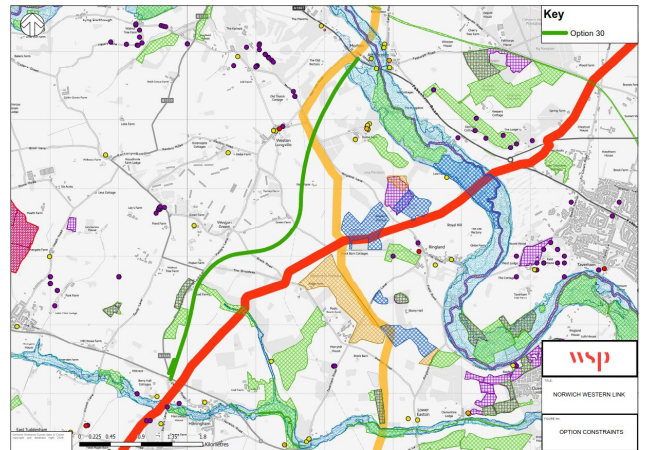


Key			
Listed Buildings trimmed	County Wildlife Site Proposed 2018	Scheduled monument	Flood Warning Areas trimmed
Grade	Other land meeting designation as a County Wildlife Site	Registered Parks and Gardens	Flood Risk Areas trimmed
Listed Building, Grade I	Special Area of Conservation	National Park trimmed	Flood Zone 3
Listed Building, Grade II*	Site of Special Scientific Interest	National Nature Reserve trimmed	Flood Zone 2
Listed Building, Grade II	Ancient Woodland	Local Nature Reserve	Flood Alert Areas trimmed
Veteran Trees	Gas Pipe	Roadside Nature Reserve	National Grid Gas Pipeline
County Wildlife Site		Country Park trimmed	Hornsea Project Three

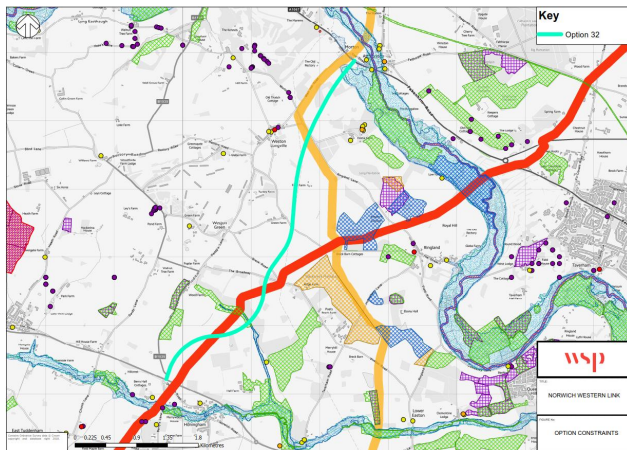
Option 28



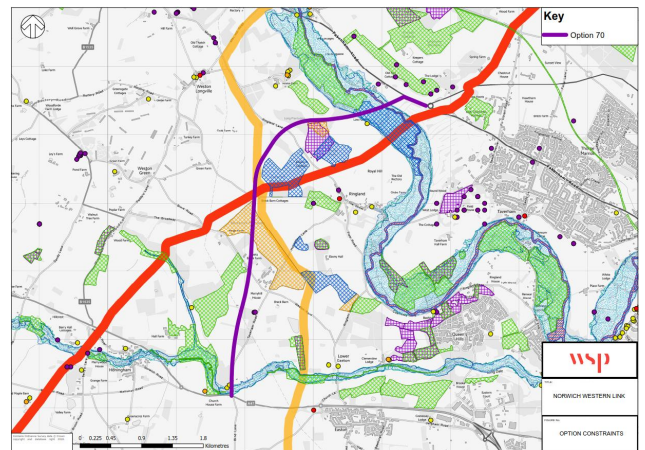
Option 30



Option 32

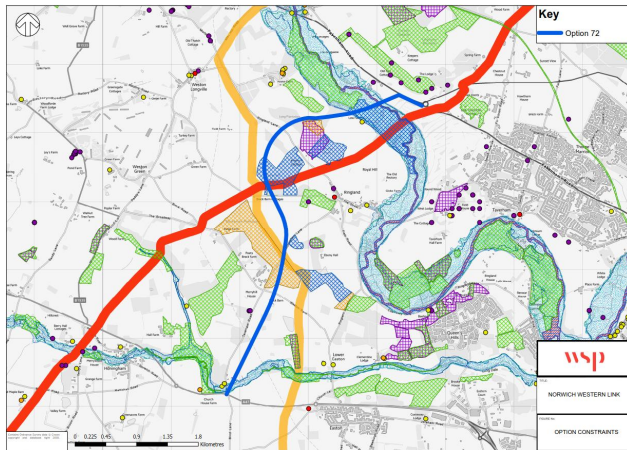


Option 70

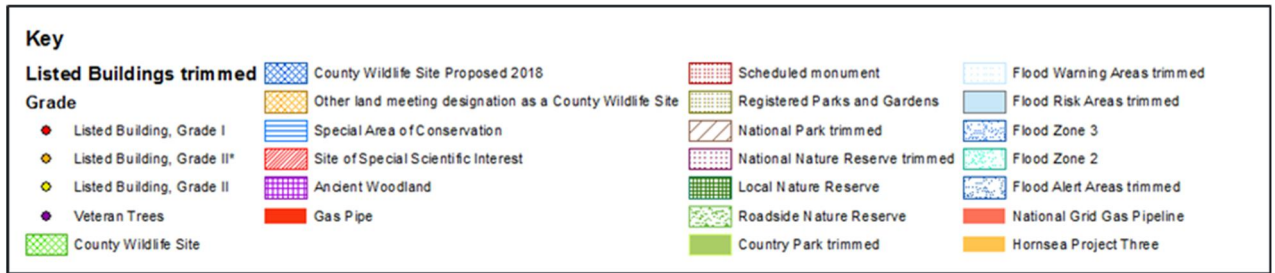
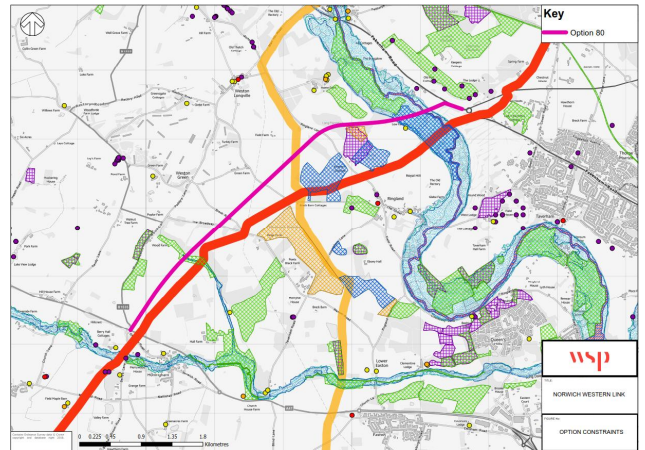


Key			
Listed Buildings trimmed	County Wildlife Site Proposed 2018	Scheduled monument	Flood Warning Areas trimmed
Grade	Other land meeting designation as a County Wildlife Site	Registered Parks and Gardens	Flood Risk Areas trimmed
Listed Building, Grade I	Special Area of Conservation	National Park trimmed	Flood Zone 3
Listed Building, Grade II*	Site of Special Scientific Interest	National Nature Reserve trimmed	Flood Zone 2
Listed Building, Grade II	Ancient Woodland	Local Nature Reserve	Flood Alert Areas trimmed
Veteran Trees	Gas Pipe	Roadside Nature Reserve	National Grid Gas Pipeline
County Wildlife Site		Country Park trimmed	Horsea Project Three

Option 72



Option 80



Non-highways options

7.9.24. The non-highways options in general scored lower against the specific objectives compared with highways options, indicating that individually they would be less likely to achieve the specific objectives unless part of a wider package. For this reason, it was decided that the remaining non-highway link options would be carried through as potential schemes which could be used as supplementary measures in association with the shortlisted highways options. The non-highway options taken forward include:

- § Option 39: Improvements to existing junctions
- § Option 40: Signing and lining improvements
- § Option 41: Signal improvements
- § Option 44: New / improved crossing points
- § Option 49: Improvements to existing bus services (28, 29 and X29)
- § Option 50: Improvements to existing bus services (23, 23A and 24)
- § Option 55: Promote cycling schemes
- § Option 58: Mobility as a service scheme
- § Option 68: Lorry management strategy
- § Option 74: New bus route connecting Dereham, Hellesdon and Norwich Airport

Existing link upgrade options

7.9.25. The existing link upgrade options comprise either single carriageway (Option 75) or dual carriageway (Option 76) with upgrades to the B1535 from the A47 east of Hockering to the A1067 at Lenwade, and the A1067 to the A1270 junction. Traffic modelling indicates that a link broadly following the existing B1535 alignment would attract lower volumes of traffic compared to new links

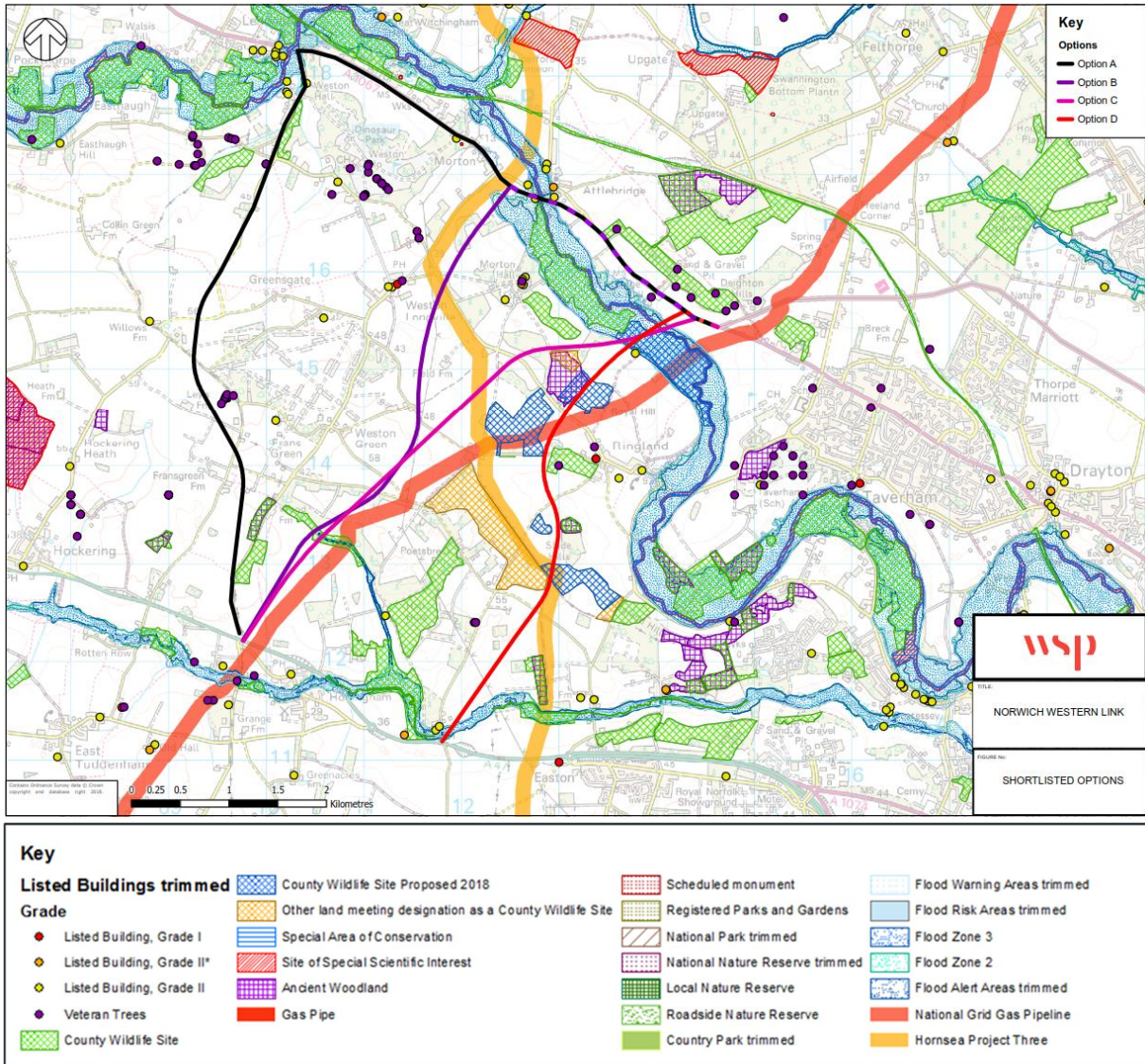
further east but the baseline study highlighted that this route could potentially benefit from geometrical upgrades. The early round of public consultation also highlighted a significant voice in favour of upgrading existing routes with about one third of respondents supporting this concept.

- 7.9.26. Option 75 has therefore been retained, as it would adequately facilitate the forecast flows associated with a single carriageway link further to the west and would take advantage of the existing single carriageway while offering continuity of network conditions in locations of new alignment. The lower costs associated with the single carriageway option would also provide a greater BCR than a dual carriageway option, providing greater value for money and lower future maintenance costs. This option may also be advantageous as it uses the existing bridge at Attlebridge rather than requiring a new viaduct structure crossing the River Wensum. However, due to the longer route from A47 to A1270 offered by this option, the benefits are expected to be less than a new link.
- 7.9.27. Due to the greater benefit derived from a single carriageway option in this location Option 76 was discounted.

7.10. SIFTING OUTCOME

- 7.10.1. During the sifting exercise, a total of 56 options were discounted following Round 1, and a further 12 options were discounted in Round 2. **Appendix H** provides the outcome of the sifting exercise and determines which options have been discounted at this stage, and the reasoning for being discounted.
- 7.10.2. Subsequently, a shortlist of three new highway link options, one existing link upgrade option and the remaining 10 non-highway options (to be included as part of a package within later stages of appraisal) will be progressed for further appraisal within Stage 2 of the DfT's WebTAG process. **Figure 43** shows the three new highway link options and the existing link upgrade option with the associated study area constraints.

Figure 43 – Shortlisted highways options with constraints



7.10.3. The shortlisted options are shown in **Table 25**, and categorised into “Non-Highways Options”, “New Highway Link Options”, and “Existing Link Upgrade Options”.

Table 25 – Shortlisted options

Category	Option
Non-Highways Options	<ul style="list-style-type: none"> § Option 39: Improvements to existing junctions § Option 40: Signing and lining improvements § Option 41: Signal improvements § Option 44: New / improved crossing points § Option 49: Improvements to existing bus services (28, 29 and X29) § Option 50: Improvements to existing bus services (23, 23A and 24) § Option 55: Promote cycling schemes § Option 58: Mobility as a service scheme § Option 68: Lorry management strategy § Option 74: New bus route connecting Dereham, Hellesdon and Norwich Airport
New Highway Link	<ul style="list-style-type: none"> § Option 2: A1067 Attlebridge to A47 west of Honingham, 2014 Purple (1A), dual § Option 8: A1067 (west of A1067 / A1270 junction) to A47 west of Easton, 2014 Red, dual § Option 80: Pink Line (2018), dual
Existing Link Upgrade	<ul style="list-style-type: none"> § Option 75: Black Line (2018 public consultation) existing route – single carriageway upgrade

7.10.4. The “Do Nothing” option has also been retained to provide a benchmark for comparison with the successful options in the later stages of the appraisal process.

8. DELIVERY

8.1. DELIVERY PROGRAMME

8.1.1. An indicative delivery programme for the scheme is enclosed in **Appendix I**. The programme indicates that the soonest timescale for commencing construction would be 2022. However, the delivery timescales are likely to be dependent upon the successful outcome of public inquiry and Compulsory Purchase Order (CPO) negotiations with affected landowners as well as alignment with the A47 North Tuddenham to Easton scheme which is currently moving towards construction in 2021.

8.2. TIMELINE

8.2.1. Key milestones in the current delivery programme can be summarised as follows:

§ Public consultation (round 2)	Late 2018
§ SOBC	Spring 2019
§ Outline Business Case (OBC)	Late 2019
§ Preliminary Design	Early-mid 2020
§ Public consultation (round 3)	Late 2020
§ Full Business Case (FBC)	Summer 2022
§ Tender Period	Mid 2020
§ Construction Phase	Late 2022

8.3. RISK MANAGEMENT

8.3.1. A project risk register has been produced identifying key risks to the NWL scheme. The magnitude and severity of risks have been assessed prior to mitigation and potential opportunities for mitigating such risks are identified. The most significant risks are noted below and potential mitigating action:

- § Ecological constraints especially the River Wensum SAC – once preferred options emerge following the second round of public consultation, a more detailed and extensive Ecology Phase 1 study will need to be carried out to visit private land areas that were not previously visited in the summer 2018 Phase 1 surveys. This will provide recommendations on the scope for ecology Phase 2 surveys required to inform the environmental assessment and planning application. Due to the sensitivity of the receiving environment, it is anticipated that detailed and extensive surveys will need to be undertaken within the preferred option assessment area. Due to the risk of potentially significant effects on the SAC, an appropriate assessment will need to be carried out under the Habitats Directive.
- § Drainage design – the key opportunity for minimising the risk of potentially significant effects affecting the SAC has thus far been identified as providing a drainage design which includes adequate pollution control measures to prevent potential contaminants arising from surface water road runoff from entering the River Wensum watercourse or any of its tributaries or groundwater pathways. Therefore, once preferred options emerge, a robust drainage strategy will need to be developed, discussed and agreed with the Environment Agency and Natural England. It is envisaged that continuing dialogue with these key stakeholders will assist with finding a solution that is sustainable and robust.
- § Securing funding to support delivery and construction of the scheme – at present there is no specific funding stream identified for the project. However, there are several third-party funding

opportunities which are currently being investigated and this is being treated as a key priority since Norfolk County Council have identified the scheme as one its top three infrastructure projects. The main source of funding is likely to be via the DfT Major Schemes budget or potentially there are new opportunities arising via the MRN consultation which was recently launched by DfT. Once preferred options emerge, more detailed costing and appraisal of the scheme will be produced and this will inform the preparation of SOBC, OBC and full major scheme business case for submission to DfT. To maximise opportunity for funding the scheme is therefore being developed in accordance with relevant DfT guidance on Transport Appraisal.

- § At the planning stage there is a risk of objection from key stakeholders involved in scheme approval such as Natural England, Environment Agency, Local Planning Authorities, Parish councils and affected landowners. A communications strategy is being developed which seeks to understand these risks in more detail and once preferred options emerge, land referencing will be undertaken to identify affected landowners, so that more detailed dialogue can commence in relation to specific scheme options. Dialogue with many of the key stakeholders has been ongoing since the earlier stages of the project and there is already a LLG of Parish Council representatives in place which meets on a bi-monthly basis.
- § Objections from members of the public are also considered to be a key risk, although the initial round of public consultation in May-July 2018 indicated that there is significant support for intervention to create a western link. A second round of public consultation is intended to commence in late 2018 and this will provide further opportunities for members of the public to comment on potential scheme options. Further consultation will also be undertaken at the preferred single option stage to inform the final design of the scheme, seeking to address remaining issues that may lead to objection prior to planning submission.
- § A47 scheme delays – due to the proximity of the A47 North Tuddenham to Easton scheme to the south and need for an NWL to tie in with the proposed Highways England works, there may be impacts on the project if the Highways England programme is delayed. The published timescales for the A47 North Tuddenham to Easton scheme are a start of construction in 2021. Whilst their Preferred Route Announcement (PRA) is published, the details of key junctions have yet to be defined, in particular whether they would be at-grade or grade separated. This is due to be clarified once a new delivery partner is appointed in late autumn 2018. At this stage, a review has been carried out for both options using the NWL traffic model at this stage as a sensitivity test. This indicates that more traffic would be likely to route through the NWL study area in the event that the proposed A47 junctions are constructed as at-grade roundabouts.
- § In the event that any post-preliminary design changes are required, this may impact on project delivery and timescales for example if the land take extents and corresponding CPO requirement are subject to change. This will be managed through careful consideration of land requirements as the scheme develops.

9. DEVELOPMENT OF OPTIONS

9.1. INTRODUCTION

- 9.1.1. This chapter presents the options brought forward from the initial sifting process, to progress to Stage 2: Further Appraisal.
- 9.1.2. This is in line with Step 7 of the Transport Appraisal Process.

Step 7 of the Transport Appraisal Process, involves the following:

- § Further reducing the number of options available
- § Developing potential options / packages
- § Identify better performing options / packages to take forward for further appraisal

9.2. OPTIONS SUMMARY

- 9.2.1. This OAR has demonstrated the complex nature of the transport issues and opportunities affecting the NWQ study area. A total of 82 options, covering a range of travel modes, approaches and scales of option as a potential means of addressing the specific objectives, have been considered and appraised using the DfT EAST sifting tool, with further environmental effects and performance against specific objectives also taken into account.
- 9.2.2. Following the systematic process of sifting (described in **Chapter 7**), using a compliant methodology in accordance with the DfT's WebTAG, the shortlisted options consists of three new highway link options, one existing link upgrade option and 10 non-highways options. The shortlisted options are:
- § **Non-Highways Options:**
 - § Option 39: Improvements to existing junctions
 - § Option 40: Signing and lining improvements
 - § Option 41: Signal improvements
 - § Option 44: New / improved crossing points
 - § Option 49: Improvements to existing bus services (28, 29 and X29)
 - § Option 50: Improvements to existing bus services (23, 23A and 24)
 - § Option 55: Promote cycling schemes
 - § Option 58: Mobility as a service scheme
 - § Option 68: Lorry management strategy
 - § Option 74: New bus route connecting Dereham, Hellesdon and Norwich Airport
 - § **New Highway Link Options:**
 - § Option 2: A1067 Attlebridge to A47 west of Honingham, 2014 Purple (1A), dual carriageway
 - § Option 8: A1067 (west of A1067 / A1270 junction) to A47 west of Easton, 2014 Red, dual carriageway
 - § Option 80: Pink Line (2018), dual carriageway
 - § **Existing Link Upgrade Option:**
 - § Option 75: Black Line (2018 public consultation) existing route – single carriageway upgrade
- 9.2.3. It is recognised that to offer the most significant contribution towards the objectives of the scheme, packages of complimentary measures, including the non-highways options, may be required. A comparison of the performance of the shortlisted options against the specific objectives has been



undertaken in order to identify which options could be packaged together in order to best address the issues within the study area. The results from this comparison are shown in **Table 26**.

Table 26 – Specific objective appraisal of shortlisted options

		5 – fully addresses the objective	4 – significantly / largely addresses the objective	3 – moderately / somewhat addresses the objective	2 – slightly / partially addresses the objective	1 – unlikely to address the objective	Reduce congestion and delay and improve journey time reliability on routes through the study area	Improve network resilience and efficiency of the strategic and local transport network	Reduce the number of Heavy Goods Vehicles using minor roads	Make the transport network safer for all users (including Non-Motorised Users)	Encourage modal shift to more sustainable modes of transport	Provide traffic relief (and reduce noise & emissions) within residential areas	Enable improved accessibility to existing and new housing and employment sites	Improve emergency response times	Improve access to green space	Not affect the ecological integrity of the River Wensum SAC	Contribute to the improved health and well-being of local residents	Improve connectivity and accessibility to Norwich International Airport, Norwich Research Park and Norfolk & Norwich University Hospital
New Highway Link Options	Option 2	5	5	5	4	2	5	4	5	5	3	3	4					
	Option 8	5	5	5	4	2	5	5	5	5	3	3	4					
	Option 80	5	5	5	4	2	4	4	4	5	3	3	2					
Non-Highways Options	Option 39	3	3	5	4	2	3	3	4	3	5	3	3					
	Option 40	3	3	5	4	1	3	1	3	3	5	3	3					
	Option 41	4	4	1	4	1	2	1	4	1	3	1	1					
	Option 44	1	1	1	4	4	4	2	1	3	3	5	2					
	Option 49	3	2	1	3	5	4	2	1	3	5	4	3					
	Option 50	3	2	1	3	5	4	2	1	3	5	4	3					
	Option 55	1	2	1	2	5	2	1	1	3	5	5	1					
Option 58	2	2	1	4	5	2	4	1	3	5	3	2						



	Option 68	3	4	5	4	1	5	1	3	2	4	4	1
	Option 74	3	3	3	3	5	3	4	1	3	5	3	5
Existing Link Upgrade Options	Option 75	3	3	4	3	3	4	3	2	3	3	4	3

9.3. OPTIONS

- 9.3.1. New link highway options have been developed based upon alignments from previous studies, identified gaps in the network, connections with the A47, engineering constraints and the physical and environmental constraints. Where possible, the alignments aim to avoid these constraints. Network improvement schemes were identified based upon existing network constraints. These options provide an opportunity to tackle congestion and improve reliability through upgraded link and junction capacity schemes.
- 9.3.2. In an effort to tackle demand based issues, a number of demand management, freight and improved information schemes were identified. These schemes seek to address issues related to rat-running, safety, severance and connectivity. Active travel and public transport options were also developed to encourage modal shift and reduce private vehicle trips on the existing road network.
- 9.3.3. Based on the analysis of the shortlisted options, options 2, 8, 75 and 80 plus along with the Do Nothing option have been carried through for further analysis. However, to simplify the remaining analysis, the options have been renamed running from west to east using A to D with the Do-nothing option renamed Option E.
- 9.3.4. Option B, previously route option 2, which runs east of Weston Longville and links to the A47 at Wood Lane now has two slight route alignment alternatives at the northern end of the route to consider potential options for where the route could join the A1067. The first alignment option will route via a new junction just west of Attlebridge and which would be routed on the A1067 through the edge of the village and would require widening the existing River Wensum bridge.
- 9.3.5. The second option would see a new viaduct crossing of the River Wensum, joining the A1067 to the east of Attlebridge, avoiding the village.
- 9.3.6. Option D, previously Option 8 is the only option to link to the A47 further east and would cross the River Tud on a 120 metre viaduct and cross the River Wensum on a viaduct joining the A1067 at a new junction requiring around 400 metres of the A1067 to be dualled.
- 9.3.7. Two alternatives are given for how it could join the A47, one at Taverham Road and one closer to Easton. This is because of Highways England's plans to dual the A47 between North Tuddenham and Easton, which include the removal of the existing A47 roundabout at Easton. There is little information currently available about the proposed junction at this location and, because of this, we have accounted for the possibility of the junction being located closer to the current Easton roundabout junction. While these two alternatives exist, little significant difference would be expected between the two options and they have therefore not been analysed separately.
- 9.3.8. The options which successfully progressed from the sifting process are shown below with their new titles while **Figure 44** shows the shortlisted highways options geographically.

§ **Option A (Orange)** Previously Option 75

§ **Option B (Purple) (Existing Bridge)** Previously Option 2

§ **Option B (Purple) (New Viaduct)** Previously Option 2

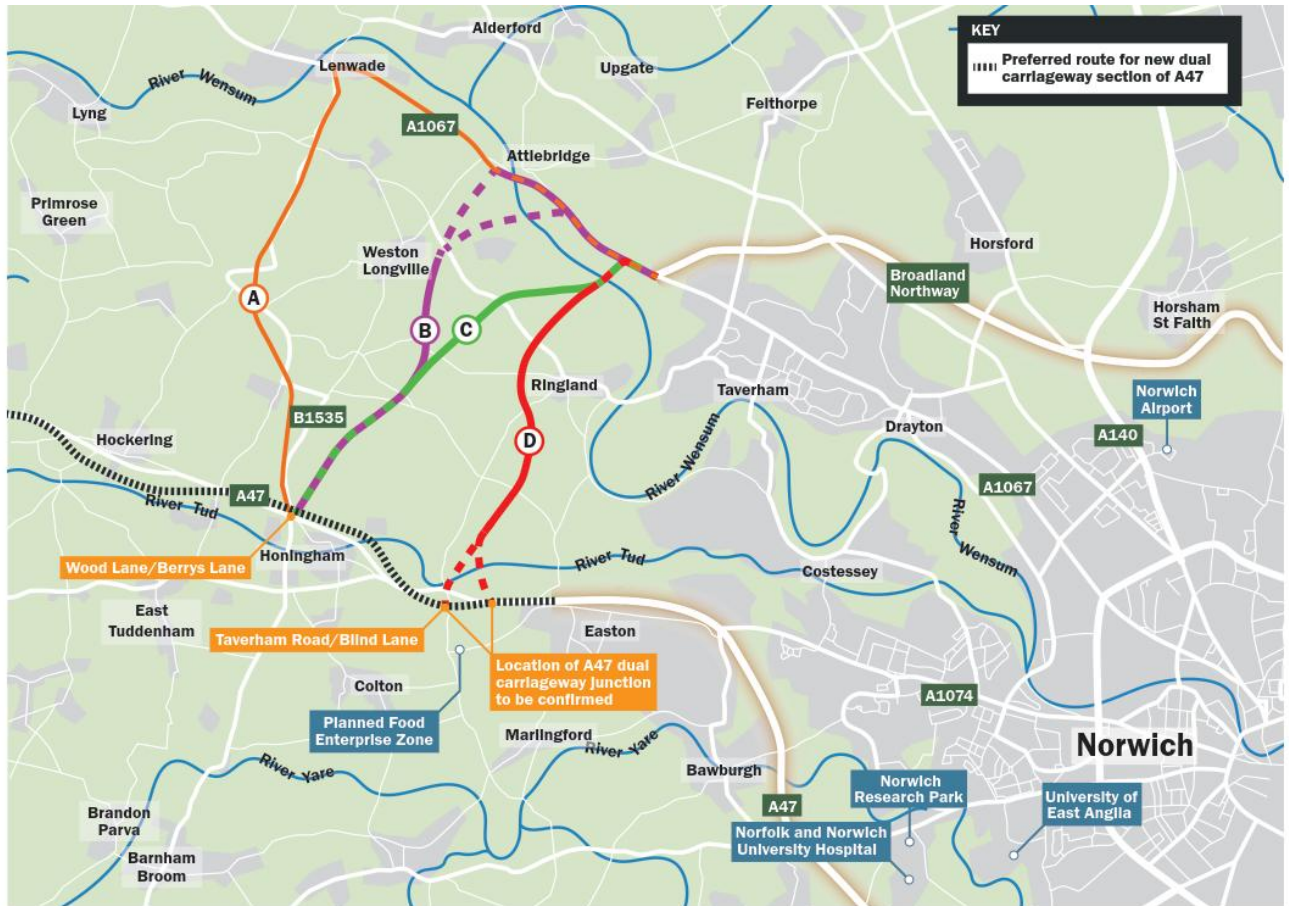
§ **Option C (Green)** Previously Option 80

§ **Option D (Red)** Previously Option 8

§ **Option E Do Nothing**

9.3.9. As stated above the Do nothing option, now Option E, will be retained, this package has been retained to act as a benchmark to compare new options with in order to demonstrate that any new options taken forward towards the SOBC stage represent better value for money and performance than a “Do Nothing” scenario.

Figure 44 – Shortlisted highways options



POTENTIAL PACKAGE MEASURES

9.3.10. The three remaining new highway link options and the existing link upgrade option have been shortlisted based on their performance against all other options through the sifting process. These options will now provide a platform from which to provide the most suitable scheme for a NWL. However, in order to produce an option which best addresses the specific objectives, the remaining non-highway options, which cover public transport, active travel, freight, and network improvement schemes will be taken through and considered in terms of complementing the four shortlisted highways options.

TRAFFIC MODELLING: FORECASTING SCENARIOS

9.3.11. Updated forecast year 2025, 2040 and 2050 networks have been produced with the ‘Core’ growth demand matrices as set out in **Chapter 3**. These are the “Do nothing” scenarios for 2025, 2040 and 2050 (i.e. Option E) that is without any Norwich Western Link infrastructure.

- 9.3.12. To undertake an assessment of the shortlisted options for NWL, the proposed schemes have been coded into the “Do nothing” network to create a “Do Something” network. This has been undertaken to understand the range of demand generated by the various options and to gauge the likely effects of an NWL.
- 9.3.13. The four options have been based on having the Highways England A47 North Tuddenham to Easton scheme included within the Do nothing as ‘at-grade junctions’ and ‘grade-separated’ junctions with the A47.

At-grade junctions

- 9.3.14. For an overview of the impact of flows on the network, **Table 27** presents the AADT for key points in 2025, 2040 and 2050 for the ‘Do Nothing’ scenario and the four options, rounded to the nearest 1,000 vehicles.

Table 27 – AADT (2025, 2040 & 2050): ‘Do Nothing’ and options

Location	Do Nothing	Option A	Option B New Viaduct	Option B Existing Bridge	Option C	Option D
2025						
A47 west of Sandy Lane (2-way)	30,000	31,000	34,000	33,000	34,000	33,000
A47 east of Wood Lane (2-way)	32,000	33,000	31,000	31,000	30,000	34,000
Former A47 west of Taverham Road	1,000	1,000	1,000	1,000	1,000	1,000
B1535 Wood Lane	9,000	5,000	1,000	1,000	1,000	1,000
Total on other existing North-south routes through study area (Taverham Road, Lyng Road, Honingham Road & Weston Hall Rd)	13,000	16,000	3,000	3,000	4,000	4,000
A1067 Attlebridge to A1270	17,000	16,000	26,000	25,000	16,000	16,000
Norwich Western Link		7,000	20,000	20,000	21,000	22,000
2040						
A47 west of Sandy Lane (2-way)	36,000	36,000	39,000	39,000	39,000	38,000
A47 east of Wood Lane (2-way)	38,000	39,000	37,000	37,000	36,000	40,000
Former A47 west of Taverham Road	7,000	7,000	5,000	5,000	5,000	7,000
B1535 Wood Lane	11,000	6,000	1,000	1,000	2,000	3,000
Total on other existing North-south routes through study area (Taverham Road, Lyng Road, Honingham Road & Weston Hall Rd)	16,000	19,000	4,000	4,000	5,000	6,000

Location	Do Nothing	Option A	Option B New Viaduct	Option B Existing Bridge	Option C	Option D
A1067 Attlebridge to A1270	20,000	19,000	36,000	34,000	19,000	19,000
Norwich Western Link		10,000	30,000	29,000	29,000	31,000
2050						
A47 west of Sandy Lane (2-way)	36,000	35,000	37,000	37,000	36,000	38,000
A47 east of Wood Lane (2-way)	39,000	39,000	32,000	32,000	33,000	41,000
Former A47 west of Taverham Road	14,000	14,000	12,000	12,000	12,000	15,000
B1535 Wood Lane	12,000	7,000	1,000	1,000	2,000	5,000
Total on other existing North-south routes through study area (Taverham Road, Lyng Road, Honingham Road & Weston Hall Rd)	20,000	25,000	5,000	5,000	8,000	9,000
A1067 Attlebridge to A1270	21,000	21,000	40,000	39,000	20,000	18,000
Norwich Western Link		13,000	37,000	37,000	36,000	35,000

9.3.15. AADT plots for the four options using 'at-grade' junctions are shown in **Figure 45** to **Figure 59**.

Figure 45 – AADT (2025) Option A: at-grade

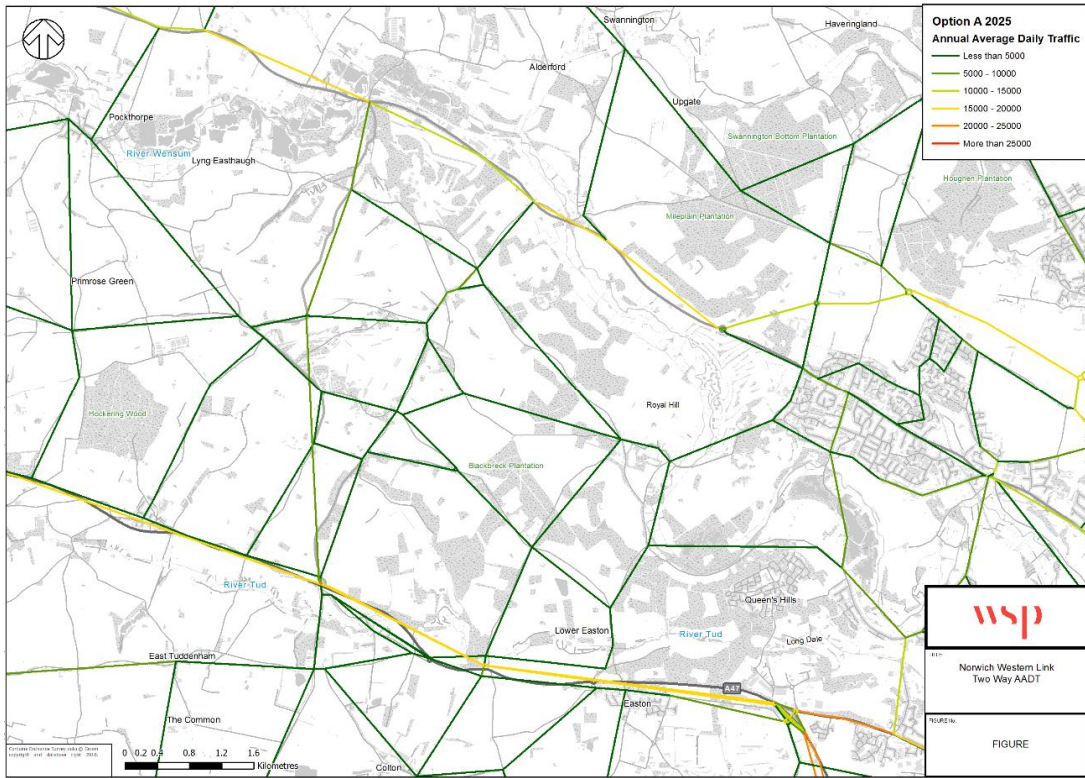


Figure 46 – AADT (2040) Option A: at-grade

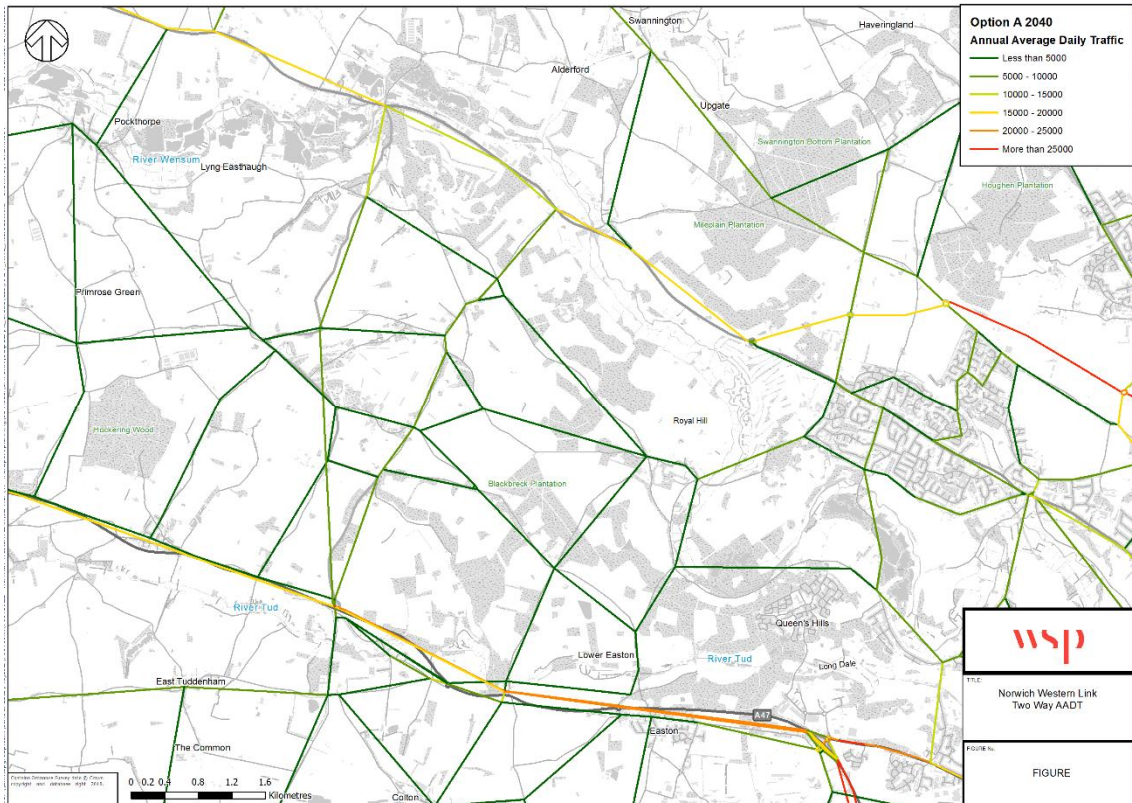


Figure 47 – AADT (2050) Option A: at-grade

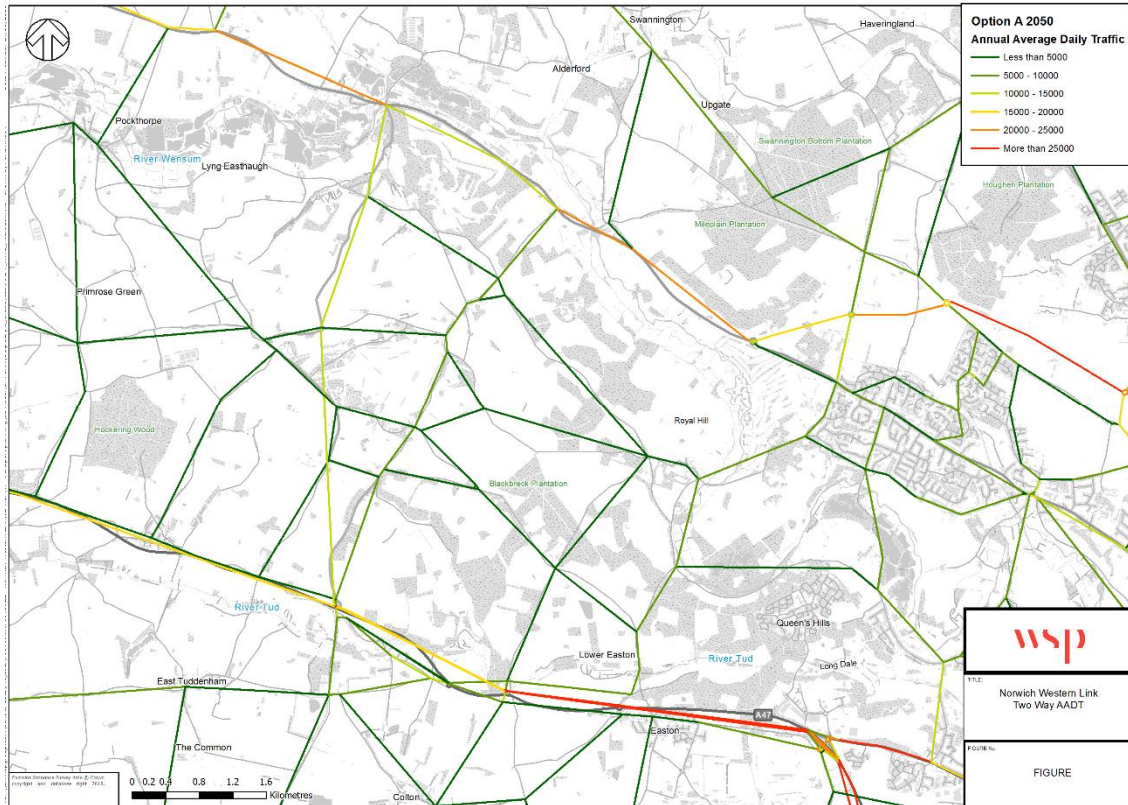


Figure 48 – AADT (2025) Option B (new viaduct): at-grade

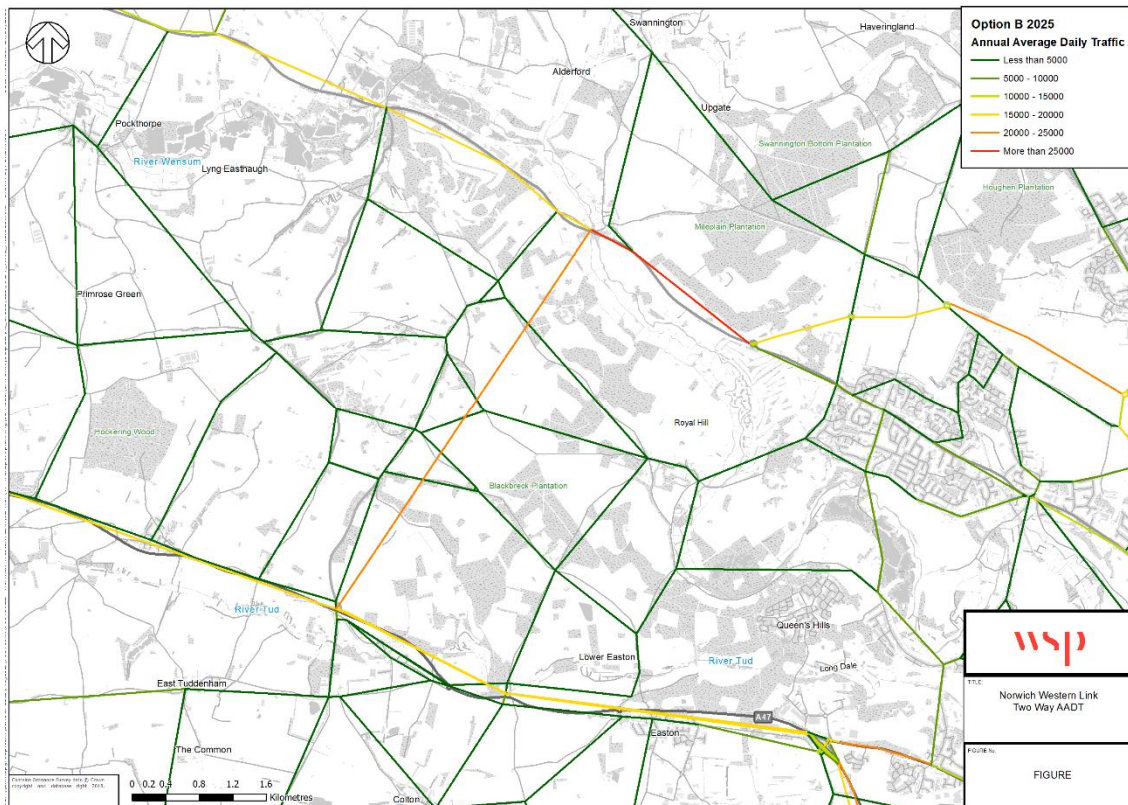


Figure 49 – AADT (2040) Option B (New Viaduct): at-grade

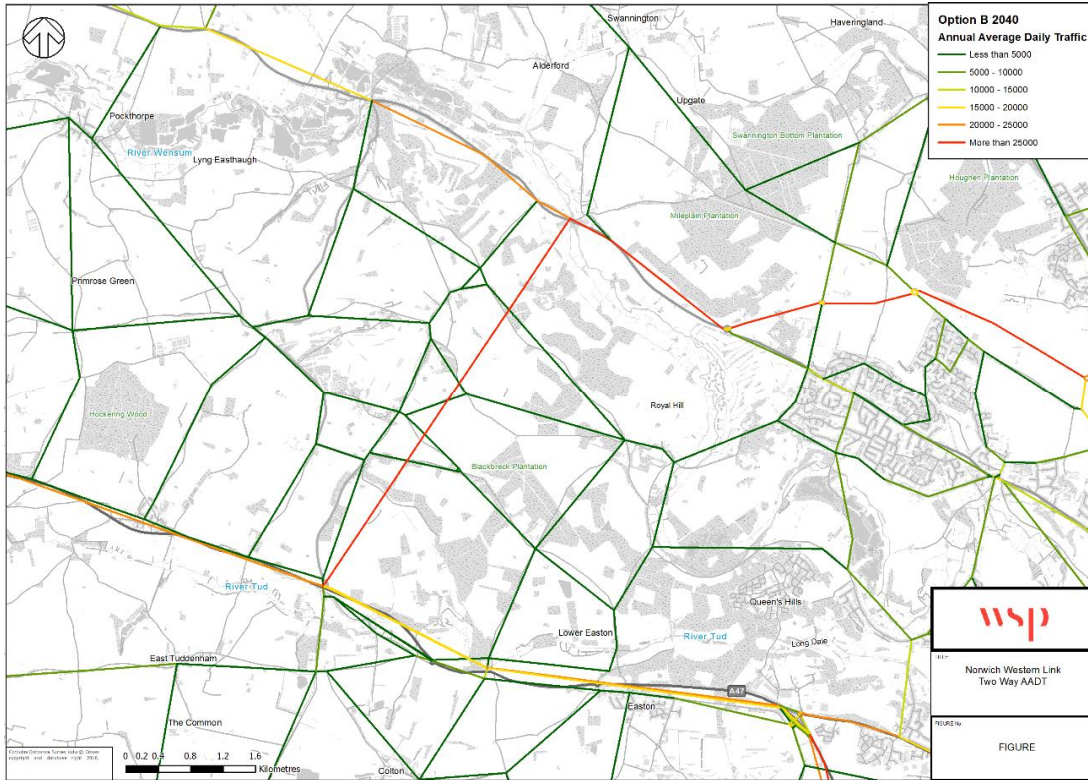


Figure 50 – AADT (2050) Option B (New Viaduct): at-grade

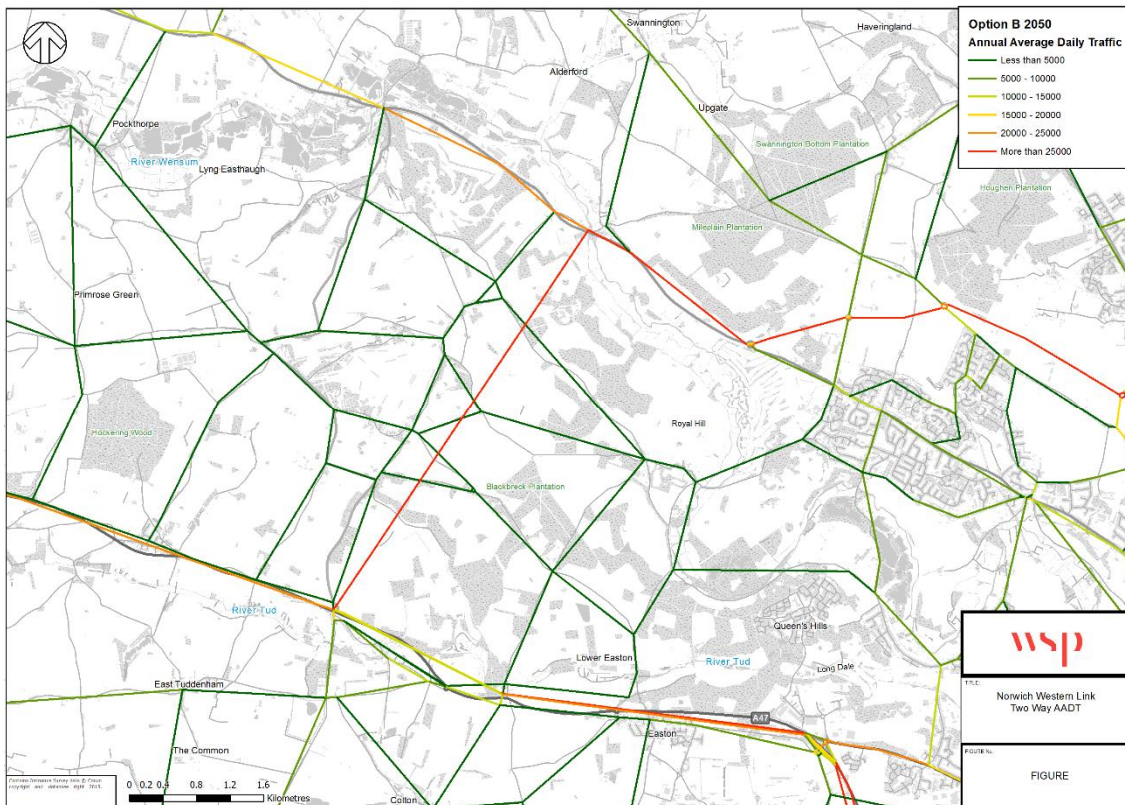


Figure 51 – AADT (2025) Option B (Existing Bridge): at-grade

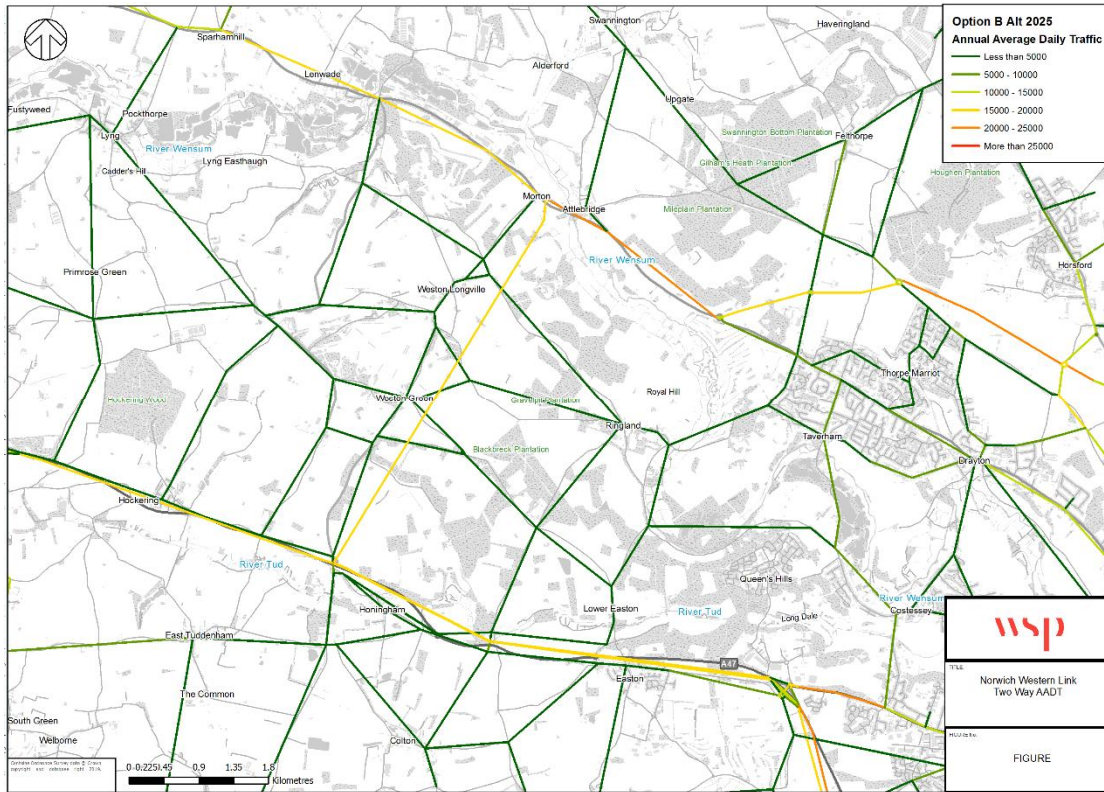


Figure 52 – AADT (2040) Option B (Existing Bridge): at-grade

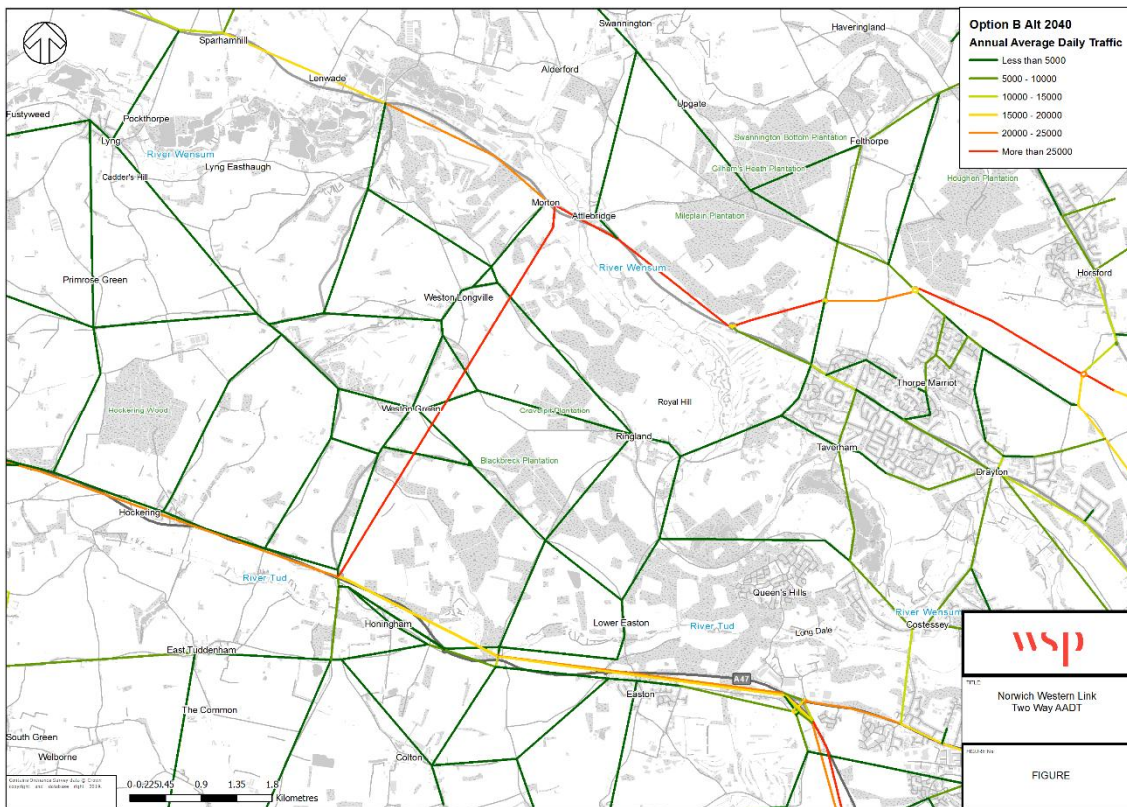


Figure 53 – AADT (2050) Option B (Existing Bridge): at-grade

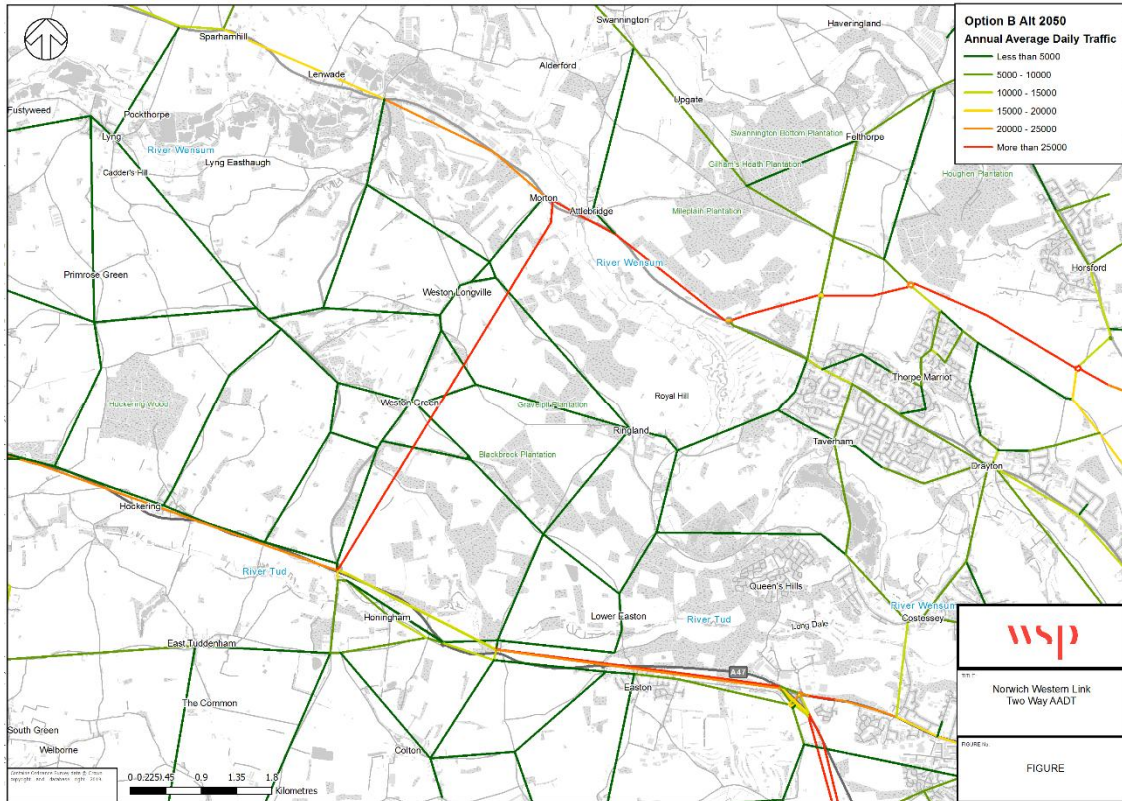


Figure 54 – AADT (2025) Option C: at-grade

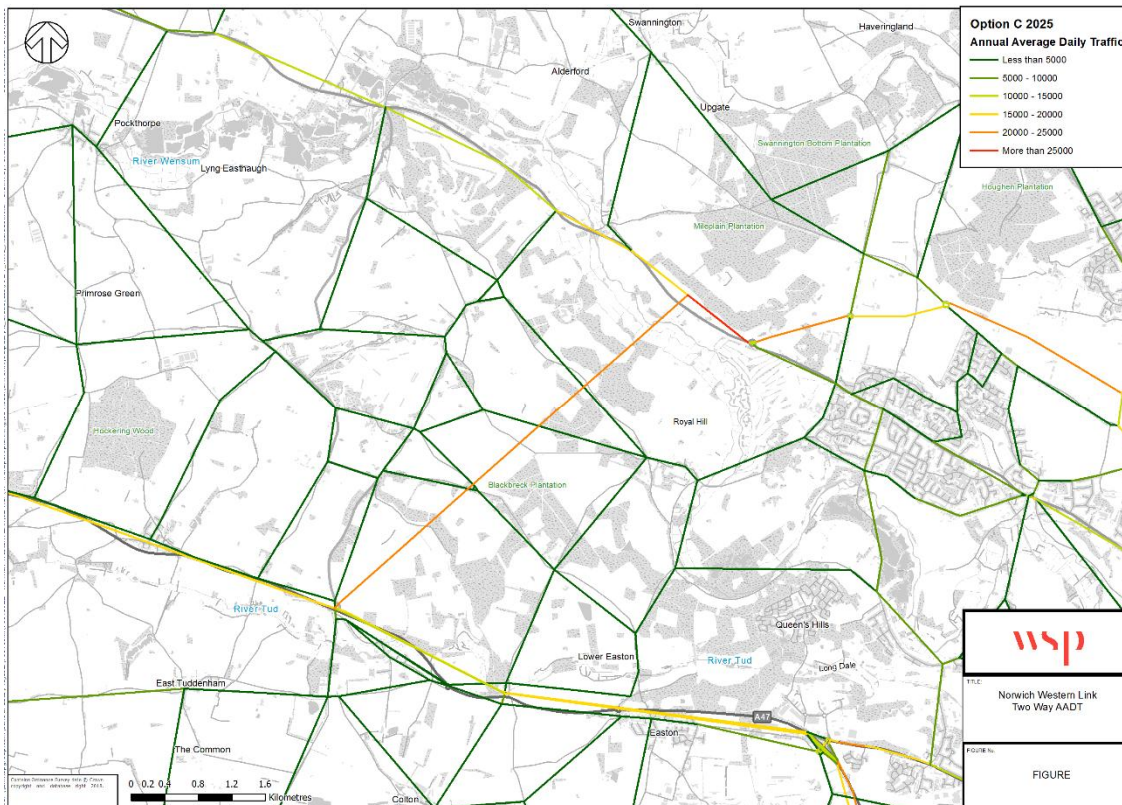


Figure 55 – AADT (2040) Option C: at-grade

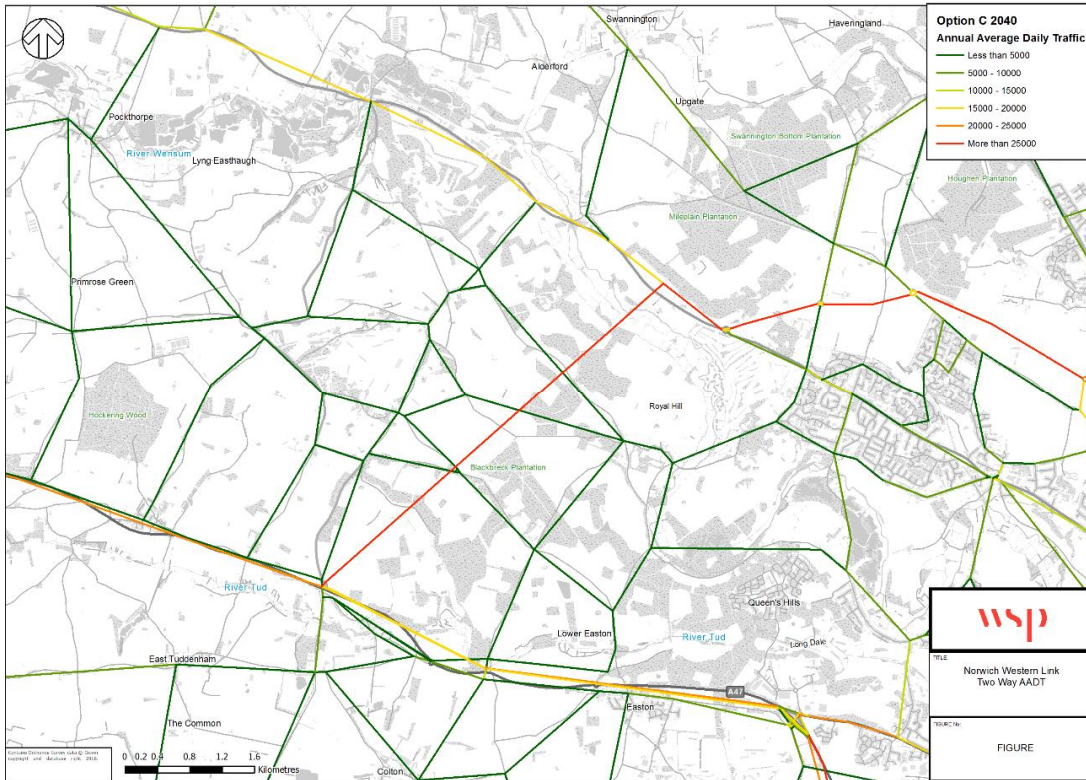


Figure 56 – AADT (2050) Option C: at-grade



Figure 57 – AADT (2025) Option D: at-grade

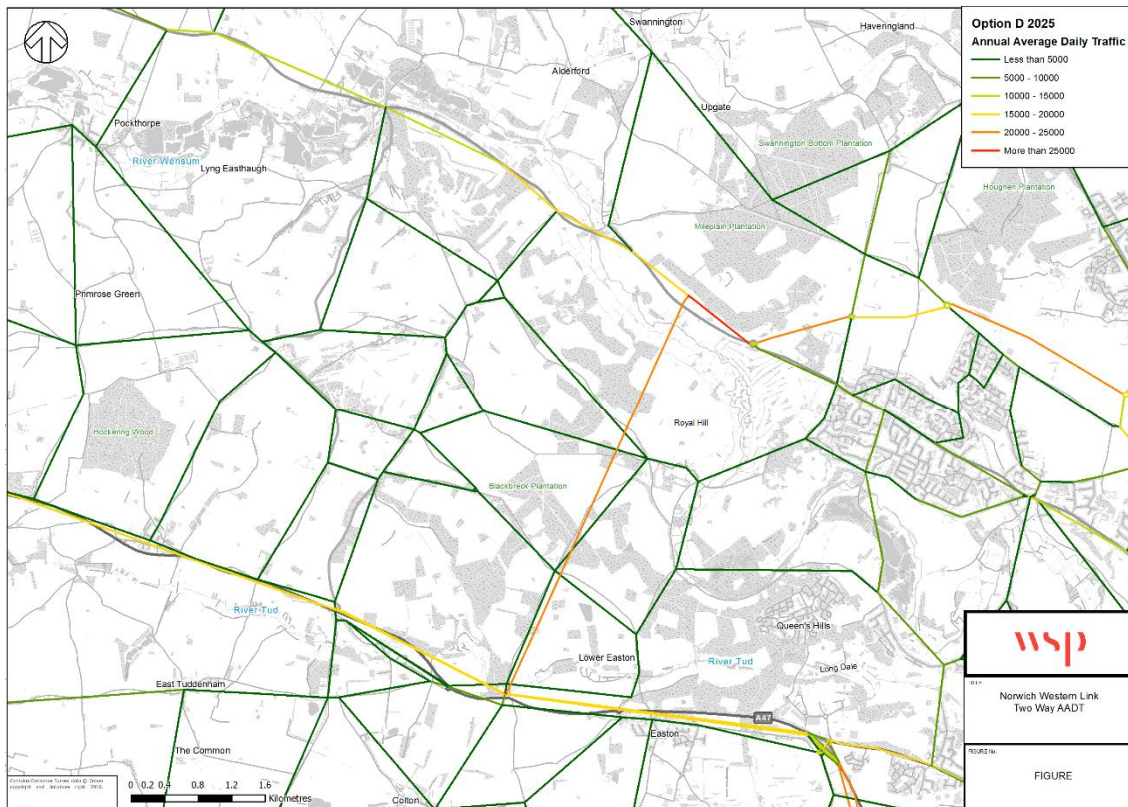


Figure 58 – AADT (2040) Option D: at-grade

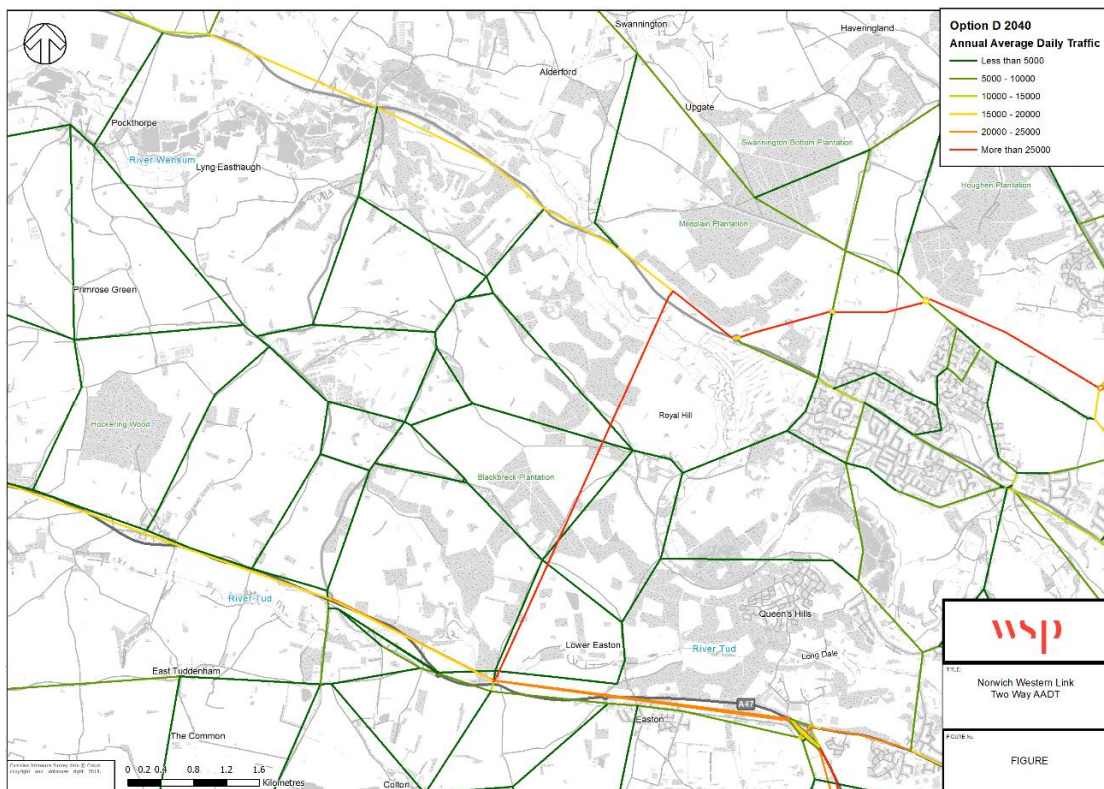
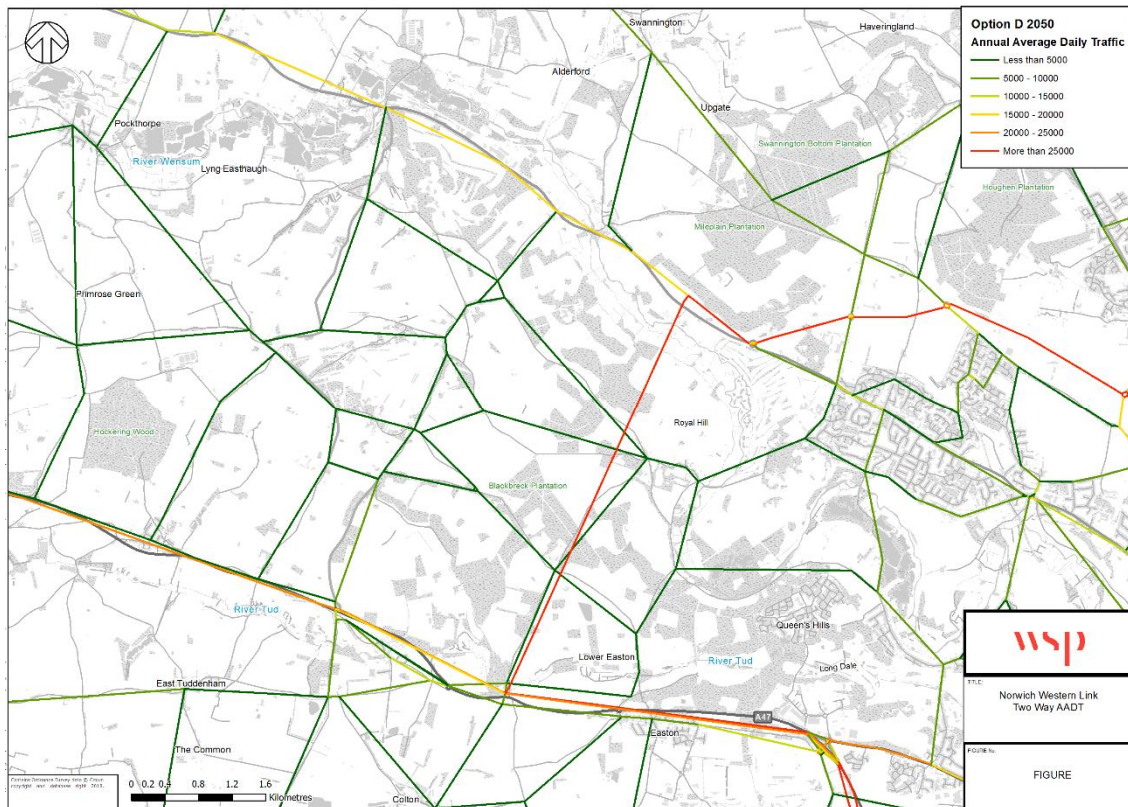


Figure 59 – AADT (2050) Option D: at-grade



Grade-separated junctions

9.3.16. For an overview of the impact of flows on the network **Table 28** presents the AADT for key points in 2025, 2040 and 2050 for the ‘Do Nothing’ scenario and the four options, to the nearest 1,000 vehicles.

Table 28 – ‘Do Nothing’ and NWL scheme options: AADT flow at key points

Location	Do Nothing	Option A	Option B New Viaduct	Option B New Bridge	Option C	Option D
2025						
A47 west of Sandy Lane (2-way)	30,000	30,000	34,000	33,000	34,000	33,000
A47 east of Wood Lane (2-way)	31,000	33,000	31,000	30,000	30,000	33,000
Former A47 west of Taverham Road	1,000	1,000	1,000	1,000	1,000	1,000
B1535 Wood Lane	8,000	5,000	1,000	1,000	1,000	1,000
Total on other existing North-south routes through study area (Taverham Road, Lyng Road, Honingham Road & Weston Hall Rd)	12,000	14,000	3,000	3,000	4,000	4,000

Location	Do Nothing	Option A	Option B New Viaduct	Option B New Bridge	Option C	Option D
A1067 Attlebridge to A1270	17,000	16,000	26,000	24,000	16,000	16,000
Norwich Western Link		7,000	20,000	19,000	21,000	21,000
2040						
A47 west of Sandy Lane (2-way)	36,000	36,000	39,000	39,000	39,000	39,000
A47 east of Wood Lane (2-way)	37,000	38,000	37,000	37,000	37,000	39,000
Former A47 west of Taverham Road	6,000	6,000	5,000	5,000	5,000	7,000
B1535 Wood Lane	9,000	6,000	1,000	1,000	2,000	3,000
Total on other existing North-south routes through study area (Taverham Road, Lyng Road, Honingham Road & Weston Hall Rd)	14,000	18,000	4,000	4,000	5,000	6,000
A1067 Attlebridge to A1270	20,000	20,000	36,000	34,000	19,000	19,000
Norwich Western Link		10,000	30,000	29,000	32,000	31,000
2050						
A47 west of Sandy Lane (2-way)	39,000	38,000	37,000	42,000	42,000	41,000
A47 east of Wood Lane (2-way)	42,000	43,000	32,000	40,000	40,000	45,000
Former A47 west of Taverham Road	14,000	14,000	12,000	13,000	12,000	15,000
B1535 Wood Lane	12,000	9,000	1,000	2,000	3,000	5,000
Total on other existing North-south routes through study area (Taverham Road, Lyng Road, Honingham Road & Weston Hall Rd)	19,000	23,000	5,000	5,000	6,000	7,000
A1067 Attlebridge to A1270	22,000	22,000	40,000	39,000	20,000	18,000
Norwich Western Link		12,000	37,000	35,000	36,000	34,000

9.3.17. AADT plots for the four options using 'grade-separated' junctions are shown in **Figure 60** to **Figure 74**.

Figure 60 – AADT (2025) Option A: grade-separated



Figure 61 – AADT (2040) Option A: grade-separated

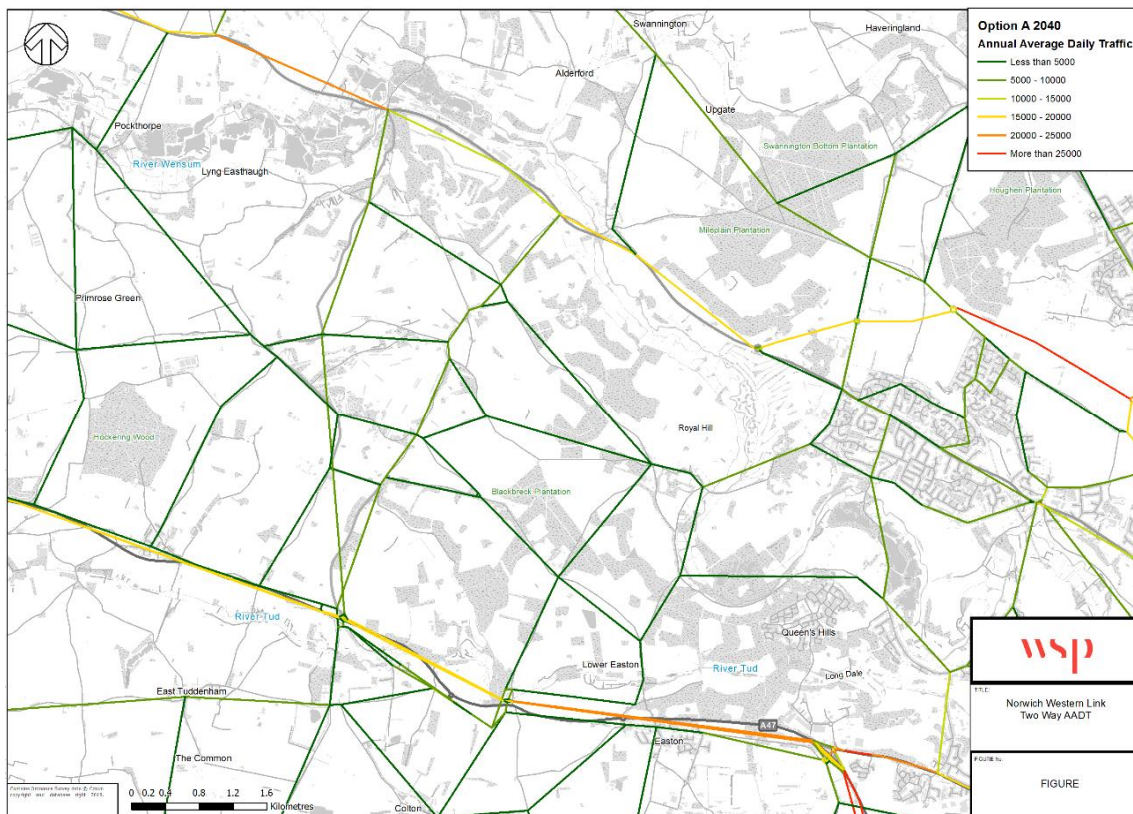


Figure 62 – AADT (2050) Option A: grade-separated

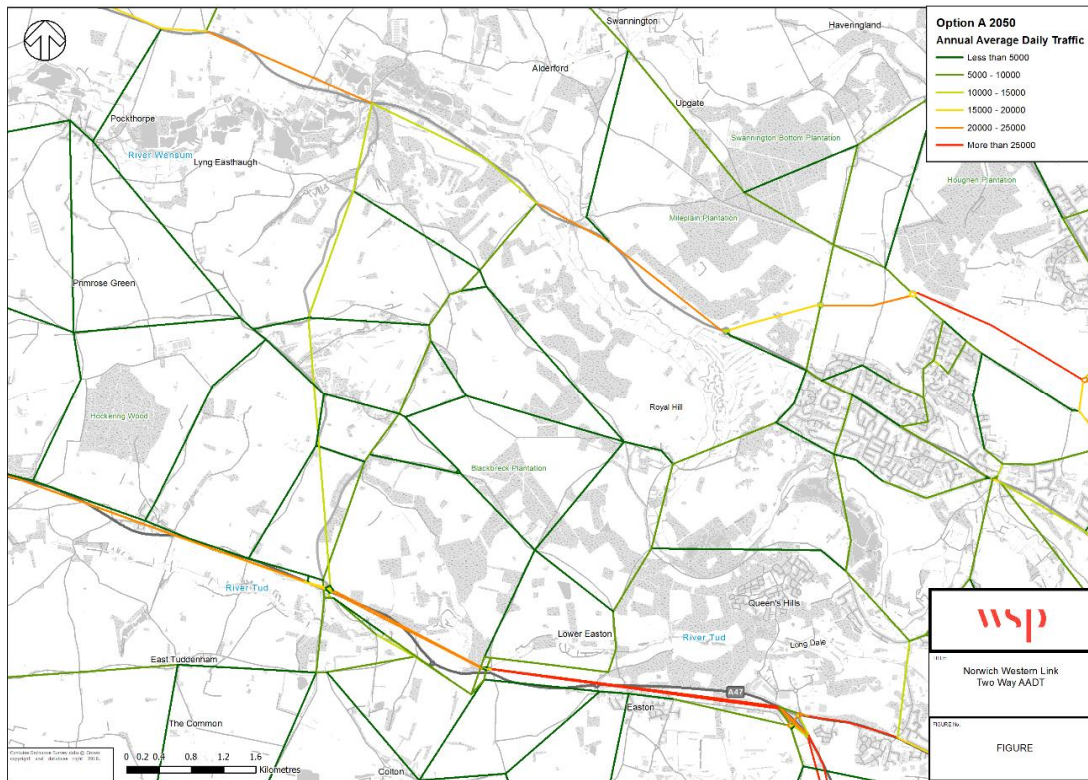


Figure 63 – AADT (2025) Option B (New Viaduct): grade-separated

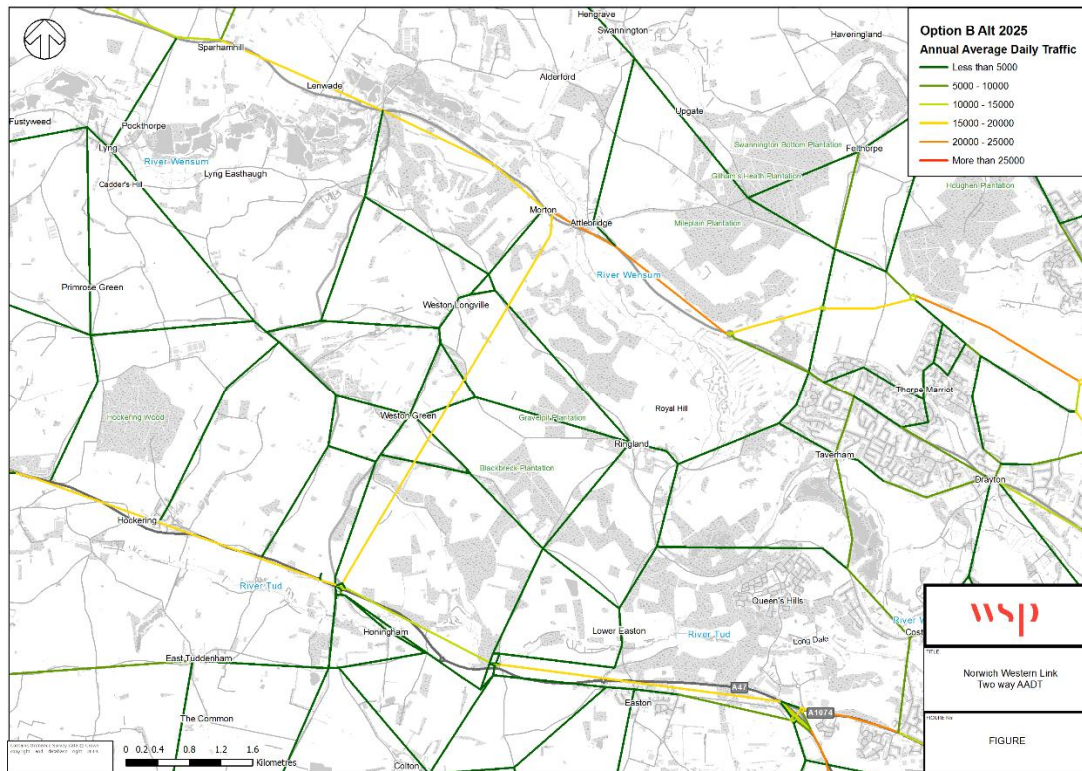


Figure 66 – AADT (2025) Option B (Existing Bridge): grade-separated

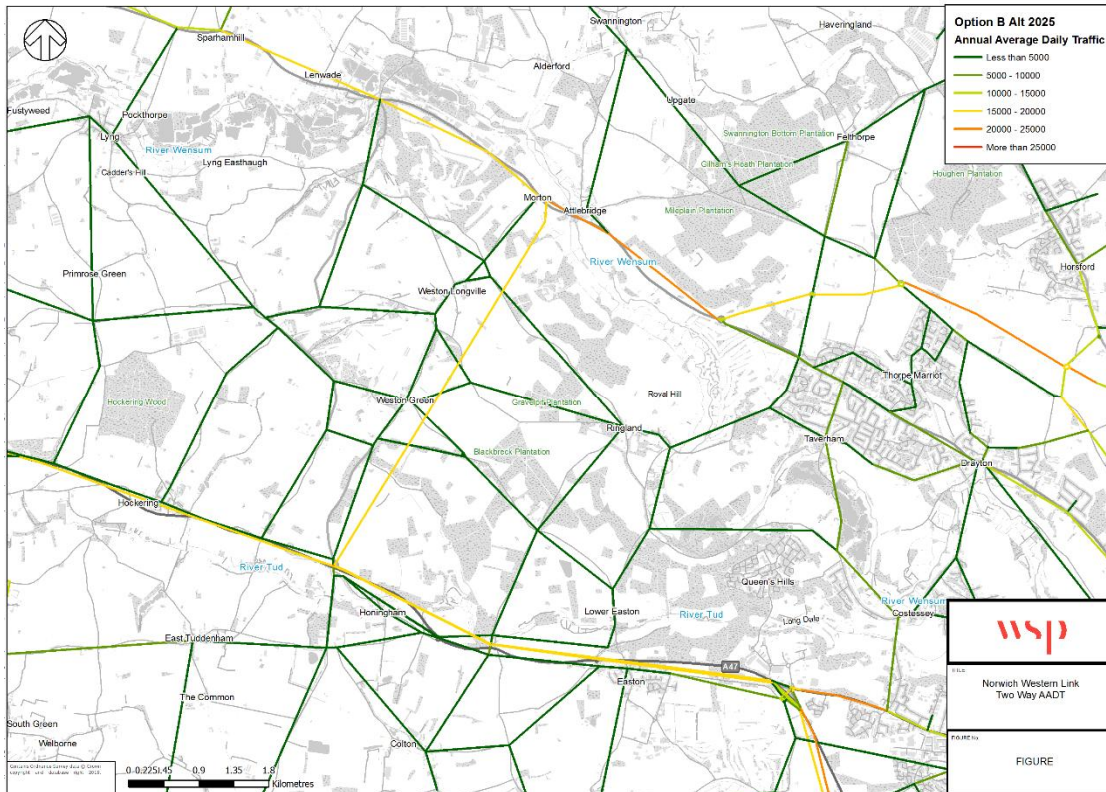


Figure 67 – AADT (2040) Option B(Existing Bridge): grade-separated

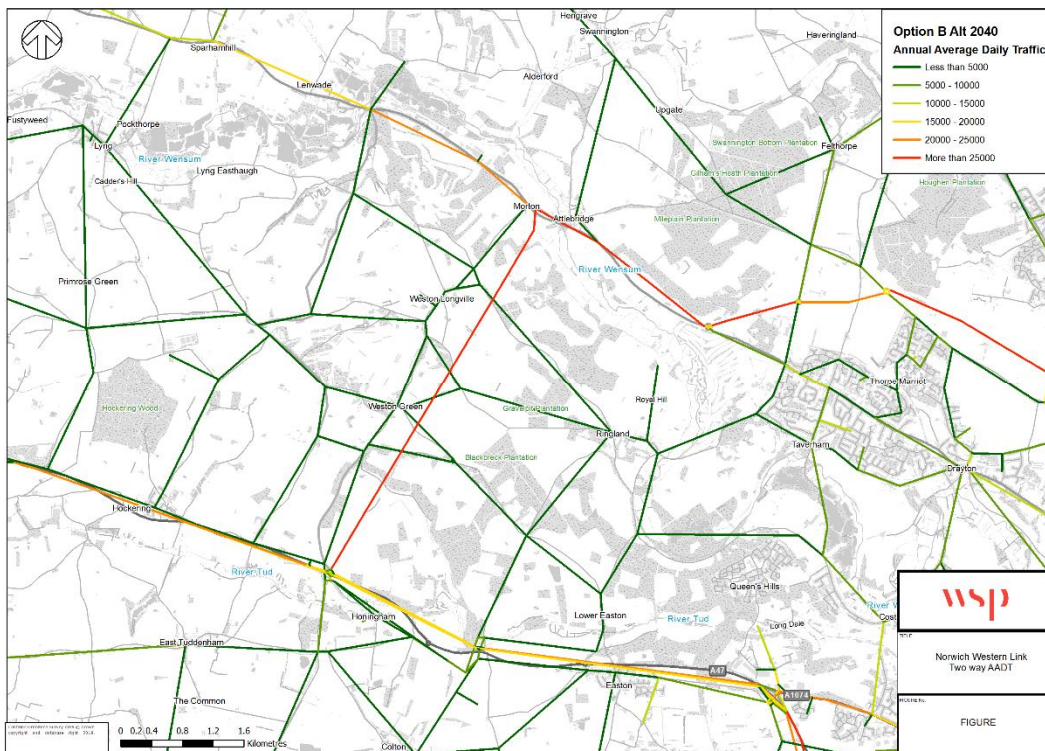


Figure 68 – AADT (2050) Option B(Existing Bridge): grade-separated

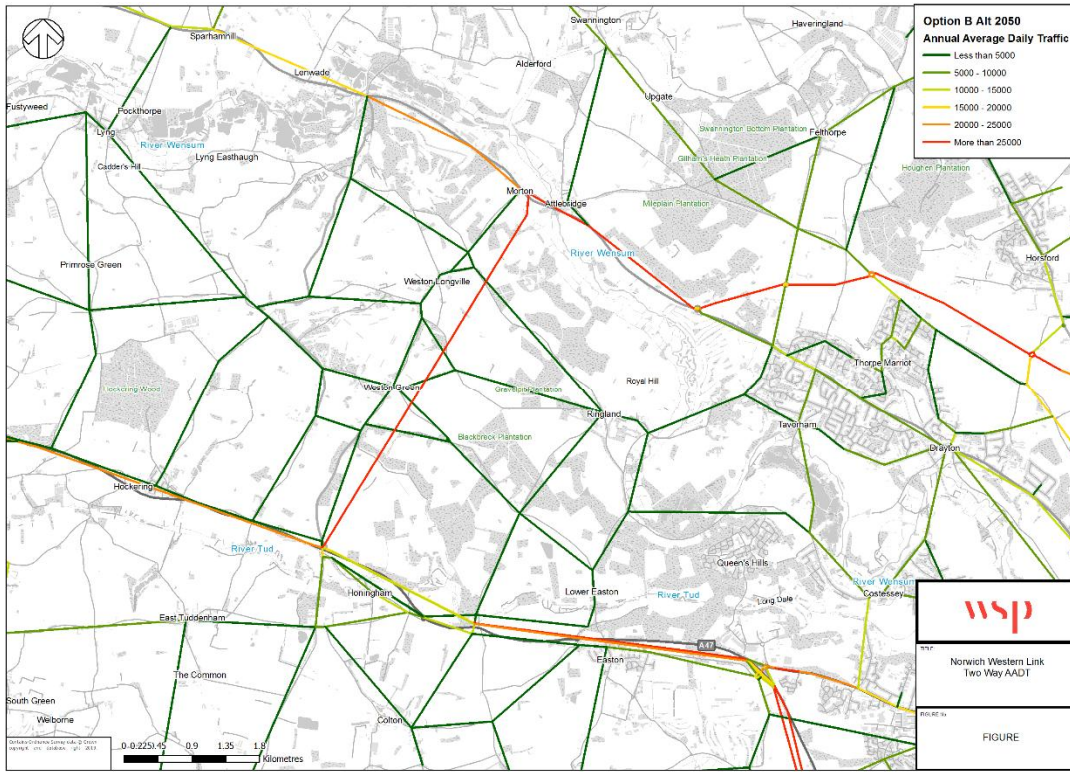


Figure 69 – AADT (2025) Option C: grade-separated

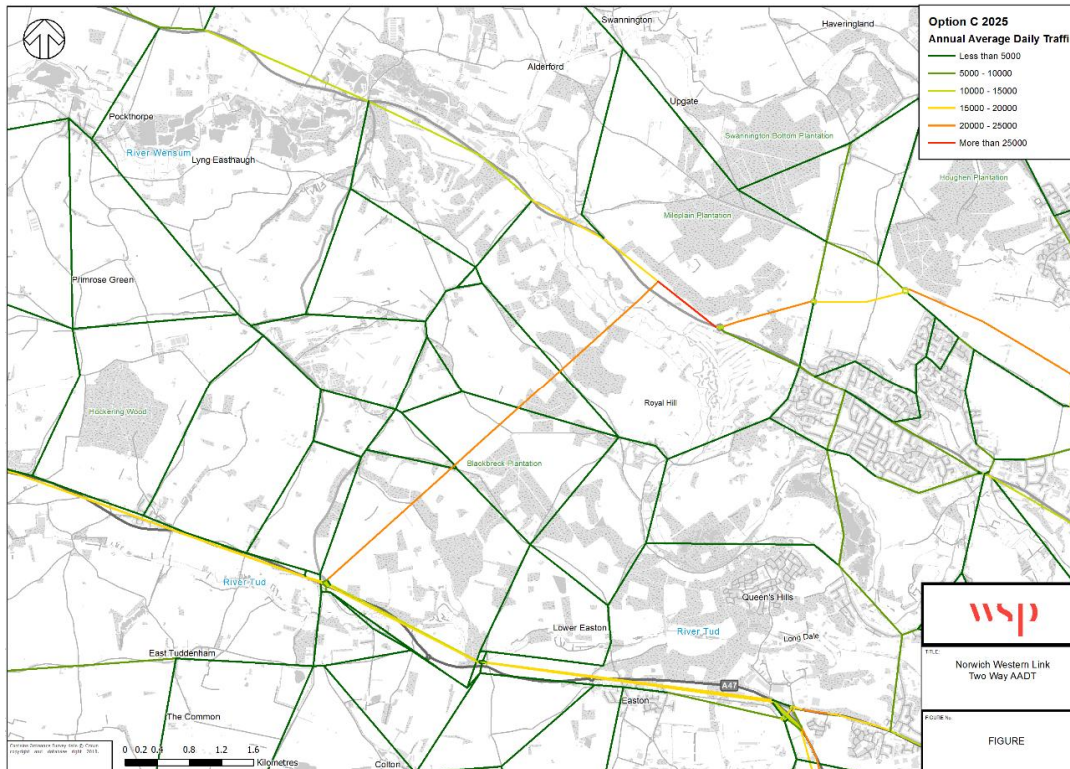


Figure 70 – AADT (2040) Option C: grade-separated

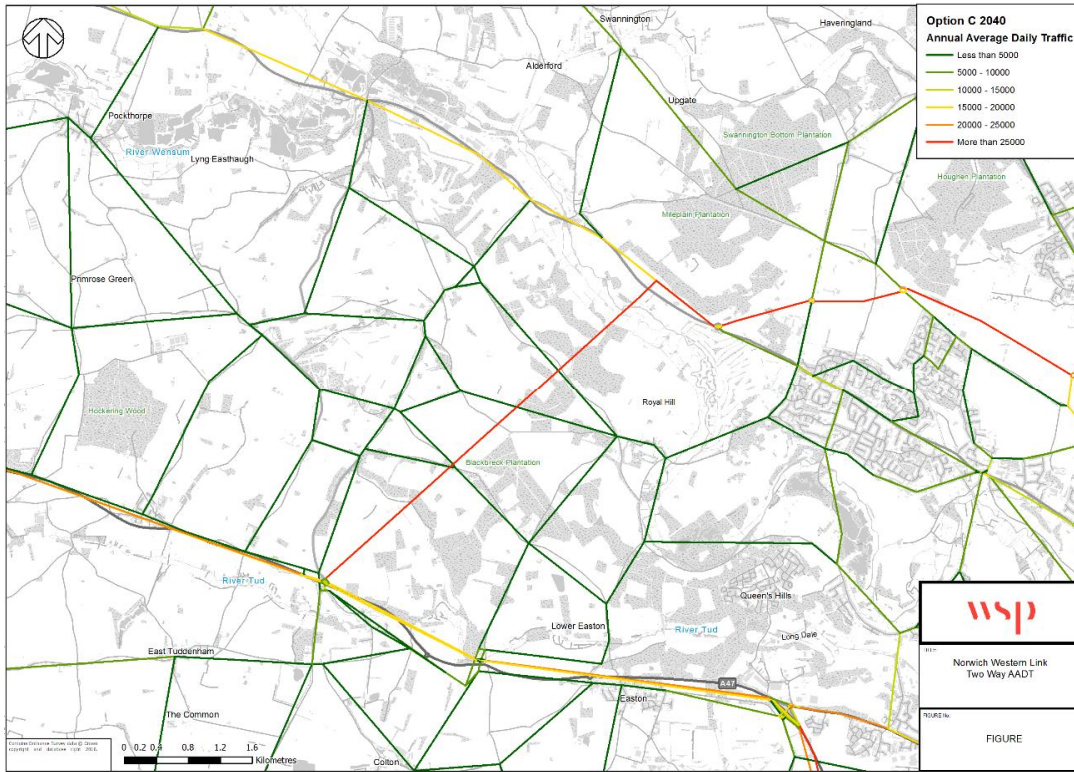


Figure 71 – AADT (2050) Option C: grade-separated

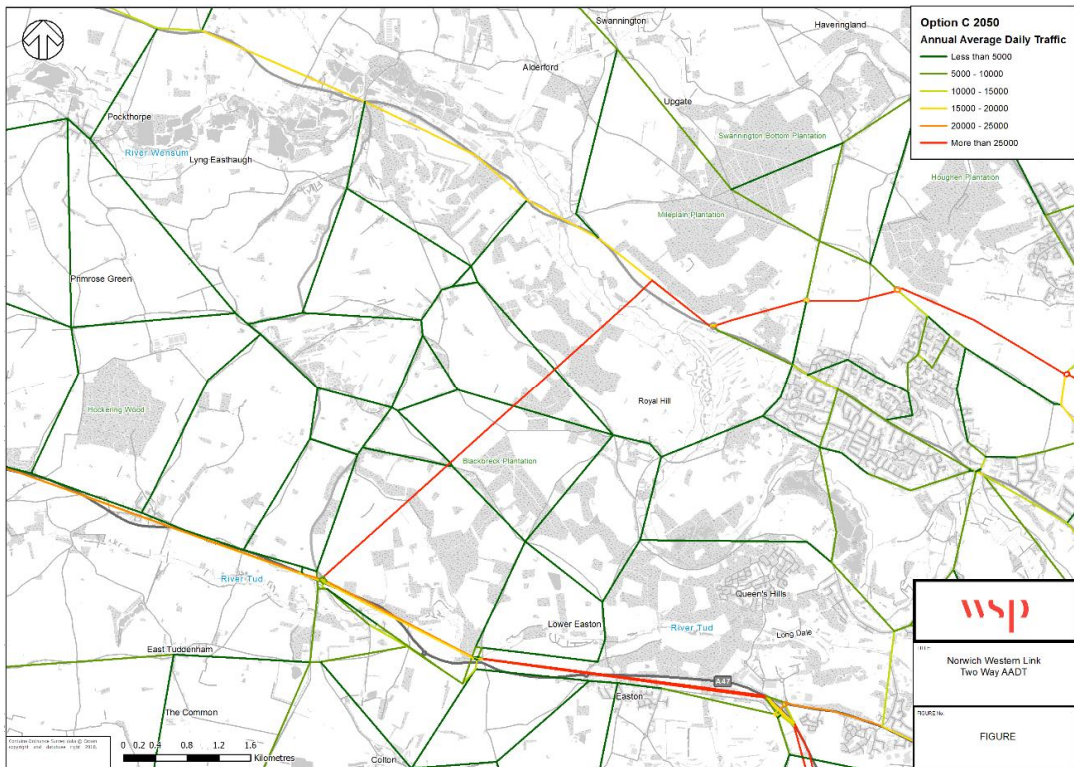


Figure 72 – AADT (2025) Option D: grade-separated

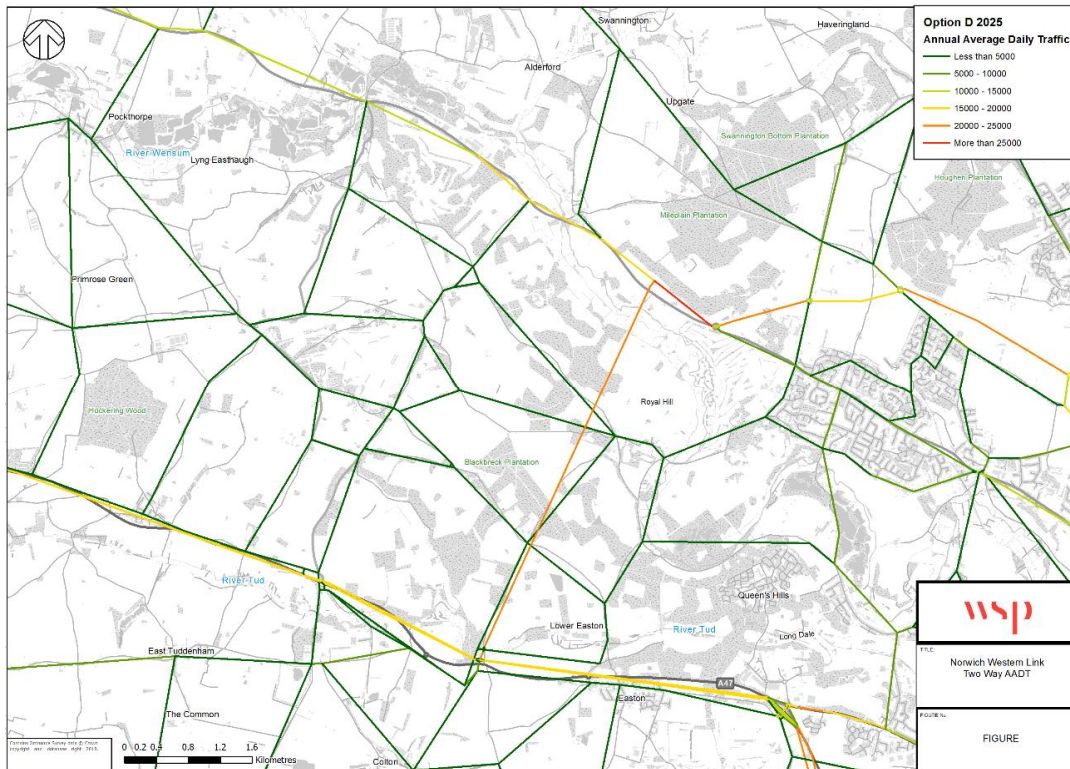


Figure 73 – AADT (2040) Option D: grade-separated

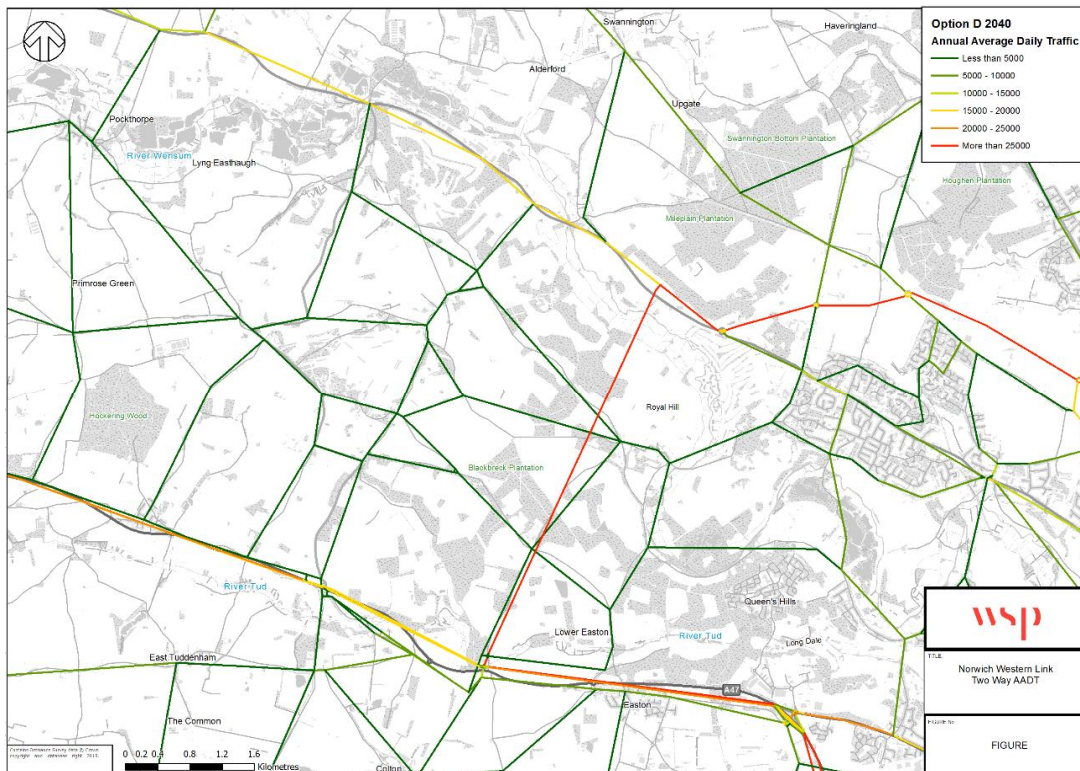
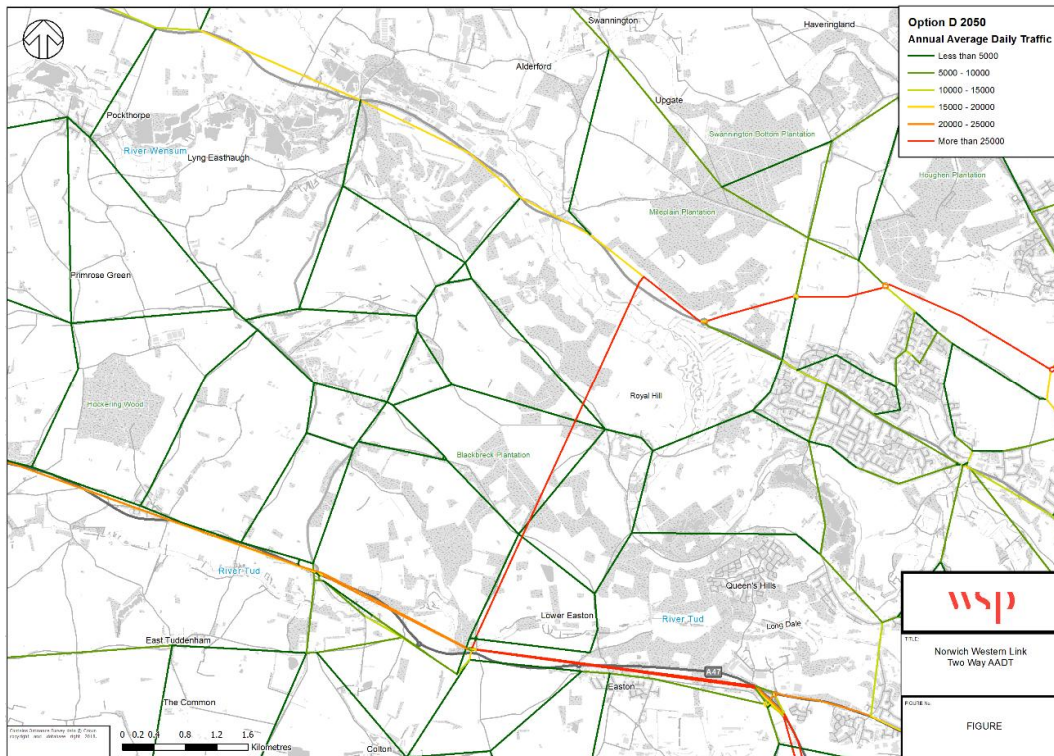


Figure 74 – AADT (2050) Option D: grade-separated



9.4. ECONOMIC APPRAISAL APPROACH

ECONOMIC APPRAISAL PROCESS

9.4.1. The appraisal of the economic elements associated with the scheme has been undertaken in accordance with WebTAG Unit A1.1 Cost-Benefit Analysis (May 2018) using the DfT’s standard appraisal software:

§ Transport User Benefit Appraisal (TUBA) version 1.9.11 with TUBA Economics File (version 1.9.11) using TAG Data Book v1.10 (May 2018).

9.4.2. The following economic elements have been considered for this stage of the assessment of the proposed Norwich Western Link scheme options:

- § Time Savings
- § Vehicle Operating Costs
- § Scheme Costs
- § Indirect tax revenue.

9.4.3. TUBA was used to carry out the economic appraisal of the NWL scheme options. All costs and benefits reported by TUBA are based on willingness to pay and expressed in the market price unit of account.

ECONOMIC PARAMETERS

9.4.4. The economic appraisal was undertaken in TUBA Version 1.9.11 with the TUBA input consisting of two files containing the economic data and scheme data.

- 9.4.5. The economic input file contains all of the economic data and parameters required by TUBA in the economic appraisal. The TUBA Economics File (version 1.9.11) has used TAG Data Book v1.8.10 (May 2018) which was the latest available at the time.
- 9.4.6. The scheme input file contains data regarding scheme costs, user classes, modelled years, annualisation factors and input matrices.

MODELLED YEARS

- 9.4.7. The economic appraisal was carried out over a 60-year period, as standard, from 2025 (opening year) to 2084. Traffic flows have been based on the 2025, 2040 and 2050 modelled forecast years.
- 9.4.8. Annualisation factors have been applied to convert peak period flows into annual flows. Details are provided in the following sections.

TIMESCALES / ANNUALISATION

- 9.4.9. TUBA makes a distinction between time slices and time periods. Standard time periods are defined in the economics file as:
- § AM Peak (Weekday 07:00 – 10:00)
 - § PM Peak (Weekday 16:00 – 19:00)
 - § Inter-peak (Weekday 10:00 – 16:00)
 - § Off-peak (Weekday 19:00 – 07:00)
 - § Weekend.
- 9.4.10. The SATURN model does not include weekend and the off-peak periods as origin-destination data were not collected for these time periods, therefore it has not been possible to determine potential benefits for these periods.
- 9.4.11. The SATURN model has been assigned as an AM peak hour model, average Inter peak hour model and a PM peak hour period which enables the benefits for these peak periods to be used in TUBA.
- 9.4.12. In order to model the time slices in TUBA, an annualisation factor is required to convert to each time period. The annualisation factor is given by $h \times d$ where h is the number of this time slice in the time period and d is the number of days a year containing the time period. The annualisation factor is specified in the scheme input file.
- 9.4.13. From the information detailed above, the modelled time slices used to represent the weekday benefit are detailed below:
- § AM peak period average hour time slice
 - § PM peak period average hour time slice
 - § Average Inter-peak period average hour time slice.
- 9.4.14. There are 253 peaked weekdays (excludes weekdays falling on bank holidays) meaning that the annualisation factors that have been used are:
- § AM peak (07:00-10:00): 693
 - § PM peak (16:00-19:00): 673
 - § Inter-peak (10:00-16:00): 1,518
- 9.4.15. These have been based on the recent observed count information collected within the study area by Norfolk County Council which looked at traffic flow volumes/patterns in the vicinity of the Norwich

Western Link as part of the on-going monitoring of the impact of the Norwich Northern Distributor Road (NNDR).

9.4.16. The benefits produced in this assessment represent a conservative estimate of the total benefits produced from the scheme. This is due to two main reasons:

§ No benefits were calculated for weekday off-peak periods (19:00 – 07:00)

§ No benefits have been calculated for weekends or bank holidays.

MATRIX INPUT

9.4.17. Matrix inputs were required for the number of trips and journey time for each user class and also for trip distance. The trip distance and journey time matrices were taken from the SATURN model directly for the 2025, 2040 and 2050 periods.

JOURNEY PURPOSE / USER CLASS

9.4.18. The trip matrices were split into the following vehicle types and journey purposes shown in **Table 29**. The correspondence between the SATURN matrix user classes and TUBA user classes is also shown.

9.4.19. In line with the production of the NATS transport model a Passenger Car Unit (PCU) value of '2.3' was used in converting HGV (vehicle units) to PCU whereas other vehicle classes remain constant i.e. 1 vehicle unit = 1 PCU for Car and LGV. For use within TUBA the HGV user class needs to be converted to vehicles therefore a factor of 0.43 i.e. 1/2.3 has been used.

9.4.20. All HGV were defined as Vehicle Type 4 (OGV1) in TUBA. As these have lower operating costs than OGV2, this is likely to have resulted in a conservative estimate of benefits attributable to HGV.

Table 29 – TUBA to SATURN matrix user class correspondence

SATURN user class	Vehicle type	Journey purpose	TUBA user class	Journey purpose	PCU to vehicle factor
1	Car	Business	1	Business	1
2	Car	Commuting	2	Commuting	1
3	Car	Other	3	Other	1
4	LGV	LGV	4	LGV Personnel	1
4	LGV	LGV	5	LGV Freight	1
5	HGV	HGV	6	OGV1	0.43

SCHEME COSTS FOR INPUT TO TUBA

9.4.21. The scheme costs, with allowance for risk, and inflation, that have been used are the latest available, at Q3 2018 prices, with Construction costs currently being estimated at:

§ Option A: £60,373,844

§ Option B: £155,497,042 (New Viaduct)

§ Option B: £129,007,811 (Existing Bridge)

- § Option C: £153,098,650
- § Option D £161,352,646

- 9.4.22. The final scheme costs are discounted back to 2010 in 2010 prices as required by DfT and WebTAG for comparison with other projects.
- 9.4.23. The scheme costs for the TUBA analysis have included optimism bias at 29.5% for the roadworks and 44.5% for the structures. This assumes that the scheme assessment is between Strategic Outline Business Case (SOBC) and Outline Business Case (OBC) in terms of the level of work that has gone into for the current cost estimates. Prices have been estimated and discounted to 2010.
- 9.4.24. The scheme costs have been set out within **Table 30** showing estimated risk and inflation.

Table 30 – Scheme costs with inflation and estimated risk

Scheme Element	Option A	Option B New Viaduct	Option B Existing Bridge	Option C	Option D
Base Cost	£42,946,446	£116,178,134	£91,532,946	£117,639,333	£122,094,678
Estimated Risk	£13,330,000	£27,870,000	£27,925,049	£24,080,000	£27,370,000
Inflation	£4,097,398	£11,448,908	£9,549,815	£11,379,317	£11,887,967
Total	£60,373,844	£155,497,042	£129,007,810	£153,098,650	£161,352,645

TRAVEL TIME CHANGES CALCULATION

- 9.4.25. Travel time savings are monetised as a perceived benefit, reflecting users' willingness to pay for a quicker journey. The value of those savings differs depending on the reason for the trip, of which three are defined in TAG; business users, commuters, and non-commuting consumers e.g. leisure trips.
- 9.4.26. The costs and benefits for travel time savings have been assessed using TUBA. The trip length, trip volume and journey time information needed for this has been taken from the relevant SATURN models.
- 9.4.27. The costs and benefits for travel time savings have been assessed using TUBA. The transport model, described in previous sections, has been used to extract time, distance and trip matrices from a Fixed Demand Model assessment for use within the TUBA assessment.

VEHICLE OPERATING COST CHANGES

- 9.4.28. Vehicle operating cost savings accrue in two categories; fuel costs, a function of the speed of the vehicle through the network and fuel efficiency, and non-fuel costs such as oil, tyres, vehicle maintenance depreciation and business vehicle capital costs, largely a function of the distance travelled by the vehicle.
- 9.4.29. The costs and benefits for vehicle operating costs have been assessed using TUBA. The trip length, trip volume and journey time information needed for this has been skimmed from the relevant SATURN models.

PRESENT VALUE OF COSTS

- 9.4.30. The Present Value of Costs (PVC) are calculated within the TUBA program where the costs are factored by an Indirect Tax Correction Factor Rate of 19%. This is then factored by the Gross Domestic Product index for the year on which the costs have been produced. This deflates the costs to 2010 prices.
- 9.4.31. These are then discounted to 2010 which produces the PVC.

TRANSPORT ECONOMIC EFFICIENCY

- 9.4.32. The DfT classifies schemes within six VfM categories, which are outlined in **Table 31**.

Table 31 – VfM categories

VfM category	Implied by...
Very High	BCR \geq 4
High	BCR between 2 and 4
Medium	BCR between 1.5 and 2
Low	BCR between 1 and 1.5
Poor	BCR between 0 and 1
Very Poor	BCR \leq 0

- 9.4.33. Each of NWL options have been categorised into a VfM category as per the information contained within **Table 31**. It must be stressed that the VfM category has been based on travel time benefits assessed using the TUBA program and does not include potential benefits from accident savings, air quality improvements or reduction in noise for example. It is more than likely that the inclusion of these other elements would increase benefits. The VfM analysis per option is shown in **Table 32**.

Table 32 – Analysis of option VfM

Type	A47 scheme with at-grade junctions	A47 scheme with grade-separated junctions
Option A	Low	Low
Option B New Viaduct	Medium	High
Option B Existing Bridge	Medium	High
Option C	Medium	High
Option D	Medium	High

10. NEXT STEPS

10.1. INTRODUCTION

- 10.1.1. Following feedback and comments on this OAR, more detailed appraisal will be undertaken during Stage 2 of the Transport Appraisal Process. The future work will identify the merits and challenges of each option, seeking ways to maximise the benefits and mitigate any adverse impacts, ultimately leading to the identification of a preferred intervention package for a NWL. The following sections outline the next steps that will be taken in regard to the options identified in **Section 9.3**.

10.2. DESIGN EVOLUTION

- 10.2.1. The shortlisted options will be designed in more detail and layouts will be produced, with potential horizontal and vertical alignments developed to inform land take assumptions. Light Detection and Ranging (LIDAR) data will be used to inform the long section design and extents of bridge decks and viaduct piers.
- 10.2.2. The majority of highway options emerging from the EAST appraisal as shortlisted options were dual carriageway options. However, further modelling is required to ascertain the exact scale and capacity requirements for each option. Therefore, prior to more extensive modelling, the scheme footprints for Option B, Option C and Option D will be based on dual carriageway alignments which would require more land take and more onerous design and mitigation requirements due to the higher design speed and additional carriageway width. This will enable a robust assessment of scheme effects, with all options being considered on an equivalent basis. In the future, if modelling demonstrates that a single carriageway option is required, the scheme extents can potentially be reduced.
- 10.2.3. Drainage mitigation will be an important part of the design, as there are stringent requirements for a robust pollution control regime to protect the integrity of the SAC for options crossing the River Wensum. Options crossing the River Tud will also require mitigation. This is likely to have substantial land take implications, with attenuation basins located at the extents of any viaduct structures. Whilst the viaduct design would minimise land take within the floodplain, any displacement of flood storage capacity would also need to be mitigated, with compensatory storage taken from land currently outside of the flood zone extents.

10.3. PACKAGING OF OPTIONS

- 10.3.1. As set out in **Chapter 7**, during option sifting non-motorised user options were found to be less effective at meeting the scheme objectives and offering a resilient future proofed solution in isolation. However, these types of measures had been set aside for future packaging along with any of the shortlisted road-based solutions.
- 10.3.2. It is recommended that feedback should be sought on potential option packaging during the second round of public consultation to inform the next stage of design and SOBC.

10.4. EQUALITIES COMPLIANCE

- 10.4.1. In order to comply with Human Rights Act and Disability Discrimination legislation, an equalities impact assessment will need to be undertaken at the next stage prior to selection of a preferred option to ensure that no users with protected characteristics (i.e. race, religion, gender, age,

mobility, maternity, sexual orientation and religion) are discriminated against in the design of the NWL. This would be informed by a non-motorised user audit and a more detailed equalities compliance assessment of the preferred option would also be completed to understand any additional mitigation requirements to make sure that an inclusive design is achieved.

10.5. LAND REFERENCING

- 10.5.1. Once the permanent land take of each option has been defined, land referencing can be undertaken to identify potentially affected landowners. Land registry searches will need to be undertaken to obtain the land parcel boundary data so that a database of landowners will be created. This will enable Norfolk County Council to contact any affected landowners. Landowners would need to inform any tenants including tenant farmers.
- 10.5.2. There is a risk that the scheme extents may encompass some unregistered land (for example, rural land which may have remained in family control for a significant period of time without being sold, and therefore has remained unregistered).

10.6. TRANSPORT MODELLING

- 10.6.1. More detailed modelling will be undertaken on each of the shortlisted options using the updated NWL transport model. Assessments will be carried out for opening year (2025), a design year 15 years after opening (2040) and a horizon year (2050), comparing the proposed scheme options against the 'Do nothing' future year network. The Modelling Technical Note has been provided within Appendix J.
- 10.6.2. The future year network will include the A47 RIS schemes and committed transport improvements. Baseline housing and employment growth will be derived from the adopted Local Plan in the short term, and this will form the basis of the "Low Growth" and "Core" scenarios. Longer term assessments will be based on the emerging Local Plan growth with a range of potential growth considered. Beyond the Local Plan horizon TEMPro or extrapolated forecasting will be applied to form a "High Growth" and "Optimistic" scenario, in accordance with the DfT's WebTAG.

10.7. ENVIRONMENT

AIR QUALITY & NOISE ASSESSMENTS

- 10.7.1. The modelled traffic data will be used to inform a quantitative air quality and noise assessment. This will consider day time and night time noise levels and will seek to identify more specific impacts on AQMAs and NIAs of the various scheme options.

LANDSCAPE

- 10.7.2. Whilst landscape has been assessed within the environmental assessment at this stage, it is recommended that a landscape objective is included within the next stage. A landscape scale approach to the habitat compensation area should be considered early to understand the most useful places for new woodland and hedgerow provision in relation to ecology (the rare *barbastelle* bat being a key concern), landscape requirements (screening etc) and the objective for better public access within the study area.

ECOLOGY SURVEYS

- 10.7.3. A high-level Phase 1 study has been completed to date – this included a walkover of the area, however, due to the scale of the study area and number of options considered, it was not possible to access all private land areas at this stage. Given the sensitivity of the receiving environment, extensive Phase 2 surveys are also likely to be required – especially in relation to bat activity, roosting and hibernation.
- 10.7.4. Following public consultation, the shortlist will be further reduced in early 2019 to inform the SOBC development. At this stage, further walkovers can be undertaken where landowner consent is available and any ponds which may offer suitable habitat for Great Crested Newts will need to be tested for presence or absence to enable the further stage of Great Crested Newt population surveys to be scoped. WSP will work with the County Ecologist to scope such surveys as appropriate to the preferred scheme options.

10.8. ENGAGEMENT

KEY STAKEHOLDER CONSULTATION

- 10.8.1. Ongoing engagement will continue via the LLG and MWG. Their feedback will be sought on the shortlisted options prior to public consultation. Once the designs of the shortlisted options are sufficiently evolved, there will be an opportunity to engage with key stakeholders such as Natural England and Environment Agency. It is envisaged that discussions at this stage will assist with mitigation design and high-level scoping of appropriate assessments. Communication and liaison with Highways England will also continue throughout the project regarding the A47 North Tuddenham to Easton scheme.

PUBLIC CONSULTATION

- 10.8.2. A second round of public consultation is proposed to commence on 26 November 2018, with a series of public events to be held in late 2018 prior to the Christmas break and after the holidays in January 2019. This will maximise opportunity for local residents and affected stakeholders to participate, whilst avoiding conflict with the seasonal holidays.
- 10.8.3. Consultation objectives for the next round of engagement have been defined as follows:
- § Understand the degree of public support for each of the shortlisted options
 - § Understand how each of the shortlisted options rank against one another
 - § Gauge support for each shortlisted option from statutory and non-statutory organisations
 - § Gain knowledge of potential scheme risks and local effects of each of the shortlisted options which may influence design or cost
 - § Informing the development of the SOBC, in particular seeking to identify additional potential social and economic scheme benefits and opportunities which may arise as a result of each shortlisted option and any aspects requiring mitigation which may influence the scheme cost
 - § Update members of the public on feedback from the previous consultation and how this has been taken into account in developing scheme options
 - § Engage with potentially affected landowners
 - § Explain the long list of options considered and shortlisting results, in particular how constraints and environmental considerations have influenced the outcome
 - § Communicate the high-level principles and broad locational characteristics of the shortlisted options now proposed



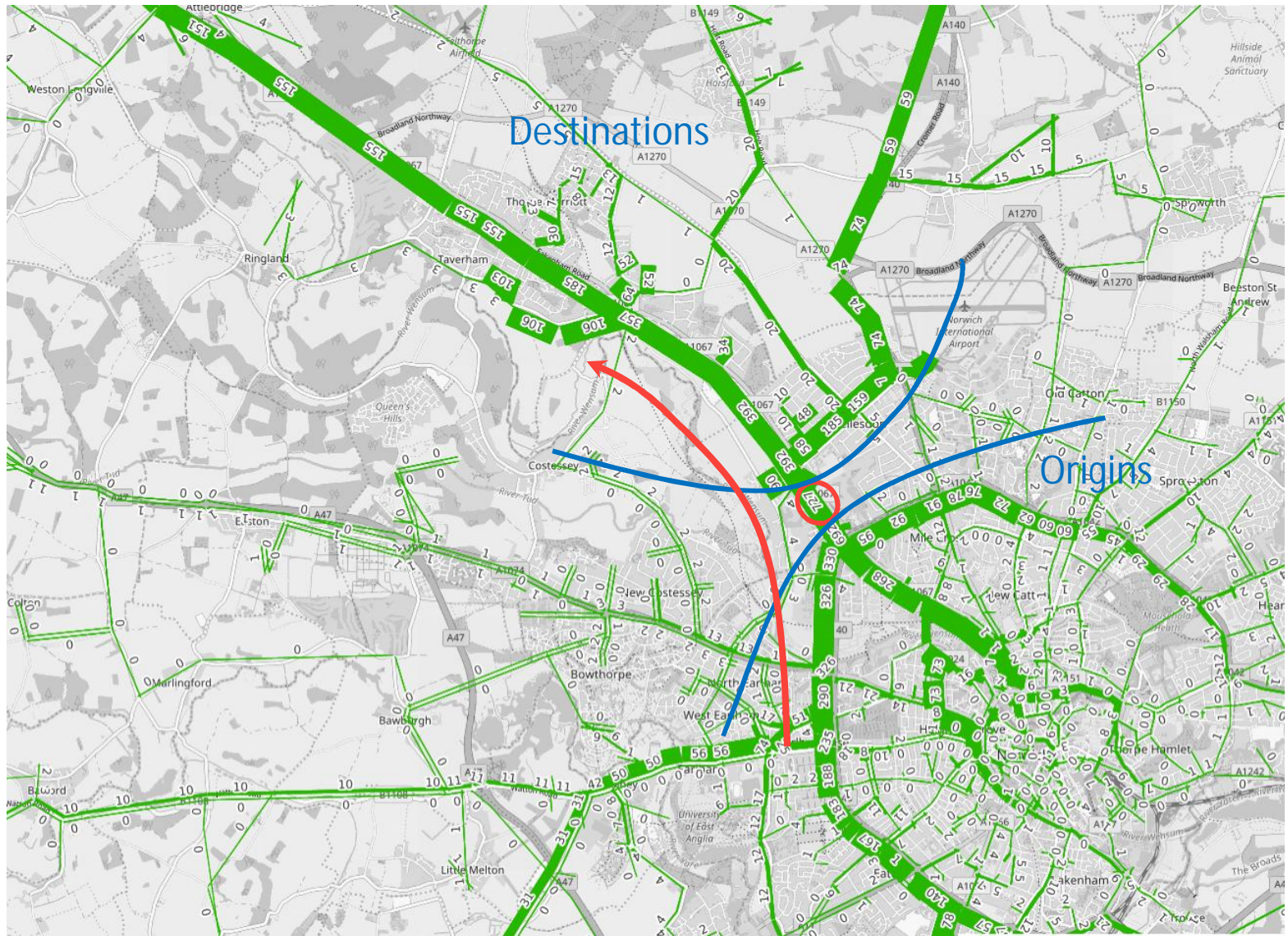
- § Explain the next steps and timescales for the project moving forward
- § Indicate the likely process for planning that might be followed and opportunities for people to engage with the project going forward (e.g. future consultation events)

Appendix A

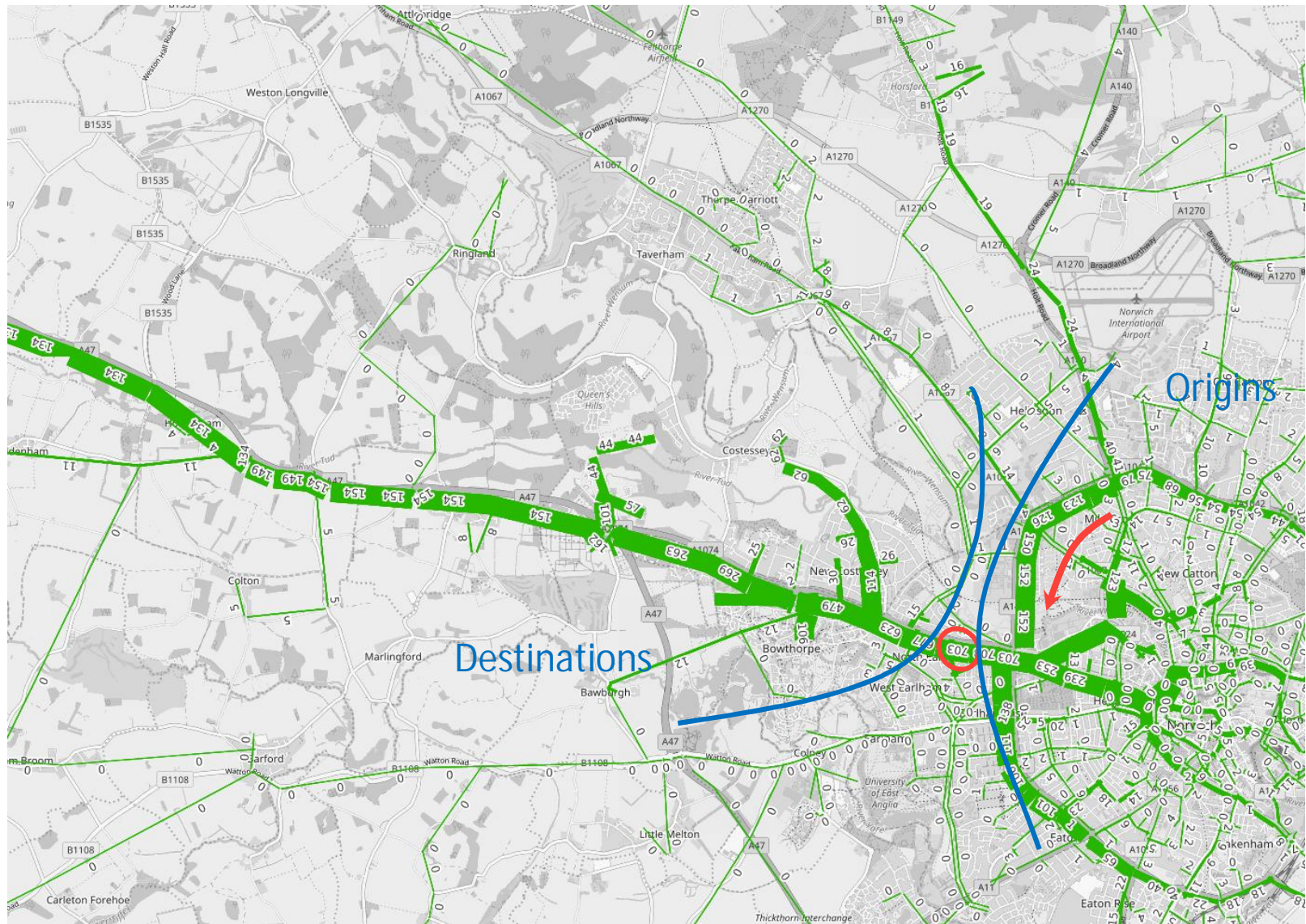


ORIGINS & DESTINATIONS BY
SPECIFIED LINK

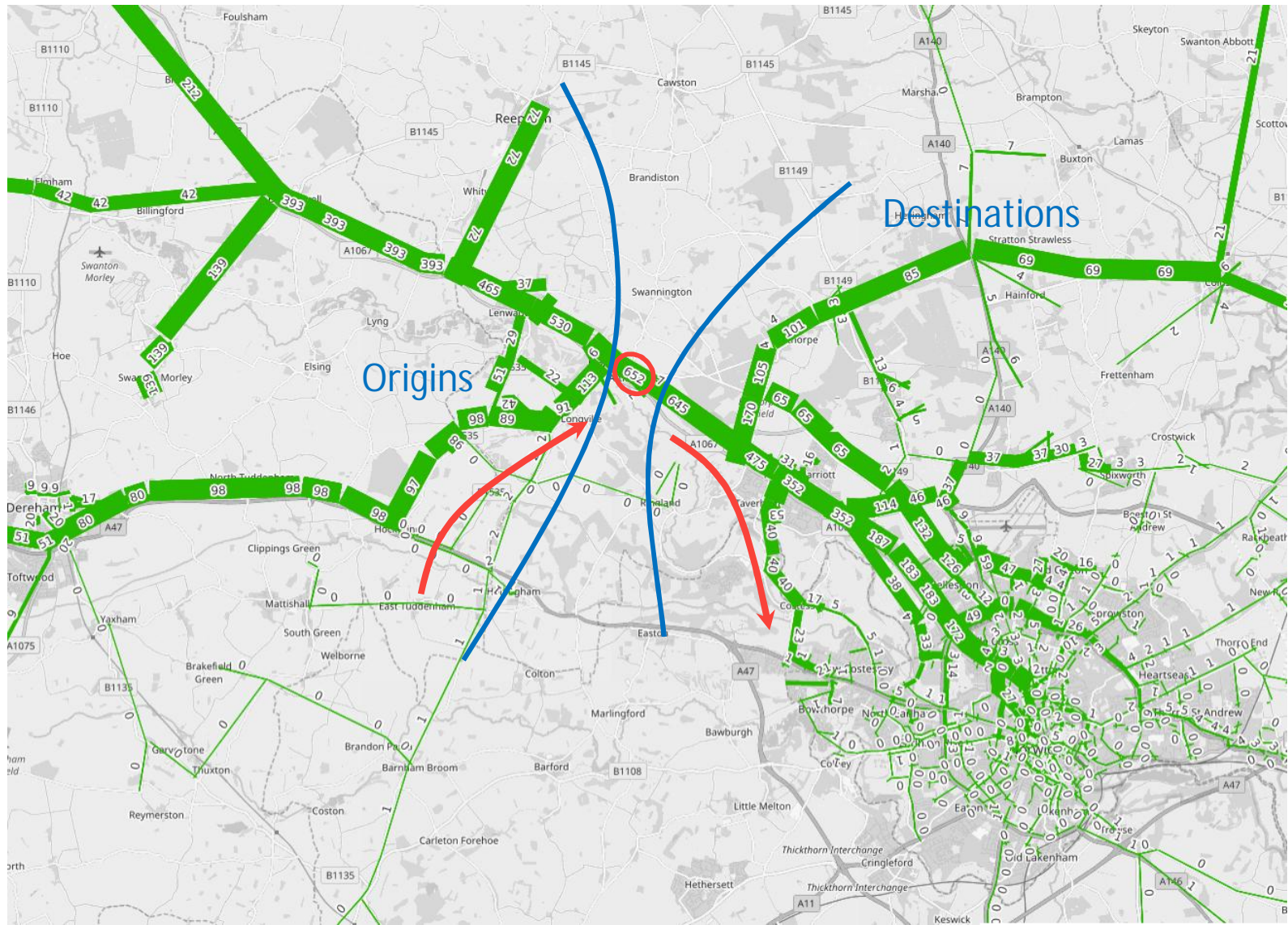
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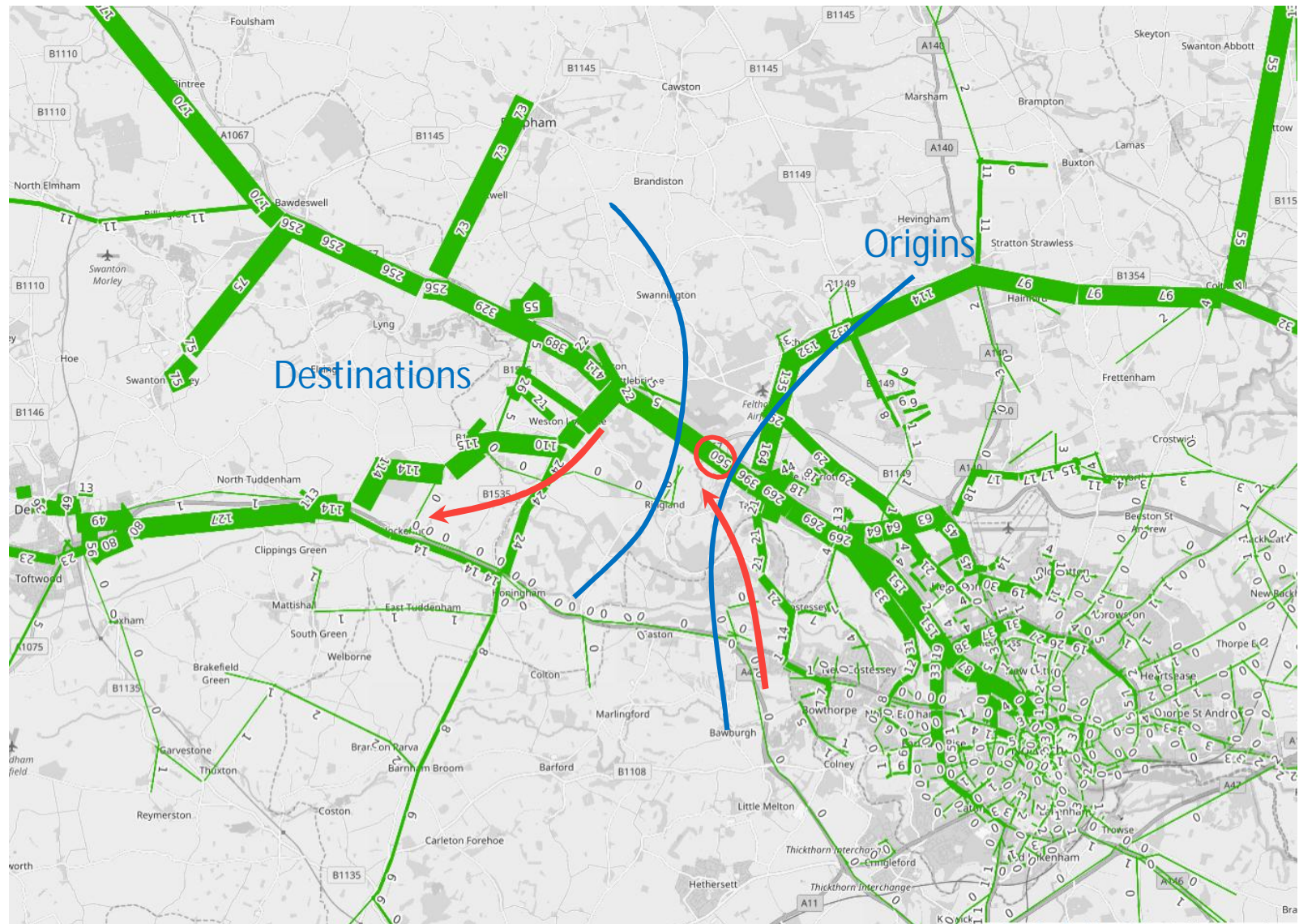
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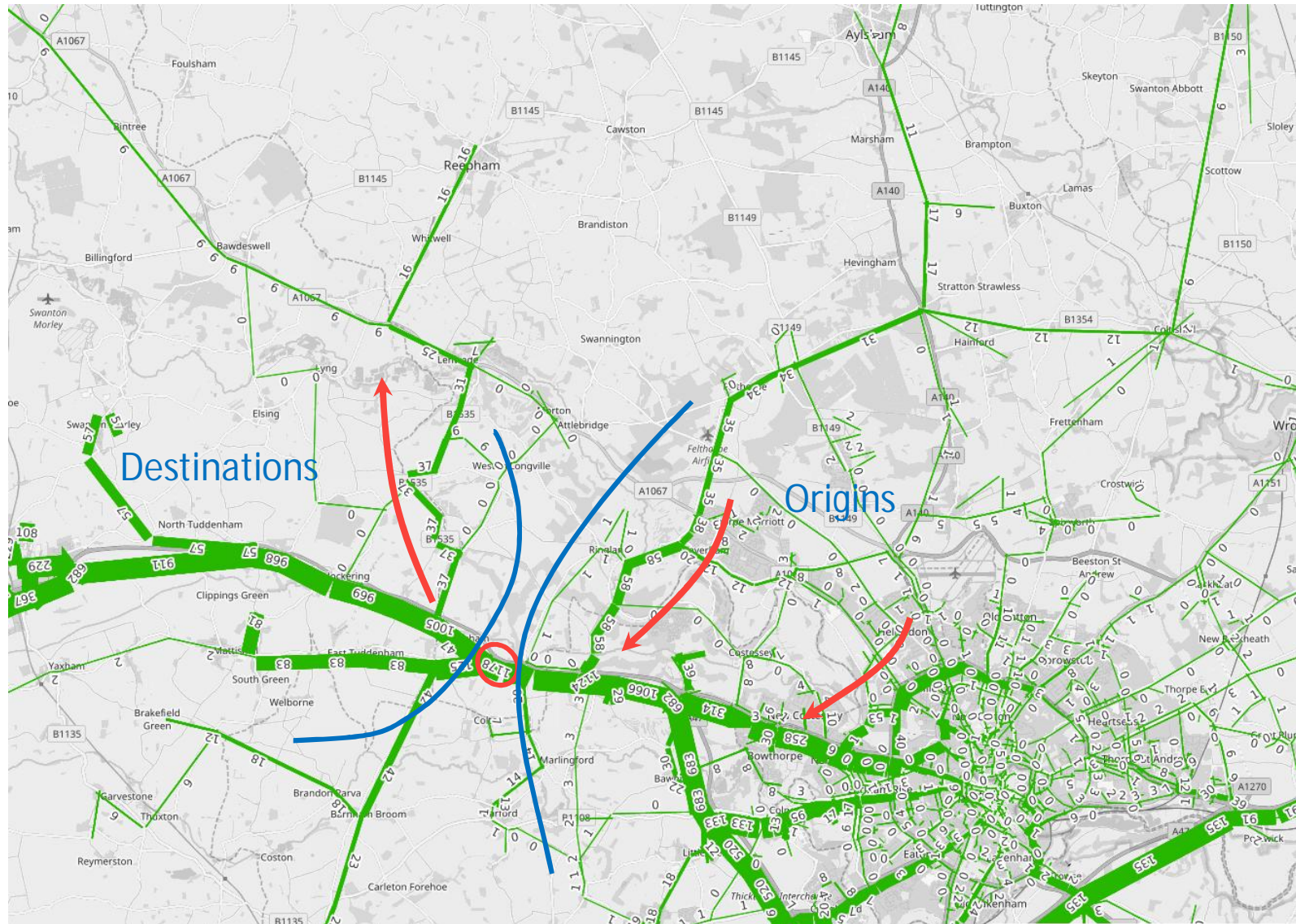
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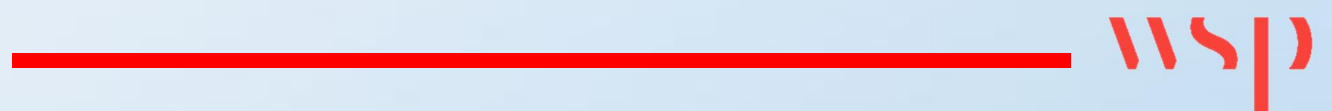
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Base AM Select Link – A47 EB

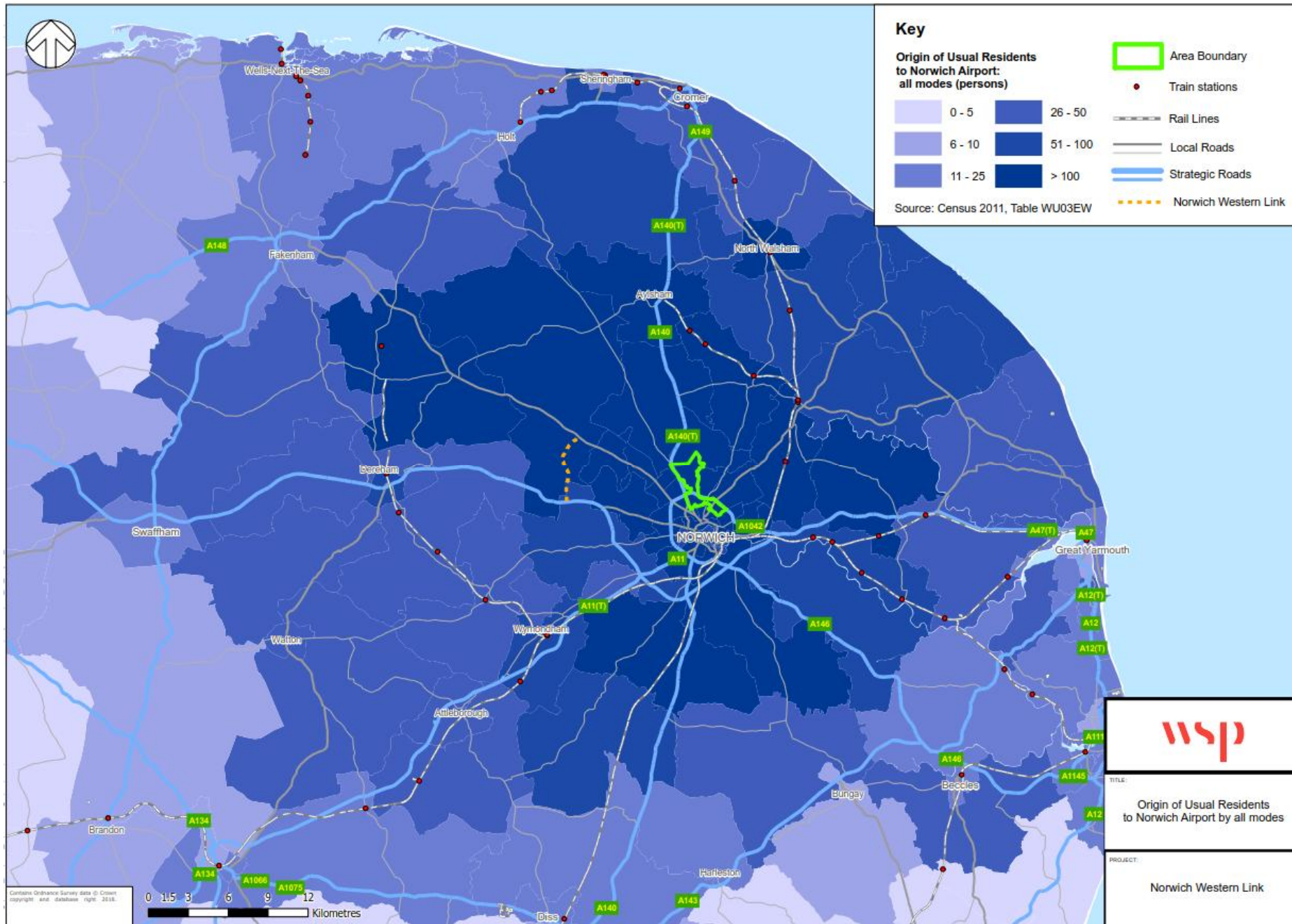


Appendix B

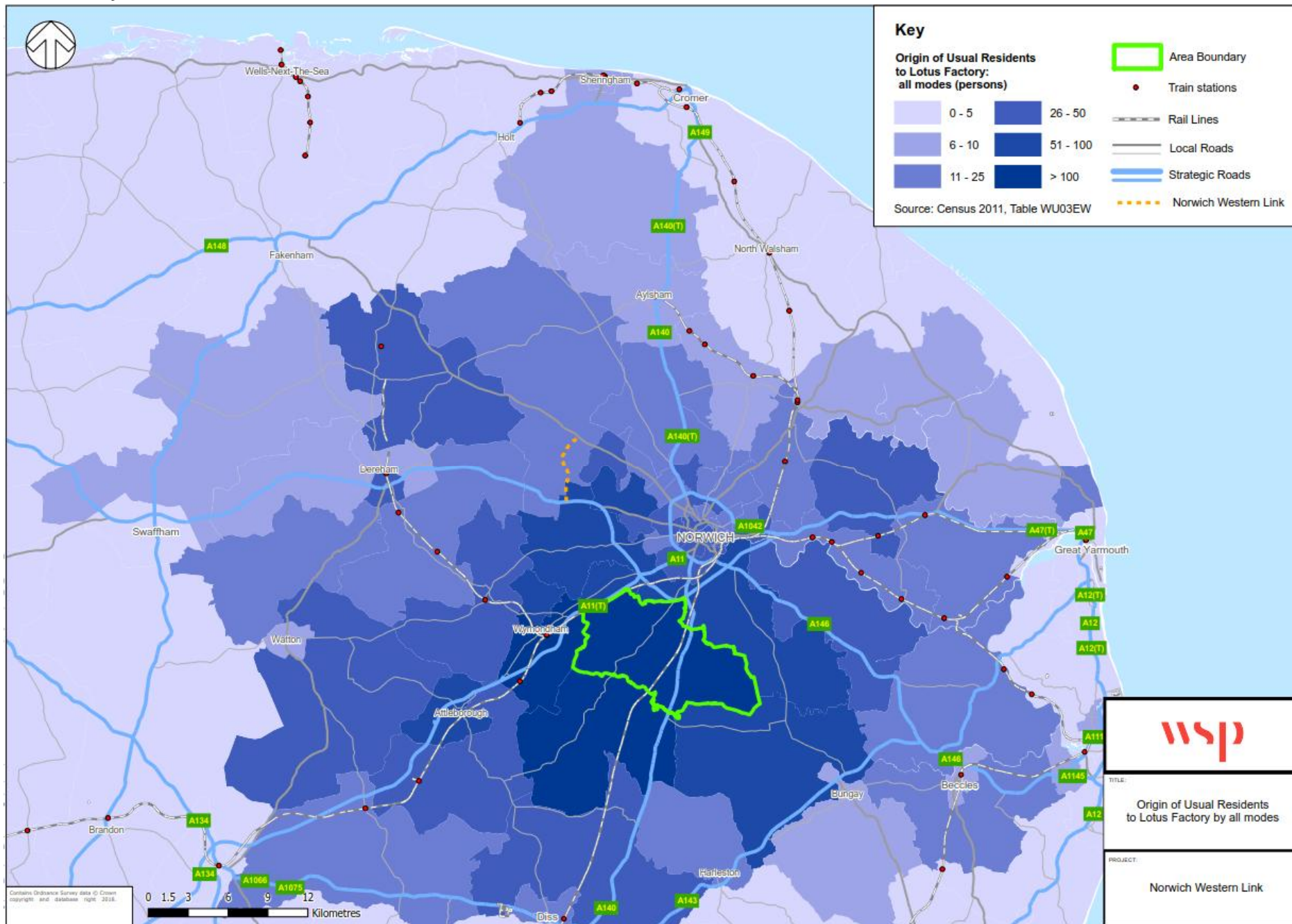


ORIGINS OF USUAL RESIDENCE
(VARIOUS EMPLOYMENT
LOCATIONS)

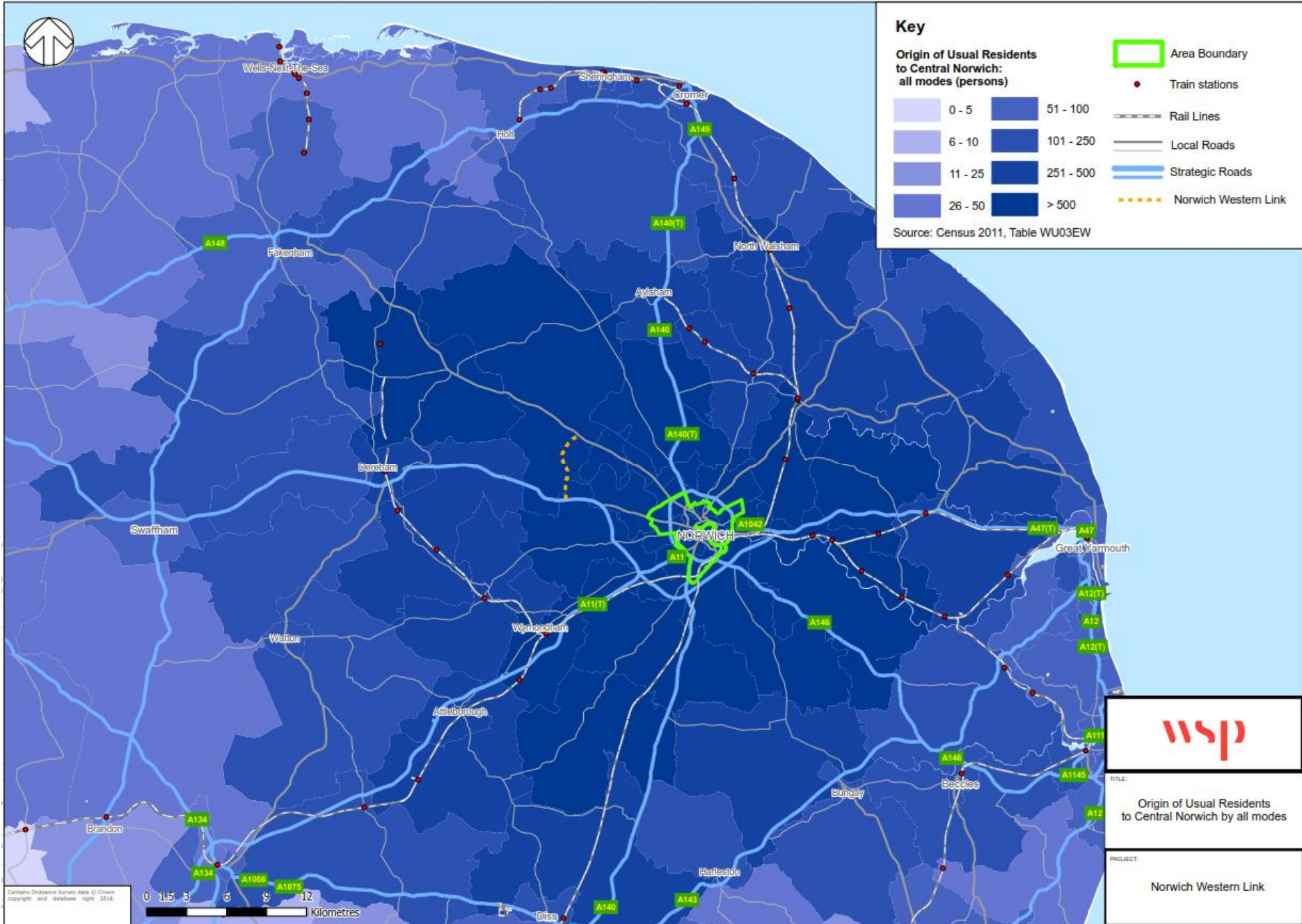
Norwich International Airport

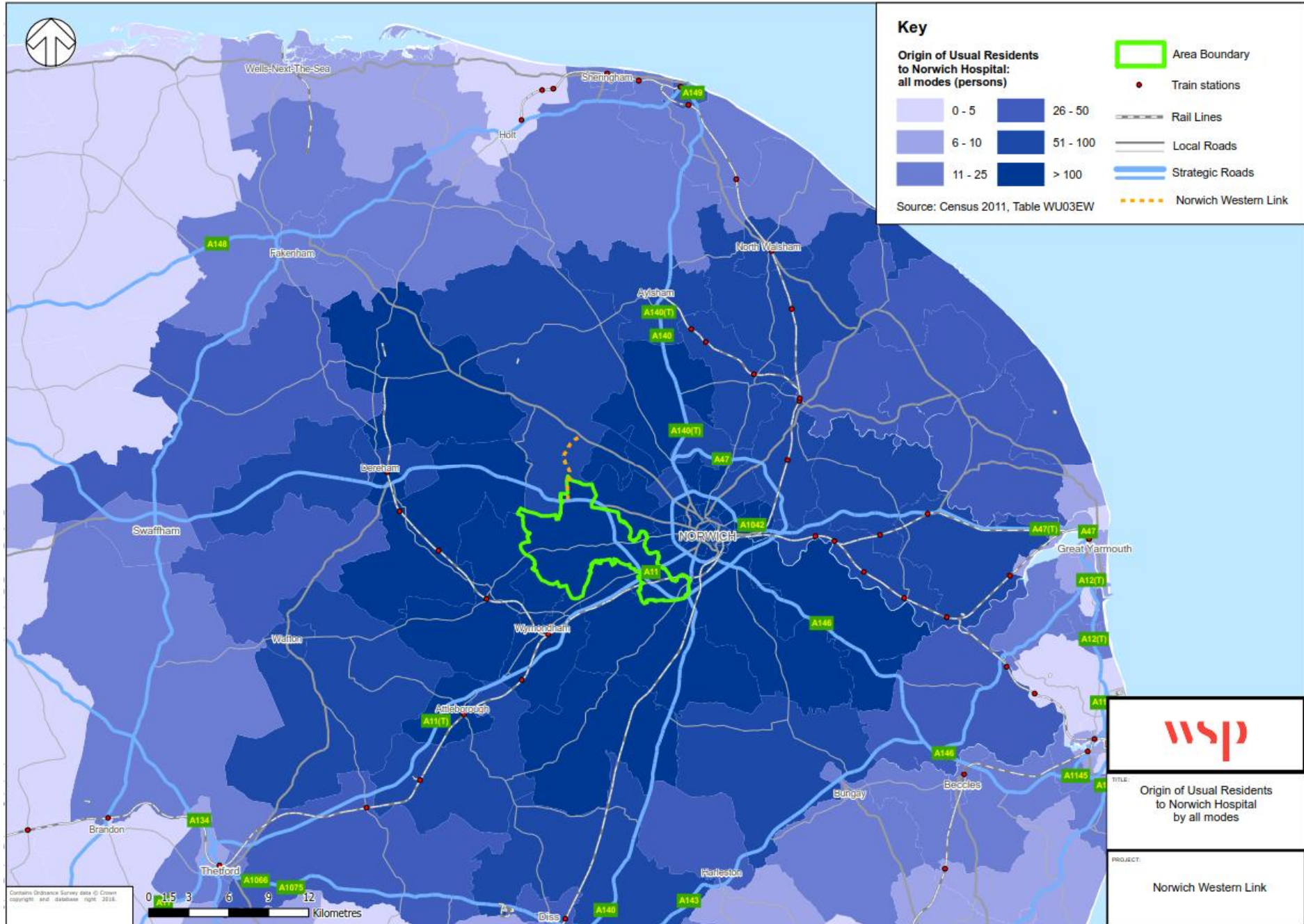


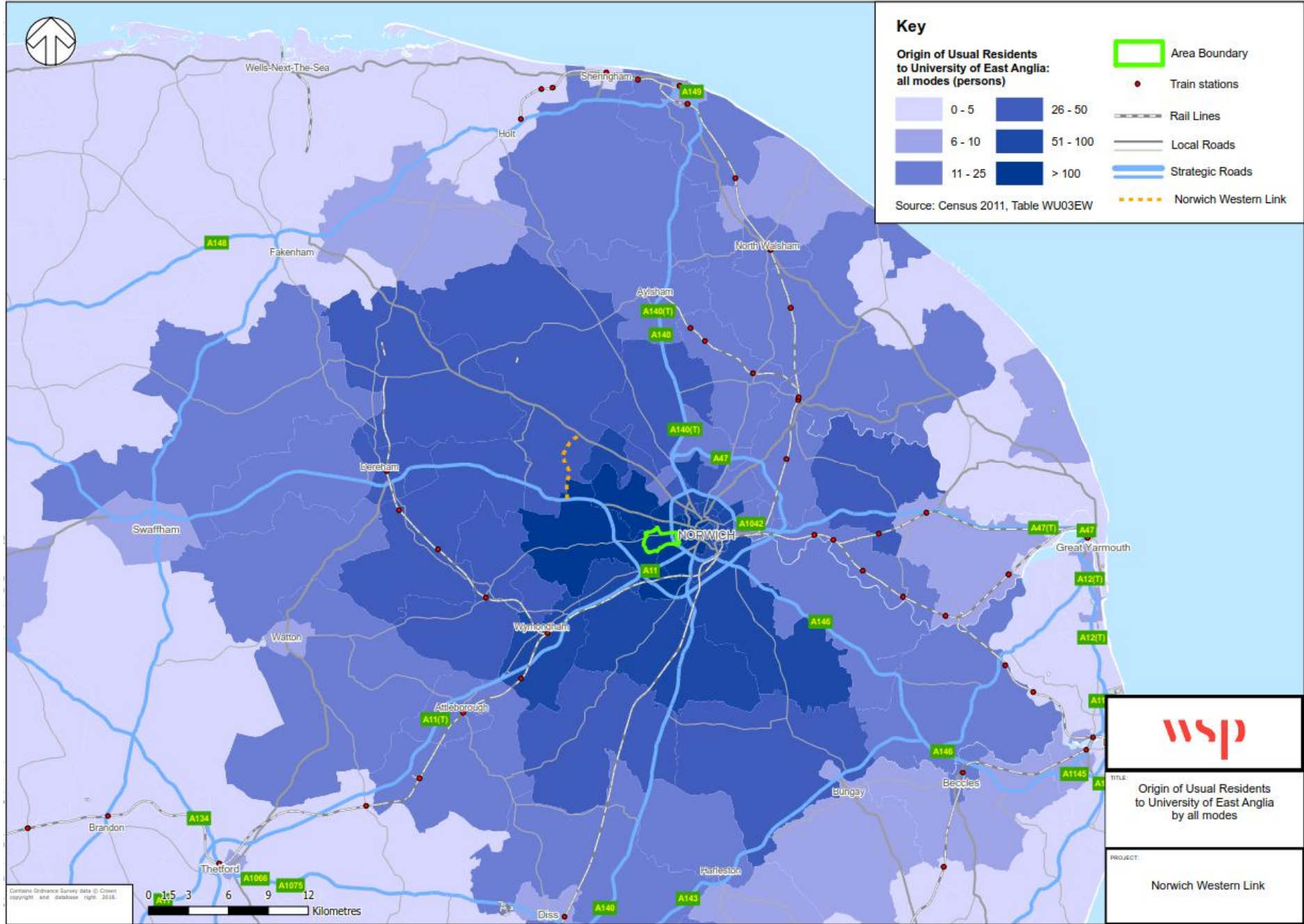
Lotus factory



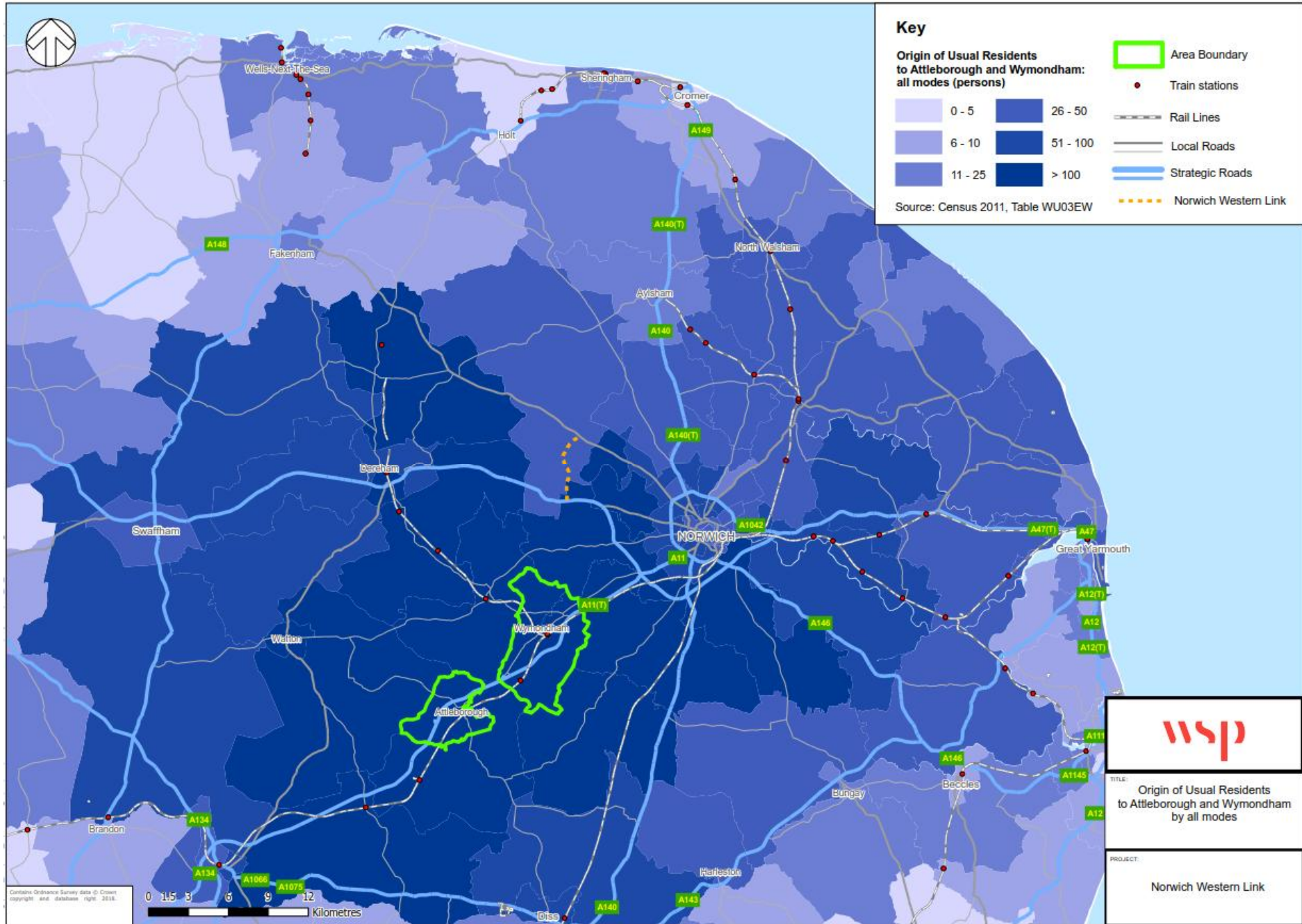
Norwich city centre





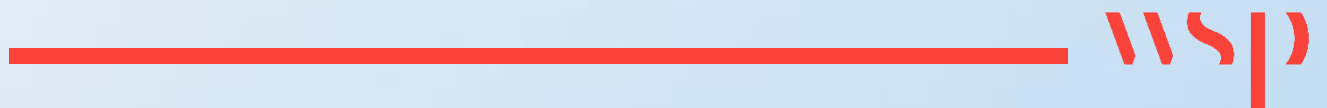


Attleborough / Wymondham



Appendix C

COMMONPLACE REPORT



Norwich Western Link

**Consultation report for Norfolk County Council
Produced by Commonplace**

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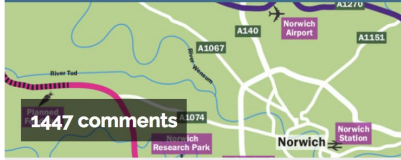
Introduction

For the Norwich Western Link consultation, two websites were created using the Commonplace online engagement platform. This report has been created by Commonplace as an analysis of the data collected.

Of the two websites, one was designed to collect people's views on general transport issues and the other to pinpoint transport issues on a 'heatmap'. For the sake of convenience, in this report we will refer to the general transport issues platform as **NWL Initial Views** and the transport issues heatmap as **NWL Map**.

Users were pointed first to the general issues website, and then directed through to the transport issues heatmap where they could pinpoint as many issues as they liked. Of the total 1,146 visitors to NWL Map, 51% were directed to the site from NWL Initial Views.


First: add your views on general transport issues



Tell us what you think about transport issues to the west of Norwich in general and what options you think we should consider.

[View details](#)

Then: pinpoint local transport issues on our map



Help us identify local transport issues and solutions by marking these on our interactive map.

[View details](#)

Observations by Commonplace

- Very well visited and commented-on websites - a total of 4,426 visitors and 2,327 comments across both platforms.
- The user 'flow', directing users first to NWL Initial Views and then on to NWL Map seemed to work as intended.
- There was a clear preference for developing a new road between the NDR and A47, with support from all types of road user.
- There was a majority of male respondents, with a good mix of ages.
- The heatmap clearly identified areas of concern on the existing road network, especially congestion and perceived inappropriate road use patterns for the type of roads available.
- Large number of News subscribers - 1,159 - providing an excellent starting point for engagement in the subsequent consultations that will be required (note that some subscribers may be registered twice - once on each website).
- We analysed the data of the most prolific contributors and found that several of the most prolific commenters were employees or contractors of Norfolk County Council, who had initially been inputting comments collected on paper forms or in person at events under their own accounts, instead of through 'survey mode' (see page 10 for more details on survey mode). Commonplace's view is that this has not influenced the data, as all types of comments are treated equally during analysis.

Part I: Engagement analysis

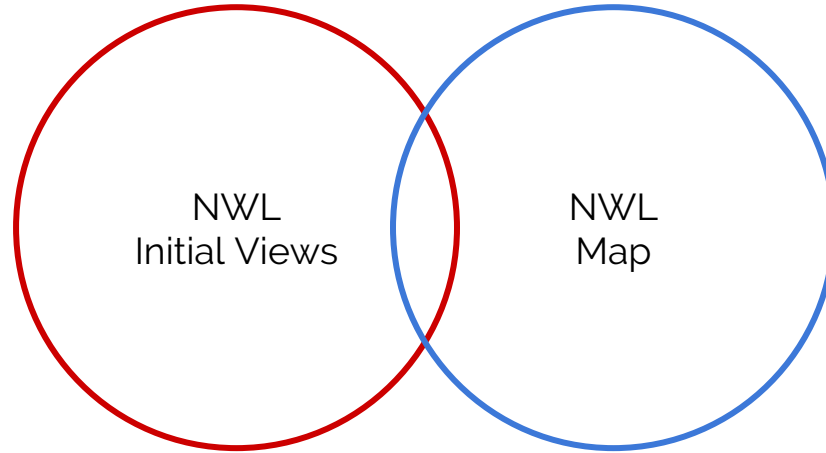
Interactions with the websites

NWL Initial Views

3,280 total visitors
1,380 total contributors

1,575 comments online
157 comments from forms
(1,732 total comments)
281 agreements
2,013 total contributions

973 news subscribers



NWL Map

1,146 total visitors
531 total contributors

752 comments online
21 comments from forms
(773 total comments)
1,890 agreements
2,663 total contributions

186 news subscribers

333 people contributed to both platforms

(The number of contributions exceeds the number of contributors as many participants make multiple contributions)

The numbers include all contributions including "unverified" - i.e. anonymous

Referrals to the websites

Source	NWL Initial Views	NWL Map	Overall
norfolk.gov.uk	2,005		2,005
nwlinitialviews.commonplace.is		582	582
Facebook	233	51	284
norfolk.citizenspace.com	40		40
intranet.crowncommercial.gov.uk	25		25
commonplace.is	23	7	30
eastonparishcouncil.co.uk	11		11
Email	10	1	11
Twitter	8	1	9
Google	3	3	6

Part II: Contributor analysis

Notes

The following section contains information about the people who contributed to the consultation - this data was analysed from the combined and de-duplicated contributor lists from both websites, to avoid counting people twice.

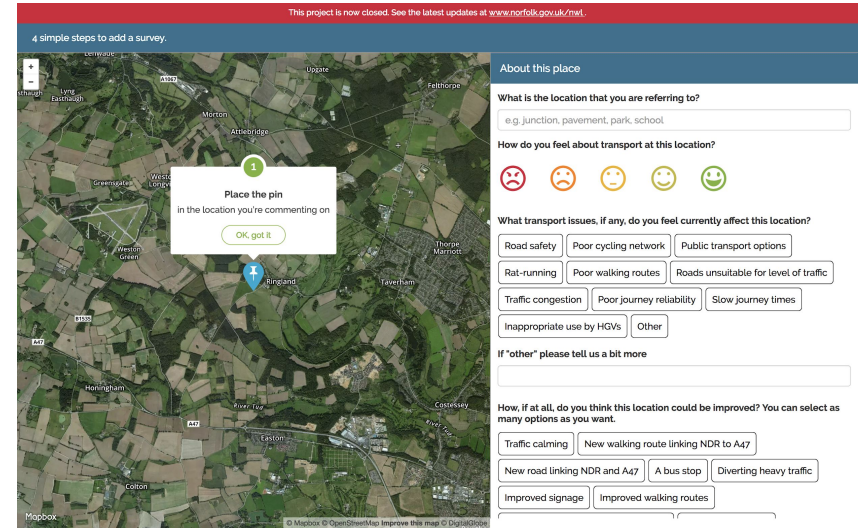
Where a chart shows 'unknown', this refers to people who left the question blank (as opposed to selecting 'Prefer not to say').

Survey mode

'Survey mode' enables project administrators to appoint individuals as 'surveyors' - people with this account privilege can input responses into a special version of the site, allowing them to register these responses without having to register an account for each individual respondent. Typically these responses would be collected either in person at consultation events, or via paper form versions of the Commonplace questions.

157 survey comments were added on NWL Initial Views, accounting for 9% of the total 1,732 comments.

21 survey comments were added on NWL Map, accounting for 3% of the total 773 comments.



This project is now closed. See the latest updates at www.norfolk.gov.uk/nwl.

4 simple steps to add a survey.

1 Place the pin in the location you're commenting on

OK, got it!

About this place

What is the location that you are referring to?
e.g. junction, pavement, park, school

How do you feel about transport at this location?

What transport issues, if any, do you feel currently affect this location?

Road safety Poor cycling network Public transport options

Rat-running Poor walking routes Roads unsuitable for level of traffic

Traffic congestion Poor journey reliability Slow journey times

Inappropriate use by HGVs Other

If "other" please tell us a bit more

How, if at all, do you think this location could be improved? You can select as many options as you want.

Traffic calming New walking route linking NDR to A47

New road linking NDR and A47 A bus stop Diverting heavy traffic

Improved signage Improved walking routes

Above: screenshot of survey mode form

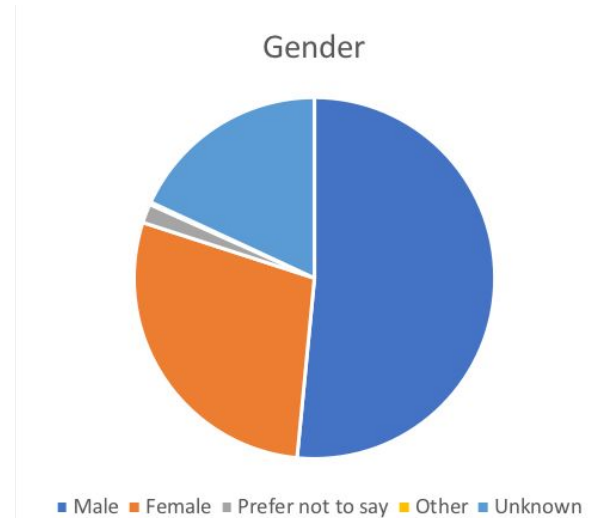
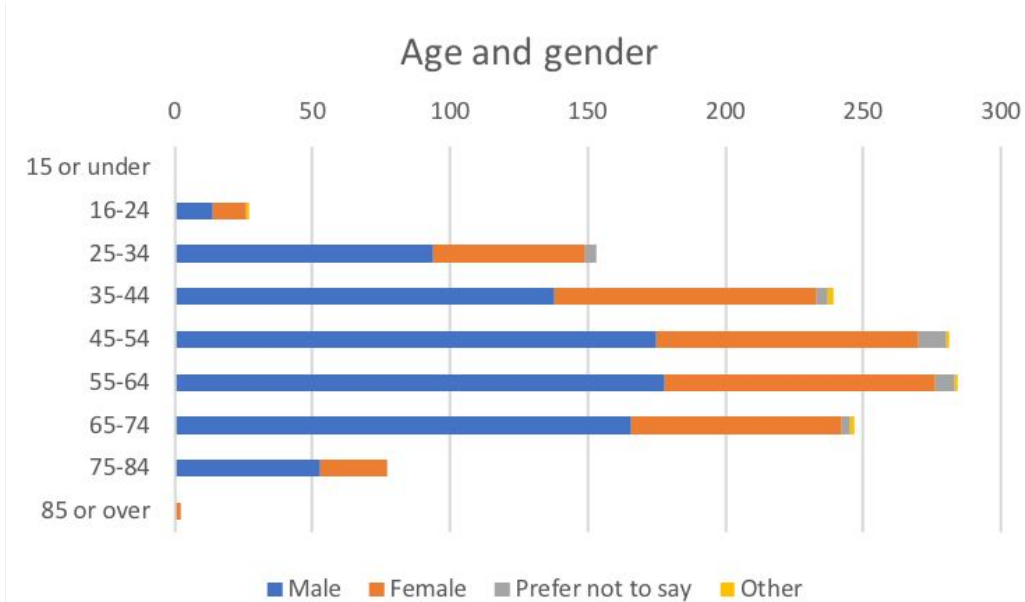
Connection to the area

An overwhelming majority of respondents said they live in the area - it is worth noting that perhaps the wording 'What is your connection to the area?' leaves it open to the respondents interpretation whether 'the area' refers to the area west of Norwich specifically, or Norfolk as a whole.



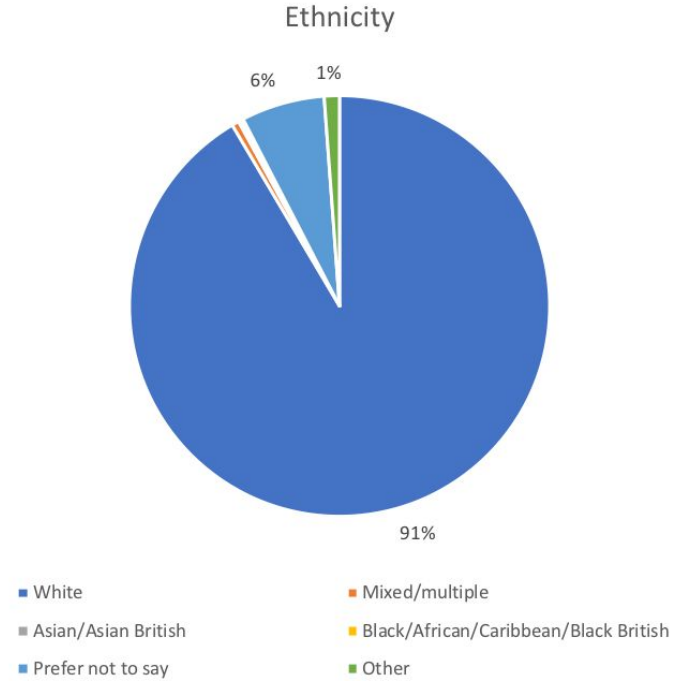
Age and gender

There was a good age spread; respondents were predominantly male.



Ethnicity

Of people who shared their ethnicity, 91% of respondents were white - this almost exactly matches the 90.9% white composition in Norwich in the 2011 census - however, other ethnic groups were under-represented.

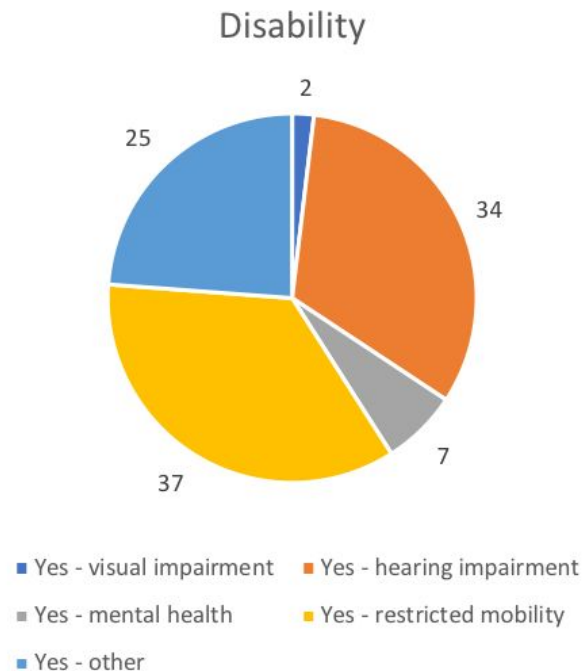


Disability

Of those respondents who identified themselves as having a disability, there was a roughly even split between hearing impairment and restricted mobility.

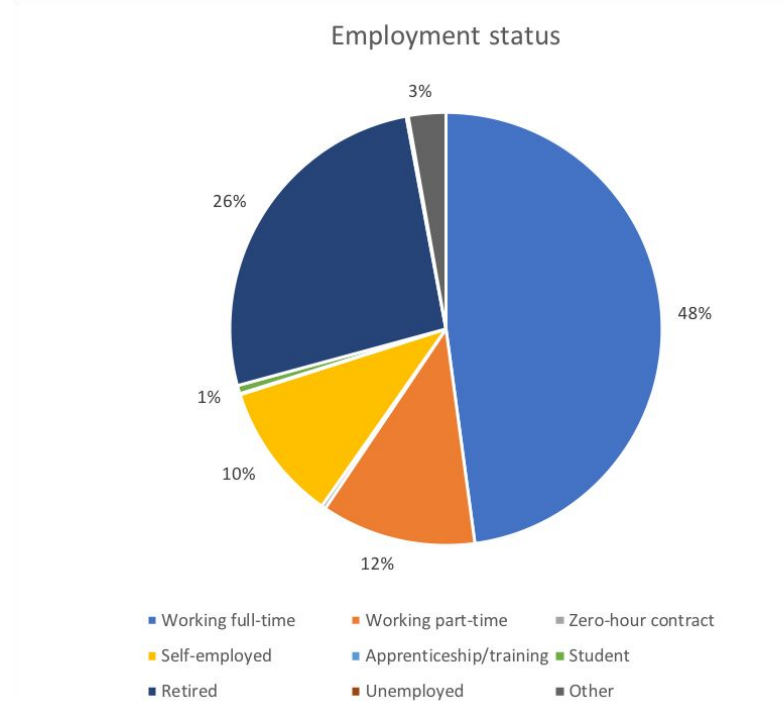
The NWL Initial Views platform meets the AA accessibility standard, meaning it is fully useable using a screen reader. Due to the interactive nature of the NWL Map project, it is not as useable with a screen reader, which may account for the lower numbers of respondents with a visual impairment.

More information can be found on the [accessibility page](#).



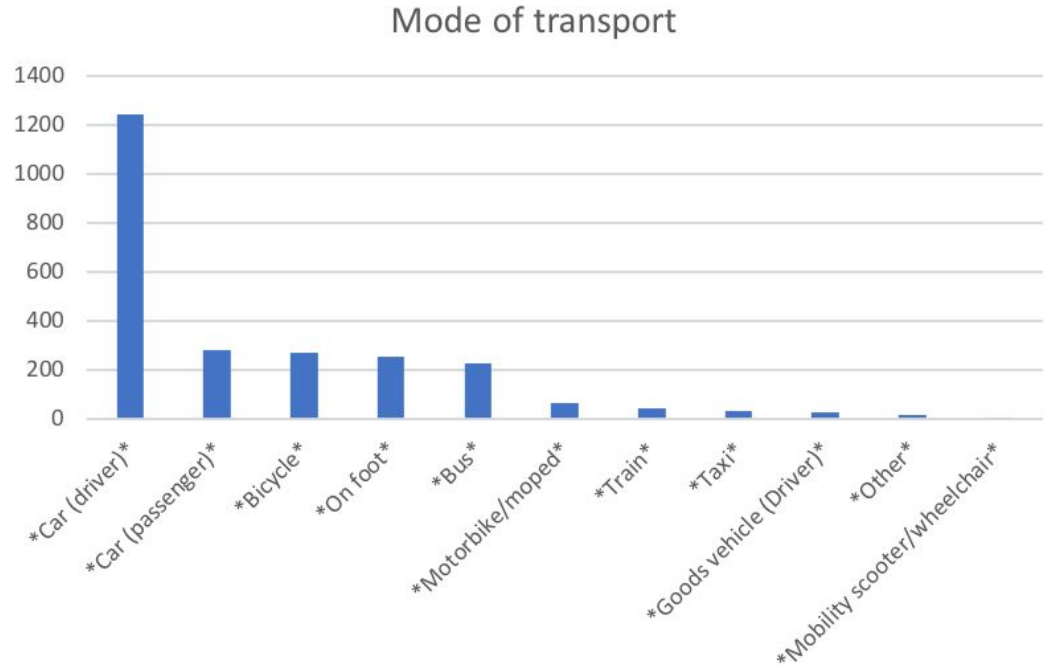
Employment status

Approximately half of contributors who chose to share their employment status are working full-time.



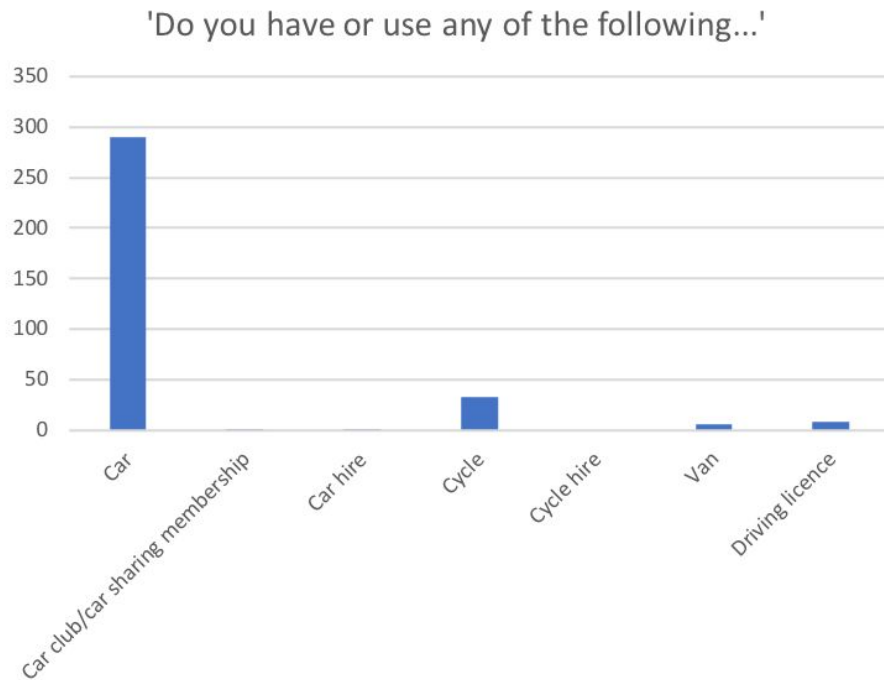
Travel and transport

Car drivers made up a large majority of transport users - however, it may be worth noting that the wording of the question was 'How do you usually travel **around this area?**', which could affect the frequency of answers such as train or mobility/scooter wheelchair.



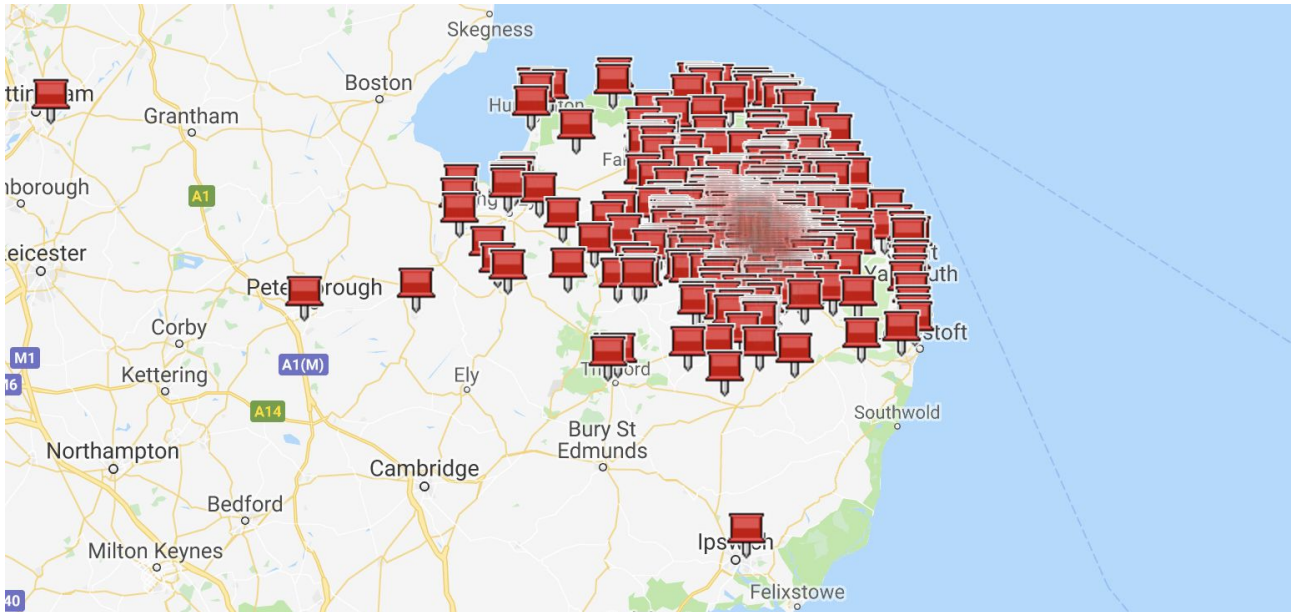
'Do you have or use any of the following...'

Respondents were asked whether they have, or use, any of a number of transport-related modes or services. The disparity between the number of responses for car/van and driving licence perhaps indicate that people were not aware that they could select multiple options, or simply did not read all of the options.



Postcode map

As one would expect, postcode analysis shows a large concentration of users in the wider Norwich area, though much of Norfolk and beyond is also covered. A small handful of respondents identified themselves as being from as far afield as Nottingham, Oxford, Bath and Edinburgh.



Number of respondents per postcode (top 5 in bold)

Postcode	Respondents	Postcode	Respondents	Postcode	Respondents	Postcode	Respondents
NR1	20	NR11	44	NR21	18	NR31	6
NR2	34	NR12	34	NR22	3	NR32	3
NR3	28	NR13	25	NR23	6	NR33	1
NR4	33	NR14	38	NR24	1	NR34	1
NR5	57	NR15	17	NR25	9	NR35	1
NR6	98	NR16	7	NR26	6	IP	19
NR7	55	NR17	17	NR27	13	PE	33
NR8	292	NR18	21	NR28	16		
NR9	162	NR19	26	NR29	7		
NR10	81	NR20	59	NR30	4		

Part III: NWL Initial Views comment analysis

Notes

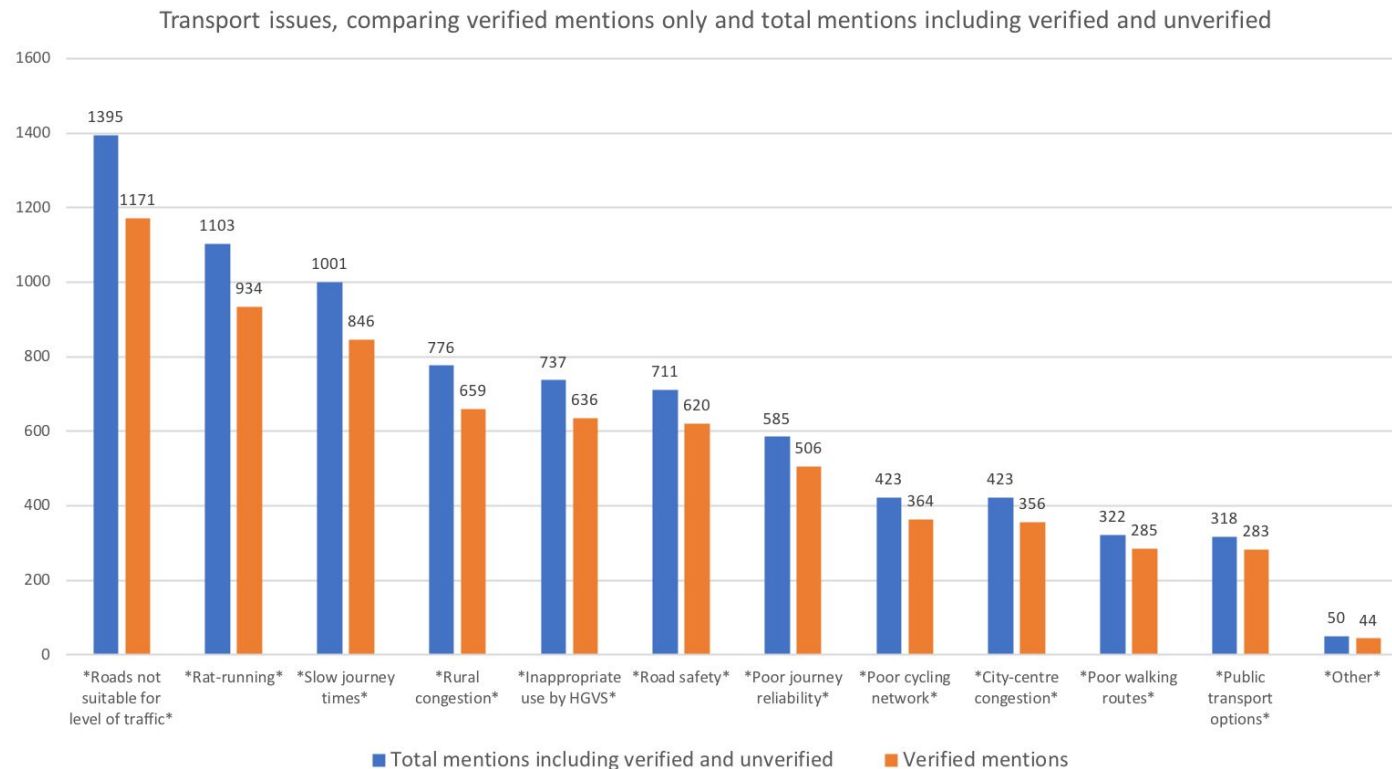
When users contribute to the Commonplace platform, they are asked to verify their comments via email. Comments that have not been verified are stored in the project database, but are not displayed publicly. Most of the analysis in this report has been taken from the full set of comments, including both verified and unverified comments. However, the following three pages show the data from the three questions below, and for these we have also included a comparison between the full set of comments and verified comments only.

“Here is a list of transport issues. Please tell us which ones, if any, are an issue in this area.”

“Although one potential option to tackle transport issues in this area is to build a new road we are committed to examining all of the possible options. Which options would you like us to explore?”

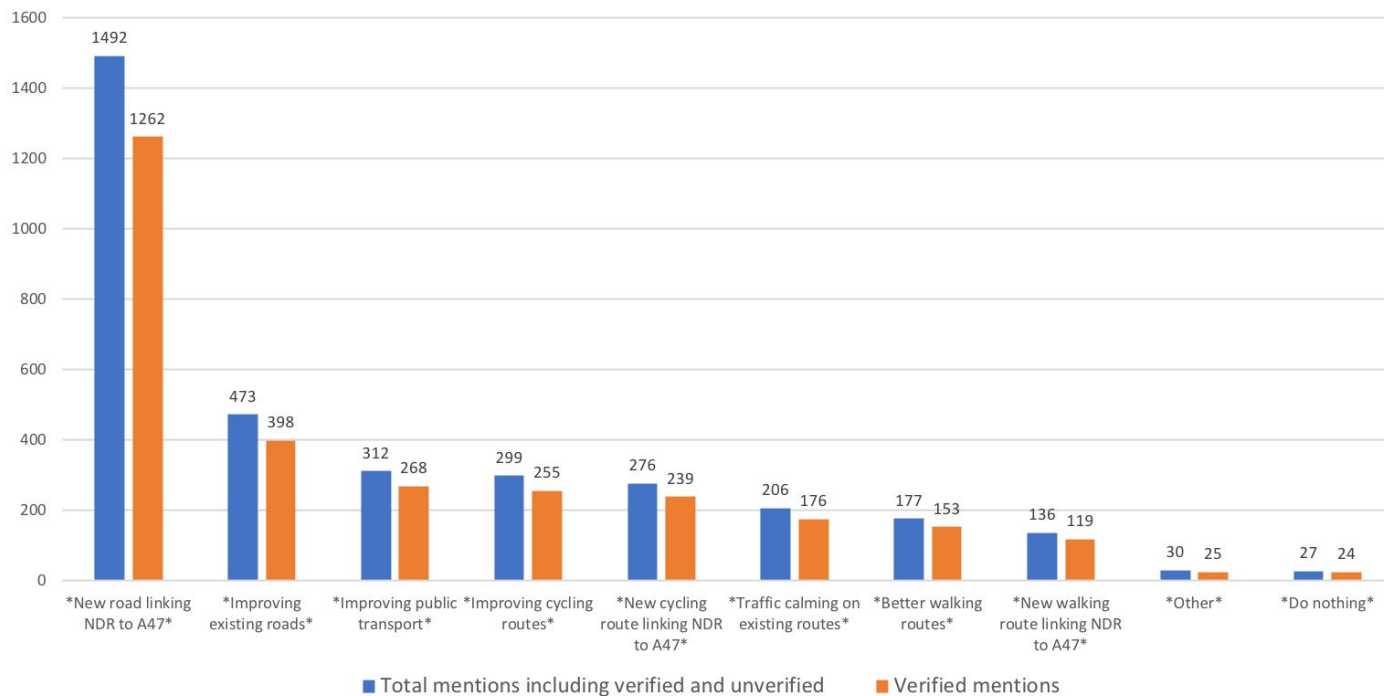
“What do you want us to take into account when considering improvements to travel in this area? You can select as many as you want.”

Transport issues



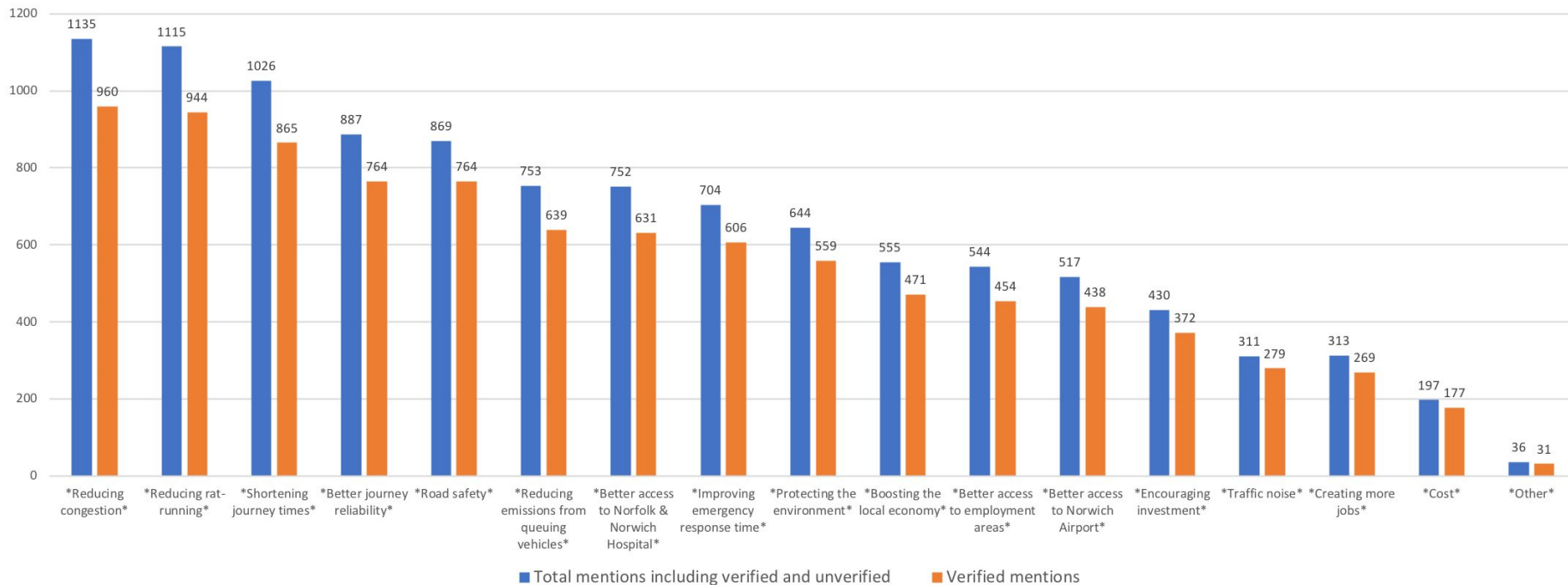
Options to explore, by popularity

Transport options, comparing verified mentions only and total mentions including verified and unverified



Issues to consider when planning transport improvements

Considerations, comparing verified mentions only and total mentions including verified and unverified

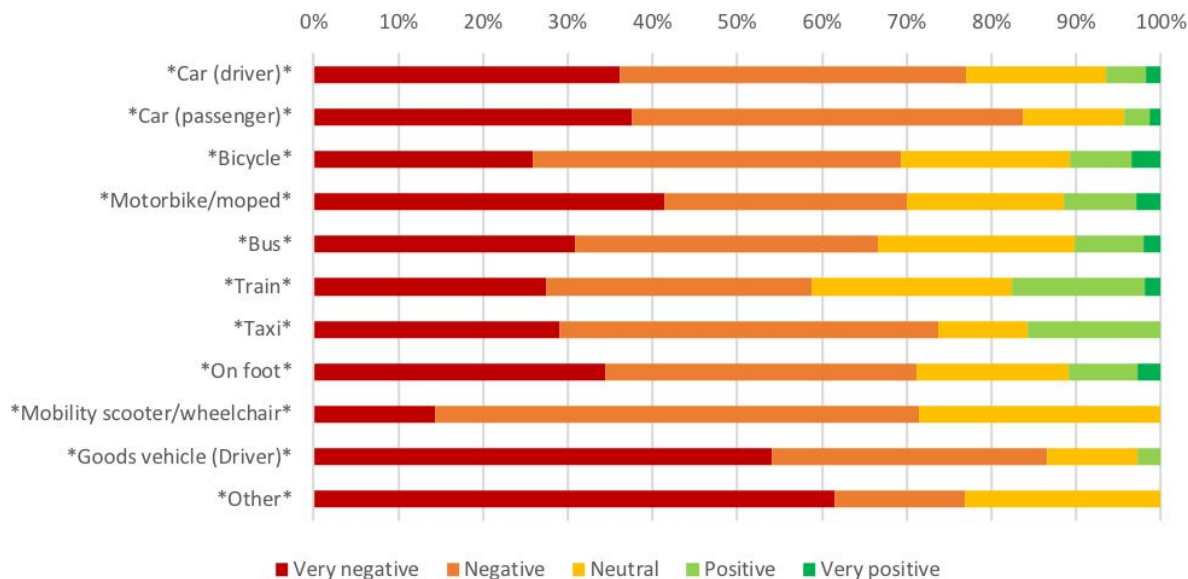


Sentiment by transport mode

Respondents were asked "How do you feel in general when travelling through the area to the west of Norwich?" - the chart opposite shows their sentiment, broken down by the mode of transport they identified themselves as using.

Proportionately, goods vehicle drivers felt the most negatively, however they also made up one of the least-represented groups of transport users.

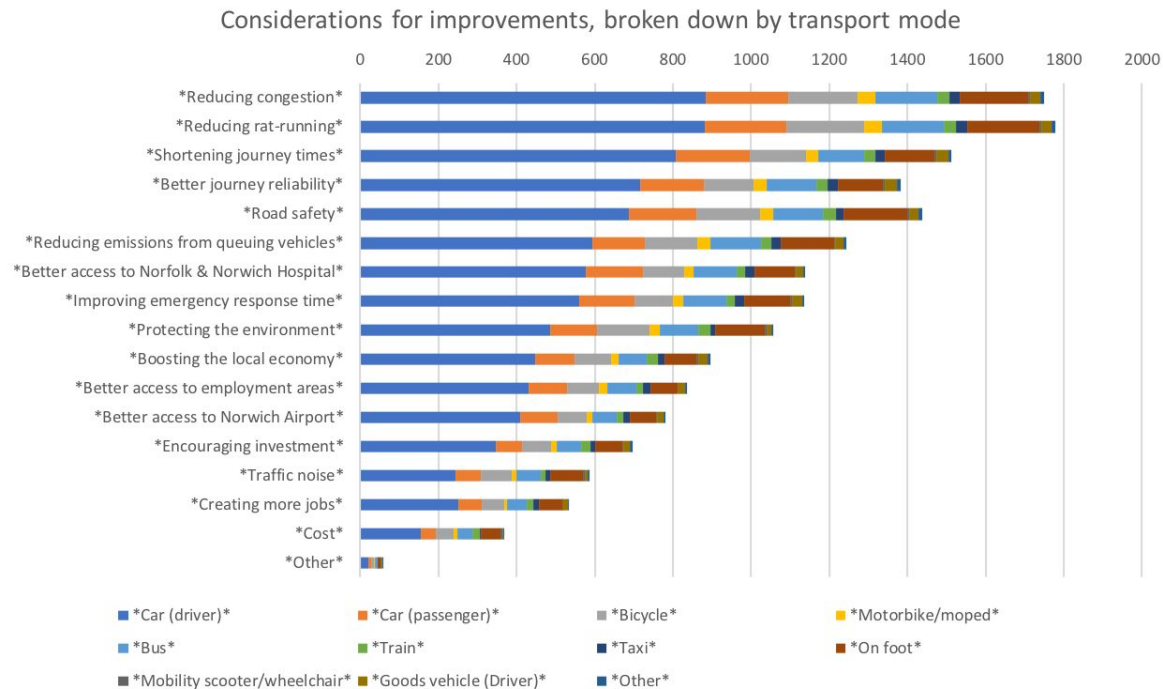
General feeling when travelling to the west of Norwich, broken down by mode of transport



Considerations for improvements

Respondents were asked what they would like the Council to take into consideration when exploring possible options to tackle transport issues.

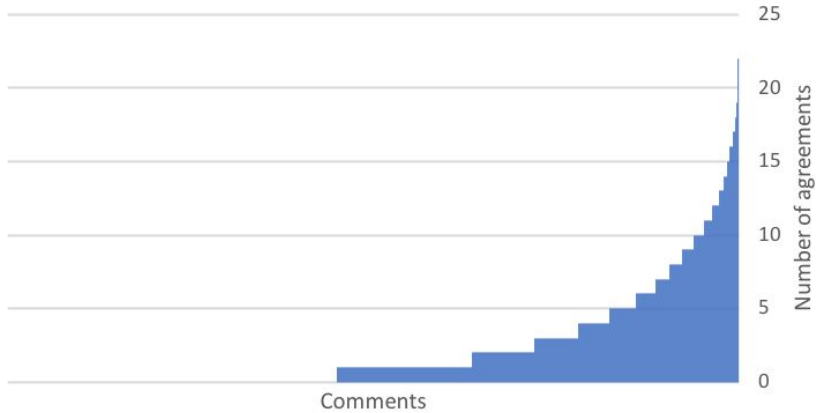
The chart opposite shows the most commonly selected tags, and the breakdown of each tag by mode of transport.



Agreement summary

Commonplace allows users to 'agree' with other people's comments (but not their own) - they can only agree with each comment once. Comparing the number of agreements per comment between the two platforms shows a stark contrast, with NWL Map featuring significantly more agreements per comment. The design of the heatmap platform encourages exploration of others' comments before adding one's own - you can immediately see the comments clustered around the location that you are interested in.

NWL Map - Agreements per comment



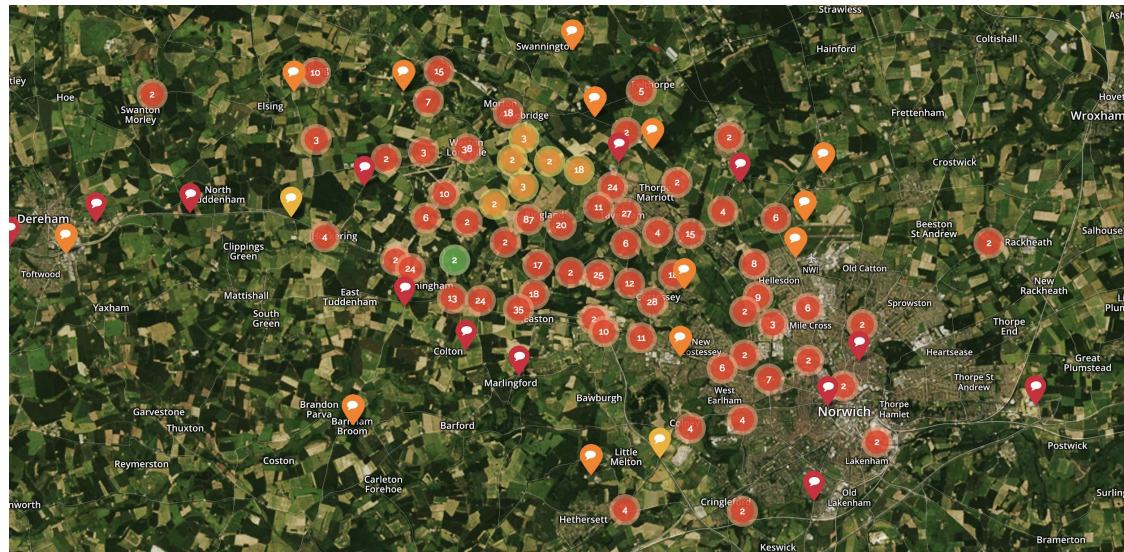
NWL Initial Views - Agreements per comment



Part IV: NWL Map comment analysis

Locations marked

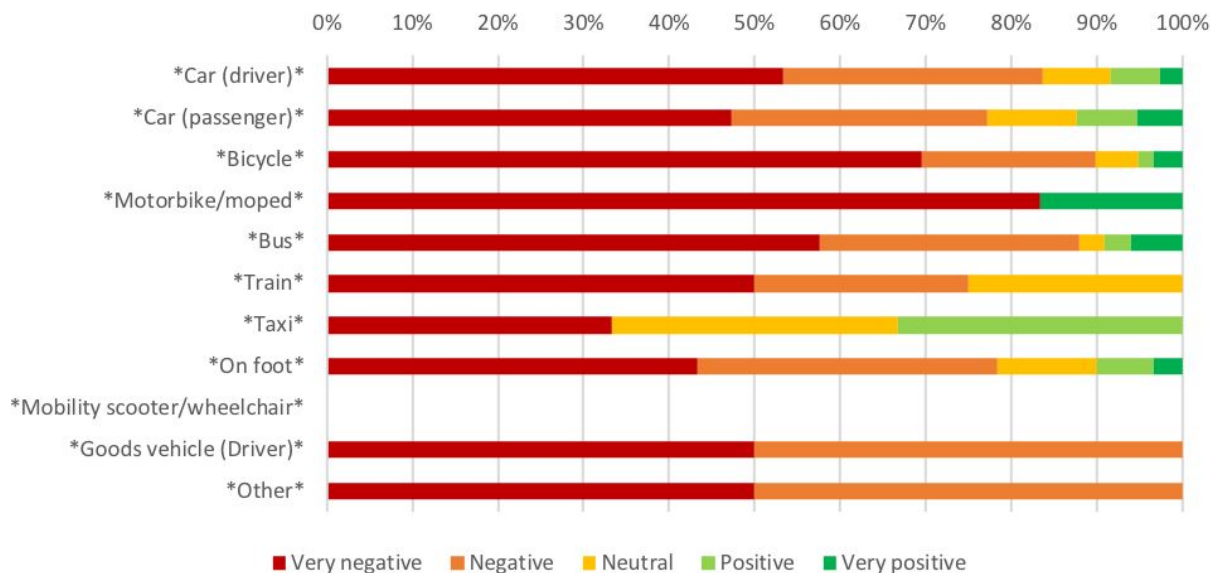
The Commonplace 'heatmap' tool allows users to mark the location that they wish to add a comment on. Although the majority of comments reflect the project's focus on the area west of Norwich, a good number of comments were added in other locations, from Litcham in the west to Wroxham in the east. One possible learning point for future consultations is to limit the extent to which users are able to zoom the map out, to avoid comments being made too far afield from the focal area of the consultation. The live map can be viewed at <https://nwlmap.commonplace.is/comments>.



Sentiment by mode of transport

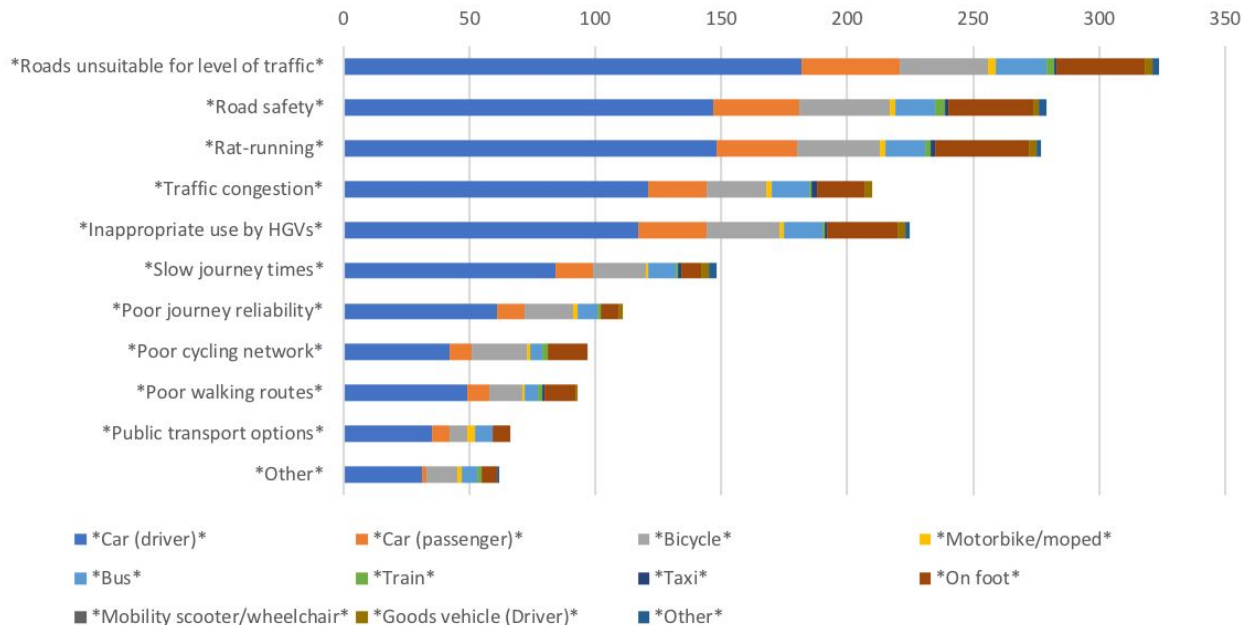
Sentiment about the current state of transport in the location the user selected was strongly negative.

Feeling about transport at the location selected, broken down by mode of transport



Transport issues by mode of transport

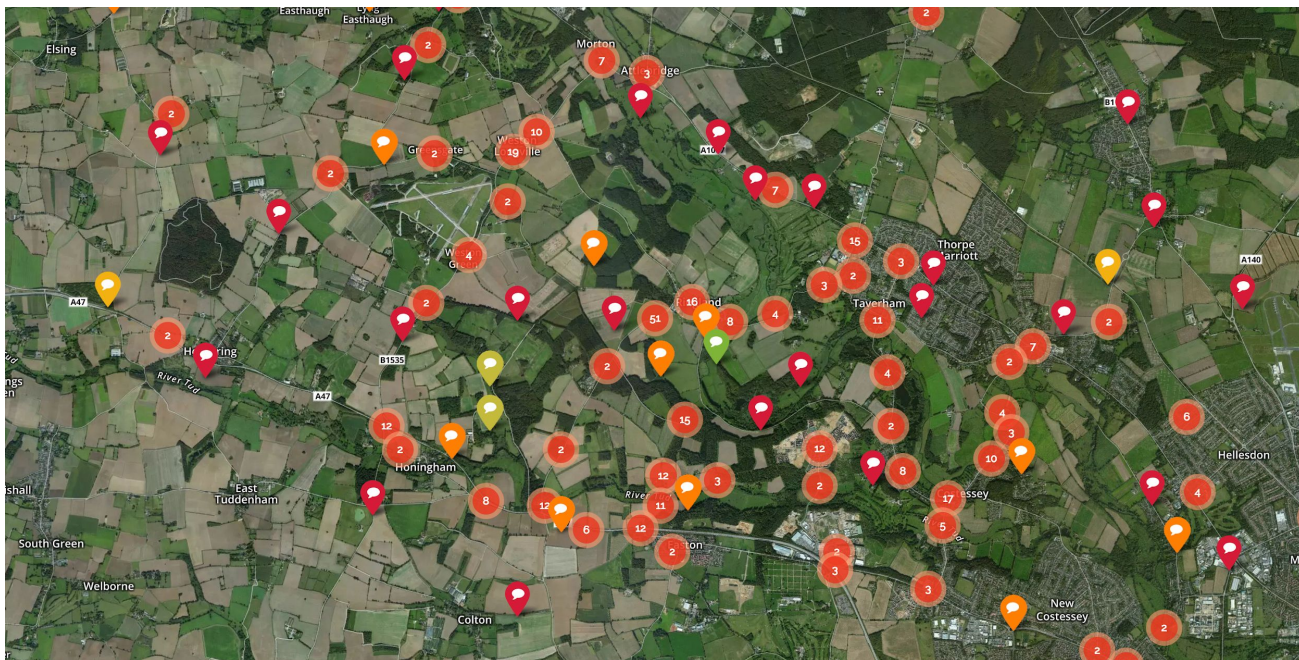
Transport issues, broken down by transport mode



Transport issue locations

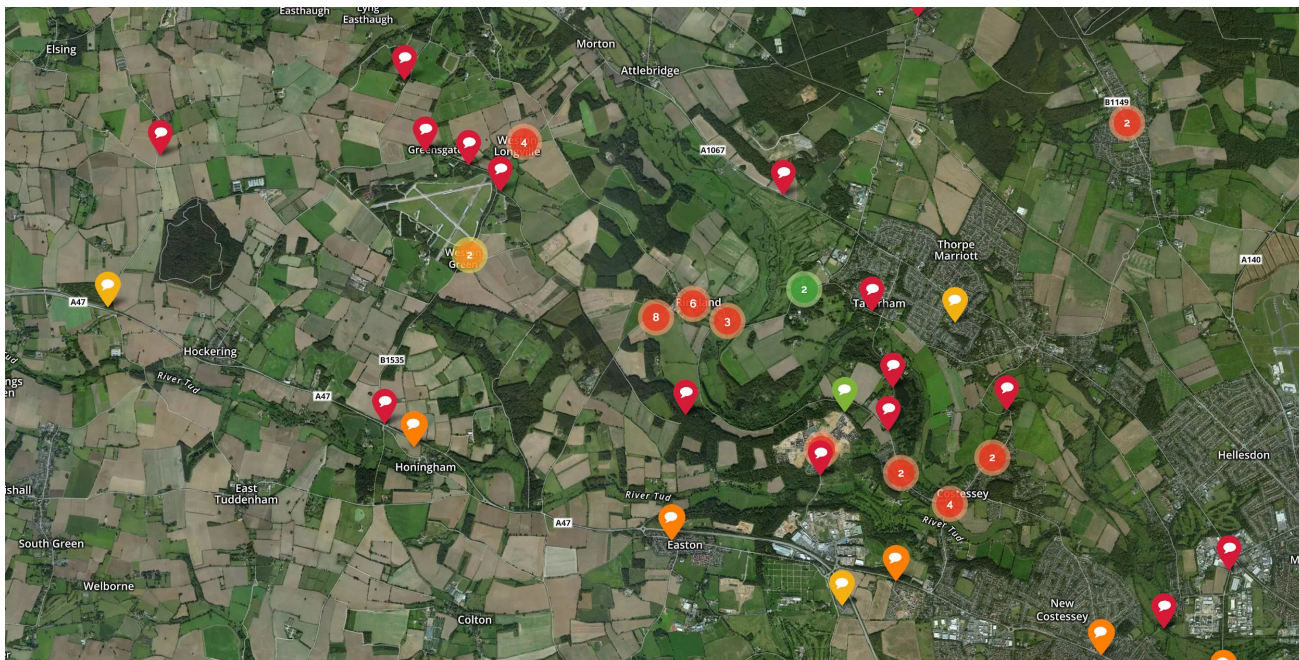
Locations tagged with 'roads unsuitable for level of traffic'

[Click here to view on live map](#) (this will show only the locations where this tag was flagged)



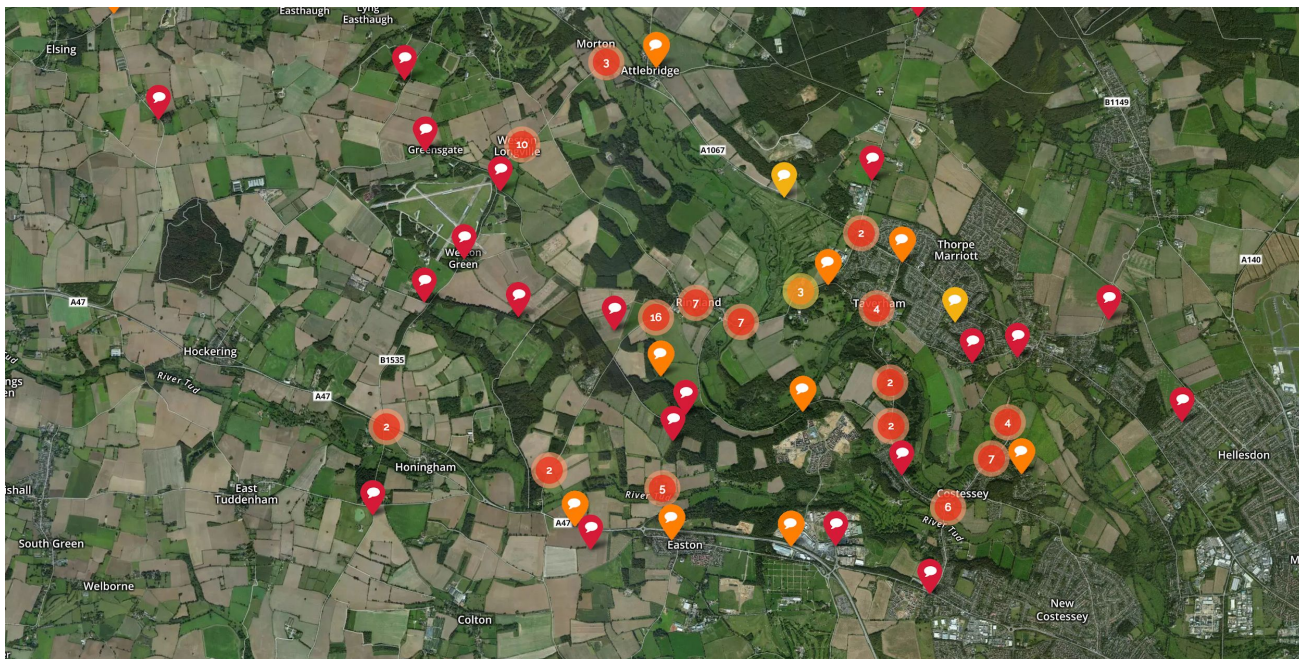
Locations tagged with 'public transport options'

[Click here to view on live map](#) (this will show only the locations where this tag was flagged)



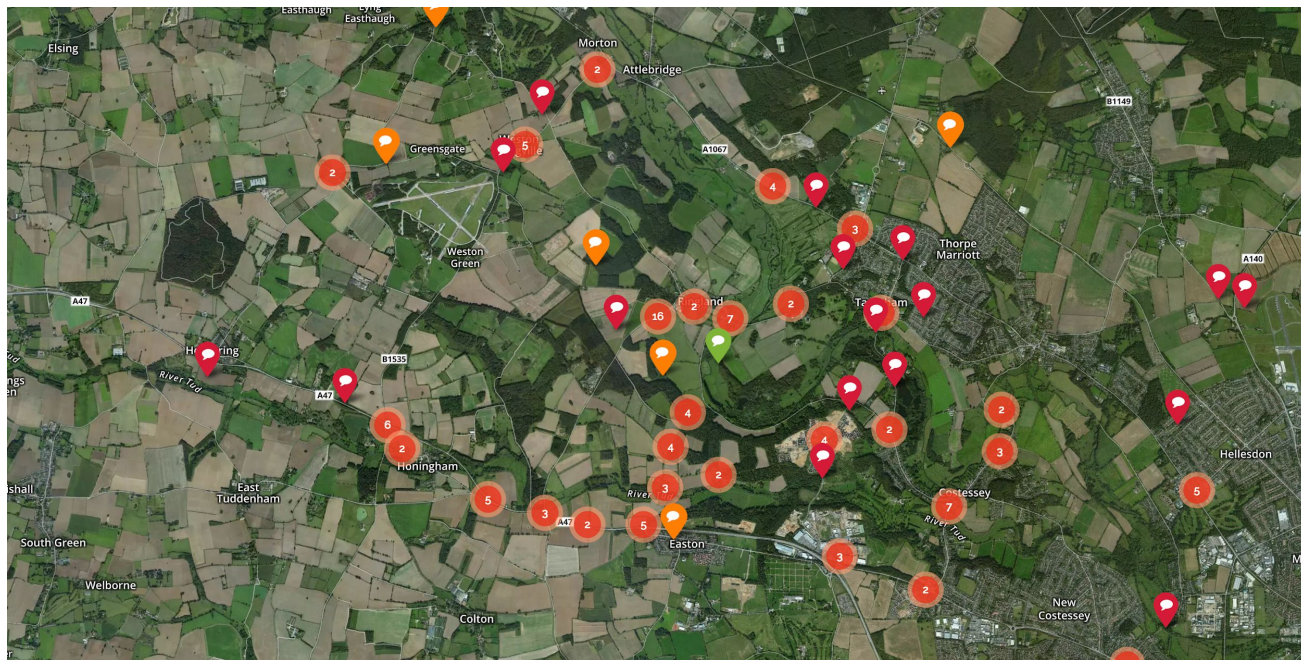
Locations tagged with 'poor walking routes'

[Click here to view on live map](#) (this will show only the locations where this tag was flagged)



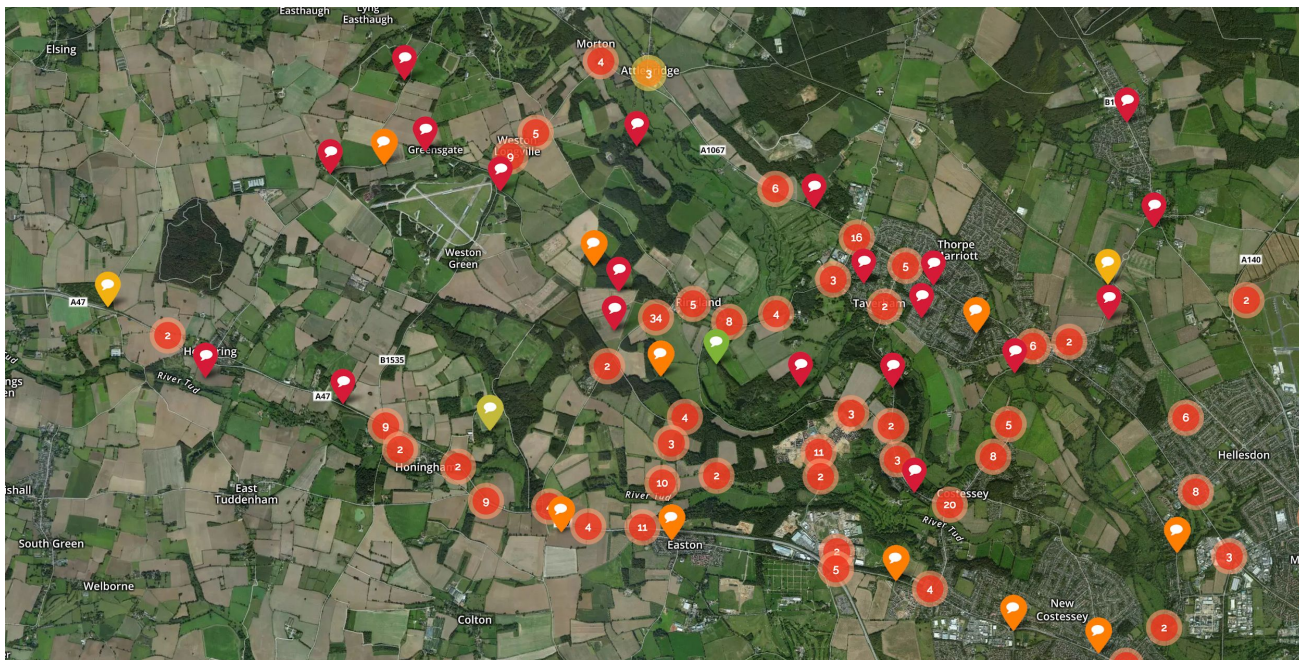
Locations tagged with 'poor journey reliability'

[Click here to view on live map](#) (this will show only the locations where this tag was flagged)



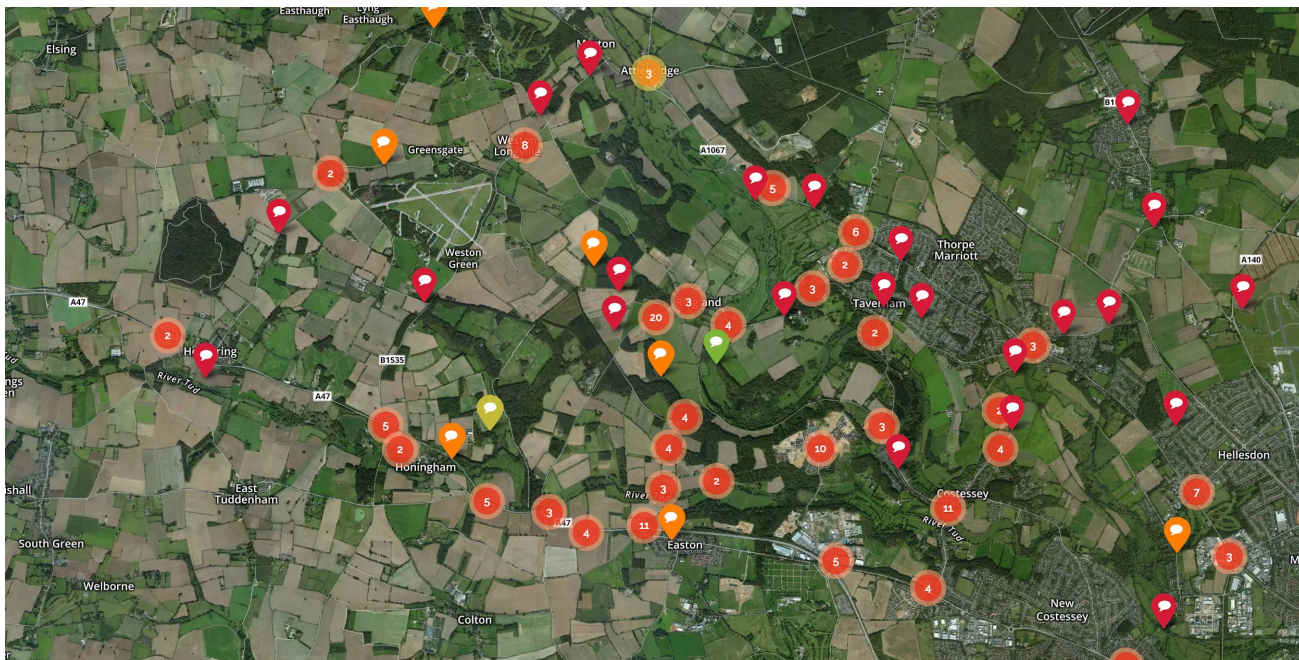
Locations tagged with 'traffic congestion'

[Click here to view on live map](#) (this will show only the locations where this tag was flagged)



Locations tagged with 'slow journey times'

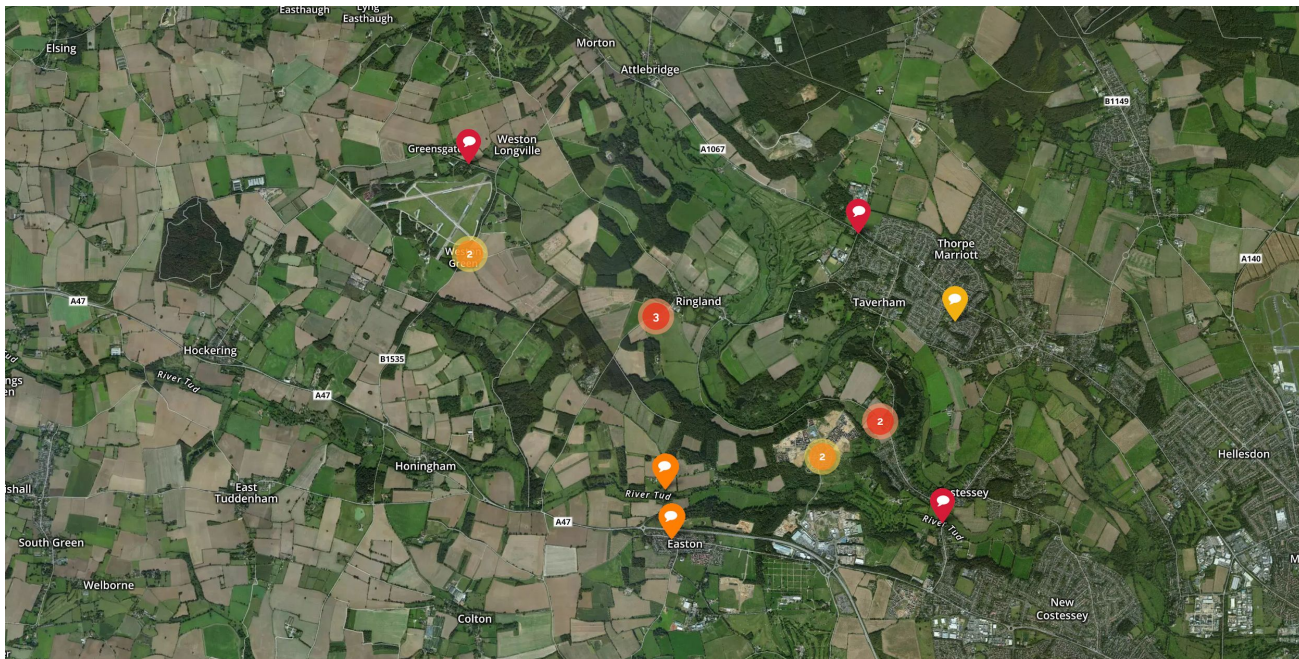
[Click here to view on live map](#) (this will show only the locations where this tag was flagged)



Transport improvement locations

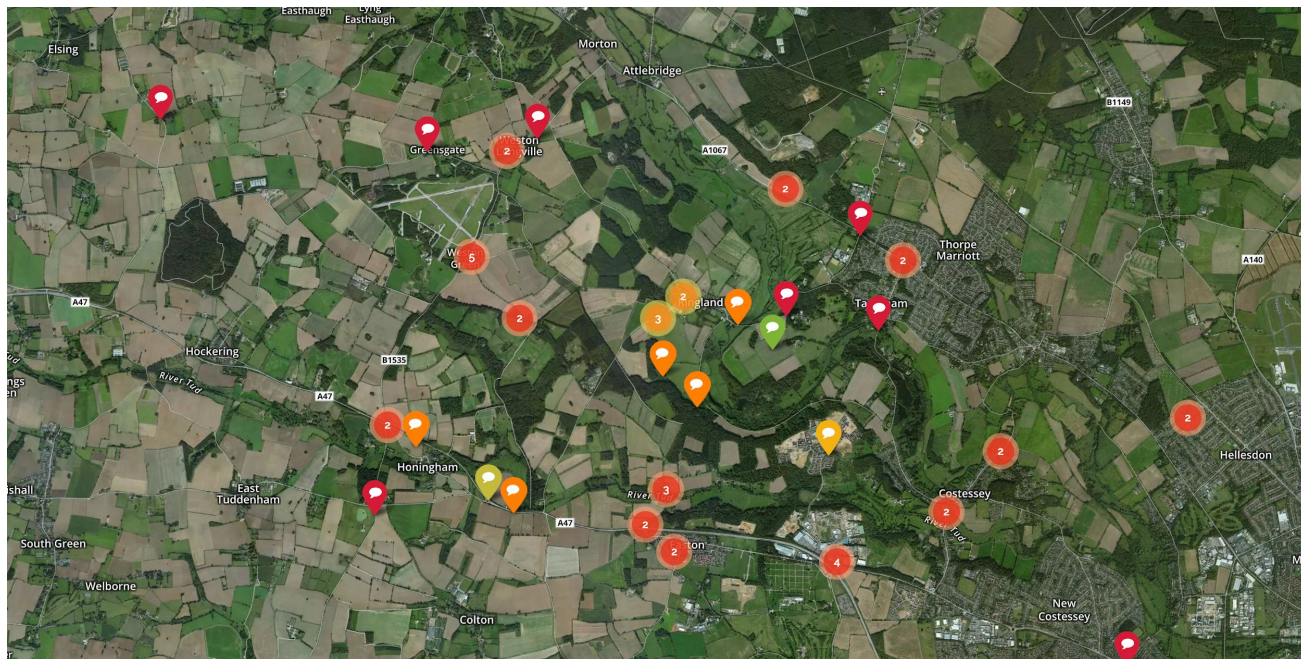
Locations tagged with 'a bus stop'

[Click here to view on live map](#) (this will show only the locations where this tag was flagged)



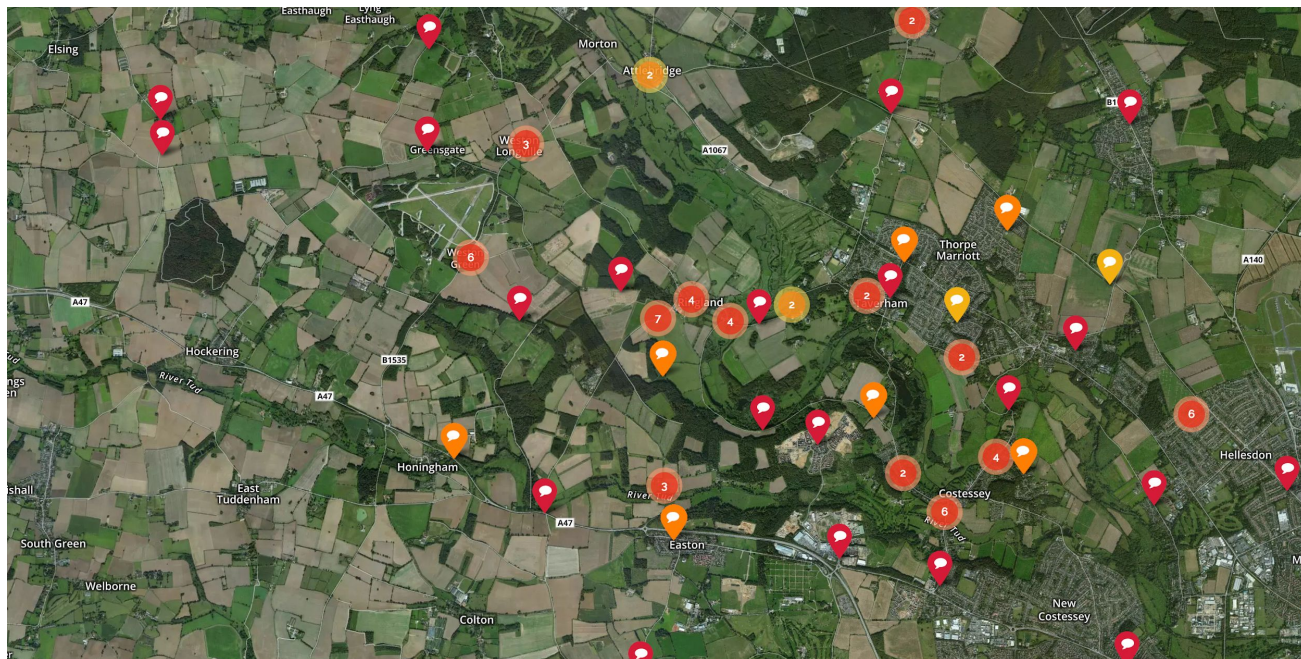
Locations tagged with 'improved signage'

[Click here to view on live map](#) (this will show only the locations where this tag was flagged)



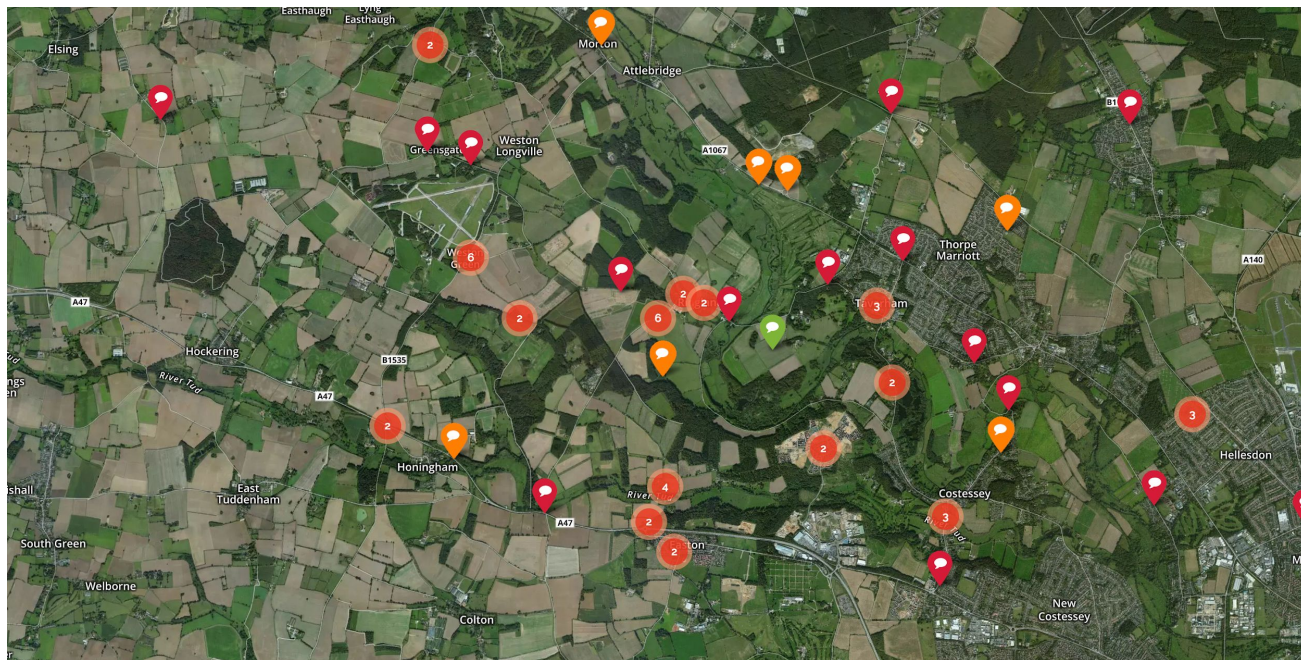
Locations tagged with 'traffic calming'

[Click here to view on live map](#) (this will show only the locations where this tag was flagged)



Locations tagged with 'speed limit change'

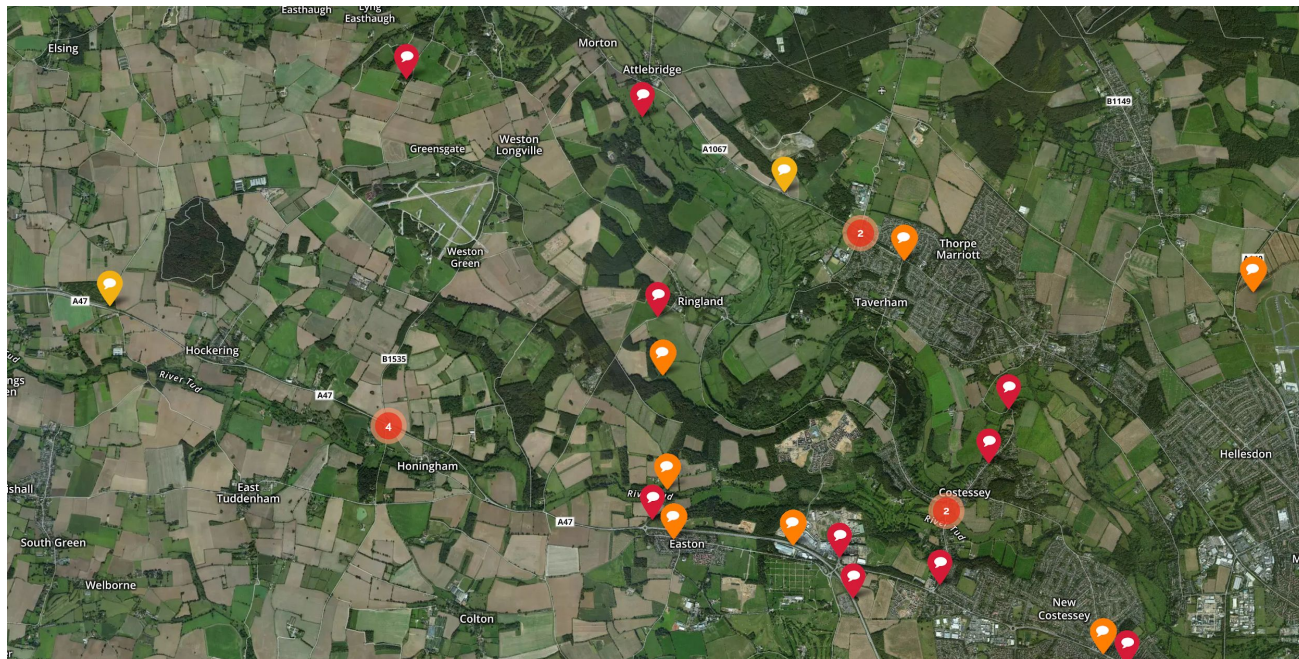
[Click here to view on live map](#) (this will show only the locations where this tag was flagged)



Locations tagged with 'a crossing'

N.B. Please note that some users had differing interpretations of 'crossing', seeing it as either a pedestrian crossing or bridge/new road.

[Click here to view on live map](#)
(this will show only the locations where this tag was flagged)



Comments with most agreements

Comment #1, 22 agreements

What is the location that you are referring to?: "Road"

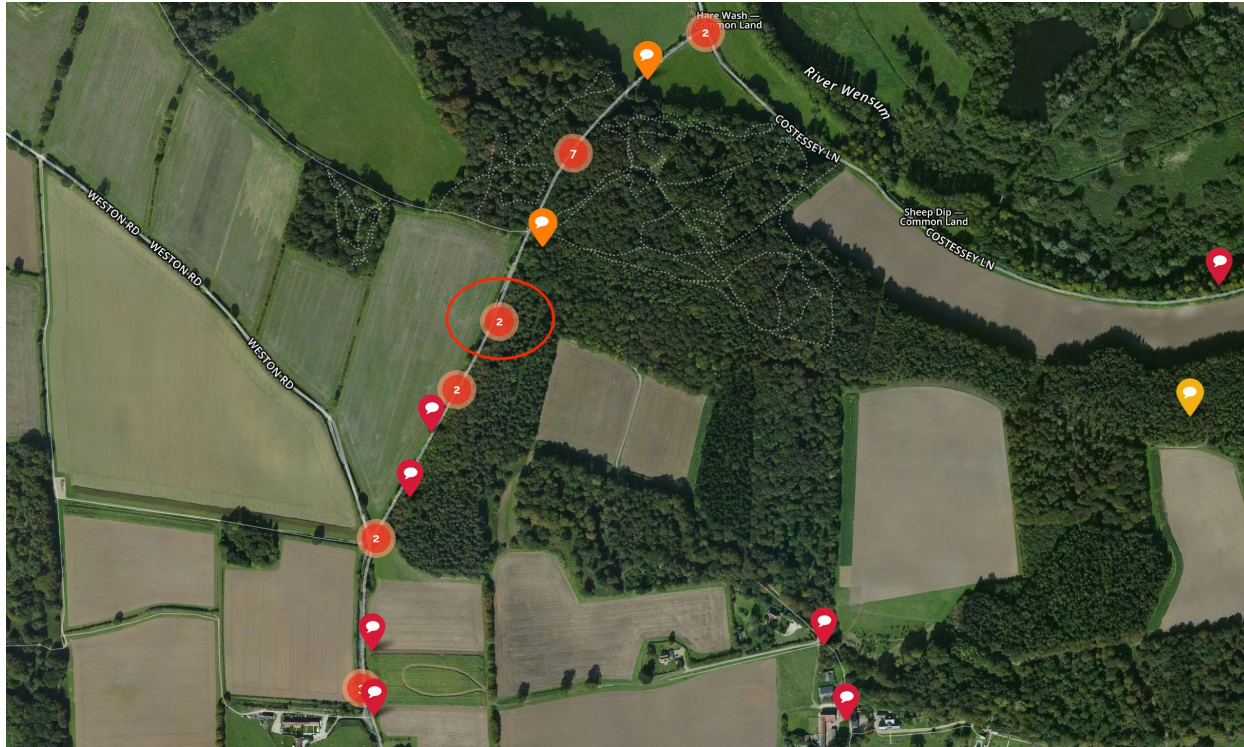
How do you feel about transport at this location?: 

What transport issues, if any, do you feel currently affect this location?: "Rat-running", "Road safety", "Other"

If "other" please tell us a bit more: "Dreadfully small road always used as a rat-run by all vehicle types. Surprised that not more accidents happen there to be honest."

[Click here to view comment on live map](#), location on following page

Comment #1, 22 agreements



Comment #2, 19 agreements

What is the location that you are referring to?: "Ringland Lane Easton"

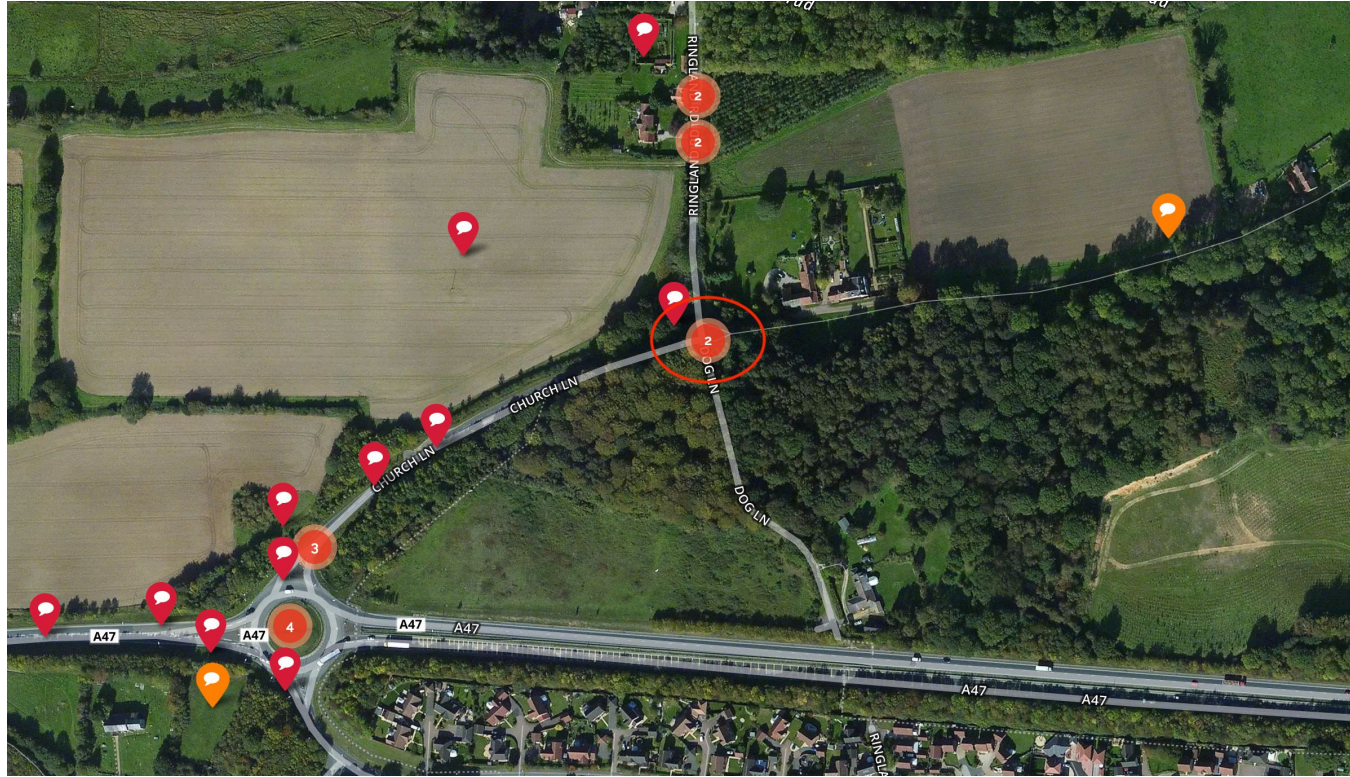
How do you feel about transport at this location?: 

What transport issues, if any, do you feel currently affect this location?: "Rat-running"

How, if at all, do you think this location could be improved?: "New road linking NDR and A47"

[Click here to view comment on live map](#), location on following page

Comment #2, 19 agreements



Comment #3: 18 agreements

What is the location that you are referring to?: "Easton roundabout where Ringland road joins"

How do you feel about transport at this location?: 

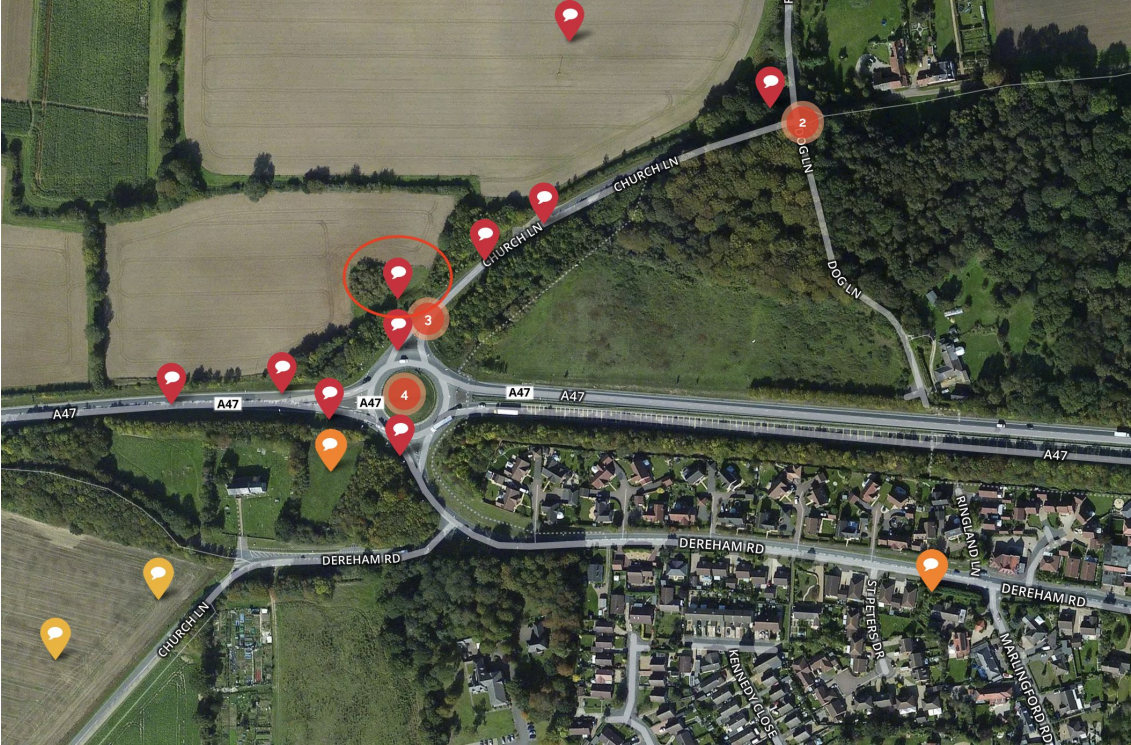
What transport issues, if any, do you feel currently affect this location?: "Rat-running", "Slow journey times", "Inappropriate use by HGVS", "Roads unsuitable for level of traffic"

How, if at all, do you think this location could be improved?: "New road linking NDR and A47", "Diverting heavy traffic", "Other"

If "other" please tell us a bit more: "To stop heavy goods vehicles using the Ringland route why not put a physical height barrier in place at either end. This would improve the journey time for the rest of us while we wait for the NDR link to the A47."

[Click here to view comment on live map](#), location on following page

Comment #3: 18 agreements



Comment #4, 18 agreements

What is the location that you are referring to?: "Costessey"

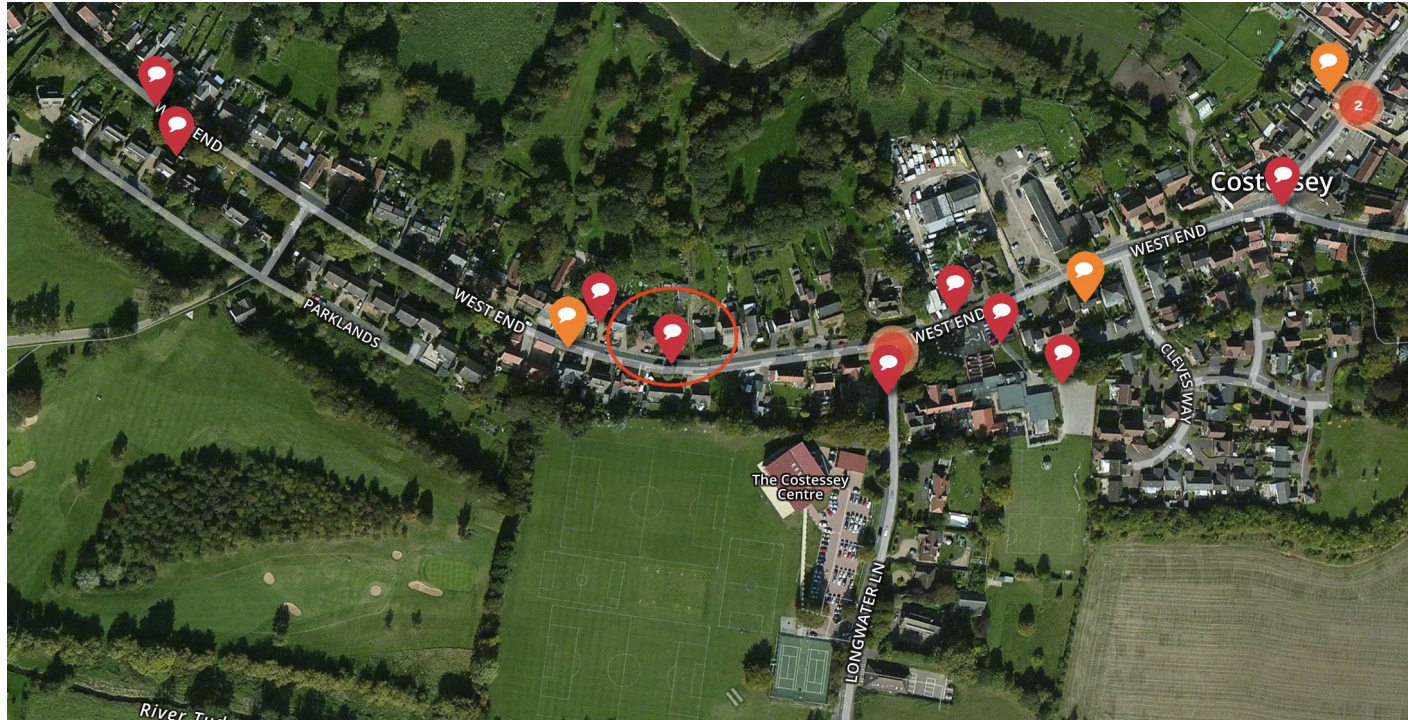
How do you feel about transport at this location?: 

What transport issues, if any, do you feel currently affect this location?: "Rat-running", "Roads unsuitable for level of traffic"

How, if at all, do you think this location could be improved?: "New road linking NDR and A47"

[Click here to view comment on live map](#), location on following page

Comment #4, 18 agreements



Comment #5, 17 agreements

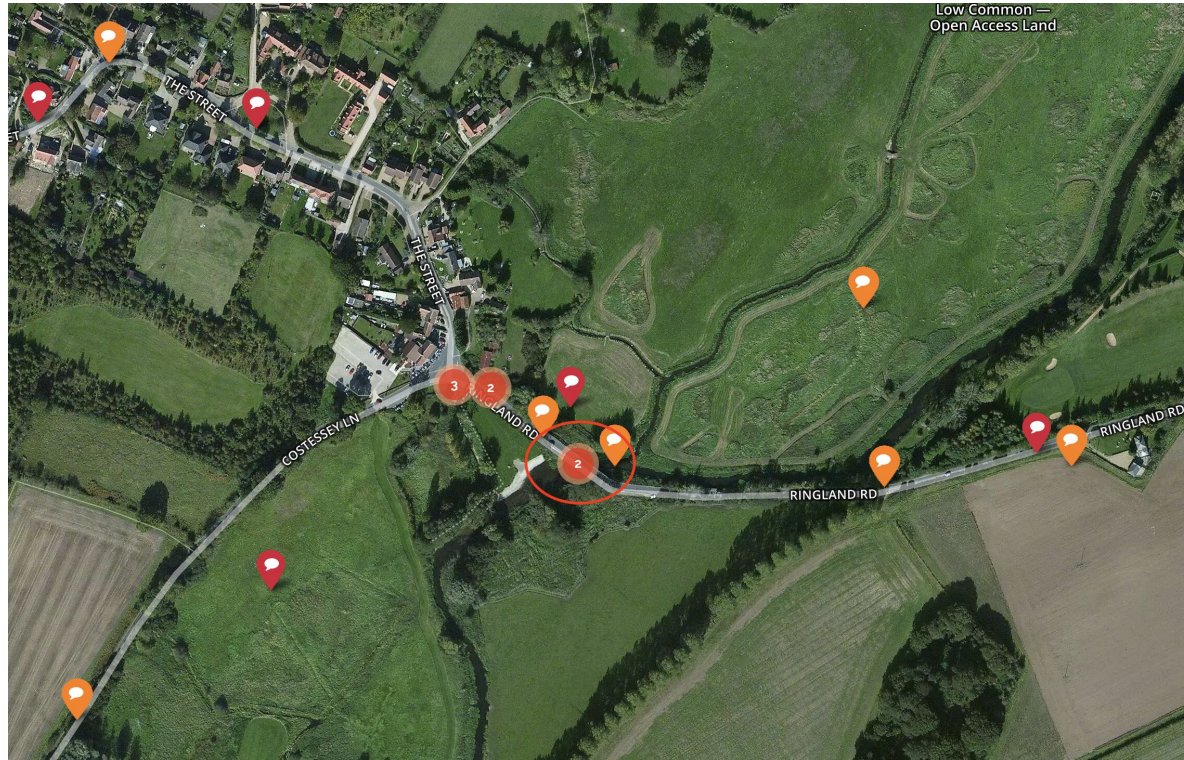
What is the location that you are referring to?: "Bridge"

How do you feel about transport at this location?: 

How, if at all, do you think this location could be improved?: "New road linking NDR and A47"

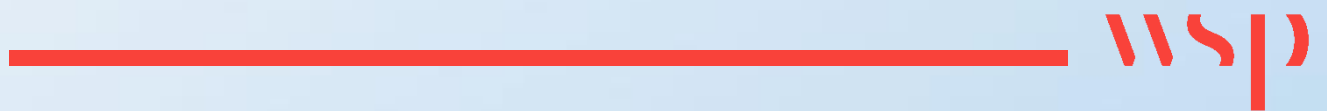
[Click here to view comment on live map](#), location on following page

Comment #5, 17 agreements



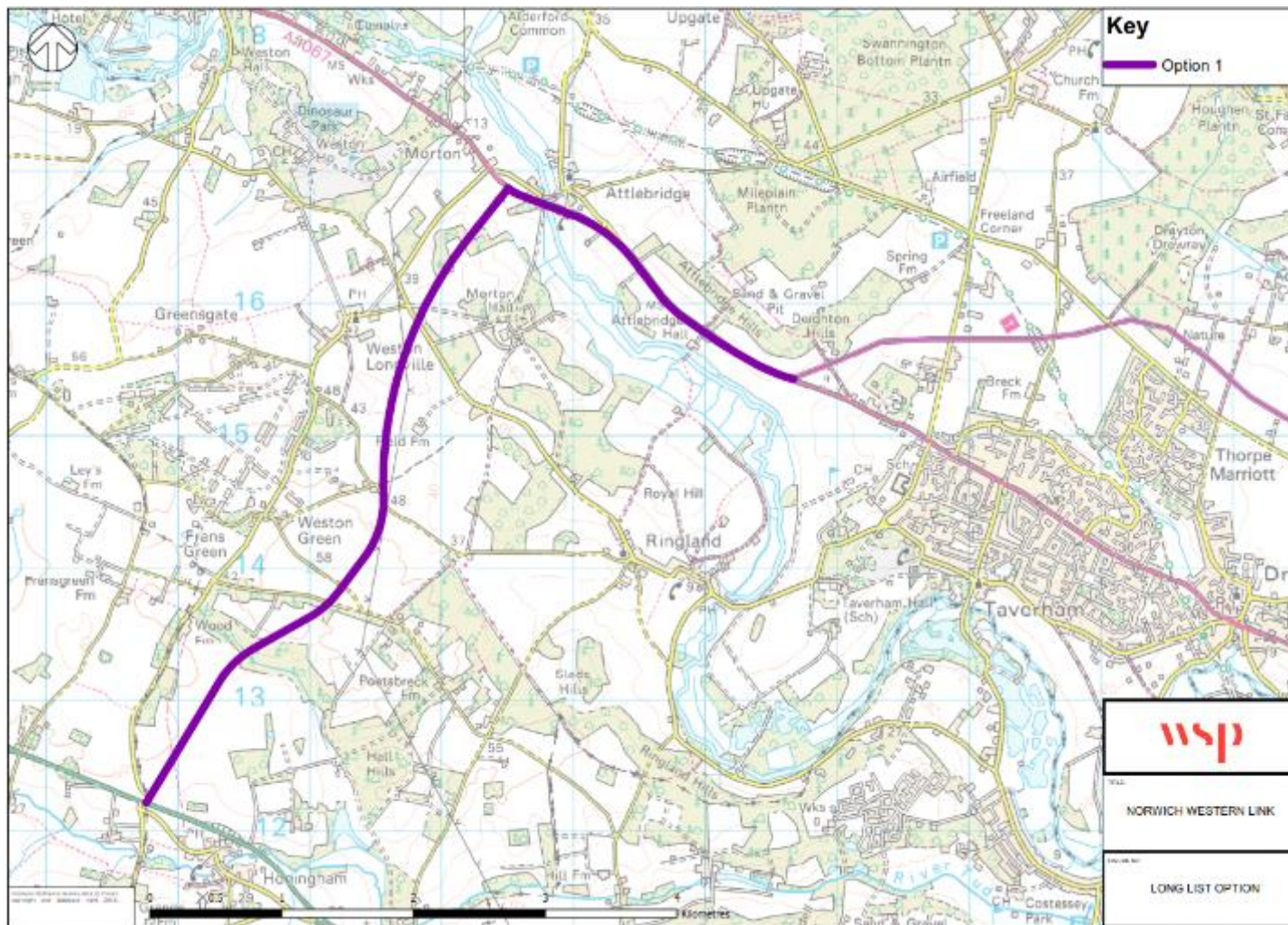
Appendix D

OPTIONS LONG LIST



OPTION 1

A1067 ATTLEBRIDGE TO A47 WEST OF HONINGHAM; 2014 PURPLE (1A), SINGLE CARRIAGEWAY



Description

From the A1067 at Attlebridge, Option 1 runs parallel to Marl Hill Road, before crossing Ringland Lane to pass east of Weston Longville. Option 1 then routes south along an alignment approximately following the pylons, and crosses Weston Road.

The route then passes east of Weston Green, before routing south-west, crossing Breck Road and The Broadway to connect with the A47 to the north-west of Honingham at the existing Wood Lane / Berry's Lane junction.

Option 1 would be of single carriageway standard.

Timeline

Medium (3-8 years)

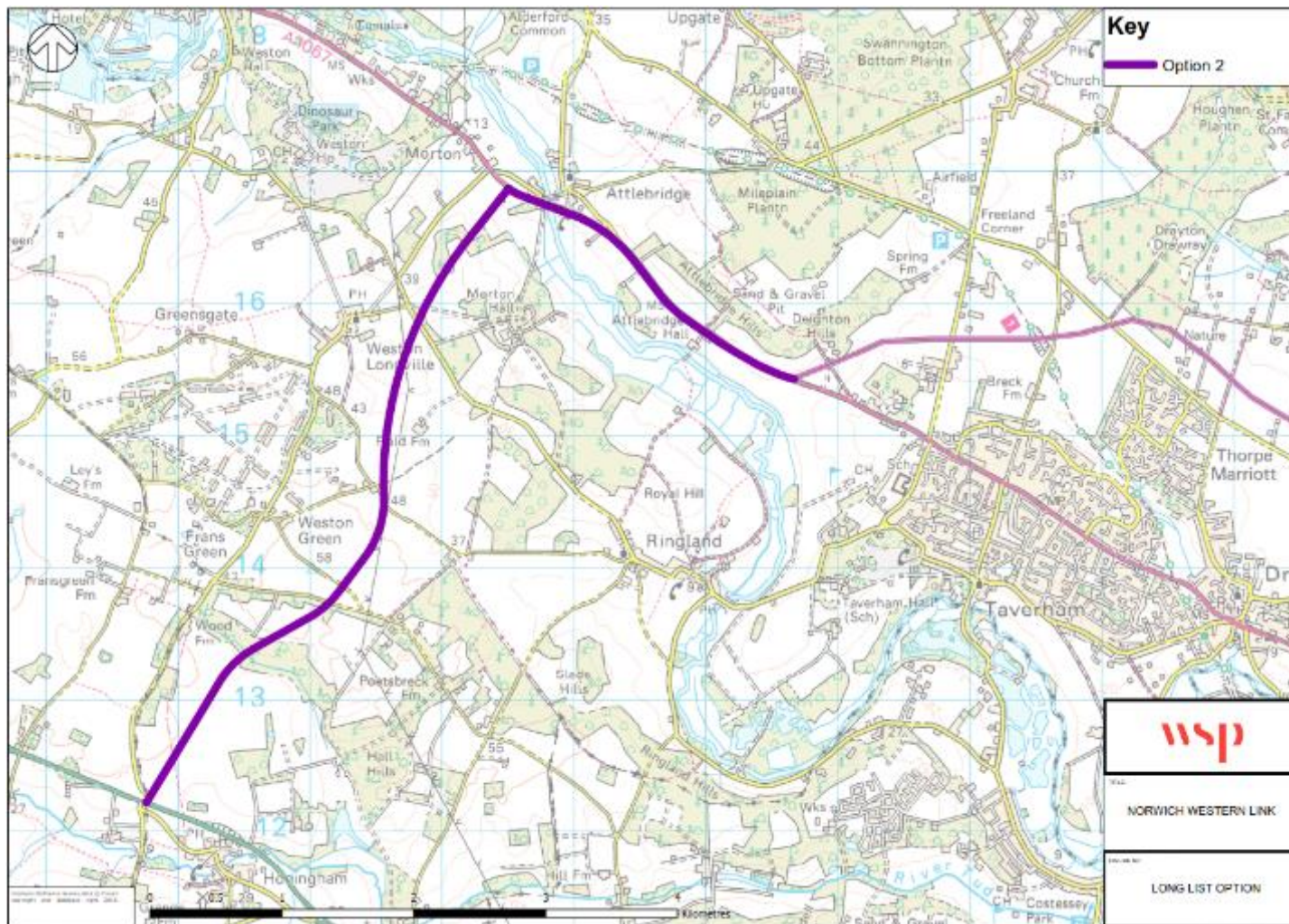
Cost

Estimated 2017 costs:

£25-£50 million

OPTION 2

A1067 ATTLEBRIDGE TO A47 WEST OF HONINGHAM; 2014 PURPLE (1A), DUAL CARRIAGEWAY



Description

From the A1067 at Attlebridge, Option 2 runs parallel to Marl Hill Road, before crossing Ringland Lane to pass east of Weston Longville. Option 2 then routes south along an alignment approximately following the pylons, and crosses Weston Road.

The route then passes east of Weston Green, before routing south-west, crossing Breck Road and The Broadway to connect with the A47 to the north-west of Honingham at the existing Wood Lane / Berry's Lane junction.

Option 2 would be of dual carriageway standard. Upgrades to the A1067 to dual carriageway standard may also be required.

Timeline

Medium (3-8 years)

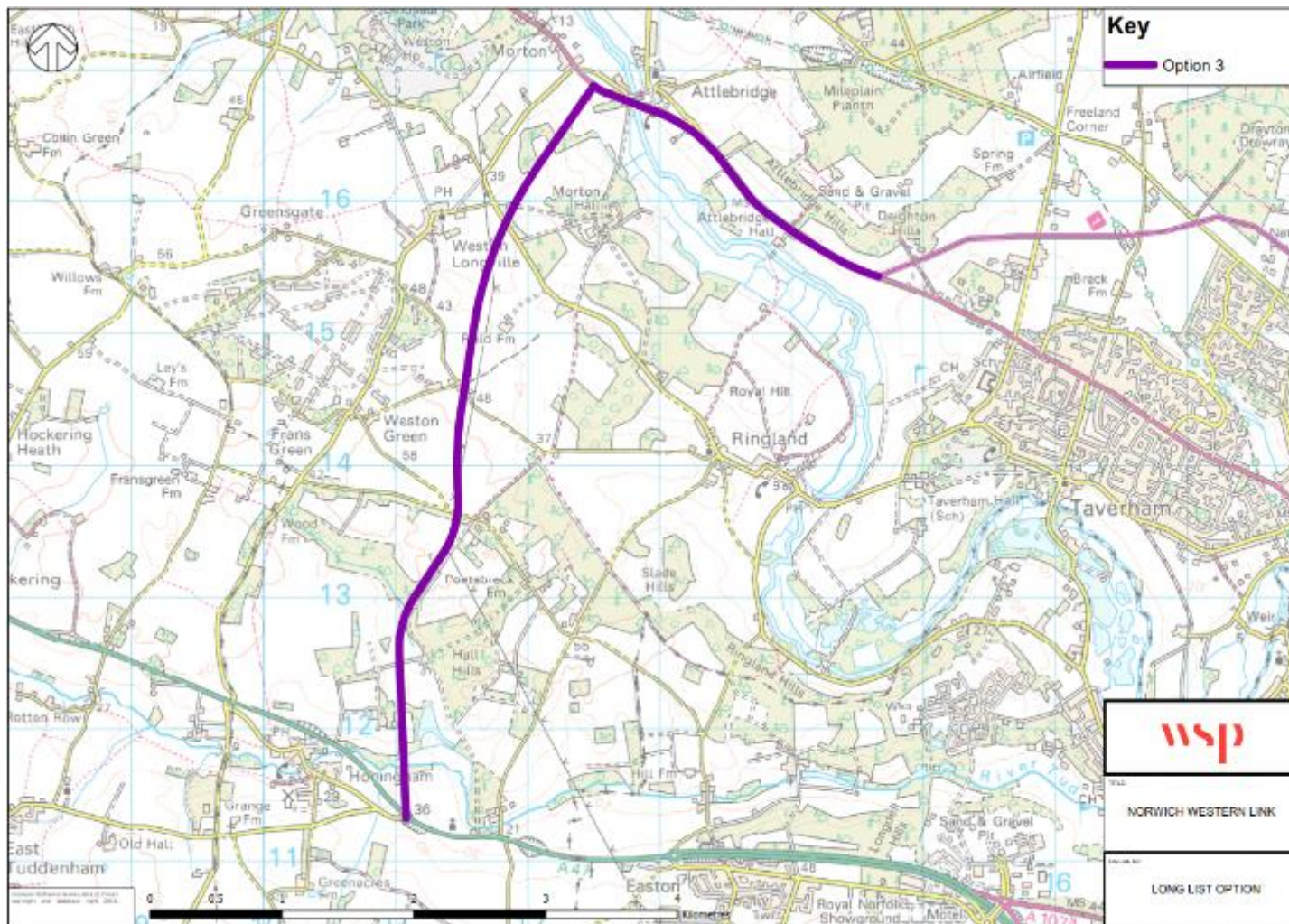
Cost

Estimated 2017 costs:

£50-£100 million

OPTION 3

A1067 ATTLEBRIDGE TO A47 WEST OF HONINGHAM; 2014 PURPLE (2A), SINGLE CARRIAGEWAY



Description

From the A1067 at Attlebridge, Option 3 runs parallel to Marl Hill Road, before crossing Ringland Lane to pass east of Weston Longville. Option 3 then routes south along an alignment approximately following the pylons, and crosses Weston Road.

The route then passes east of Weston Green, continuing south to cross The Broadway. Option 3 passes east of Hall Farm, and crosses the River Tud, before joining into the A47 and Norwich Road.

Option 3 would be of single carriageway standard.

Timeline

Medium (3-8 years)

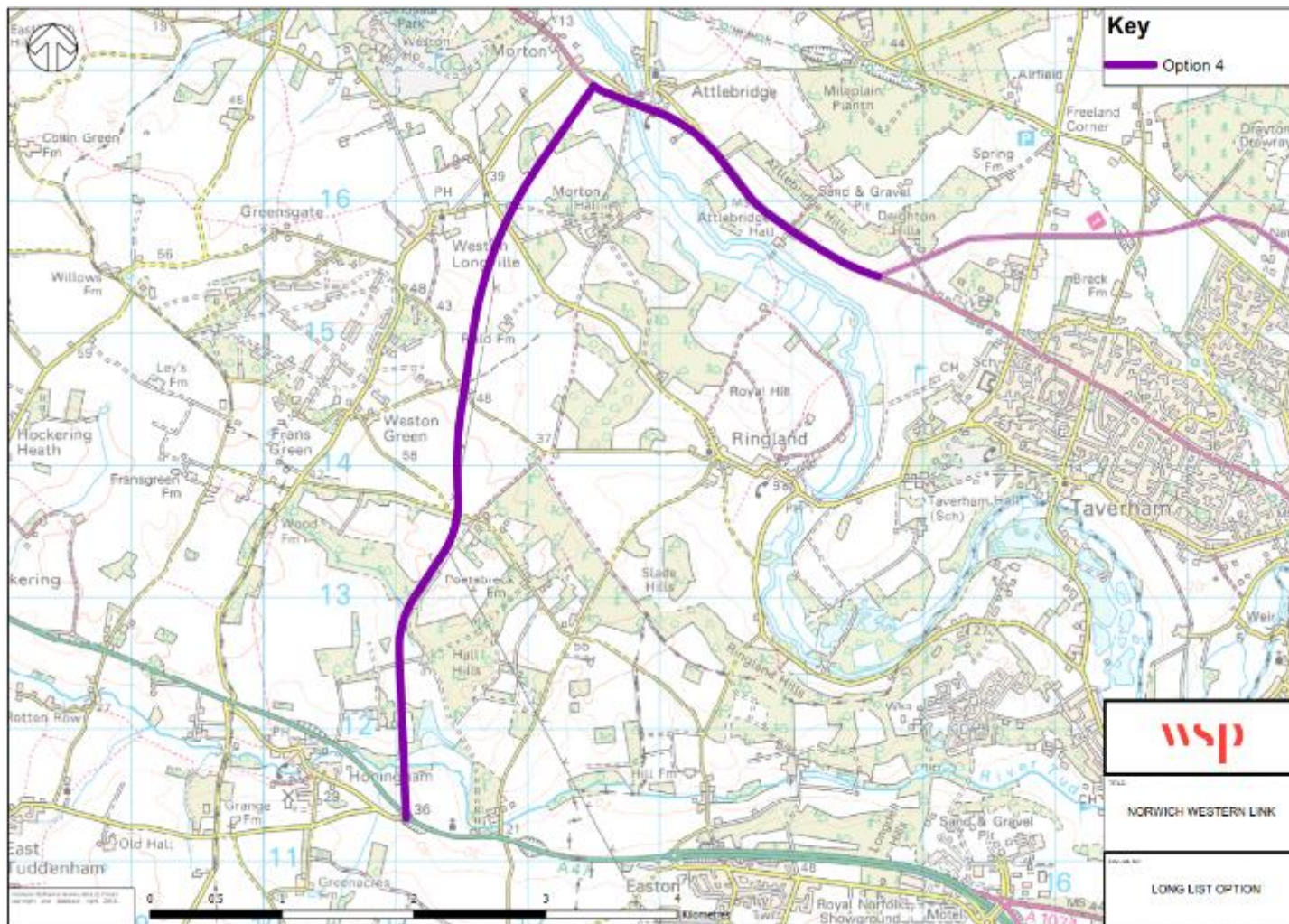
Cost

Estimated 2017 costs:

£25-£50 million

OPTION 4

A1067 ATTLEBRIDGE TO A47 WEST OF HONINGHAM; 2014 PURPLE (2A), DUAL CARRIAGEWAY



Description

From the A1067 at Attlebridge, Option 4 runs parallel to Marl Hill Road, before crossing Ringland Lane to pass east of Weston Longville. Option 4 then routes south along an alignment approximately following the pylons, and crosses Weston Road.

The route then passes east of Weston Green, continuing south to cross The Broadway. Option 4 passes east of Hall Farm, and crosses the River Tud, before joining into the A47 and Norwich Road.

Option 4 would be of dual carriageway standard. Upgrades to the A1067 to dual carriageway standard may also be required.

Timeline

Medium (3-8 years)

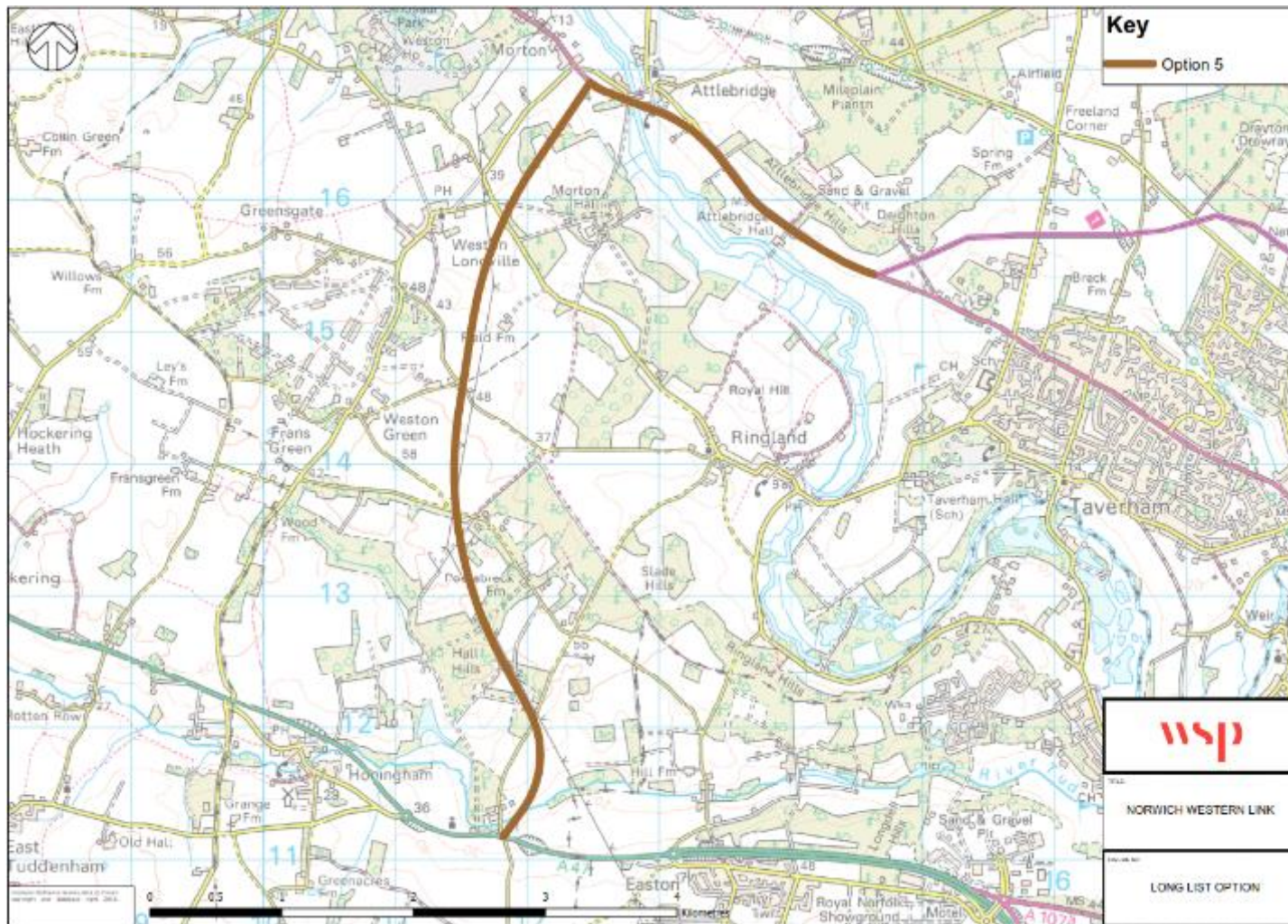
Cost

Estimated 2017 costs:

£50-£100 million

OPTION 5

A1067 ATTLEBRIDGE TO A47 WEST OF EASTON; 2014 BROWN, SINGLE CARRIAGEWAY



Description

From the A1067 at Attlebridge, Option 5 runs parallel to Marl Hill Road, before crossing Ringland Lane to pass east of Weston Longville. Option 5 then routes south along an alignment approximately following the pylons, and crosses Weston Road.

The route then passes east of Weston Green, crossing The Broadway, before routing south-east, passing through Hall Hill before crossing Taverham Road. Option 5 crosses the River Tud, to connect with the A47 via Taverham Road to the west of Easton on the single carriageway section, close to the existing lay-by.

Option 5 would be of single carriageway standard.

Timeline

Medium (3-8 years)

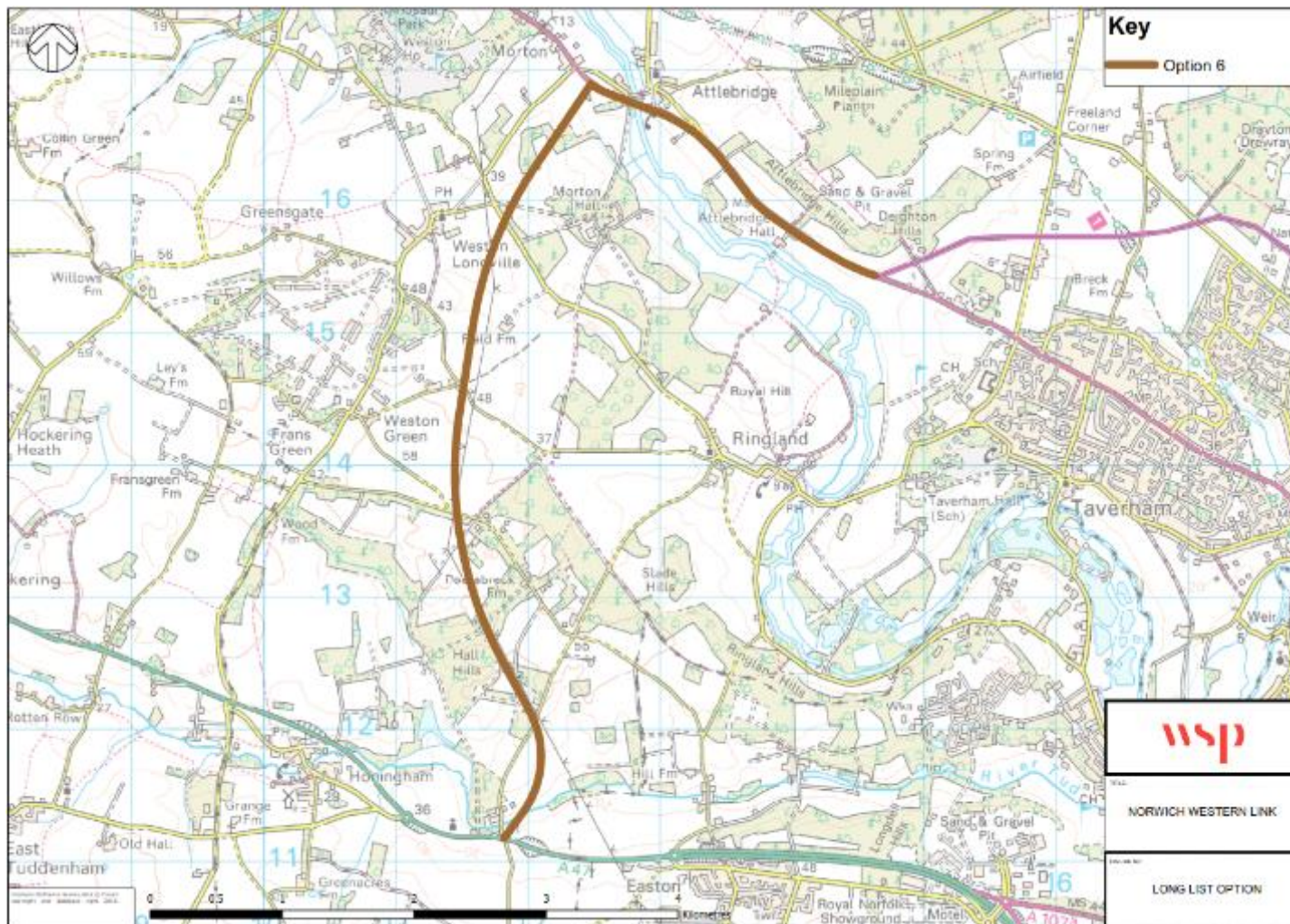
Cost

Estimated 2017 costs:

£25-£50 million

OPTION 6

A1067 ATTLEBRIDGE TO A47 WEST OF EASTON; 2014 BROWN, DUAL CARRIAGEWAY



Description

From the A1067 at Attlebridge, Option 6 runs parallel to Marl Hill Road, before crossing Ringland Lane to pass east of Weston Longville. Option 6 then routes south along an alignment approximately following the pylons, and crosses Weston Road.

The route then passes east of Weston Green, crossing The Broadway, before routing south-east, passing through Hall Hill before crossing Taverham Road. Option 6 crosses the River Tud, to connect with the A47 to the west of Easton on the single carriageway section, close to the existing lay-by via Taverham Road.

Option 6 would be of dual carriageway standard. Upgrades to the A1067 to dual carriageway standard may also be required.

Timeline

Medium (3-8 years)

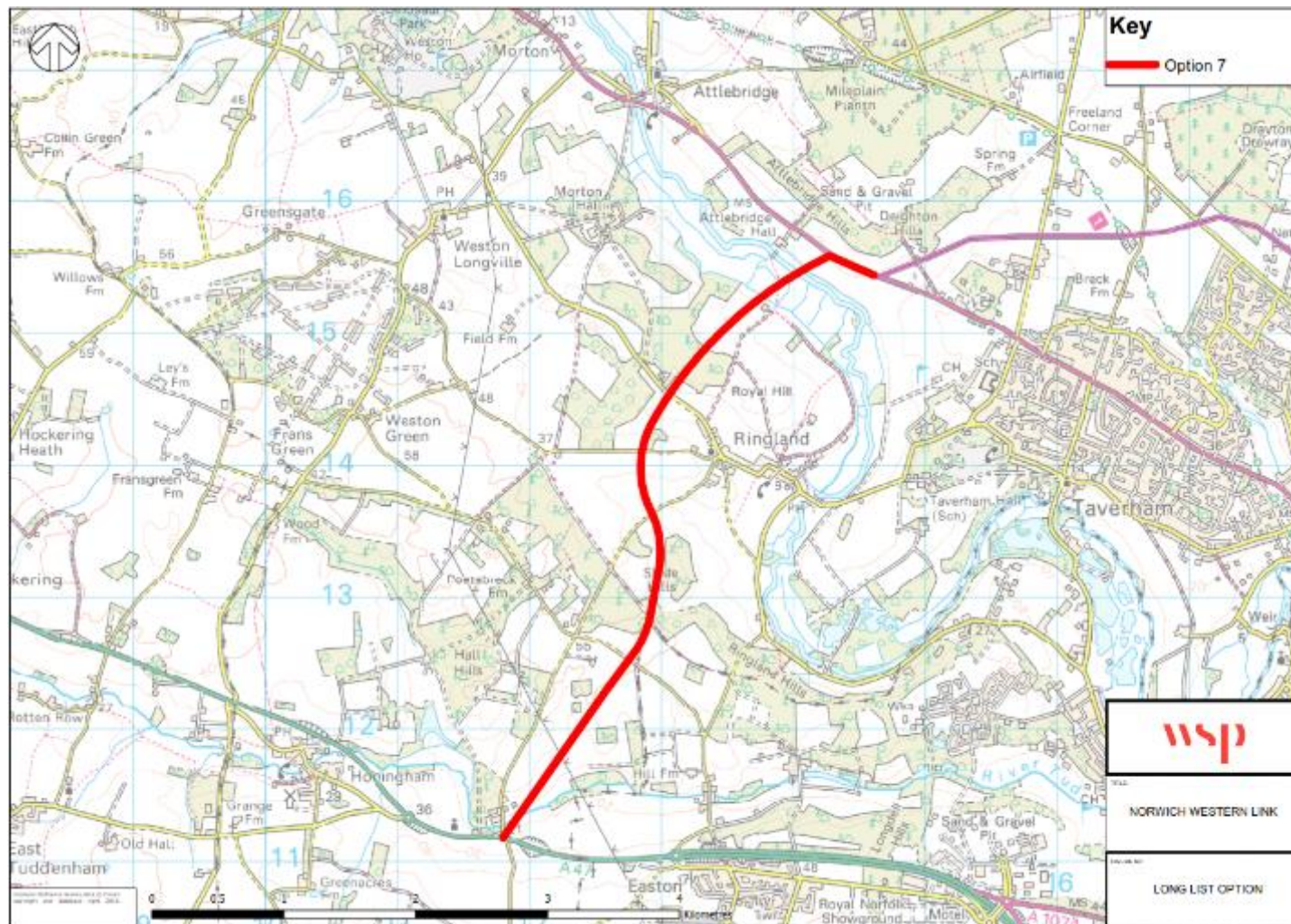
Cost

Estimated 2017 costs:

£50-£100 million

OPTION 7

A1067 (WEST OF A1067 / A1270 JUNCTION) TO A47 WEST OF EASTON; 2014 RED, SINGLE CARRIAGEWAY



Description

From the A1067, west of the junction with the A1270 at Deighton Hills, Option 7 heads south-west, crossing the River Wensum, before passing west of Ringland, crossing a number of local roads (Ringland Lane, Weston Road and Honingham Lane).

The route then heads south crossing Weston Road for a second time, before passing west of Hill Farm. Option 7 then crosses the River Tud to connect with the A47 to the west of Easton at the existing Taverham Road junction.

Option 7 would be of single carriageway standard.

Timeline

Medium (3-8 years)

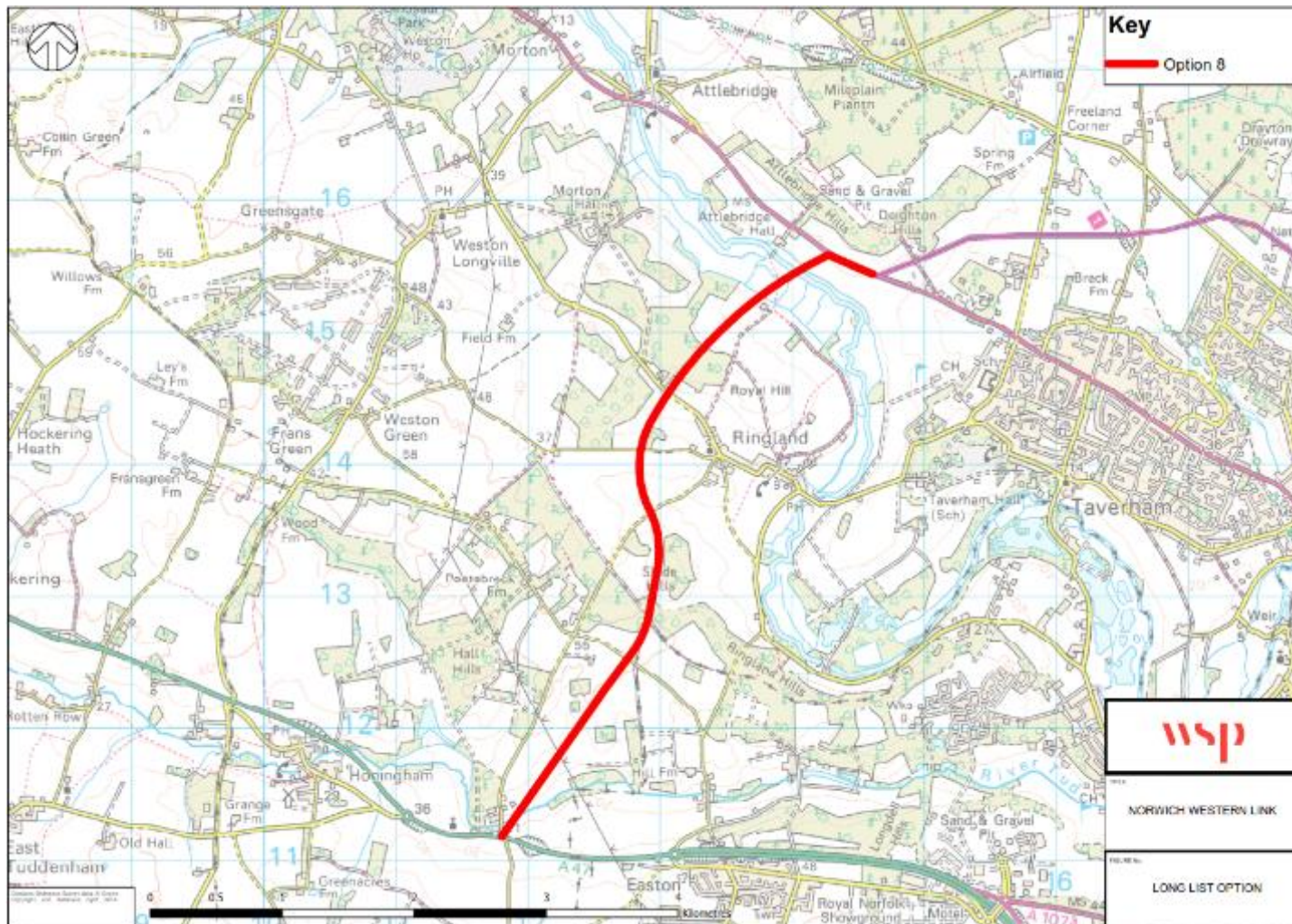
Cost

Estimated 2017 costs:

£100-£150 million

OPTION 8

A1067 (WEST OF A1067 / A1270 JUNCTION) TO A47 WEST OF EASTON; 2014 RED, DUAL CARRIAGEWAY



Description

From the A1067, west of the junction with the A1270 at Deighton Hills, Option 8 heads south-west, crossing the River Wensum, before passing west of Ringland, crossing a number of local roads (Ringland Lane, Weston Road and Honingham Lane).

The route then heads south crossing Weston Road for a second time, before passing west of Hill Farm. Option 8 then crosses the River Tud to connect with the A47 to the west of Easton at the existing Taverham Road junction.

Option 8 would be of dual carriageway standard. Upgrades to the A1067 to dual carriageway standard may also be required.

Timeline

Medium (3-8 years)

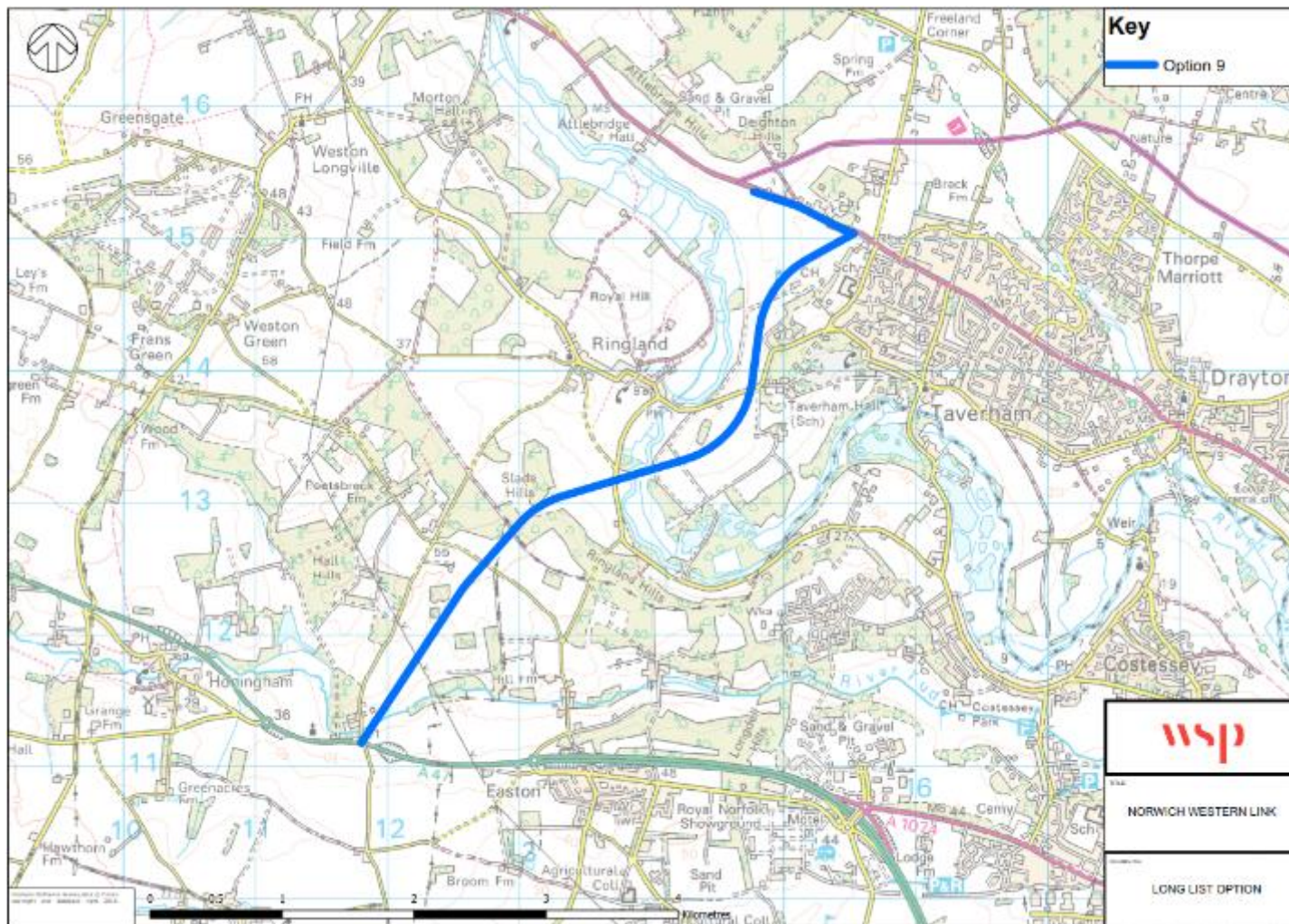
Cost

Estimated 2017 costs:

£150-£200 million

OPTION 9

A1067 (EAST OF A1067 / A1270 JUNCTION) TO A47 WEST OF EASTON; 2014 BLUE (1), SINGLE CARRIAGEWAY



Description

From the A1067, east of the junction with the A1270 at Deighton Hills, Option 9 skirts the north-west edge of Taverham before crossing Ringland Road.

The route then turns south-west and crosses the River Wensum and Costessey Lane to the south of Ringland.

Option 9 continues in a south-western direction through Ringland Hills, crossing Weston Road, before heading south, passing west of Hill Farm. The route crosses the River Tud to connect with the A47 to the west of Easton at the existing Taverham Road junction.

Option 9 would be of single carriageway standard.

Timeline

Medium (3-8 years)

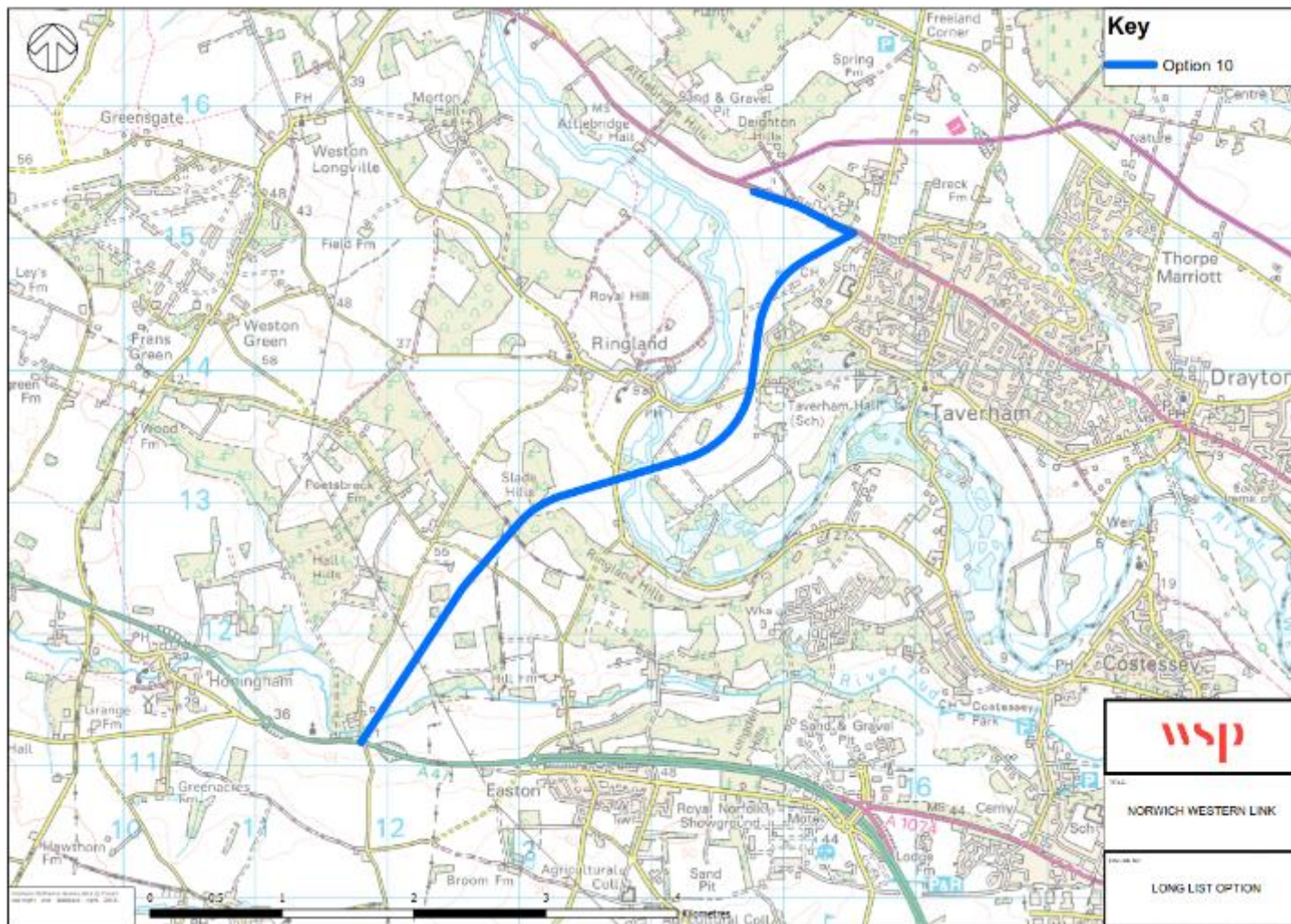
Cost

Estimated 2017 costs:

£100-£150 million

OPTION 10

A1067 (EAST OF A1067 / A1270 JUNCTION) TO A47 WEST OF EASTON; 2014 BLUE (1), DUAL CARRIAGEWAY



Description

From the A1067, east of the junction with the A1270 at Deighton Hills, Option 10 skirts the north-west edge of Taverham before crossing Ringland Road.

The route then turns south-west and crosses the River Wensum and Costessey Lane to the south of Ringland.

Option 10 continues in a south-western direction through Ringland Hills, crossing Weston Road, before heading south, passing west of Hill Farm. The route crosses the River Tud to connect with the A47 to the west of Easton at the existing Taverham Road junction.

Option 10 would be of dual carriageway standard. Upgrades to the A1067 to dual carriageway standard may also be required.

Timeline

Medium (3-8 years)

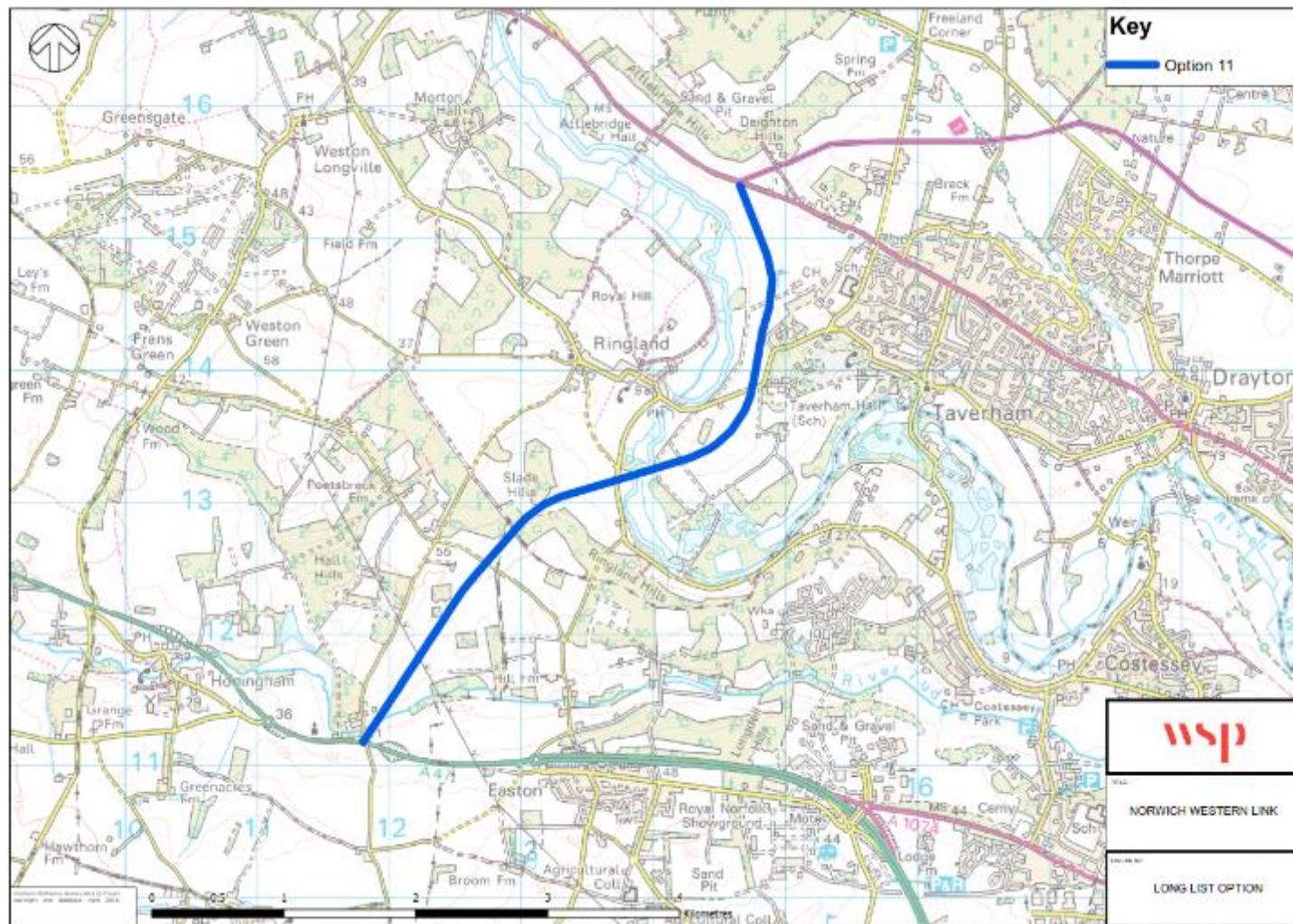
Cost

Estimated 2017 costs:

£100-£200 million

OPTION 11

A1067 / A1270 JUNCTION TO A47 WEST OF EASTON; 2014 BLUE (2), SINGLE CARRIAGEWAY



Description

From the A1067 junction with the A1270 at Deighton Hills, Option 11 heads south, crossing Ringland Road, to the west of Taverham.

The route then turns south-west and crosses the River Wensum and Costessey Lane to the south of Ringland.

Option 11 continues in a south-western direction through Ringland Hills, crossing Weston Road, before heading south, passing west of Hill Farm. The route crosses the River Tud to connect with the A47 to the west of Easton at the existing Taverham Road junction.

Option 11 would be of single carriageway standard.

Timeline

Medium (3-8 years)

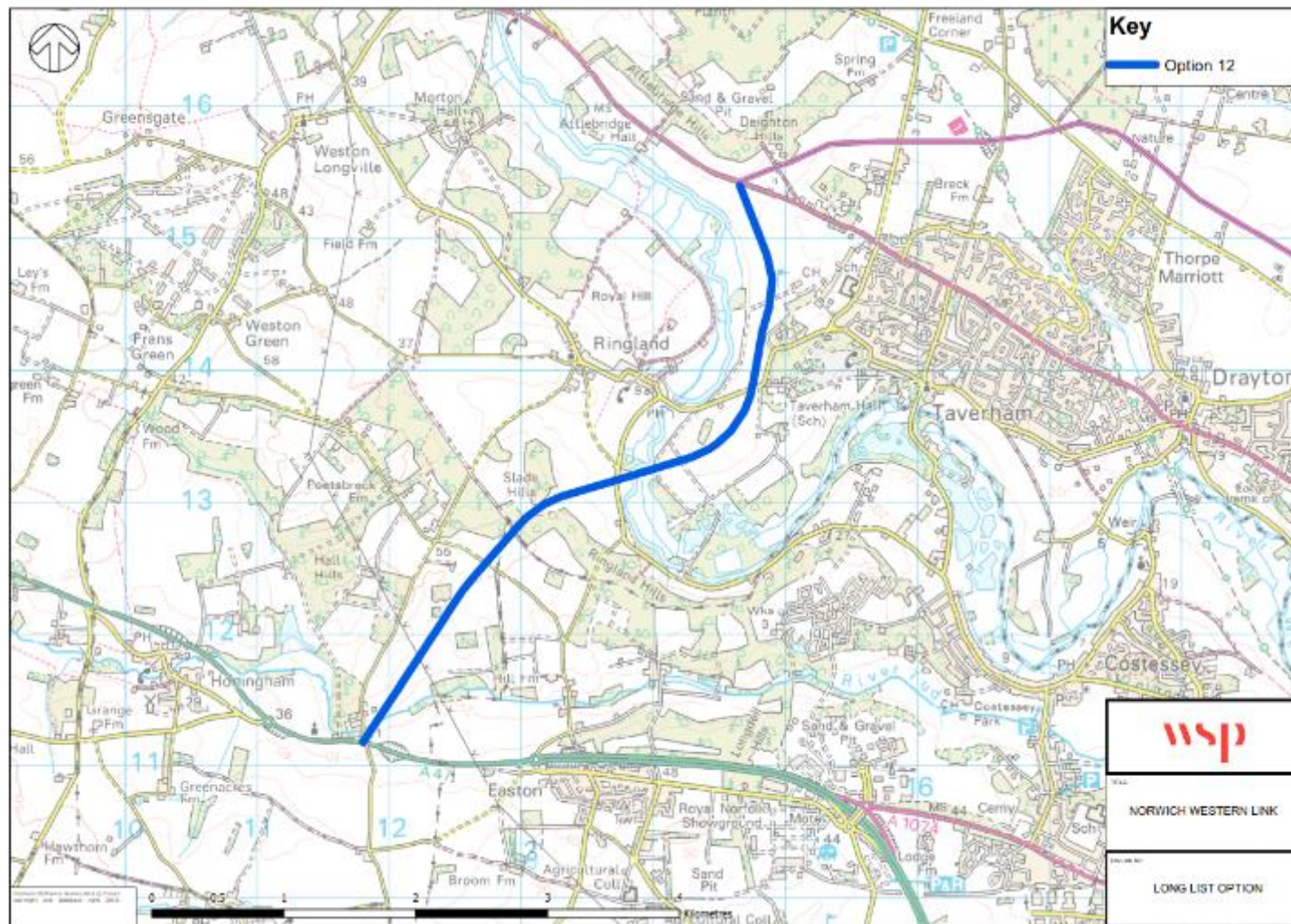
Cost

Estimated 2017 costs:

£100-£150 million

OPTION 12

A1067 / A1270 JUNCTION TO A47 WEST OF EASTON; 2014 BLUE (2), DUAL CARRIAGEWAY



Description

From the A1067 junction with the A1270 at Deighton Hills, Option 12 heads south, crossing Ringland Road, to the west of Taverham.

The route then turns south-west and crosses the River Wensum and Costessey Lane to the south of Ringland.

Option 12 continues in a south-western direction through Ringland Hills, crossing Weston Road, before heading south, passing west of Hill Farm. The route crosses the River Tud to connect with the A47 to the west of Easton at the existing Taverham Road junction.

Option 12 would be of dual carriageway standard.

Timeline

Medium (3-8 years)

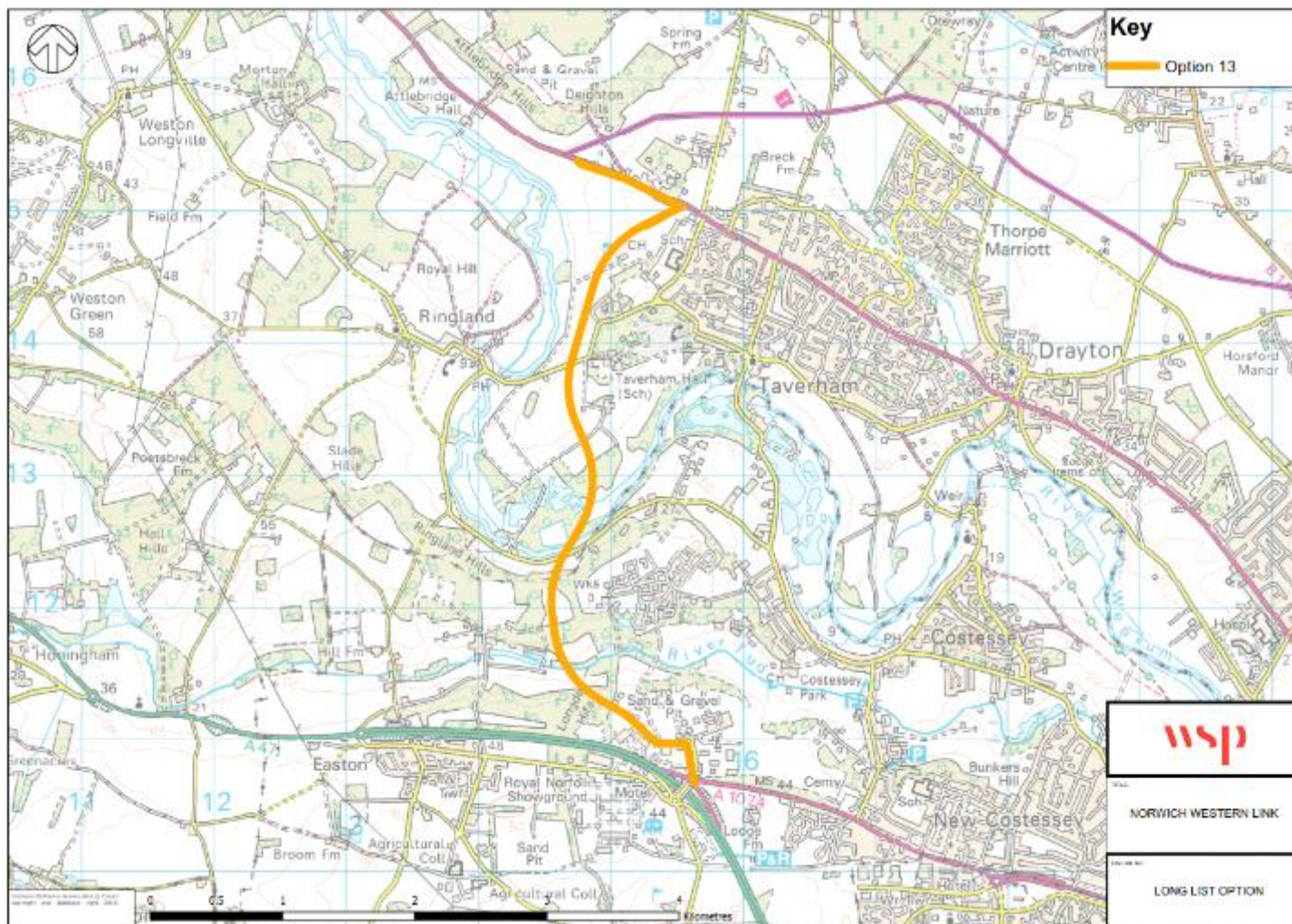
Cost

Estimated 2017 costs:

£150-£250m

OPTION 13

A1067 (EAST OF A1067 / A1270 JUNCTION) TO A47 / A1074 LONGWATER INTERCHANGE; 2014 ORANGE (1), SINGLE CARRIAGEWAY



Description

From the A1067, east of the junction with the A1270 at Deighton Hills, Option 13 skirts the north-west edge of Taverham before crossing Ringland Road.

The route then turns south and crosses the River Wensum and Costessey Lane to the south-east of Ringland.

Option 13 continues south through Ringland Hills to the west of Queen's Hill before crossing the River Tud. The route passes through the Longwater employment area to connect with the A47 / A1074 Longwater Interchange.

Option 13 would be of single carriageway standard.

Timeline

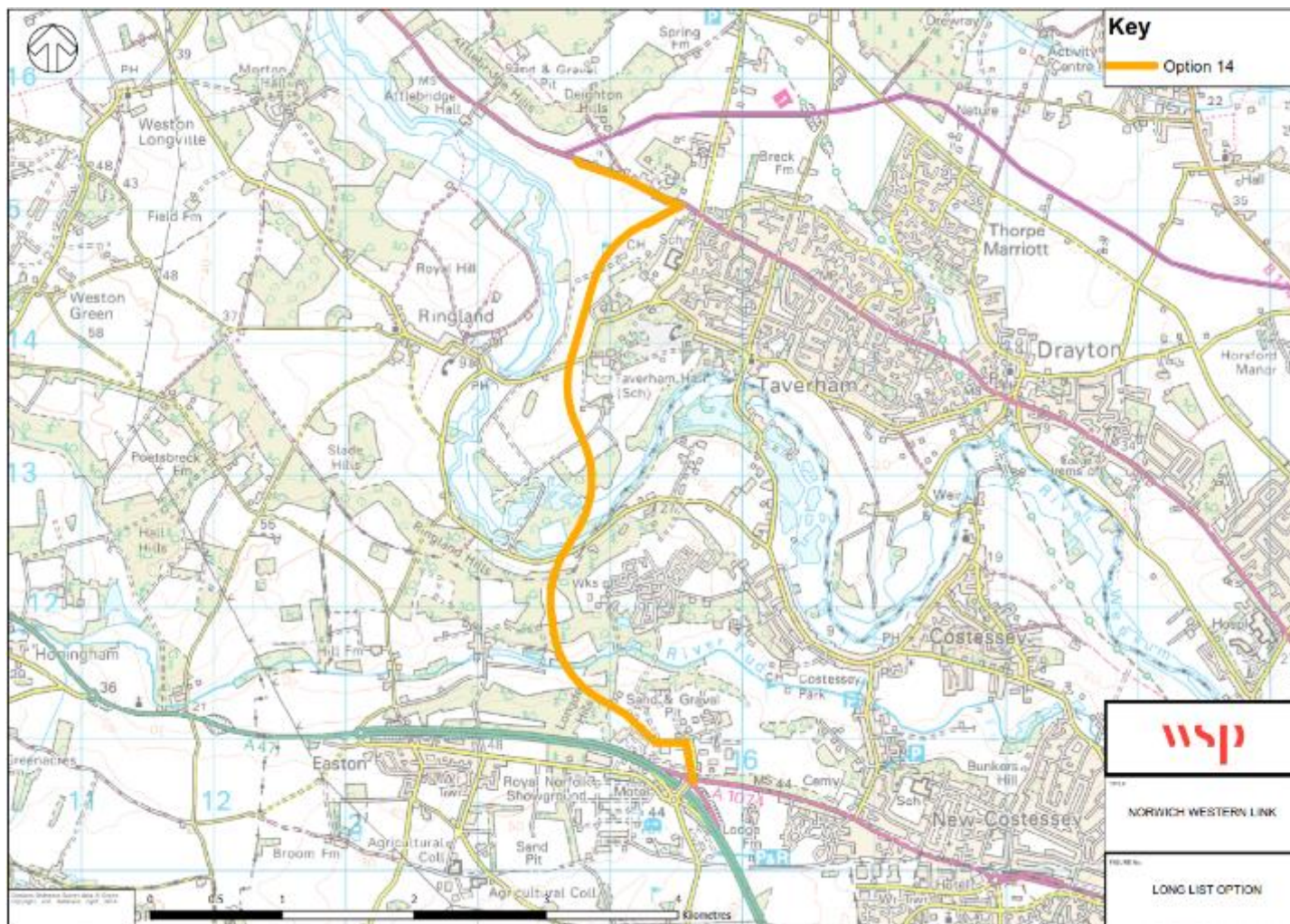
Medium (3-8 years)

Cost

Estimated 2017 costs:
£100-£150 million

OPTION 14

A1067 (EAST OF A1067 / A1270 JUNCTION) TO A47 / A1074 LONGWATER INTERCHANGE; 2014 ORANGE (1), DUAL CARRIAGEWAY



Description

From the A1067, east of the junction with the A1270 at Deighton Hills, Option 14 skirts the north-west edge of Taverham before crossing Ringland Road.

The route then turns south and crosses the River Wensum and Costessey Lane to the south-east of Ringland.

Option 14 continues south through Ringland Hills to the west of Queen's Hill before crossing the River Tud. The route passes through the Longwater employment area to connect with the A47 / A1074 Longwater Interchange.

Option 14 would be of dual carriageway standard. Upgrades to the A1067 to dual carriageway standard may also be required.

Timeline

Medium (3-8 years)

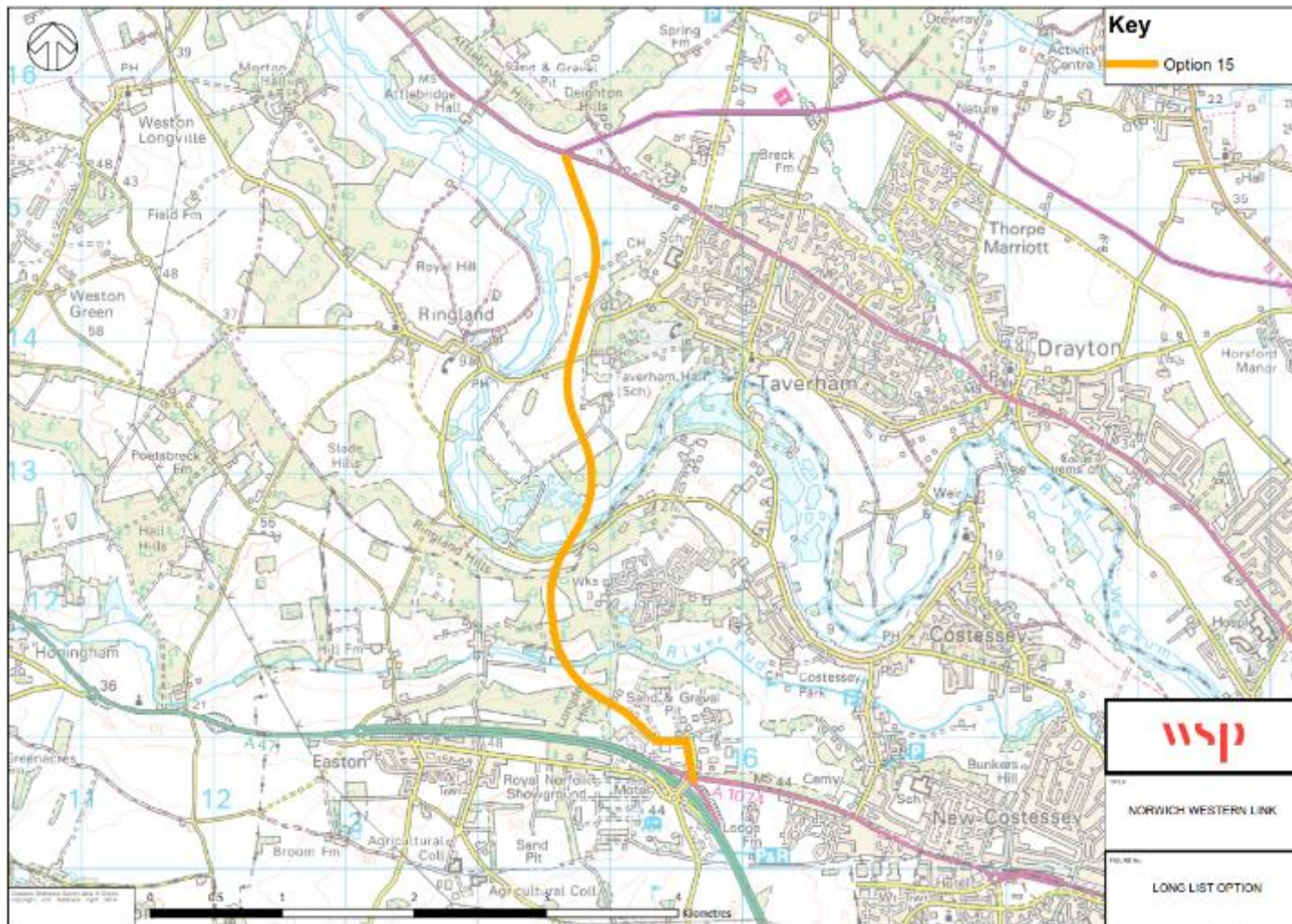
Cost

Estimated 2017 costs:

£150-£200 million

OPTION 15

A1067 / A1270 JUNCTION TO A47 / A1074 LONGWATER INTERCHANGE; 2014 ORANGE (2), SINGLE CARRIAGEWAY



Description

From the A1067 junction with the A1270 at Deighton Hills, Option 15 heads south, crossing Ringland Road, to the west of Taverham.

The route continues south and crosses the River Wensum and Costessey Lane to the south-east of Ringland.

Option 15 passes through Ringland Hills to the west of Queen's Hill before crossing the River Tud. The route passes through the Longwater employment area to connect with the A47 / A1074 Longwater Interchange.

Option 15 would be of single carriageway standard.

Timeline

Medium (3-8 years)

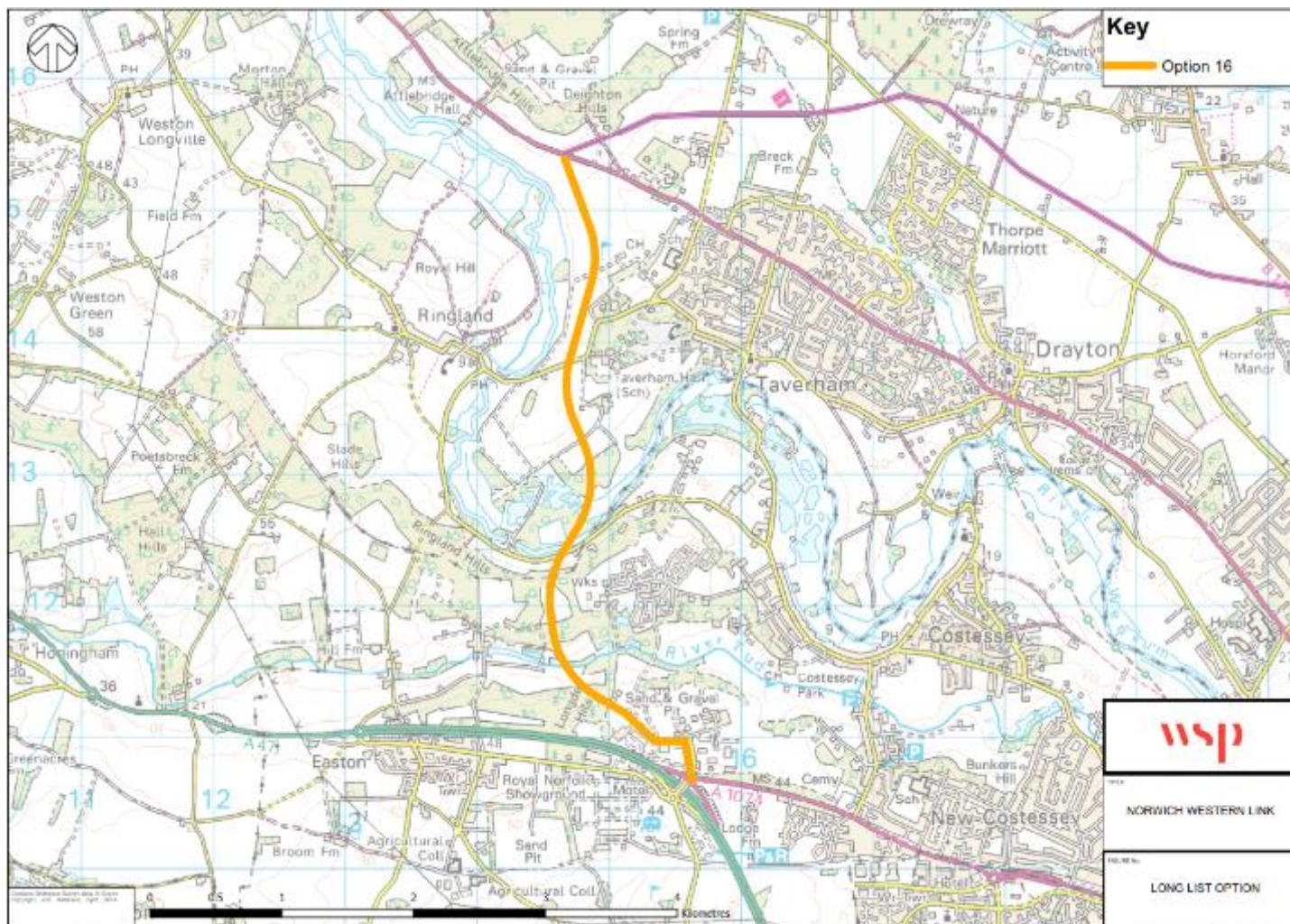
Cost

Estimated 2017 costs:

£100-£150 million

OPTION 16

A1067 / A1270 JUNCTION TO A47 / A1074 LONGWATER INTERCHANGE; 2014 ORANGE (2), DUAL CARRIAGEWAY



Description

From the A1067 junction with the A1270 at Deighton Hills, Option 16 heads south, crossing Ringland Road, to the west of Taverham.

The route continues south and crosses the River Wensum and Costessey Lane to the south-east of Ringland.

Option 16 passes through Ringland Hills to the west of Queen's Hill before crossing the River Tud. The route passes through the Longwater employment area to connect with the A47 / A1074 Longwater Interchange.

Option 16 would be of dual carriageway standard.

Timeline

Medium (3-8 years)

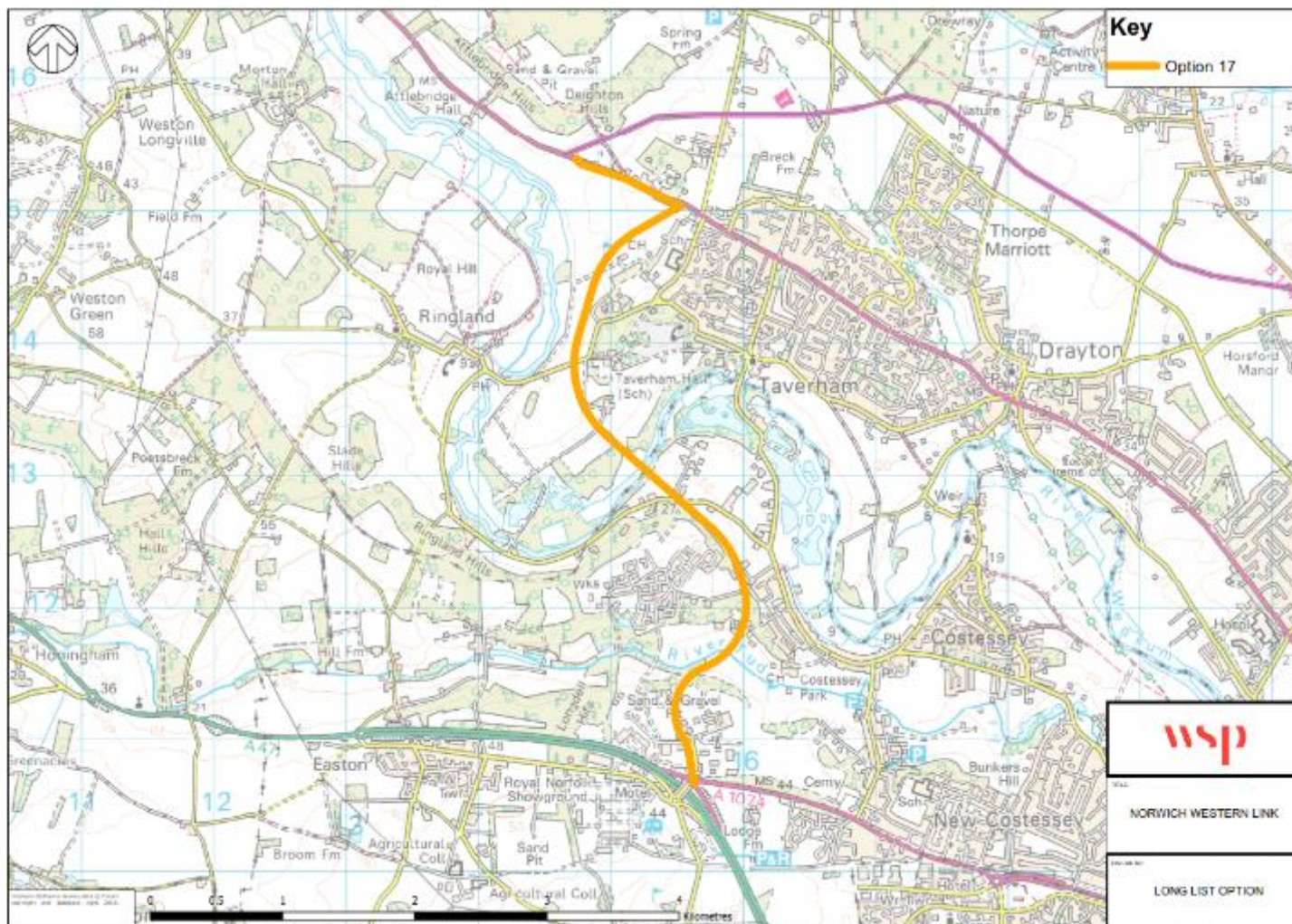
Cost

Estimated 2017 costs:

£150-£200 million

OPTION 17

A1067 (EAST OF A1067 / A1270 JUNCTION) TO A47 / A1074 LONGWATER INTERCHANGE; 2014 ORANGE (3), SINGLE CARRIAGEWAY



Description

From the A1067, east of the junction with the A1270 at Deighton Hills, Option 17 skirts the north-west edge of Taverham before crossing Ringland Road.

The route turns south-east and crosses the River Wensum and Costessey Lane to the south of Taverham.

Option 17 then passes between Queen's Hill and Costessey, before crossing the River Tud. The route passes through the Longwater employment area to connect with the A47 / A1074 Longwater Interchange.

Option 17 would be of single carriageway standard.

Timeline

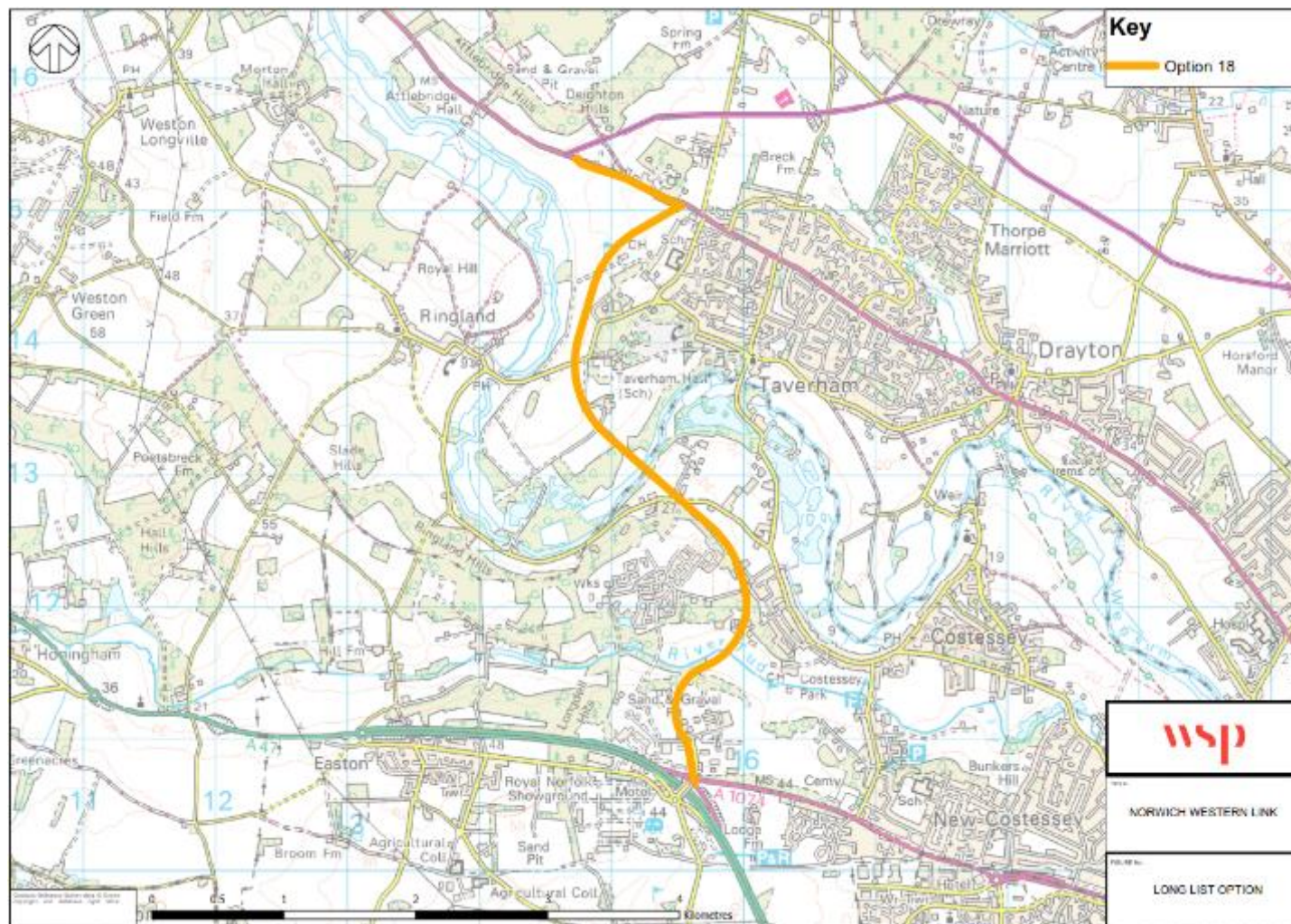
Medium (3-8 years)

Cost

Estimated 2017 costs:
£100-£150 million

OPTION 18

A1067 (EAST OF A1067 / A1270 JUNCTION) TO A47 / A1074 LONGWATER INTERCHANGE; 2014 ORANGE (3), DUAL CARRIAGEWAY



Description

From the A1067, east of the junction with the A1270 at Deighton Hills, Option 18 skirts the north-west edge of Taverham before crossing Ringland Road.

The route turns south-east and crosses the River Wensum and Costessey Lane to the south of Taverham.

Option 18 then passes between Queen's Hill and Costessey, before crossing the River Tud. The route passes through the Longwater employment area to connect with the A47 / A1074 Longwater Interchange.

Option 18 would be of dual carriageway standard. Upgrades to the A1067 to dual carriageway standard may also be required.

Timeline

Medium (3-8 years)

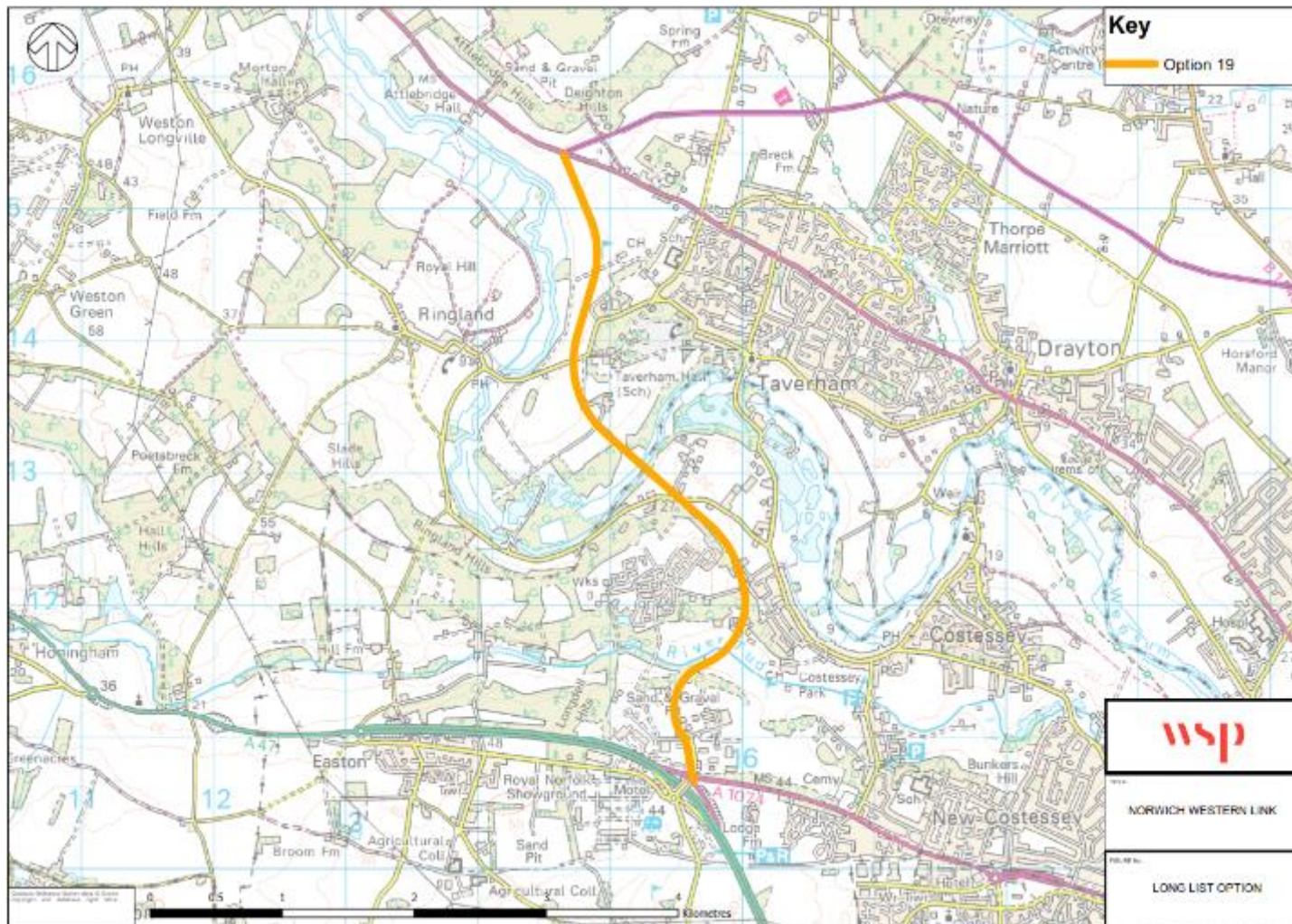
Cost

Estimated 2017 costs:

£150-£200 million

OPTION 19

A1067 / A1270 JUNCTION TO A47 / A1074 LONGWATER INTERCHANGE; 2014 ORANGE (4), SINGLE CARRIAGEWAY



Description

From the A1067 junction with the A1270 at Deighton Hills, Option 19 heads south, crossing Ringland Road, to the west of Taverham.

The route turns south-east and crosses the River Wensum and Costessey Lane to the south of Taverham.

Option 19 then passes between Queen's Hill and Costessey, before crossing the River Tud. The route passes through the Longwater employment area to connect with the A47 / A1074 Longwater Interchange.

Option 19 would be of single carriageway standard.

Timeline

Medium (3-8 years)

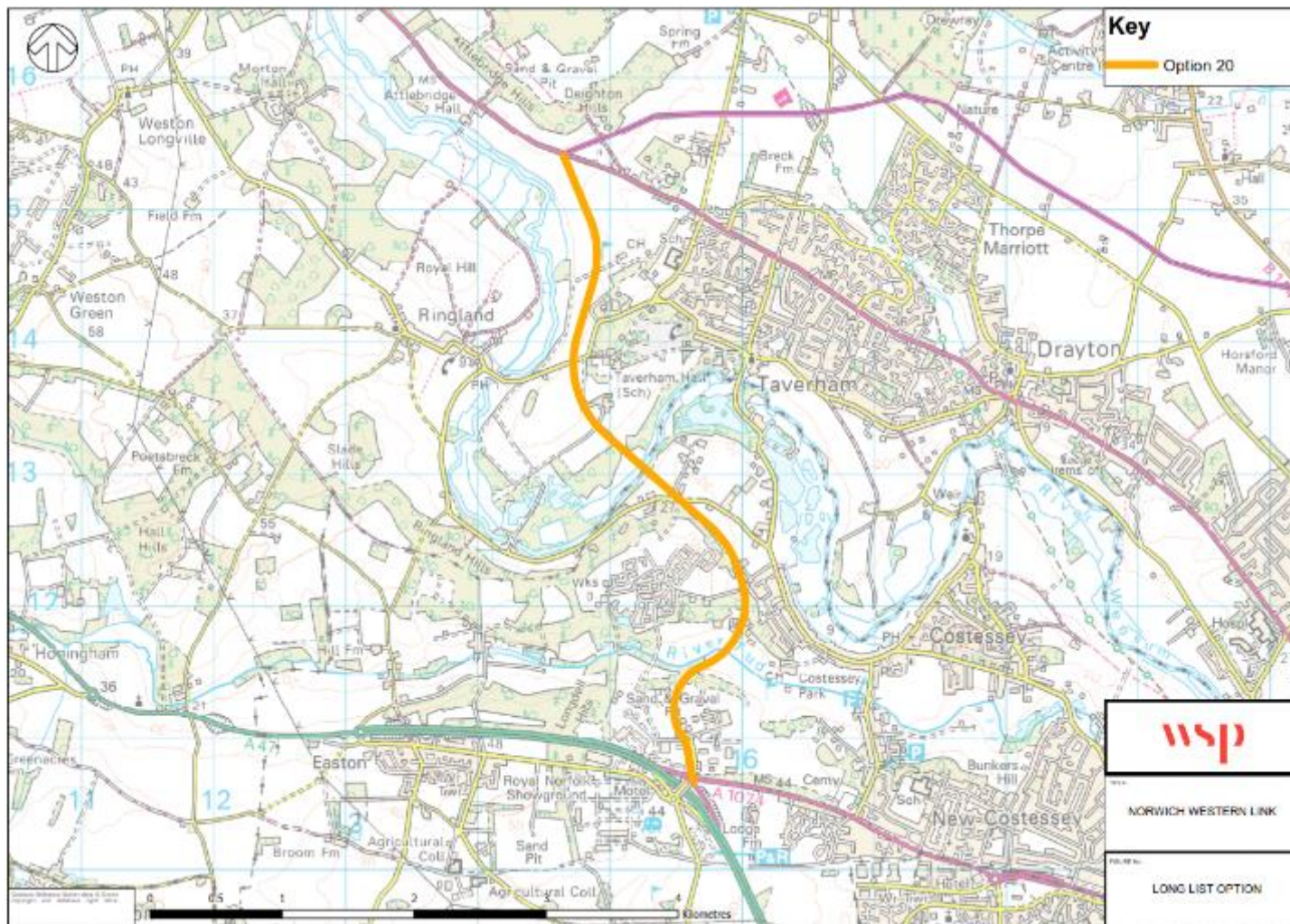
Cost

Estimated 2017 costs:

£150-£200 million

OPTION 20

A1067 / A1270 JUNCTION TO A47 / A1074 LONGWATER INTERCHANGE; 2014 ORANGE (4), DUAL CARRIAGEWAY



Description

From the A1067 junction with the A1270 at Deighton Hills, Option 20 heads south, crossing Ringland Road, to the west of Taverham.

The route turns south-east and crosses the River Wensum and Costessey Lane to the south of Taverham.

Option 20 then passes between Queen's Hill and Costessey, before crossing the River Tud. The route passes through the Longwater employment area to connect with the A47 / A1074 Longwater Interchange.

Option 20 would be of dual carriageway standard.

Timeline

Medium (3-8 years)

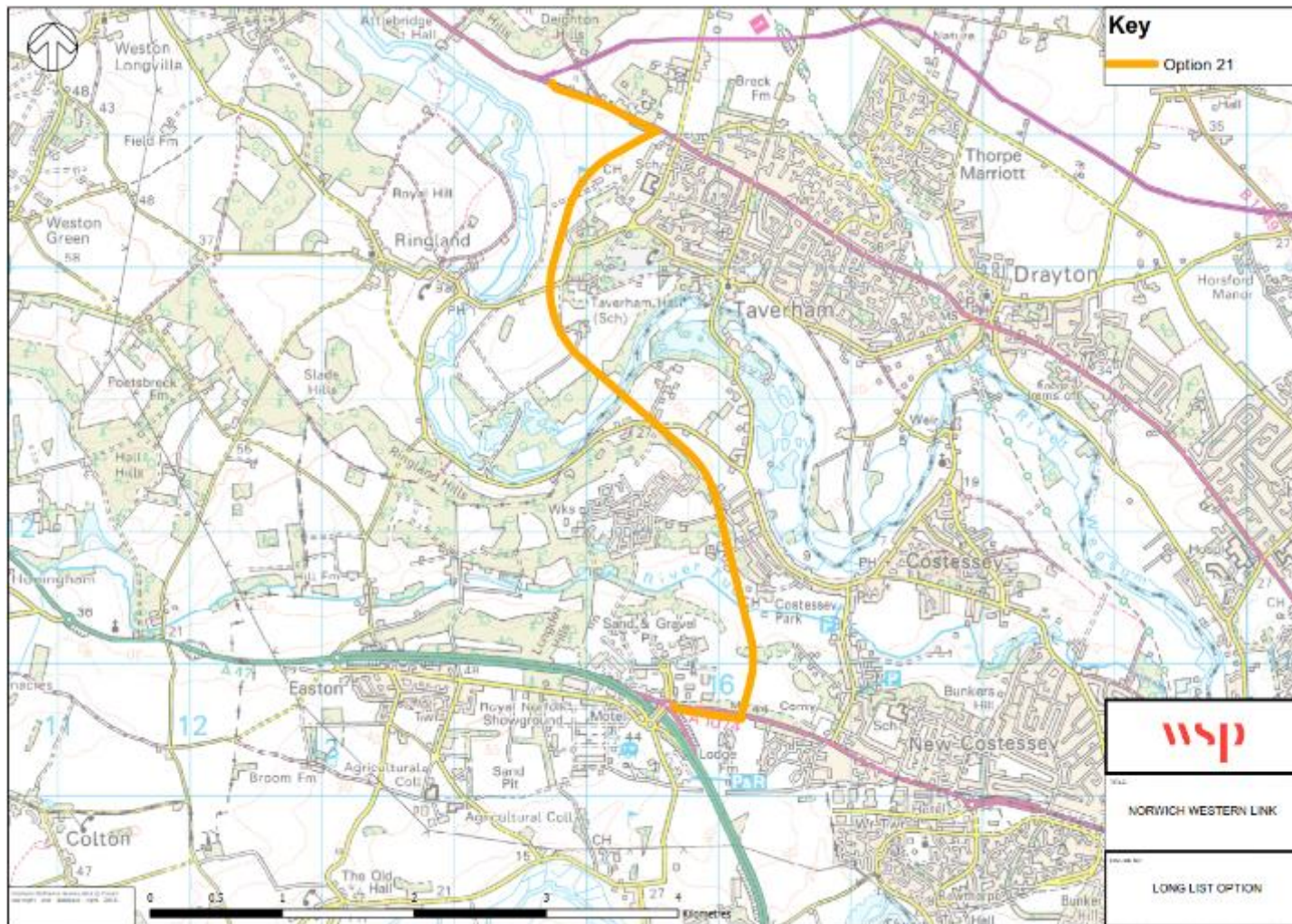
Cost

Estimated 2017 costs:

£200-£250 million

OPTION 21

A1067 (EAST OF A1067 / A1270 JUNCTION) TO A1074 EAST OF LONGWATER; 2014 ORANGE (5), SINGLE CARRIAGEWAY



Description

From the A1067, east of the junction with the A1270 at Deighton Hills, Option 21 skirts the north-west edge of Taverham before crossing Ringland Road.

The route turns south-east and crosses the River Wensum and Costessey Lane to the south of Taverham.

Option 21 then passes between Queen's Hill and Costessey, before crossing the River Tud. The route passes to the east of the Longwater employment area to connect with the A1074 between Longwater and New Costessey.

Option 21 would be of single carriageway standard.

Timeline

Medium (3-8 years)

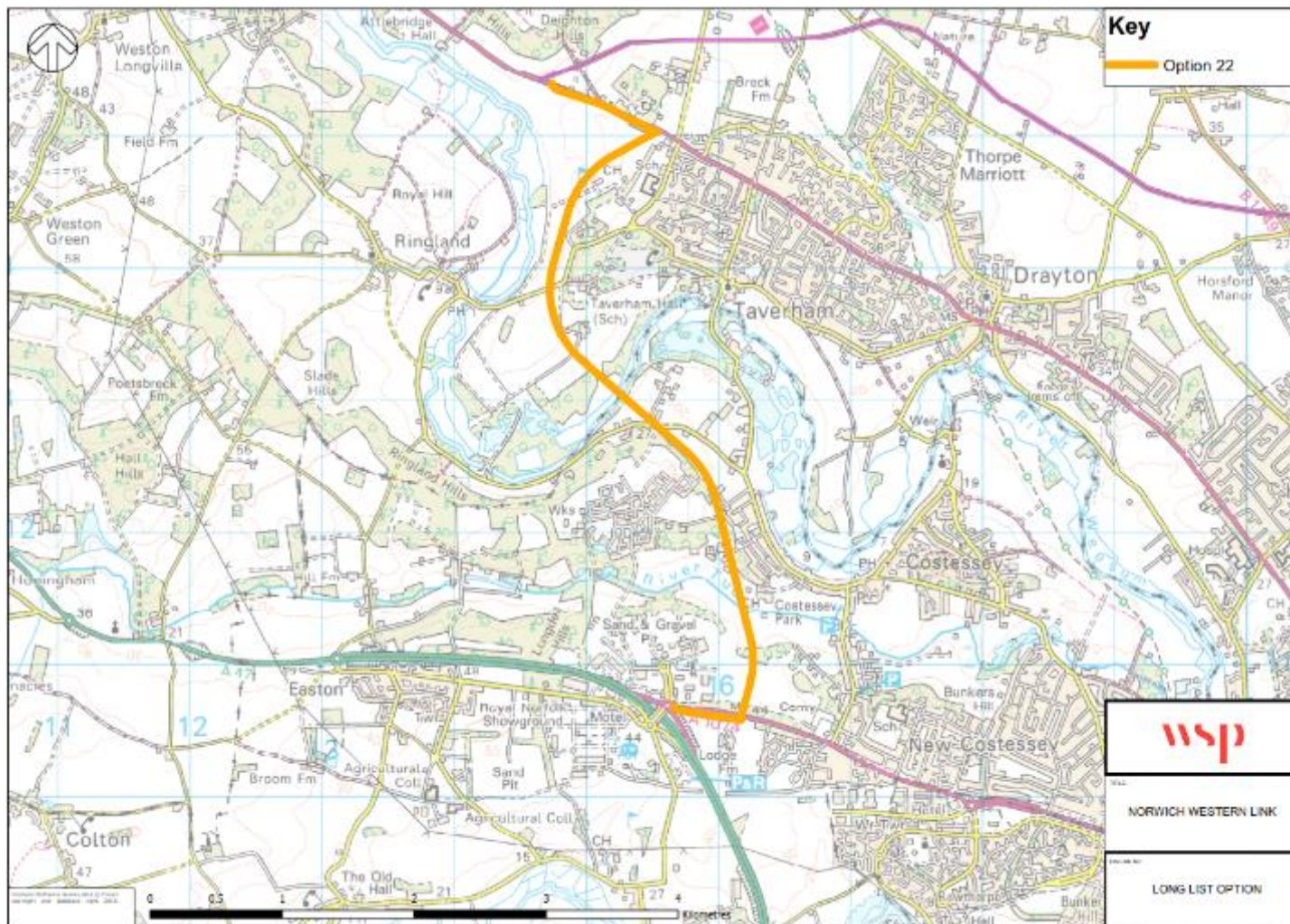
Cost

Estimated 2017 costs:

£150-£200 million

OPTION 22

A1067 (EAST OF A1067 / A1270 JUNCTION) TO A1074 EAST OF LONGWATER; 2014 ORANGE (5), DUAL CARRIAGEWAY



Description

From the A1067, east of the junction with the A1270 at Deighton Hills, Option 22 skirts the north-west edge of Taverham before crossing Ringland Road.

The route turns south-east and crosses the River Wensum and Costessey Lane to the south of Taverham.

Option 22 then passes between Queen's Hill and Costessey, before crossing the River Tud. The route passes to the east of the Longwater employment area to connect with the A1074 between Longwater and New Costessey.

Option 22 would be of dual carriageway standard. Upgrades to the A1067 and A1074 to dual carriageway standard may also be required.

Timeline

Medium (3-8 years)

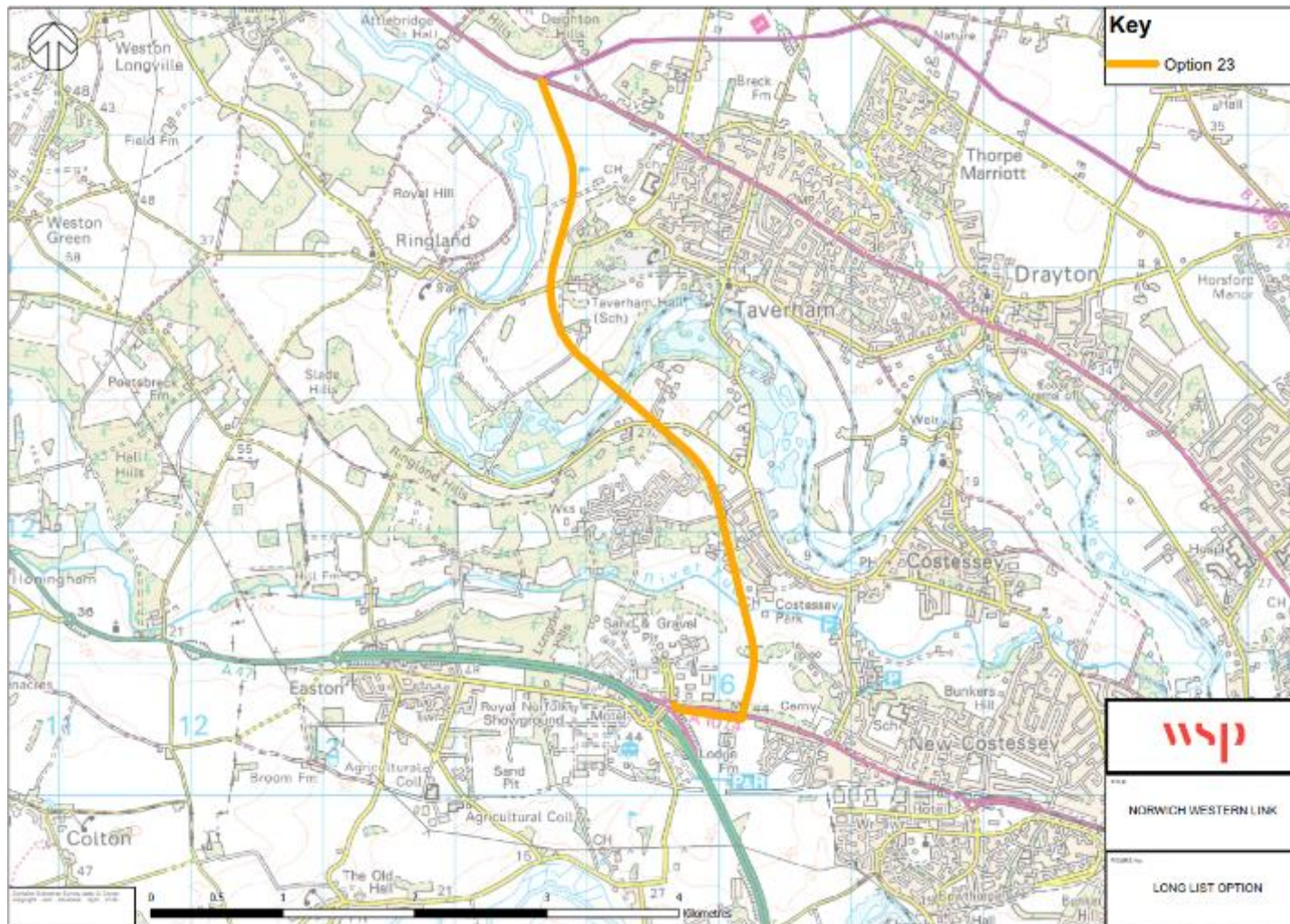
Cost

Estimated 2017 costs:

£200-£250 million

OPTION 23

A1067 / A1270 JUNCTION TO A1074 EAST OF LONGWATER; 2014 ORANGE (6), SINGLE CARRIAGEWAY



Description

From the A1067 junction with the A1270 at Deighton Hills, Option 23 heads south, crossing Ringland Road, to the west of Taverham.

The route turns south-east and crosses the River Wensum and Costessey Lane to the south of Taverham.

Option 23 then passes between Queen's Hill and Costessey, before crossing the River Tud. The route passes to the east of the Longwater employment area to connect with the A1074 between Longwater and New Costessey.

Option 23 would be of single carriageway standard.

Timeline

Medium (3-8 years)

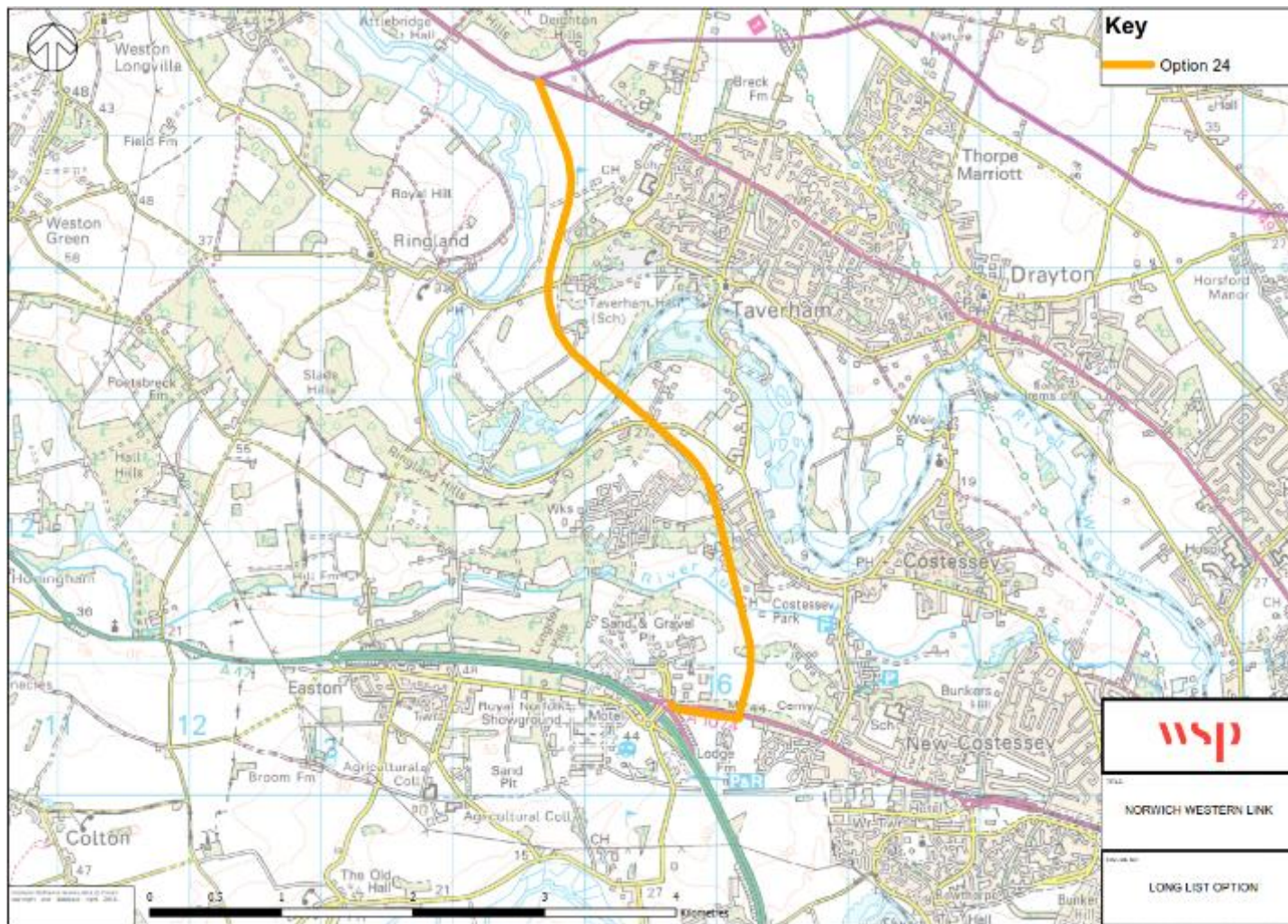
Cost

Estimated 2017 costs:

£100-£150 million

OPTION 24

A1067 / A1270 JUNCTION TO A1074 EAST OF LONGWATER; 2014 ORANGE (6), DUAL CARRIAGEWAY



Description

From the A1067 junction with the A1270 at Deighton Hills, Option 24 heads south, crossing Ringland Road, to the west of Taverham.

The route turns south-east and crosses the River Wensum and Costessey Lane to the south of Taverham.

Option 24 then passes between Queen's Hill and Costessey, before crossing the River Tud. The route passes to the east of the Longwater employment area to connect with the A1074 between Longwater and New Costessey.

Option 24 would be of dual carriageway standard. Upgrades to the A1074 to dual carriageway standard may also be required.

Timeline

Medium (3-8 years)

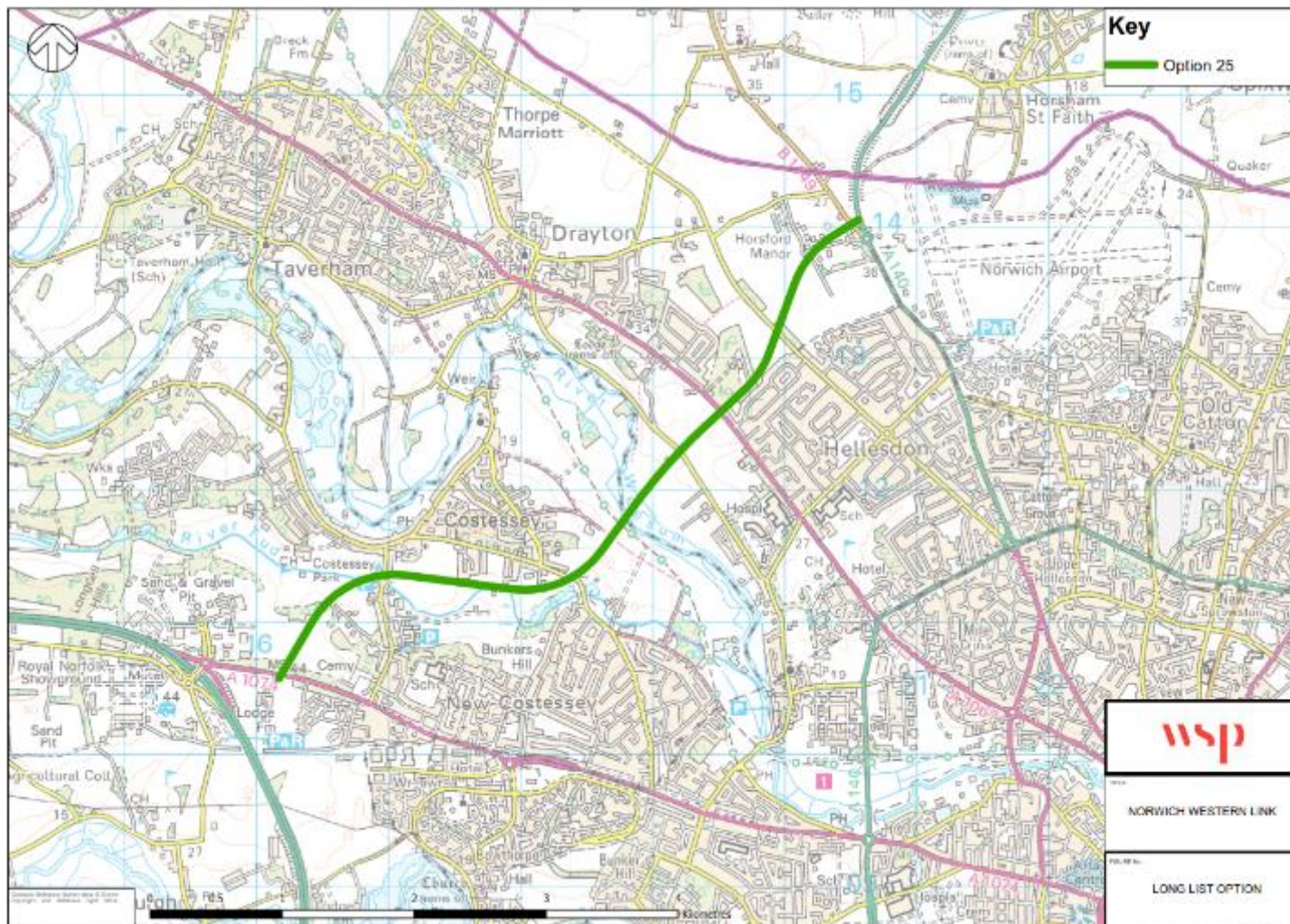
Cost

Estimated 2017 costs:

£200-£250 million

OPTION 25

A140 / A1270 JUNCTION TO A1074 EAST OF LONGWATER; 2014 GREEN, SINGLE CARRIAGEWAY



Description

From the A140 junction with the A1270, Option 25 heads south-west, passing Hellesdon to the north-west crossing Reepham Road.

The route continues in a south-western direction crossing the A1067, Low Road and the River Wensum.

Option 25 then routes west, crossing Town House Road, passing to the south of Costessey, crossing Longwater Lane and the River Tud, before connecting to the A1074 between Longwater and New Costessey.

Option 25 would be of single carriageway standard.

Timeline

Medium (3-8 years)

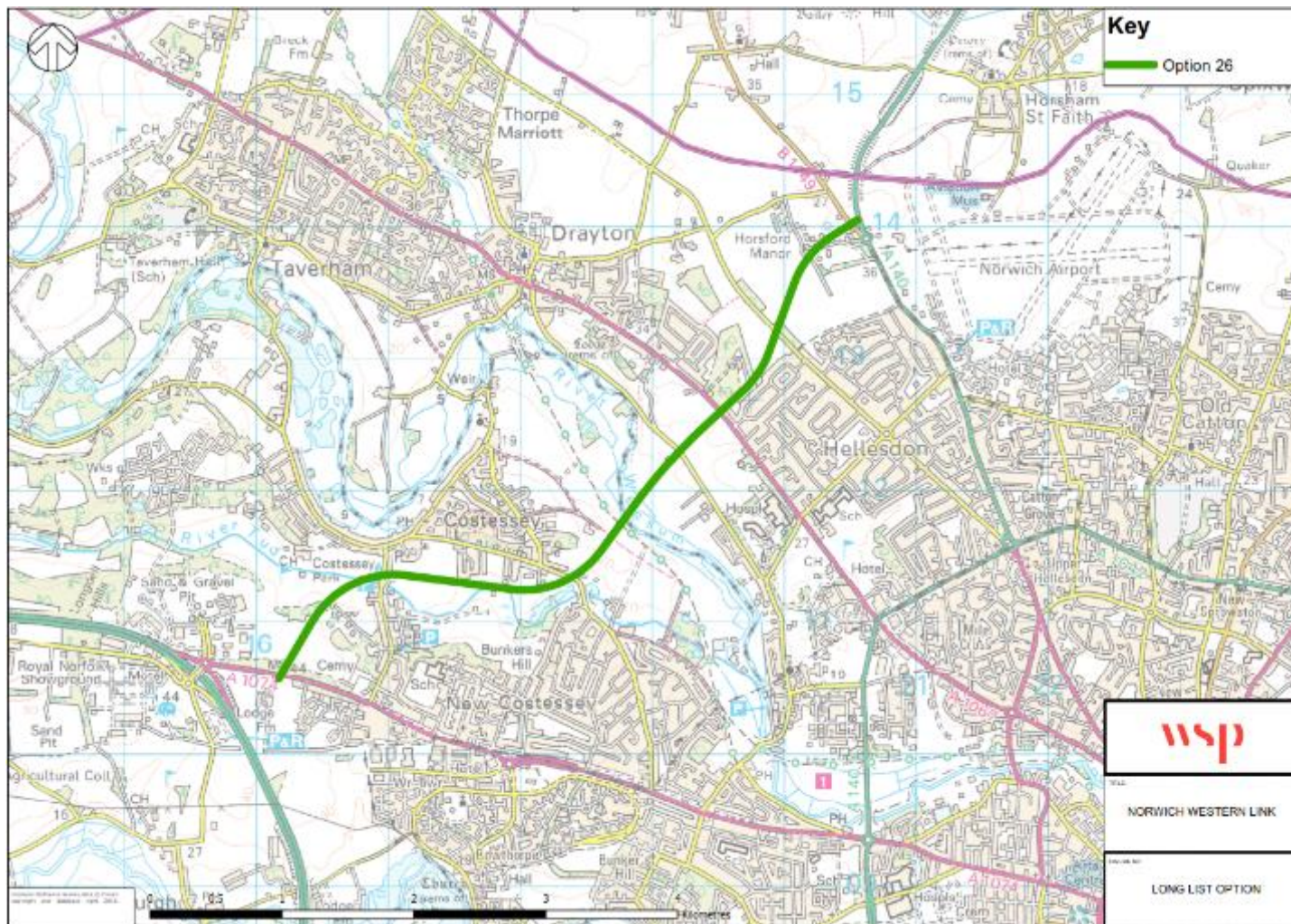
Cost

Estimated 2017 costs:

£100-£150 million

OPTION 26

A140 / A1270 JUNCTION TO A1074 EAST OF LONGWATER; 2014 GREEN, DUAL CARRIAGEWAY



Description

From the A140 junction with the A1270, Option 26 heads south-west, passing Helleston to the north-west crossing Reepham Road.

The route continues in a south-western direction crossing the A1067, Low Road and the River Wensum.

Option 26 then routes west, crossing Town House Road, passing to the south of Costessey, crossing Longwater Lane and the River Tud, before connecting to the A1074 between Longwater and New Costessey.

Option 26 would be of dual carriageway standard. Upgrades to the A1074 to dual carriageway standard may also be required.

Timeline

Medium (3-8 years)

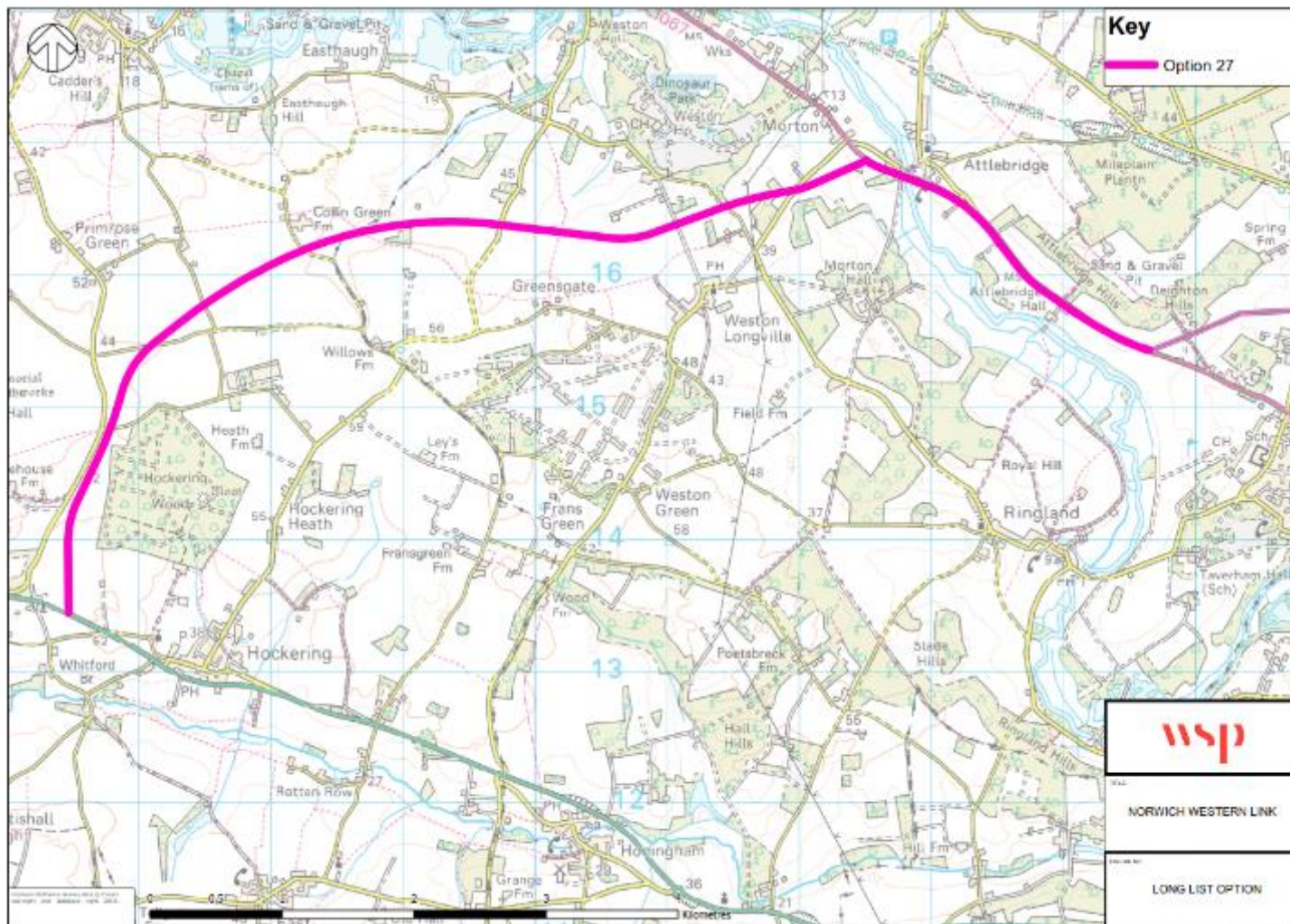
Cost

Estimated 2017 costs:

£200-£250 million

OPTION 27

NORTH TUDDENHAM VIA ATTLEBRIDGE; 2018 ROAD ALIGNMENT (1), SINGLE CARRIAGEWAY



Description

From the A1067, west of Attlebridge, Option 27 heads west crossing Marl Hill Road and Morton Lane and the B1535 toward Collin Green Farm.

The route then heads south-west passing between Collin Green Farm (north of alignment) and the solar farm (south of the alignment), before crossing Blind Lane.

Option 27 routes south running parallel to Lyng Road. It crosses Stone Road passing west of Hockering Wood to connect with the A47 east of North Tuddenham.

Option 27 would be of single carriageway standard.

Timeline

Medium (3-8 years)

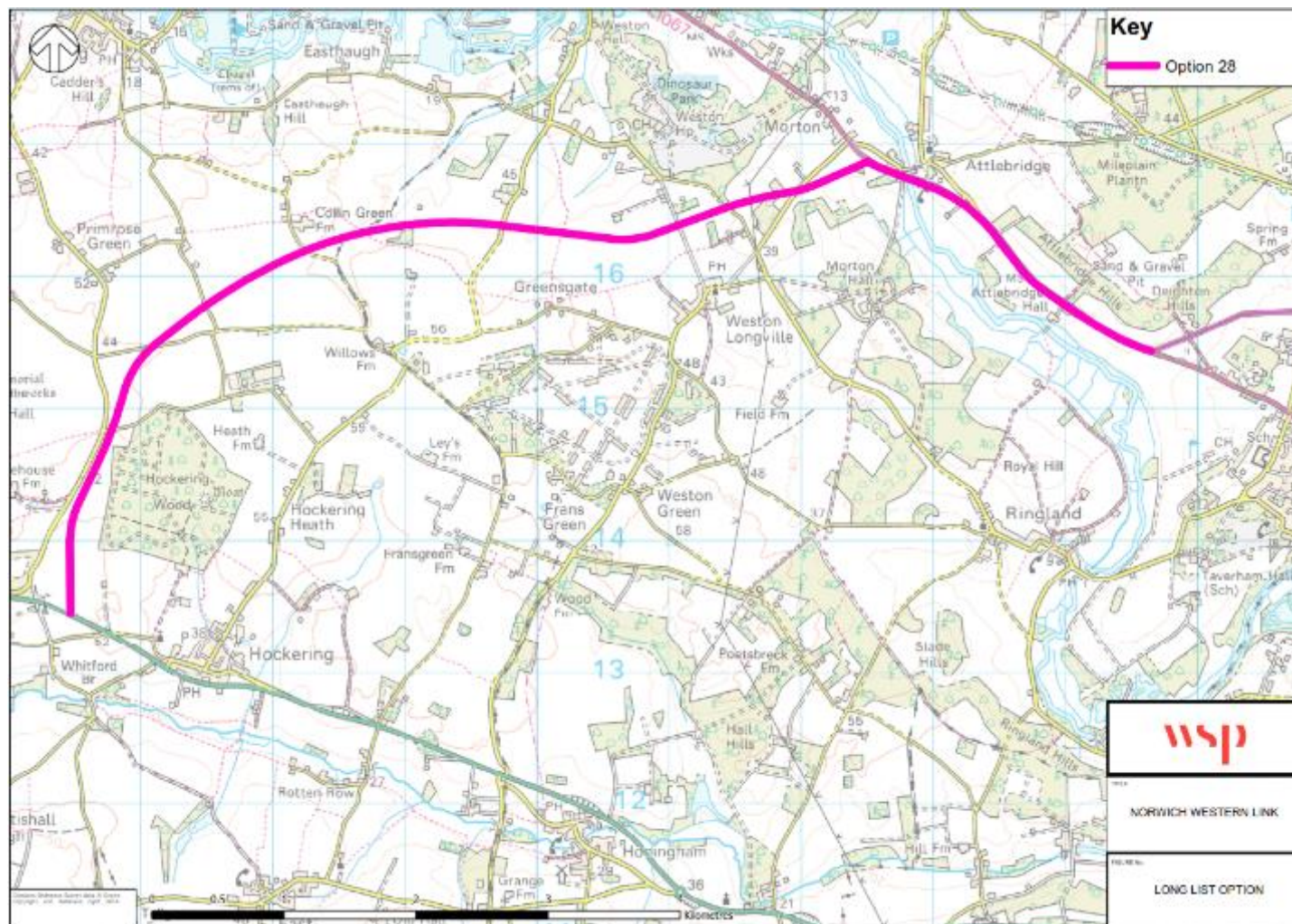
Cost

Estimated 2017 costs:

£50-£100 million

OPTION 28

NORTH TUDDENHAM VIA ATTLEBRIDGE; 2018 ROAD ALIGNMENT (1), DUAL CARRIAGEWAY



Description

From the A1067, west of Attlebridge, Option 28 heads west crossing Marl Hill Road and Morton Lane and the B1535 toward Collin Green Farm.

The route then heads south-west passing between Collin Green Farm (north of alignment) and the solar farm (south of the alignment), before crossing Blind Lane.

Option 28 routes south running parallel to Lyng Road. It crosses Stone Road passing west of Hockering Wood to connect with the A47 east of North Tuddenham.

Option 28 would be of dual carriageway standard. Upgrades to the A1067 to dual carriageway standard may also be required.

Timeline

Medium (3-8 years)

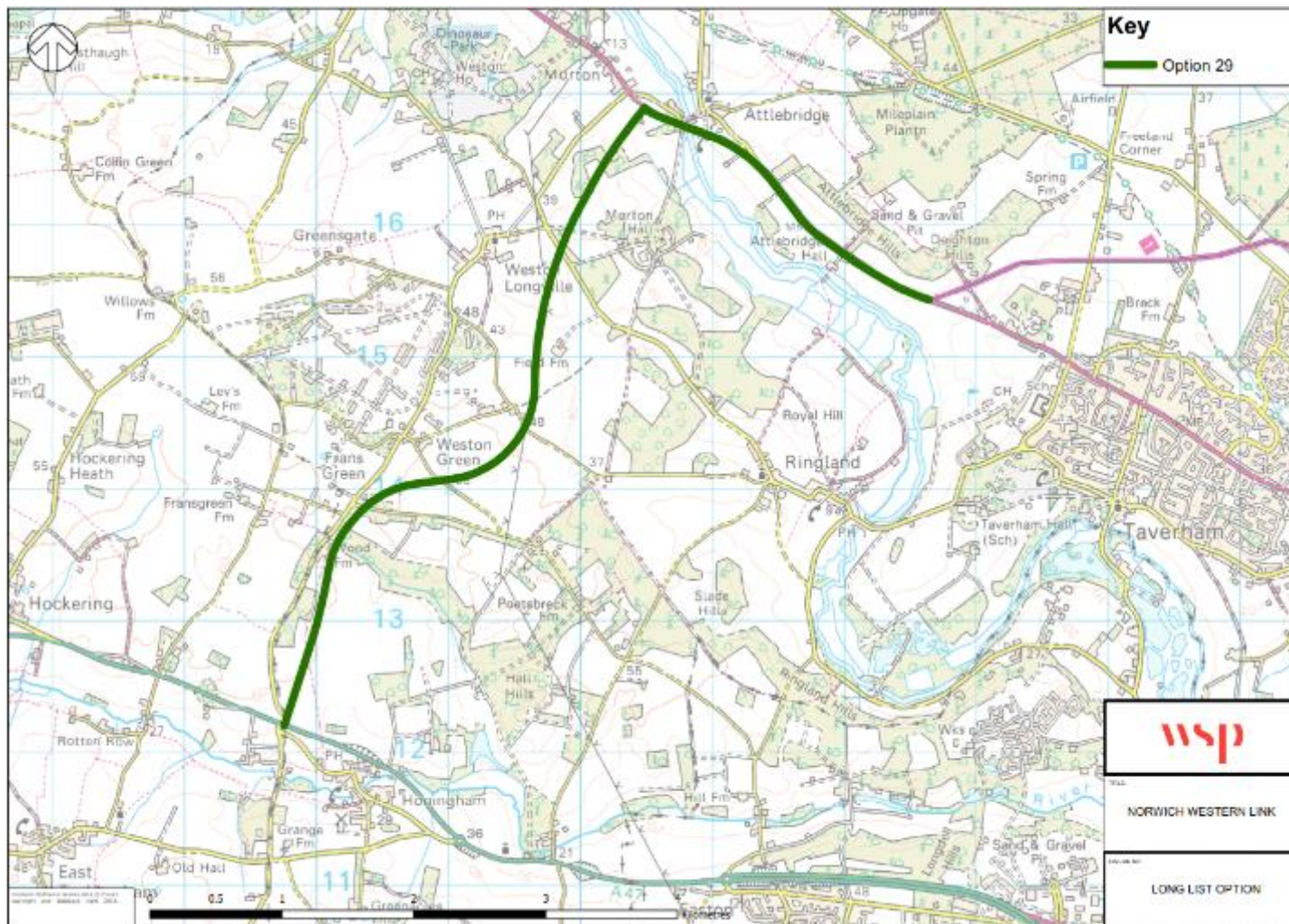
Cost

Estimated 2017 costs:

£100-£150 million

OPTION 29

A47 HONINGHAM TO ATTLEBRIDGE (1); 2018 ROAD ALIGNMENT (2), SINGLE CARRIAGEWAY



Description

From the A1067 west of Attlebridge, Option 29 runs parallel to Marl Hill Road, before crossing Ringland Lane to pass east of Weston Longville. Option 29 then routes south along an alignment approximately following the pylons, and crosses Weston Road.

The route then passes east of Weston Green, before routing south-west, crossing Breck Road and The Broadway. The route runs parallel to Wood Lane to connect with the A47 to the north-west of Honingham at the existing Wood Lane / Berrys Lane junction.

Option 29 would be of single carriageway standard.

Timeline

Medium (3-8 years)

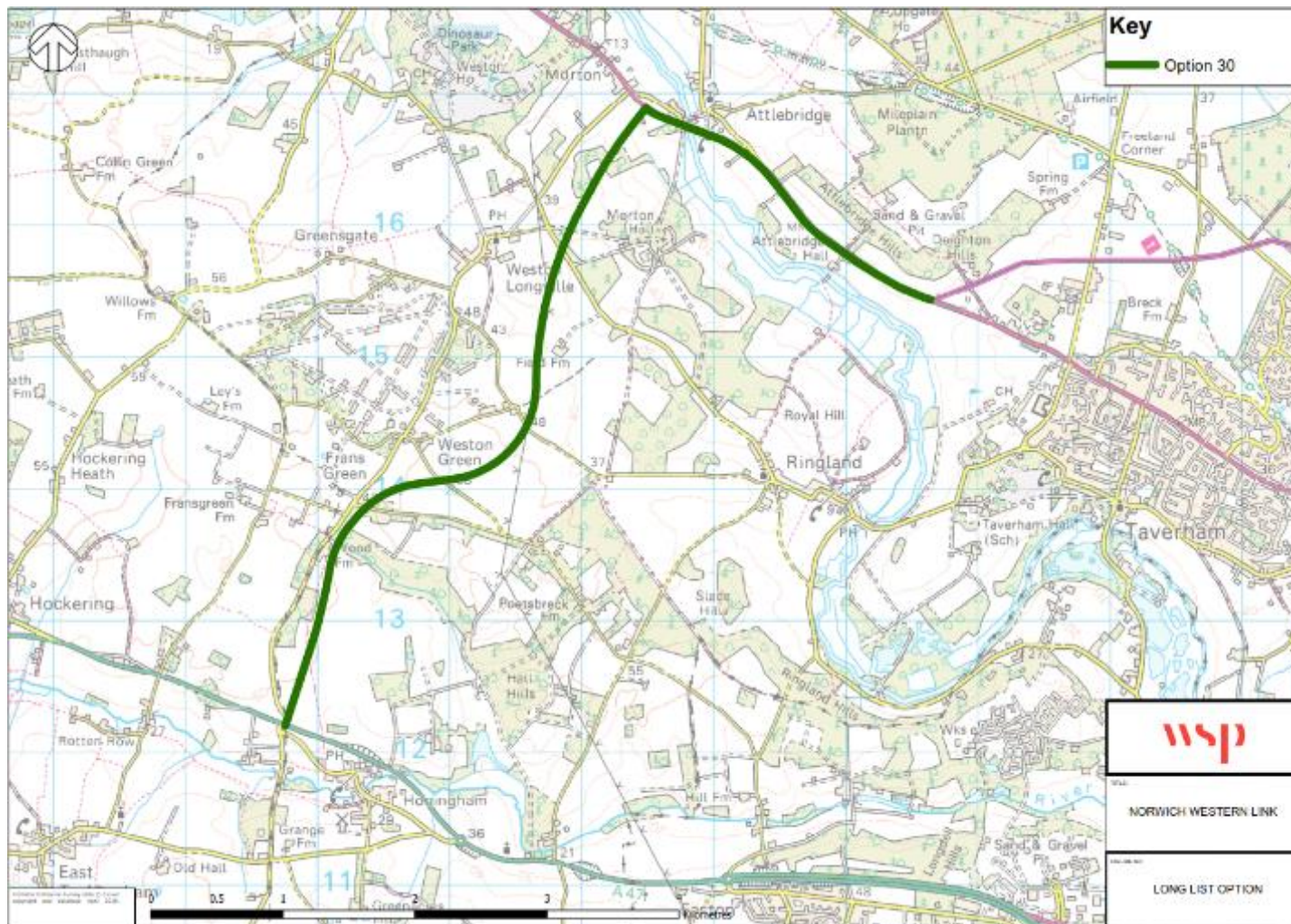
Cost

Estimated 2017 costs:

£50-£100 million

OPTION 30

A47 HONINGHAM TO ATTLEBRIDGE (1); 2018 ROAD ALIGNMENT (2), DUAL CARRIAGEWAY



Description

From the A1067 west of Attlebridge, Option 30 runs parallel to Marl Hill Road, before crossing Ringland Lane to pass east of Weston Longville. Option 30 then routes south along an alignment approximately following the pylons, and crosses Weston Road.

The route then passes east of Weston Green, before routing south-west, crossing Breck Road and The Broadway. The route runs parallel to Wood Lane to connect with the A47 to the north-west of Honingham at the existing Wood Lane / Berrys Lane junction.

Option 30 would be of dual carriageway standard. Upgrades to the A1067 to dual carriageway standard may also be required.

Timeline

Medium (3-8 years)

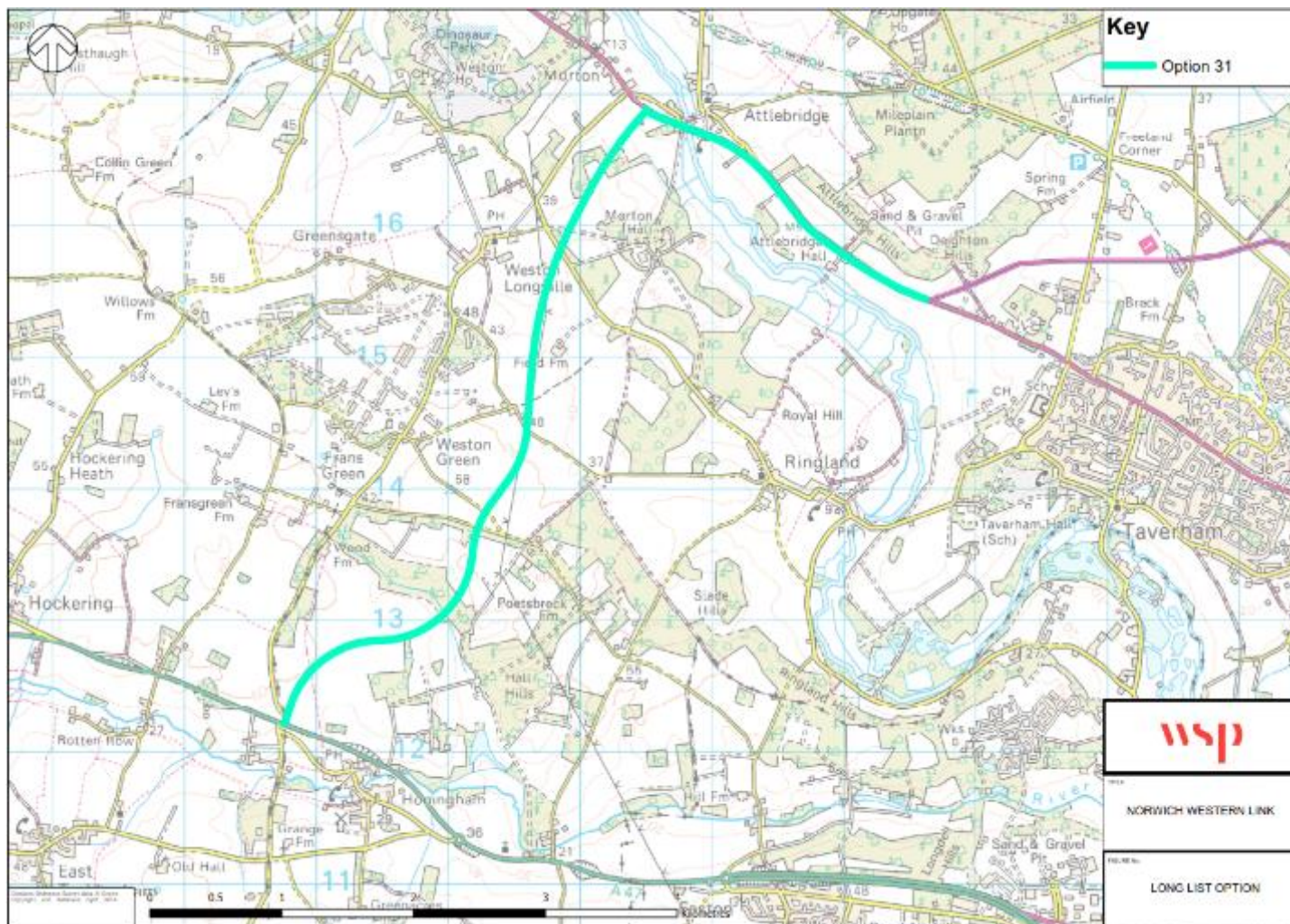
Cost

Estimated 2017 costs:

£100-£150 million

OPTION 31

A47 TO ATTLEBRIDGE (2); 2018 ROAD ALIGNMENT (3), SINGLE CARRIAGEWAY



Description

From the A1067 west of Attlebridge, Option 31 runs parallel to Marl Hill Road, before crossing Ringland Lane to pass east of Weston Longville. Option 31 then routes south along an alignment approximately following the pylons, and crosses Weston Road.

The route continues south passing east of Weston Green and crossing Breck Road and The Broadway.

Option 31 then heads south-west just north of Hall Hills to connect with the A47 to the north-west of Honingham at the existing Wood Lane / Berrys Lane junction.

Option 31 would be of single carriageway standard.

Timeline

Medium (3-8 years)

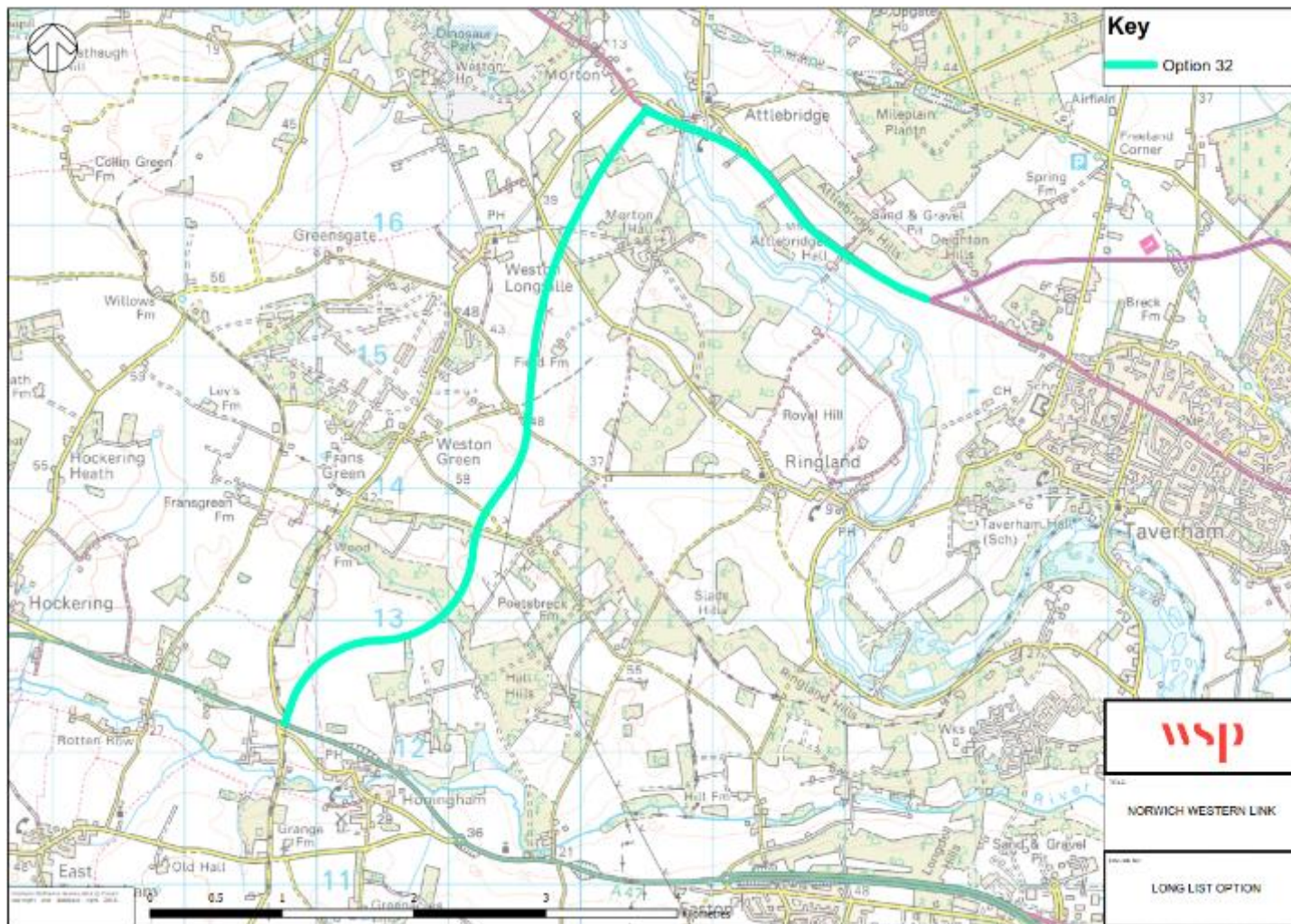
Cost

Estimated 2017 costs:

£50-£100 million

OPTION 32

A47 TO ATTLEBRIDGE (2); 2018 ROAD ALIGNMENT (3), DUAL CARRIAGEWAY



Description

From the A1067 west of Attlebridge, Option 32 runs parallel to Marl Hill Road, before crossing Ringland Lane to pass east of Weston Longville. Option 32 then routes south along an alignment approximately following the pylons, and crosses Weston Road.

The route continues south passing east of Weston Green and crossing Breck Road and The Broadway.

Option 32 then heads south-west just north of Hall Hills to connect with the A47 to the north-west of Honingham at the existing Wood Lane / Berrys Lane junction.

Option 32 would be of dual carriageway standard. Upgrades to the A1067 to dual carriageway standard may also be required.

Timeline

Medium (3-8 years)

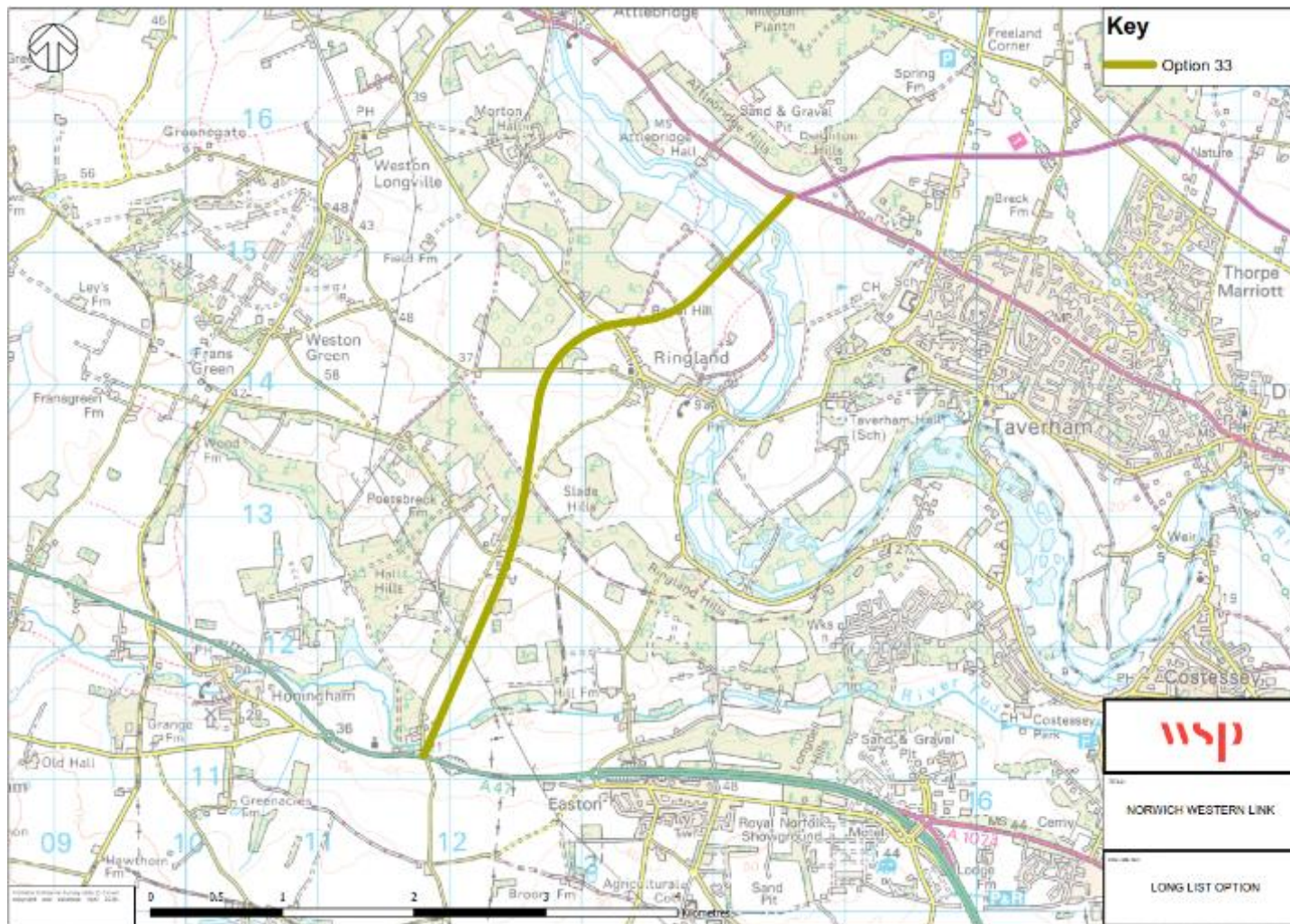
Cost

Estimated 2017 costs:

£100-£150 million

OPTION 33

A47 EASTON TO A1067 / A1270 JUNCTION; 2018 ROAD ALIGNMENT (4), SINGLE CARRIAGEWAY



Description

From the A1067 junction with the A1270 at Deighton Hills, Option 33 heads south-west, crossing the River Wensum.

The route continues, crossing Ringland Lane, Weston Road and Honingham Lane. The route then heads south crossing Weston Road and the River Tud to connect with the A47 at the existing Taverham Road junction.

Option 33 would be of single carriageway standard.

Timeline

Medium (3-8 years)

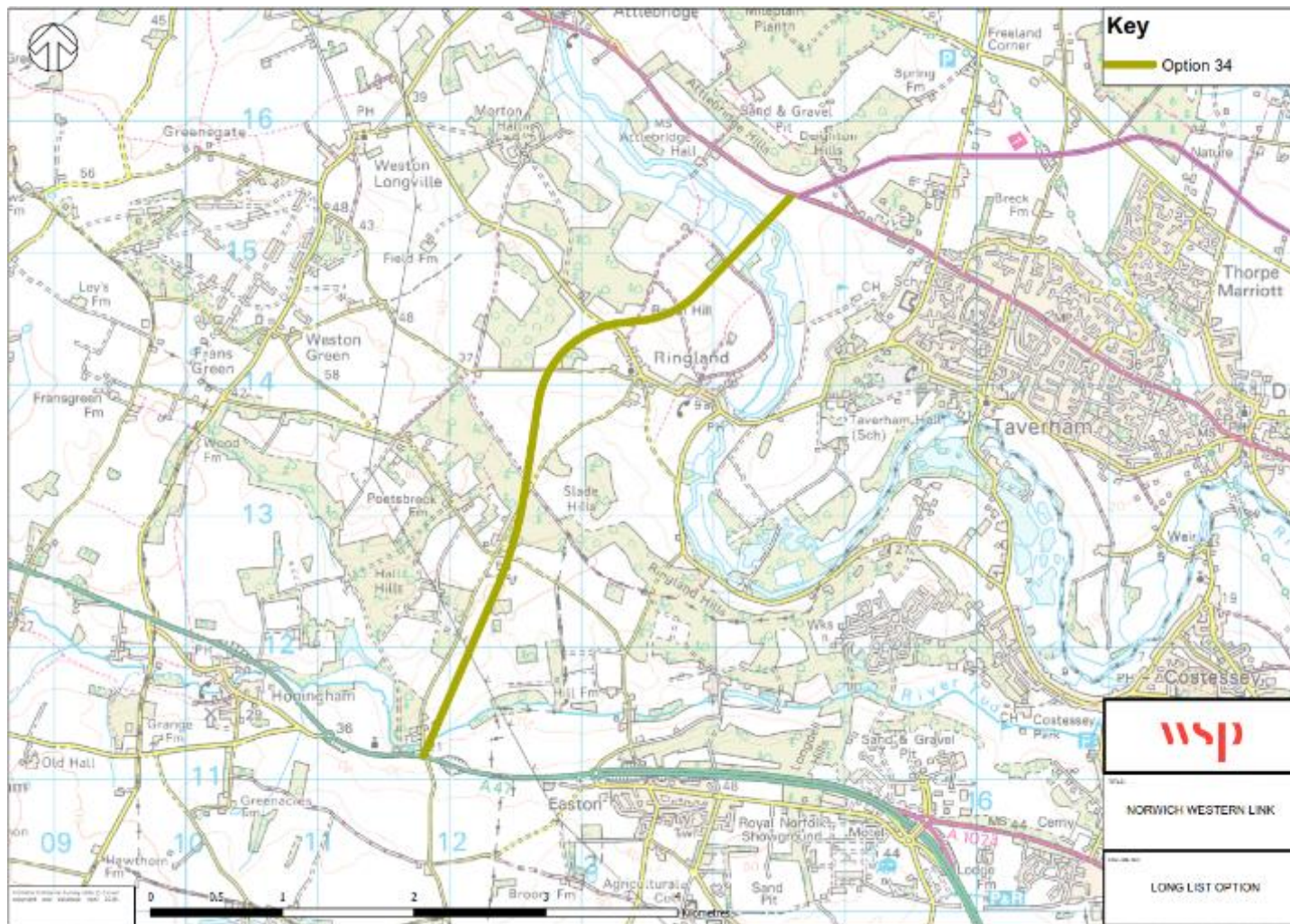
Cost

Estimated 2017 costs:

£100-£150 million

OPTION 34

A47 EASTON TO A1067 / A1270 JUNCTION; 2018 ROAD ALIGNMENT (4), DUAL CARRIAGEWAY



Description

From the A1067 junction with the A1270 at Deighton Hills, Option 34 heads south-west, crossing the River Wensum.

The route continues, crossing Ringland Lane, Weston Road and Honingham Lane. The route then heads south crossing Weston Road and the River Tud to connect with the A47 at the existing Taverham Road junction.

Option 34 would be of dual carriageway standard.

Timeline

Medium (3-8 years)

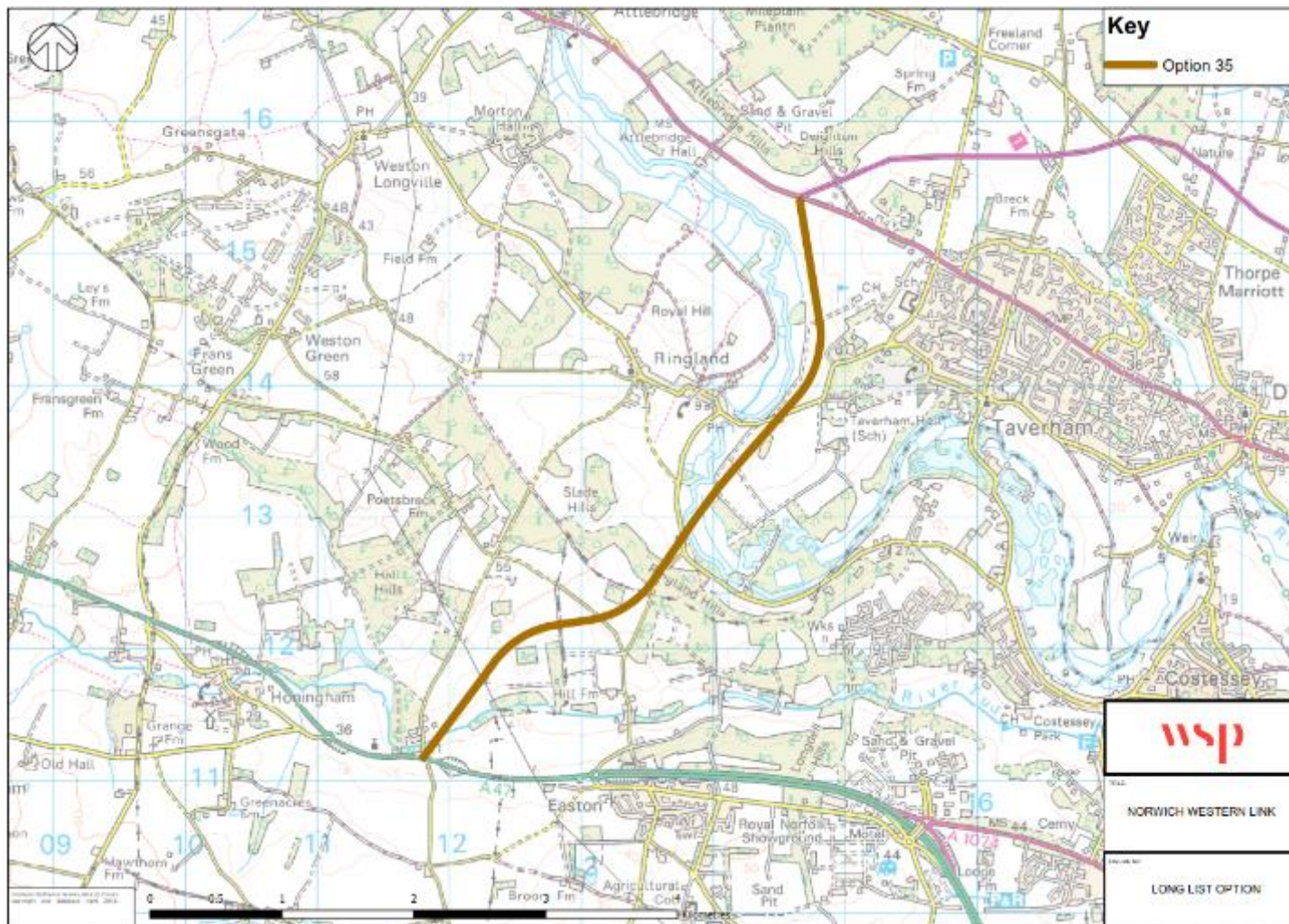
Cost

Estimated 2017 costs:

£150-£200 million

OPTION 35

A47 EASTON TO A1067 / A1270 JUNCTION; 2018 ROUTE ALIGNMENT (5), SINGLE CARRIAGEWAY



Description

From the A1067 junction with the A1270 at Deighton Hills, Option 35 heads south, crossing Ringland Road to the west of Taverham.

The route then turns south-west and crosses the River Wensum and connects to the Costessey Lane / Ringland Lane junction to the south of Ringland.

Option 35 continues in a south-western direction following Ringland Road through Ringland Hills, before passing north of Hill Farm. The route crosses the River Tud to connect with the A47 to the west of Easton at the existing Taverham Road junction.

Option 35 would be of single carriageway standard.

Timeline

Medium (3-8 years)

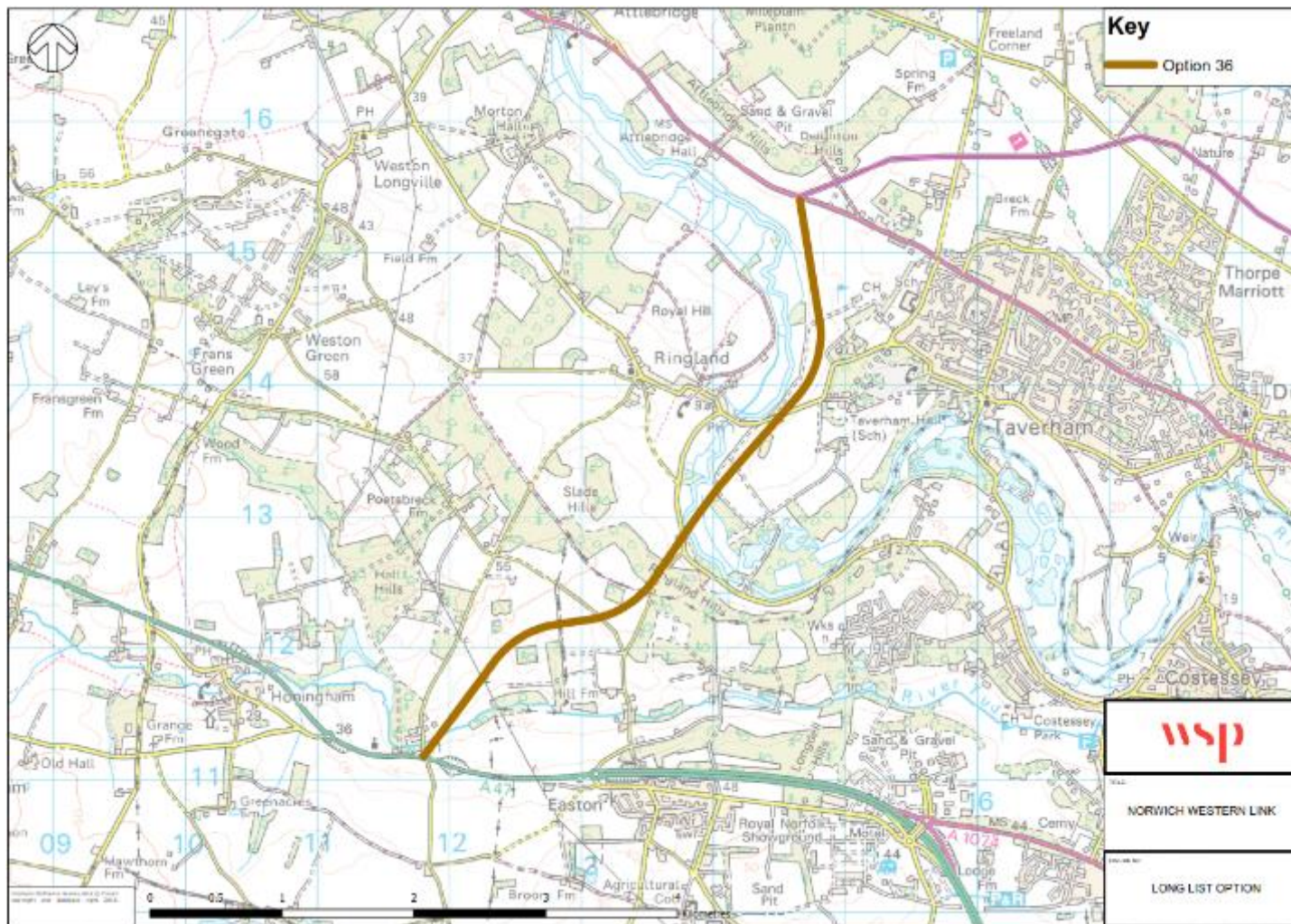
Cost

Estimated 2017 costs:

£100-£150 million

OPTION 36

A47 EASTON TO A1067 / A1270 JUNCTION; 2018 ROUTE ALIGNMENT (5), DUAL CARRIAGEWAY



Description

From the A1067 junction with the A1270 at Deighton Hills, Option 36 heads south, crossing Ringland Road to the west of Taverham.

The route then turns south-west and crosses the River Wensum and connects to the Costessey Lane / Ringland Lane junction to the south of Ringland.

Option 36 continues in a south-western direction following Ringland Road through Ringland Hills, before passing north of Hill Farm. The route crosses the River Tud to connect with the A47 to the west of Easton at the existing Taverham Road junction.

Option 36 would be of dual carriageway standard.

Timeline

Medium (3-8 years)

Cost

Estimated 2017 costs:

£150-£200 million

OPTION 37

TOLLED ROUTES / BRIDGES



Description

Tolled routes / bridges to reduce traffic flow on routes used as alternatives to avoid delays and congestion (“rat-runs”).

Currently no locations have been developed as these would be dependent on a number of factors.

Timeline

Medium (3-8 years)

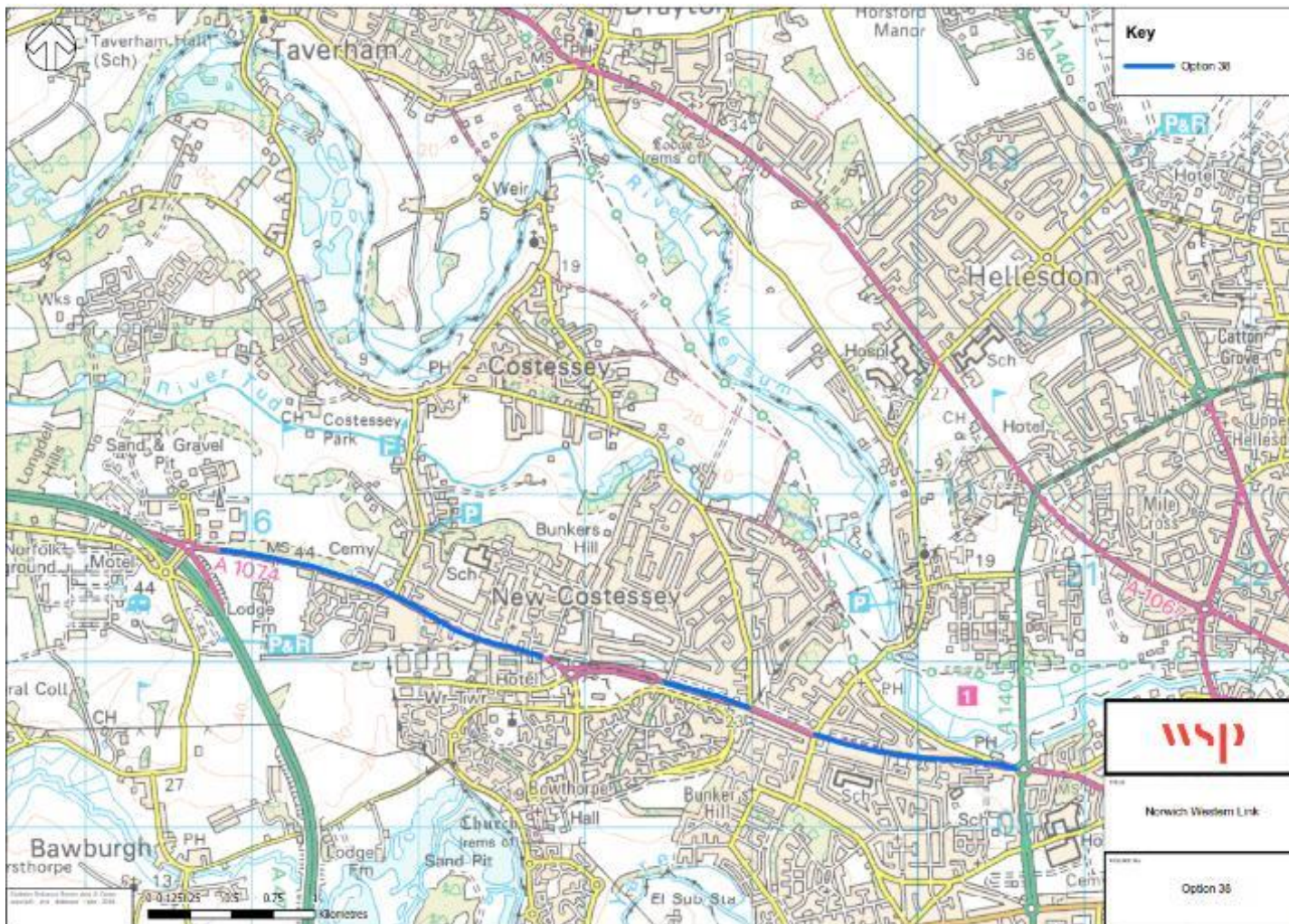
Cost

Estimated 2017 costs:

£2-£5 million

OPTION 38

IMPROVEMENTS TO EXISTING ROUTES



Description

Improvements to the existing A1074 route to increase capacity and improve traffic flow.

This could include localised widening, upgrading the A1074 from the A140 Sweet Briar Road / Guardian Road junction to the A47 Norwich Southern Bypass to dual carriageway standard.

This, in turn, would align with the Highways England A47 Road Investment Strategy scheme.

Timeline

Medium (3-8 years)

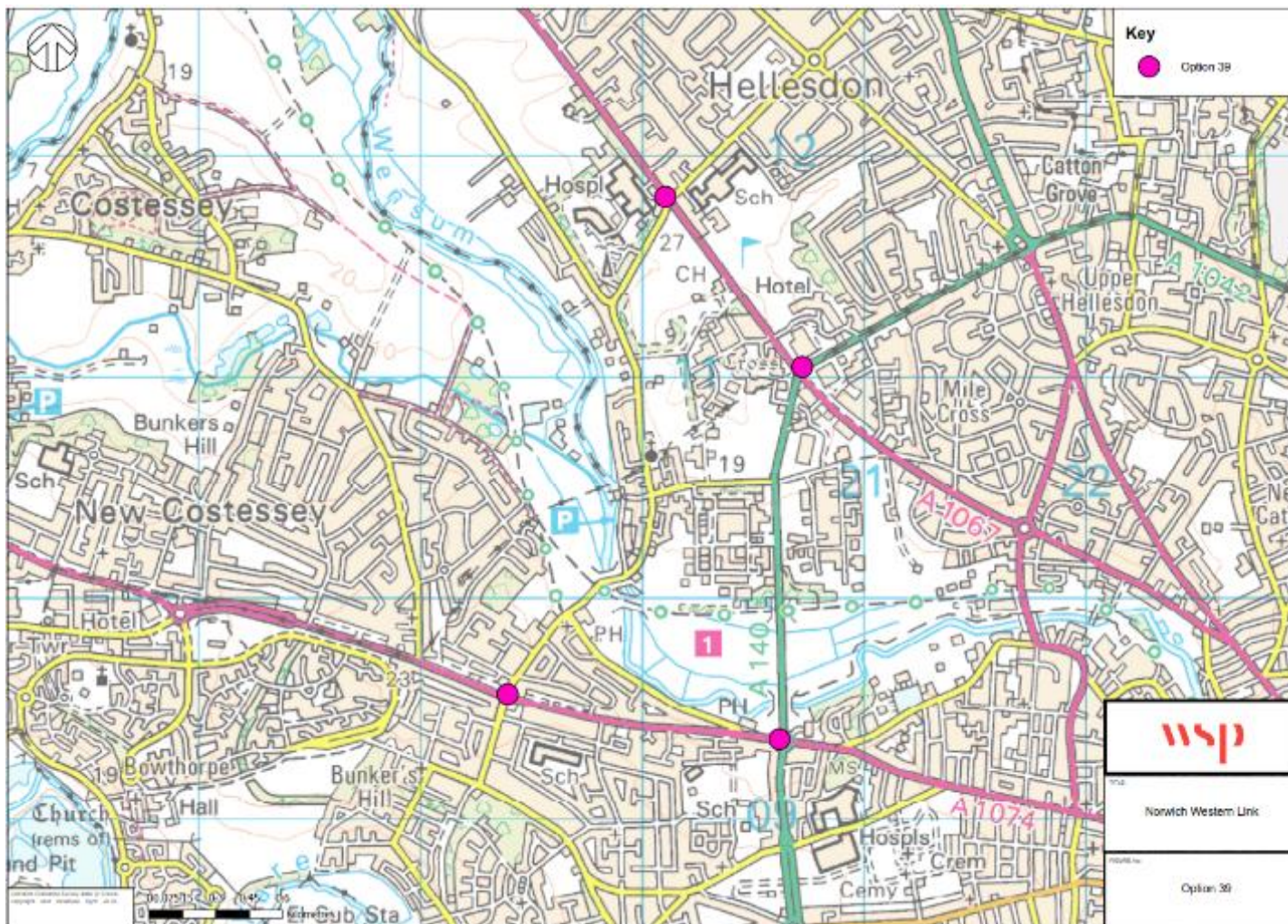
Cost

Estimated 2017 costs:

£10-£25 million (dependent on the scale of the improvements)

OPTION 39

IMPROVEMENTS TO EXISTING JUNCTIONS



Description

Improvements to existing junctions to maximise capacity, improve traffic flow and address safety issues.

The potential locations for junction improvements include:

- A1074 Dereham Road / Marl Pit Lane / Larkman Lane
- A140 Sweet Briar Road / A1074 Dereham Road / A140 Guardian Road
- A140 Boundary Road / A1067 Drayton Road / A140 Sweet Briar Road / A1067 Drayton High Road
- A1067 Drayton High Road / Middletons Lane / Hospital Lane

Timeline

Short (1-2 years)

Cost

Estimated 2017 costs:

£0-£5 million (dependent on the scale of the improvements)

OPTION 40

SIGNING AND LINING IMPROVEMENTS



Description

Improvements to existing signing and road markings to improve route choice and deter rat-running and unnecessary Heavy Good Vehicle (HGV) movements.

This includes the potential for the introduction of Variable Message Signs (VMS) to warn drivers of congestion, accidents, roadwork zones, speed limits and car park availability.

Timeline

Short (1-2 years)

Cost

Estimated 2017 costs:

£0-£5 million (dependent on the scale of the improvements)

OPTION 41

SIGNAL IMPROVEMENTS



Description

Improvements to signalised junctions to improve the connectivity and reliability of the network by improving junction efficiency and capacity.

Improvements could potentially include bus priority signals and greater and coordination on junctions.

Timeline

Short (1-2 years)

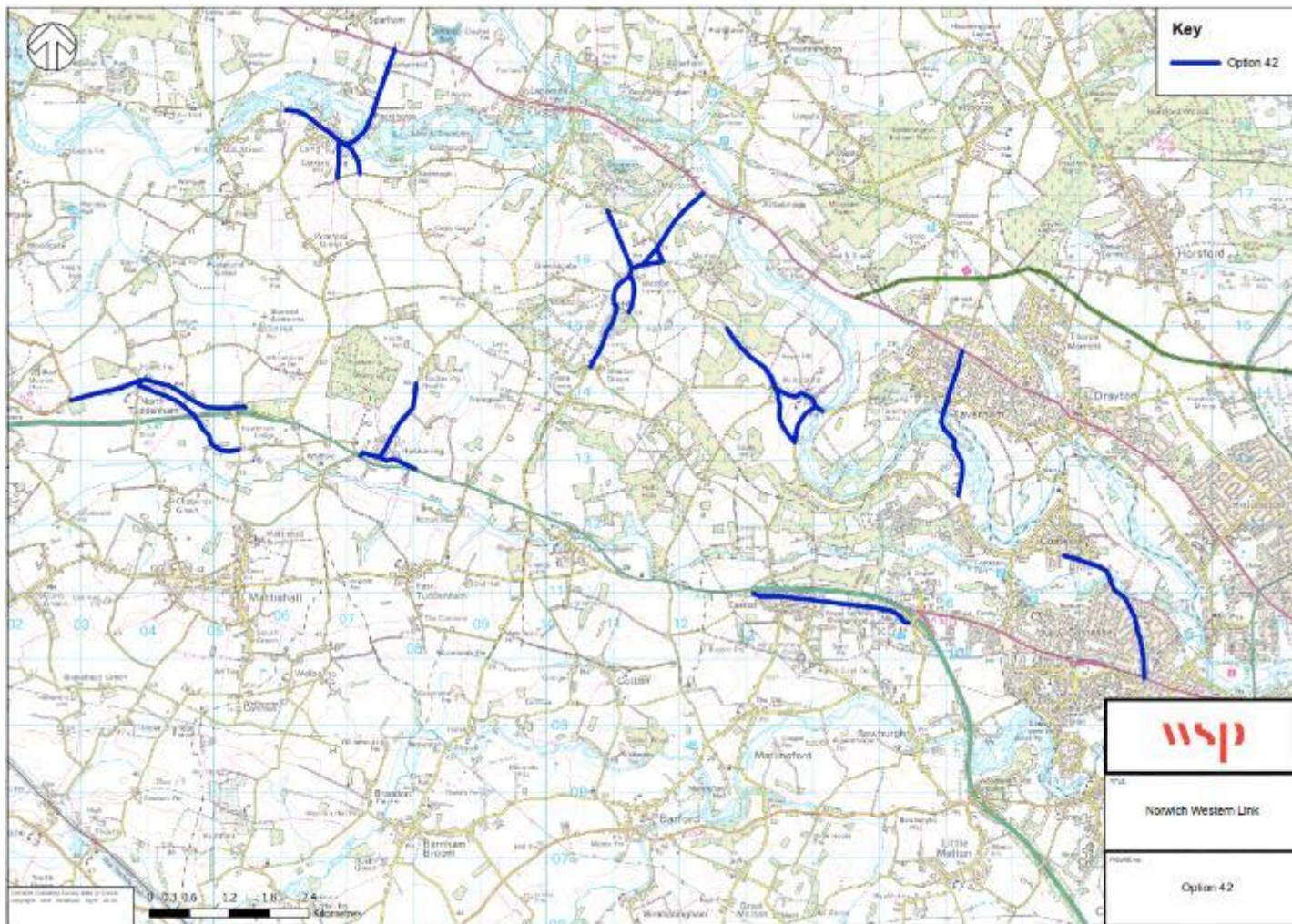
Cost

Estimated 2017 costs:

£2-£5 million (dependent on design and potential land requirements)

OPTION 42

SPEED LIMIT CHANGES



Description

Changes to speed limits, to improve traffic flow, routing decisions and safety.

Potential areas for speed limit changes include:

- Dereham Road (connecting to the A47, passing through Easton)
- Norwich Road / Town House Road (from the A1074 in New Costessey towards Costessey)
- Sandy Lane / Taverham Lane (A1067 to Costessey)
- Ringland (Costessey Lane / Field Road / The Street)
- Weston Longville (Marl Hill / Church Street / Honingham Road / Field Road)
- Hockering (The Street / Heath Road)
- North Tuddenham (Norwich Road / Low Road)
- Lyng (Lyng Road / The Street / The Common / Rectory Road)

Timeline

Short (1-2 years)

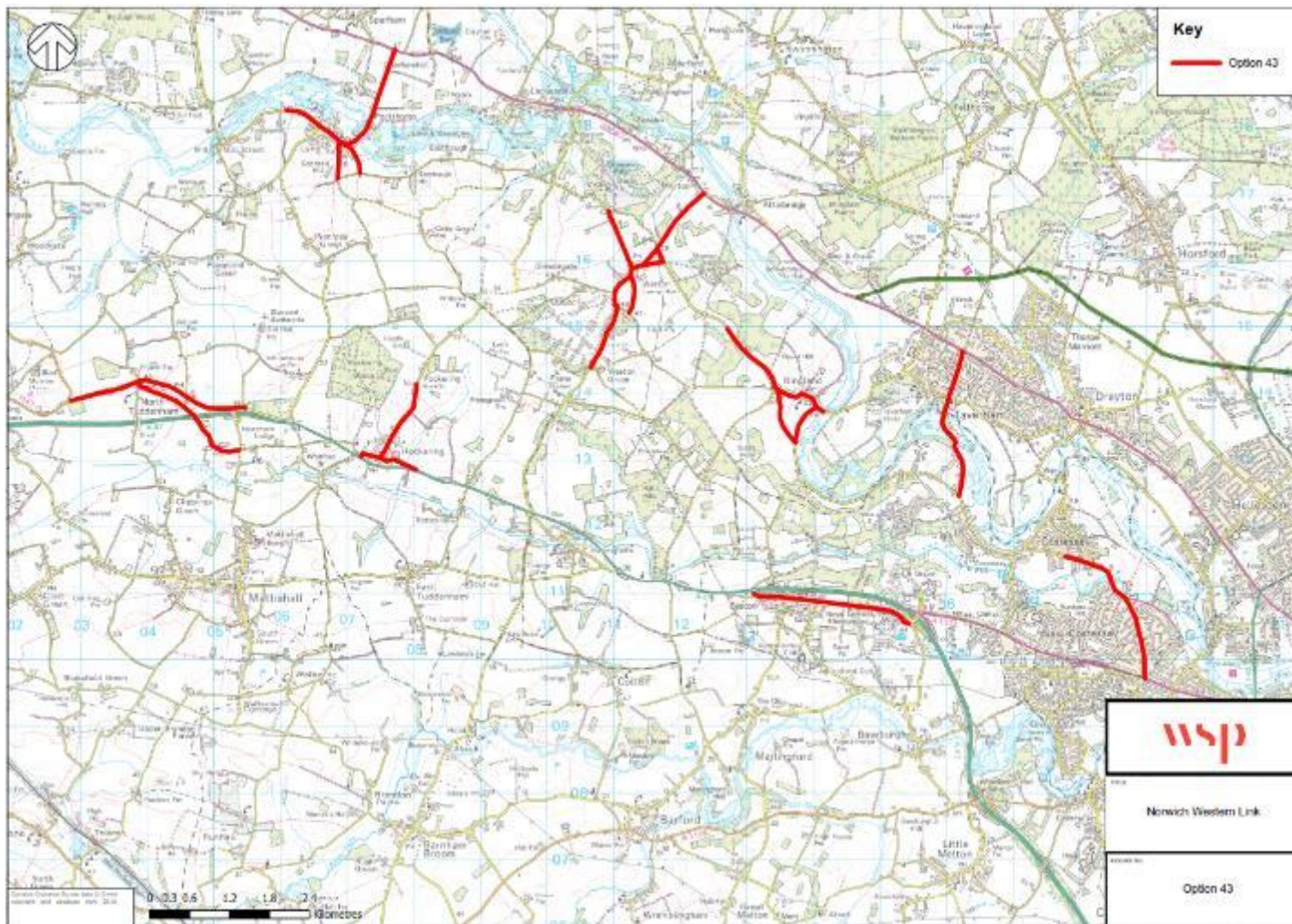
Cost

Estimated 2017 costs:

£2-£5 million (dependent upon potential scale and location of alterations)

OPTION 43

DIRECTIONAL TRAFFIC MANAGEMENT SCHEMES



Description

Directional management schemes which focus on locations where rat-running occurs. Schemes could include changing two-way sections of road altered to one-way only sections. Potential locations include:

- Dereham Road (connecting to the A47, passing through Easton)
- Norwich Road / Town House Road (from the A1074 in New Costessey towards Costessey)
- Sandy Lane / Taverham Lane (A1067 to Costessey)
- Ringland (Costessey Lane / Field Road / The Street)
- Weston Longville (Marl Hill / Church Street / Honingham Road / Field Road)
- Hockering (The Street / Heath Road)
- North Tuddenham (Norwich Road / Low Road)
- Lyng (Lyng Road / The Street / The Common / Rectory Road)

Timeline

Short (1-2 years)

Cost

Estimated 2017 costs:

£1-£5 million (dependent upon potential scale and location of alterations)

OPTION 44

NEW / IMPROVED CROSSING POINTS



Description

New / improved crossing points to improve safety and accessibility for all users.

Crossing could include controlled and uncontrolled crossings, for example pelican / puffin crossings and refuge islands.

Timeline

Short (1-2 years)

Cost

£1-£3 million (dependent on the number of crossing points and any potential adjacent works)

Estimate based upon the assumption of £20,000-£50,000 per crossing

OPTION 45

NEW WIDER FOOTPATH



Description

New wider footpath to improve accessibility and promote modal shift away from cars towards alternative modes of transport.

A new wider footpath would provide better care for pedestrians including those with disabilities.

Timeline

Short (1-2 years)

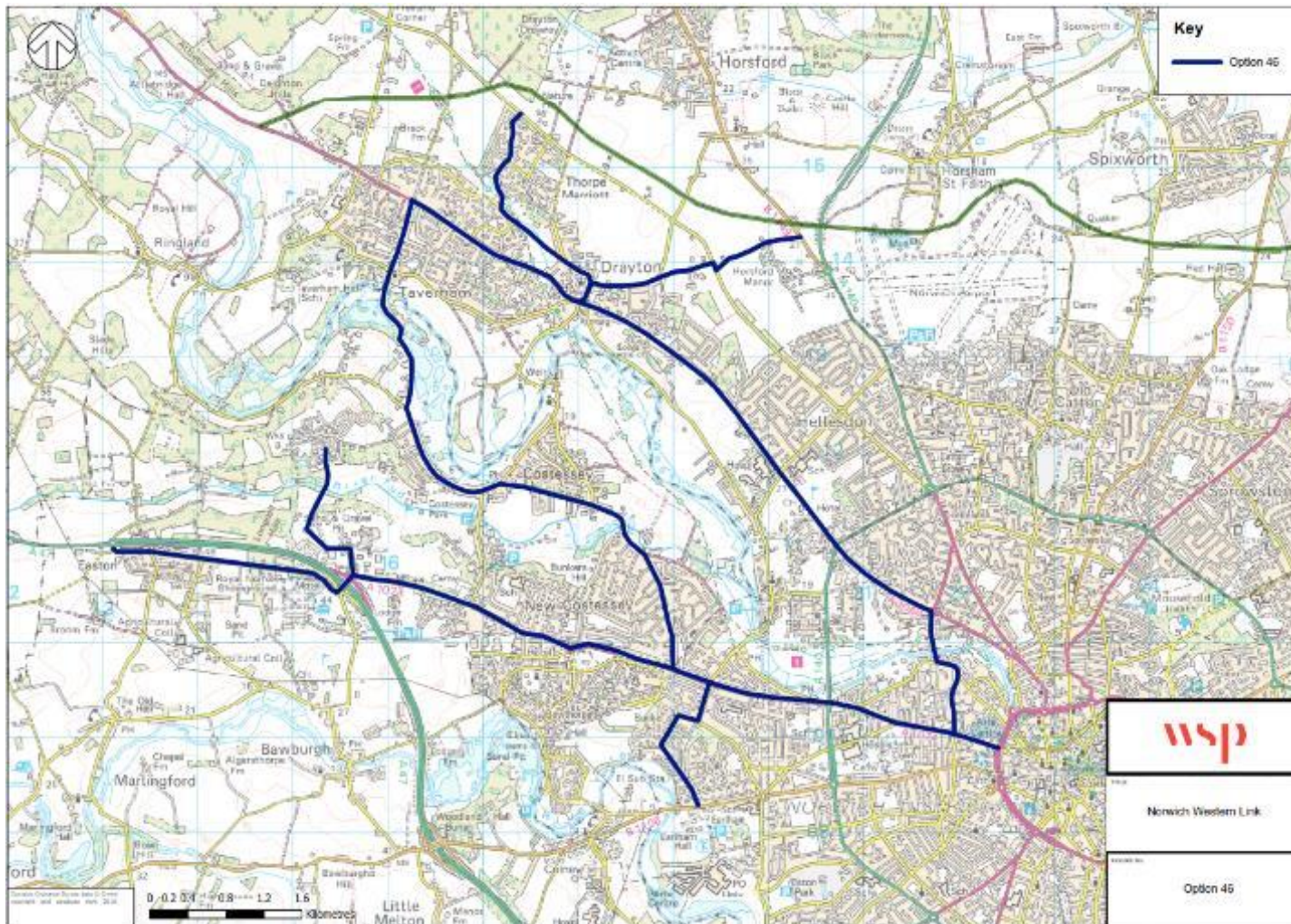
Cost

Estimated 2017 costs:

£1-£5 million (dependent on scale of the scheme and land requirements)

OPTION 46

NEW CYCLING LINKS TO KEY FACILITIES AND SERVICES



Description

New cycling links to key facilities and services, for example schools and employment areas.

There is potential to include both on-line and off-line cycle routes. Tying in with existing cycle links would be advantageous.

The cycle network could include the following:

- Thorpe Marriot to Drayton (linking to the A1270 Northern Distributor Road)
- Norwich to Easton (along the A1074)
- Taverham to Norwich (along the A1067)
- Taverham to New Costessey (via Costessey)

Timeline

Medium (3-8 years)

Cost

Estimated 2017 costs:

£5-£10 million (dependent on scale of the scheme and land requirements)

OPTION 47

CYCLE PARKING FACILITIES



Description

New improved cycle parking provision at key facilities and services, for example schools and employment areas.

Improved cycle parking would improve accessibility and safety, as well as encouraging cycling as a viable alternative mode of transport.

Timeline

Short (1-2 years)

Cost

£1-£3 million (dependent on scale of the facilities provided and the ability to incentivise private business to contribute to costs)

OPTION 48

NEW ORBITAL BUS ROUTE



Description

A new orbital bus route connecting towns in the western quadrant and proposed business parks.

A route has not yet been identified.

Timeline

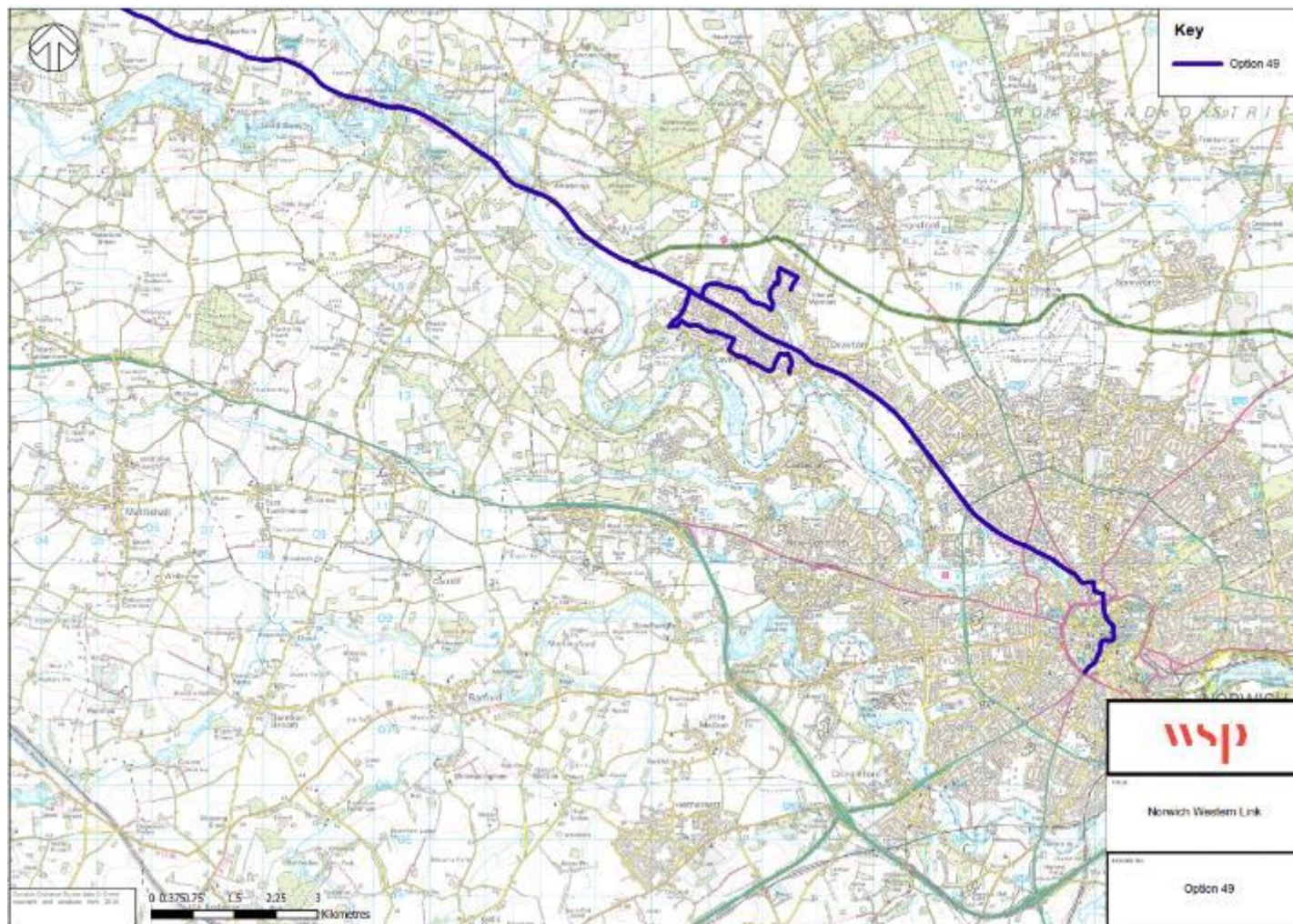
Short (1-2 years)

Cost

£2-£5 million (dependent on the route length and service frequency – peak vehicle requirement and staff cost drive revenue costs)

OPTION 49

IMPROVEMENTS TO EXISTING BUS SERVICES (28, 29 AND X29)



Description

Improvements to the existing 28, 29 and X29 bus services, including increased frequencies during the evening and weekend.

Improving bus services will increase accessibility and connectivity of public transport that is more reliable, potentially contributing to modal shift away from car use.

Timeline

Short (1-2 years)

Cost

Estimated £2-£5 million (dependent on the route length and service frequency – peak vehicle requirement and staff cost drive revenue costs)

OPTION 50

IMPROVEMENTS TO EXISTING BUS SERVICES (23, 23A, 24, 24A)



Description

Improvements to the existing 23, 23A, 24 and 24A bus services, including increased frequencies during the evening and weekend.

Improving bus services will increase accessibility and connectivity of public transport that is more reliable, potentially contributing to modal shift away from car use.

Timeline

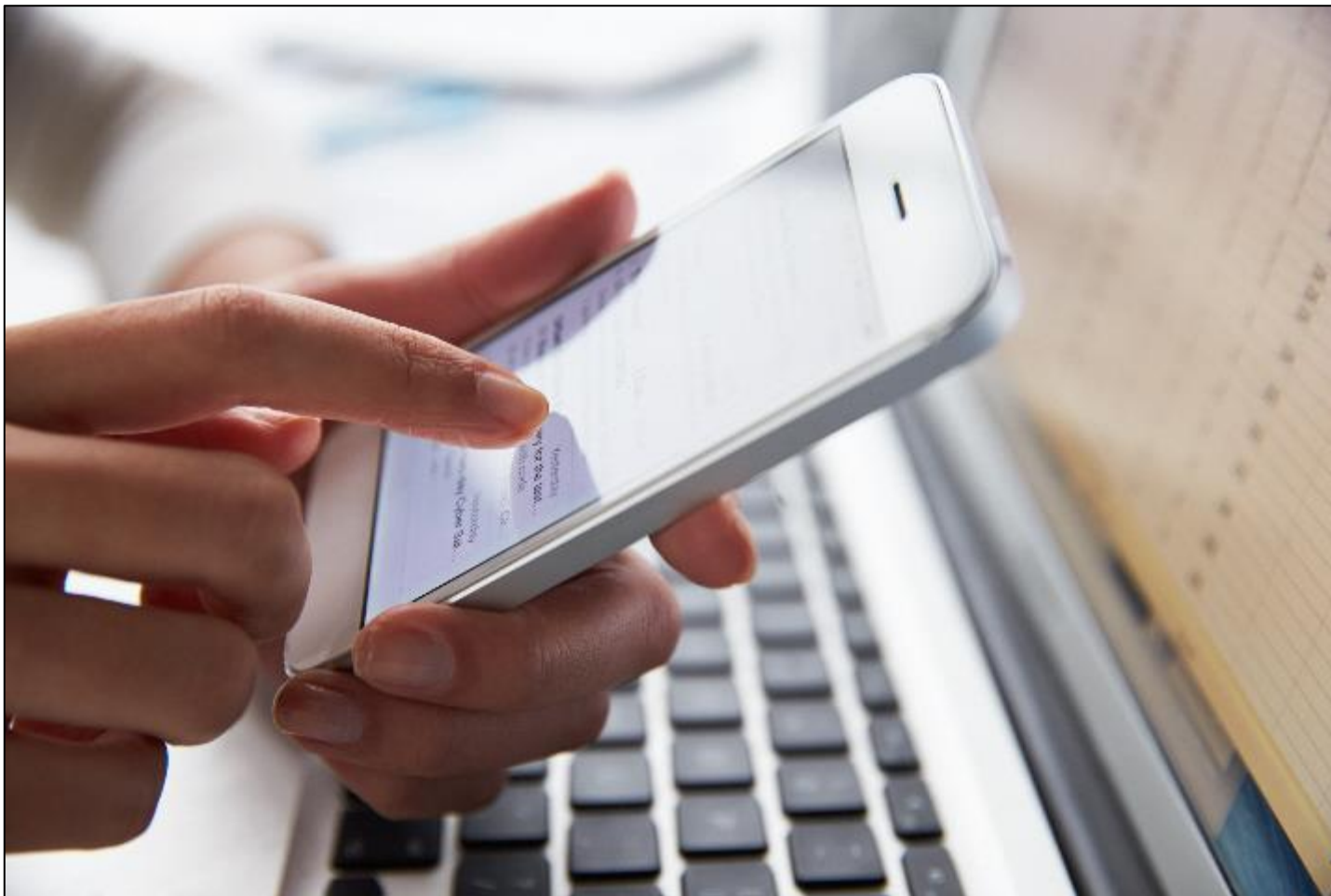
Short (1-2 years)

Cost

Estimated £2-£5 million (dependent on the route length and service frequency – peak vehicle requirement and staff cost drive revenue costs)

OPTION 51

IMPROVED PUBLIC TRANSPORT INFORMATION: REAL-TIME APP



Description

Improved public transport information in the form of improved online real-time apps to encourage modal shift.

Real-time apps will increase accessibility and connectivity of public transport that is more reliable, potentially contributing to modal shift away from car use.

The use of real-time apps is dependent on the option and current technological roll out – there are currently multiple projects within the UK and EU.

Timeline

Short (1-2 years)

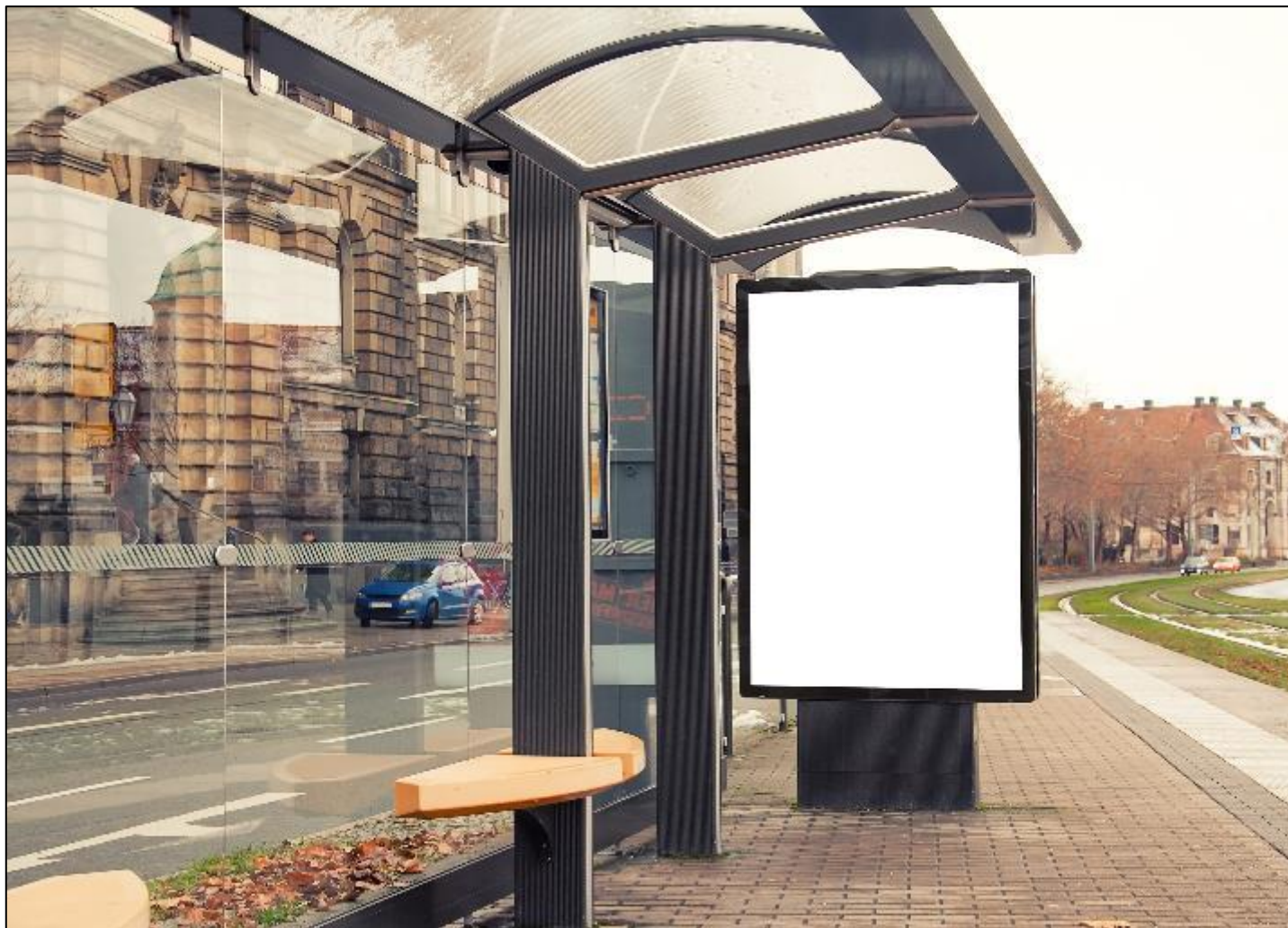
Cost

Estimated cost of £50,000 for a new basic app. With the inclusion of a real-time journey planner, new innovative functions, like push notifications, and other features, the cost could be £250,000-£350,000.

The cost of upgrading and improving an existing source is unknown.

OPTION 52

IMPROVED PUBLIC TRANSPORT INFORMATION: REAL-TIME INFORMATION AT STOPS



Description

Improved public transport information in the form of real-time information at bus stops to encourage the use of bus services and subsequently modal shift.

Real-time information at bus stops will increase accessibility and connectivity of public transport that is more reliable.

Timeline

Short (1-2 years)

Cost

£15,000 per stop, with the assumption that the appropriate technology exists within the existing bus fleet.

OPTION 53

UPDATE THE DIGITAL ROAD MAP



Description

Update the digital road map to provide better navigation information, improving routing, connectivity and journey reliability.

Timeline

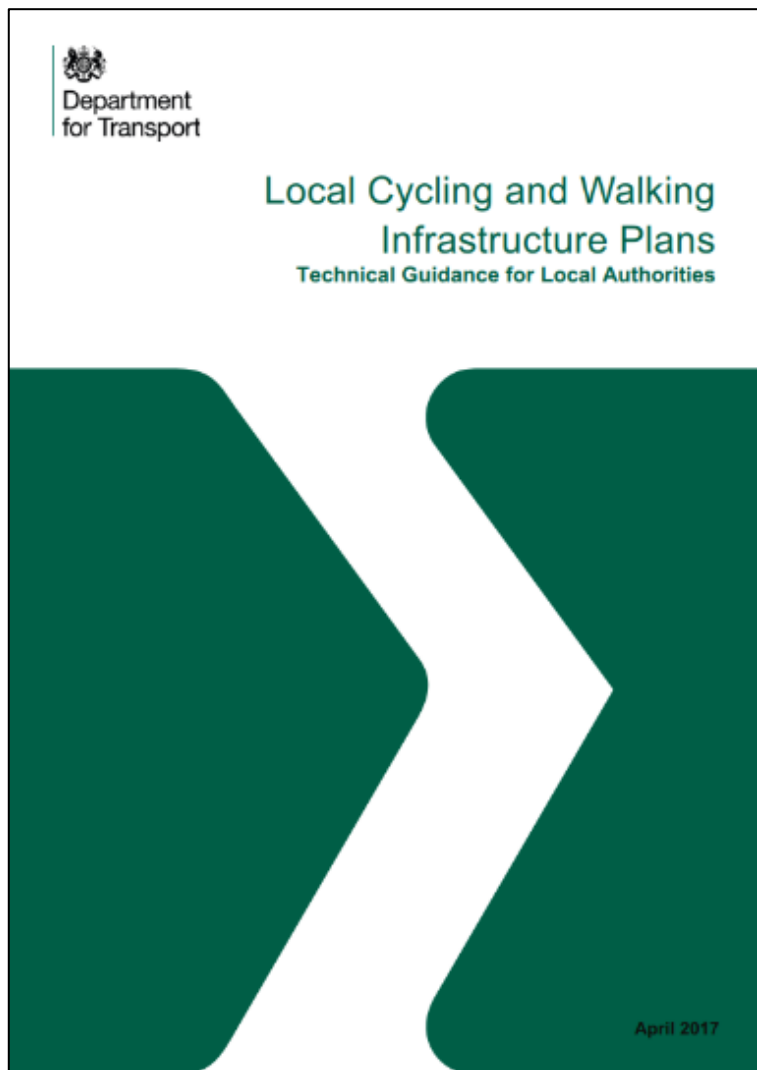
Short (1-2 years)

Cost

Up to £1 million (estimate which considers the collection of data only)

OPTION 54

DEVELOP LOCAL CYCLING AND WALKING INFRASTRUCTURE PLAN



Source:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/607016/cycling-walking-infrastructure-technical-guidance.pdf

Stage	Name	Description
1	Determining Scope	Establish the geographical extent of the LCWIP, and arrangements for governing and preparing the plan.
2	Gathering Information	Identify existing patterns of walking and cycling and potential new journeys. Review existing conditions and identify barriers to cycling and walking. Review related transport and land use policies and programmes.
3	Network Planning for Cycling	Identify origin and destination points and cycle flows. Convert flows into a network of routes and determine the type of improvements required.
4	Network Planning for Walking	Identify key trip generators, core walking zones and routes, audit existing provision and determine the type of improvements required.
5	Prioritising Improvements	Prioritise improvements to develop a phased programme for future investment.
6	Integration and Application	Integrate outputs into local planning and transport policies, strategies, and delivery plans.

Description

Develop a Local Cycling and Walking Infrastructure Plan (LCWIP). This is a strategic approach to identifying cycling and walking improvements required at the local level.

An LCWIP would enable a long-term approach to developing local cycling and walking networks (ideally over a 10-year period), in order to encourage modal shift – increasing the number of trips made of foot or by cycle, and reduce vehicular trips and associated congestion and rat-running.

The LCWIP would form the planning element of a package containing walking and cycling options.

Timeline

Short (1-2 years)

Cost

Estimated cost up to £500,000 (excluding infrastructure)

OPTION 55

PROMOTE CYCLING SCHEMES



Description

Promote cycling schemes (for example Cyclescheme www.cyclescheme.co.uk) to increase the uptake of cycling in the area and encourage modal shift subsequently reducing the number of vehicular trips.

The promotion of cycling schemes would generally be an element of a package of cycling schemes.

Timeline

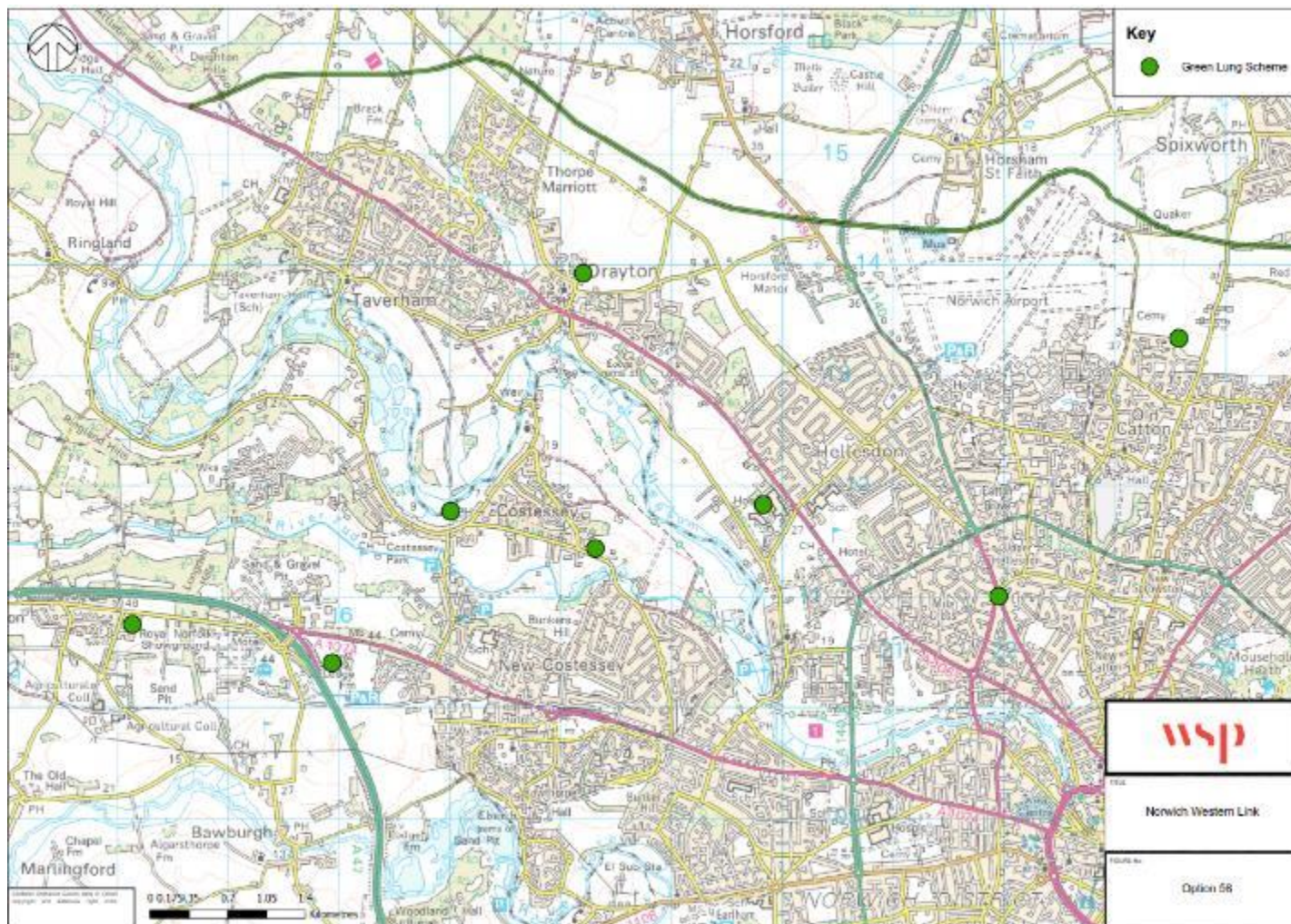
Short (1-2 years)

Cost

Estimated cost of up to £1 million (dependent on the use of media sources)

OPTION 56

DEVELOP GREEN LUNG SCHEMES



Description

A Green Lung is an designated area of natural parkland (usually within an urban region) which replenishes the air with oxygen and provides improved air quality.

Implementation of green lung schemes, particularly adjacent to proposed development, would improve access to green space and encourage modal shift towards walking and cycling.

Timeline

Medium (3-8 years)

Cost

Estimated cost of £1-£5 million

OPTION 57

BIKE-ON-BUS SCHEMES



Description

Implement bike-on-bus schemes to encourage modal shift and active travel by combining both cycling and public transport use.

Bike-on-bus scheme would make public transport more accessible and improve connectivity, with the potential for improved journey times.

Timeline

Short (1-2 years)

Cost

£1-3 million. Costs could be significant due to the requirement of retrofitting existing vehicles or purchasing new vehicles.

OPTION 58

MOBILITY AS A SERVICE SCHEME



Description

Mobility as a Service schemes combine public and private transportation methods into a unified platform as services, where trips can be managed.

Implementing Mobility as a Service schemes improves access for all groups and to all areas, leading to modal shift away from privately owned modes of transport, and reduced journey times.

Timeline

Medium (3-8 years)

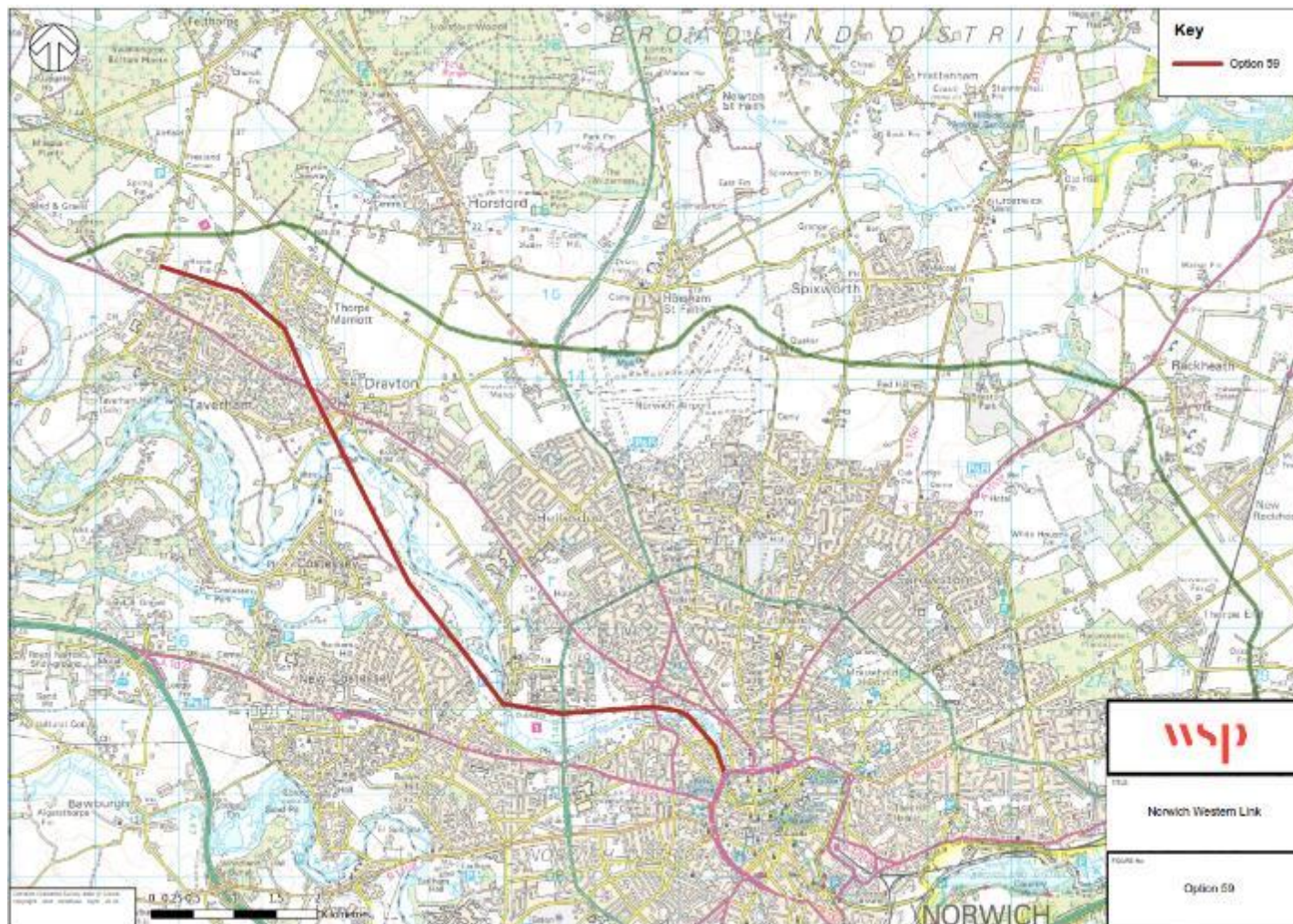
Cost

Estimated 2017 costs:

£0-£3 million

OPTION 59

LIGHT RAIL



Description

A light rail service connecting all locations from the A147 St Crispins Road / A147 Barn Road / Barker Street roundabout to Fir Covert Road, following the alignment of the Marriott's Way (disused railway path).

The route leaves Norwich City Centre heading north-west crossing the River Wensum, before turning west, skirting between Heigham Grove and Sweet Briar Industrial Estate.

The light rail alignment would cross the River Wensum for a second time before heading north-west, passing west of Hellesdon. The route continues through the River Wensum Valley up to Drayton (crossing the River Wensum for a third time), before crossing the A1067 passing through Thorpe Marriot (north of Taverham) and connecting with Fir Covert Road.

Timeline

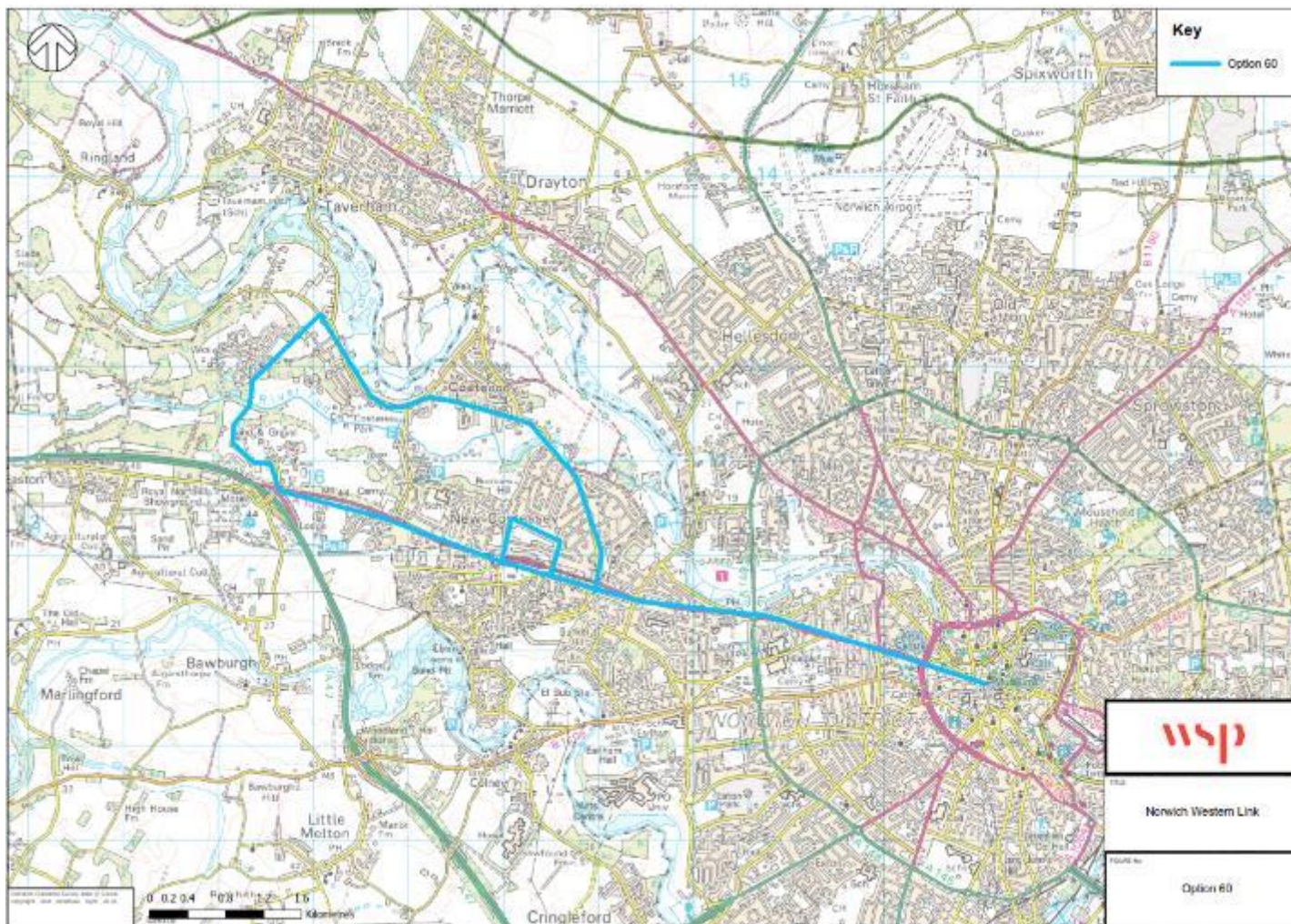
Medium (3-8 years)

Cost

Estimated 2017 costs:
£250-£300 million

OPTION 60

VERY LIGHT RAIL



Description

A very light rail service connecting Longwater, Queen's Hill and Costessey to Norwich City Centre.

The route follows the existing A1074 from Norwich City Centre westward, passing Clover Hill, New Costessey, and Longwater, where it meets the A47 Norwich Southern Bypass.

The very light rail would then head north through the Longwater Industrial Estate following Sir Alfred Munnings Road to serve Queen's Hill. The service would then join West End at the junction with Ringland Lane and Taverham Lane following this to Costessey, before connecting back to the A1074 via Town House Road and Norwich Road.

Timeline

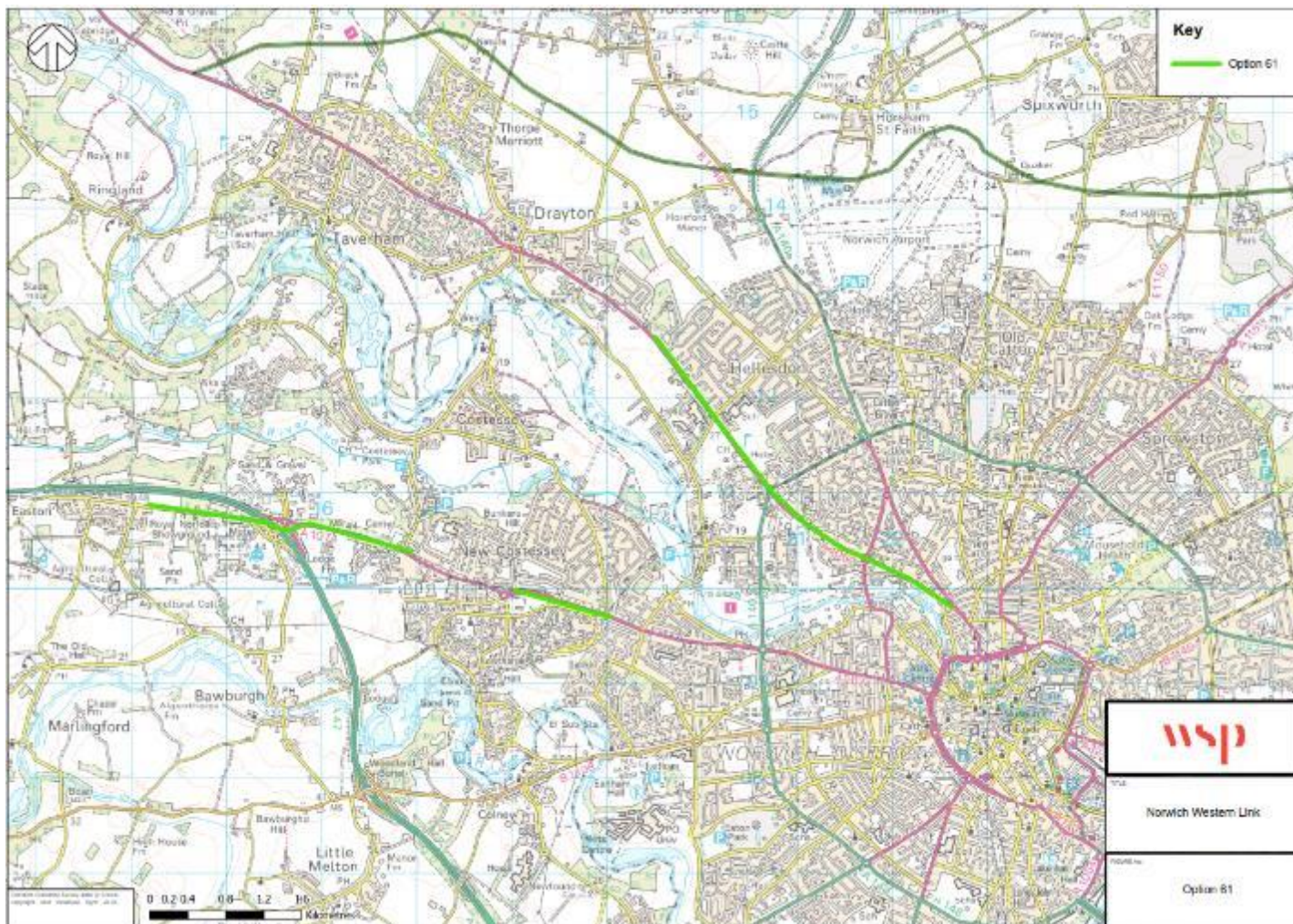
Long (8+ years)

Cost

Estimated 2017 costs:
£200-£250 million

OPTION 61

OFFLINE BUSWAY



Description

Provision of offline busways (including partial and full options). These would be installed alongside key highway corridors with localised widening.

There are several route options available, including:

- A1074 corridor: between Norwich Road and A1074 / Breckland Road / Wendene / Barnard Road Roundabout.
- A1074 corridor: between Longwater Lane and Easton, crossing the A47 and utilising Dereham Road.
- A1067 corridor: between the A1067 / A1402 junction Drayton Wood Road.

Timeline

Long (8+ years)

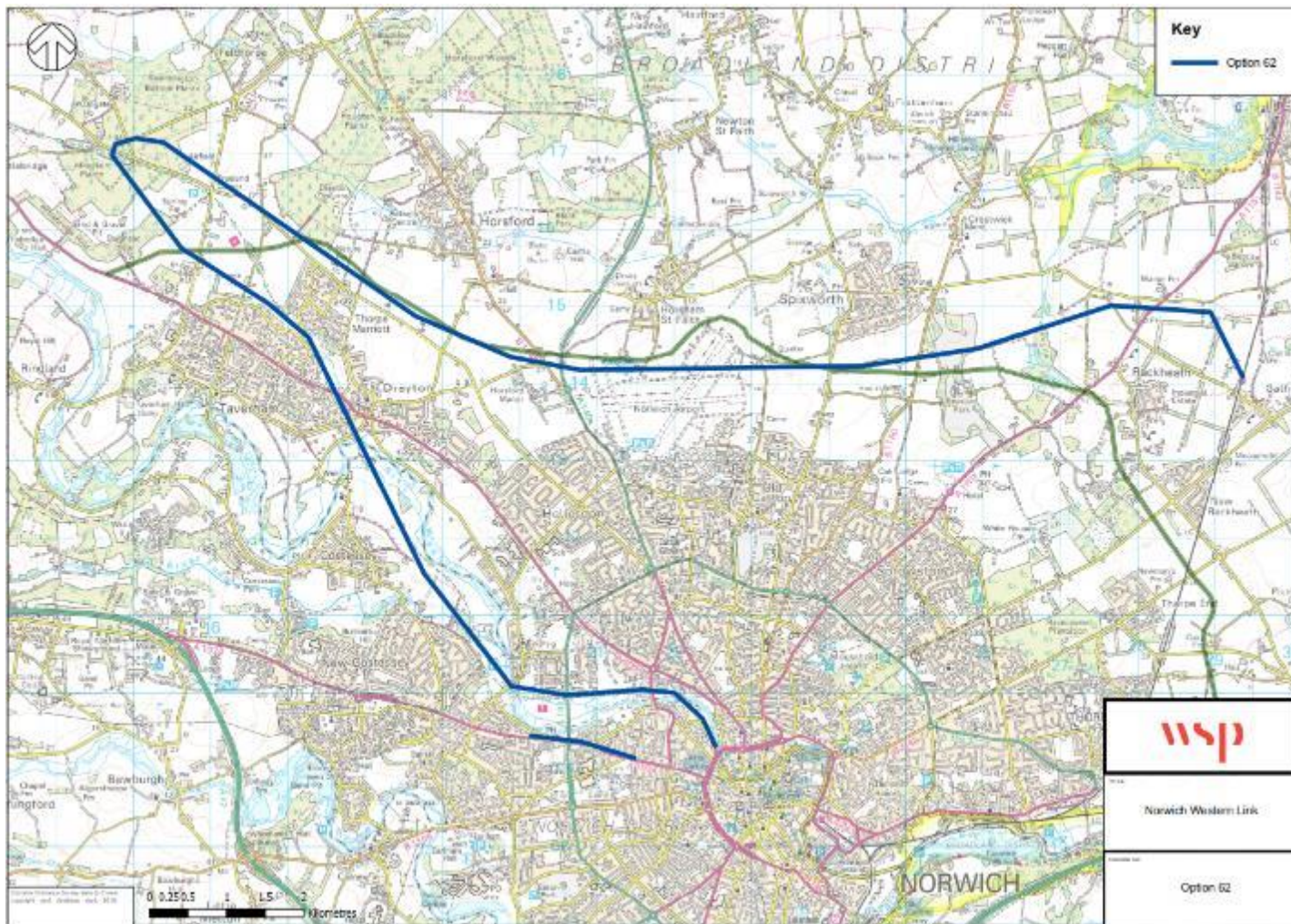
Cost

Estimated 2017 costs:

£50-£100 million

OPTION 62

NEW ORBITAL RAIL LINE



Description

The orbital rail line would follow the alignment of the Marriott's Way (disused railway path) from Norwich City Centre out north-west to Fir Covert Road, north of Taverham – crossing the River Wensum on three occasions.

The rail line would then extend to cross the A1270 and Reepham Road before routing east, passing south of Felthorpe, and Horsford following the A1270 alignment. The route then crosses the A140, passing north of Norwich International Airport connecting with the proposed development south of Horsham St Faith.

The route then passes south of Spixworth, before crossing the B1150. It passes north of Rackheath crossing Wroxham Road connecting with the existing railway line north of Salhouse Station to the north-east of Norwich.

Timeline

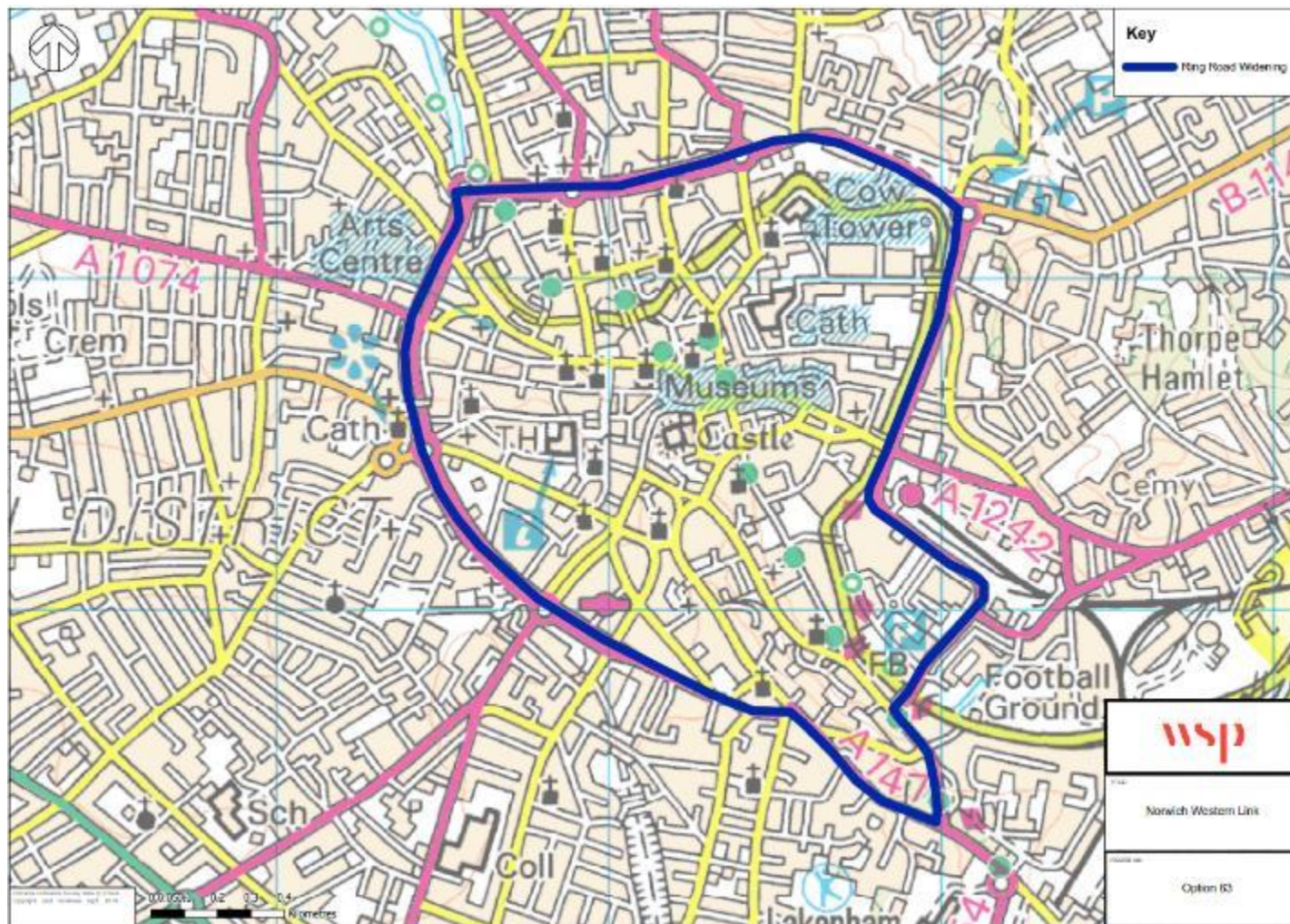
Long (8+ years)

Cost

Estimate of £400-£500 million (based upon a 14-mile route).

OPTION 63

INNER RING ROAD WIDENING



Description

Widening of the existing inner ring road (A147) to improve capacity, connectivity journey time and reliability, while improving access to Norwich from the western quadrant.

Timeline

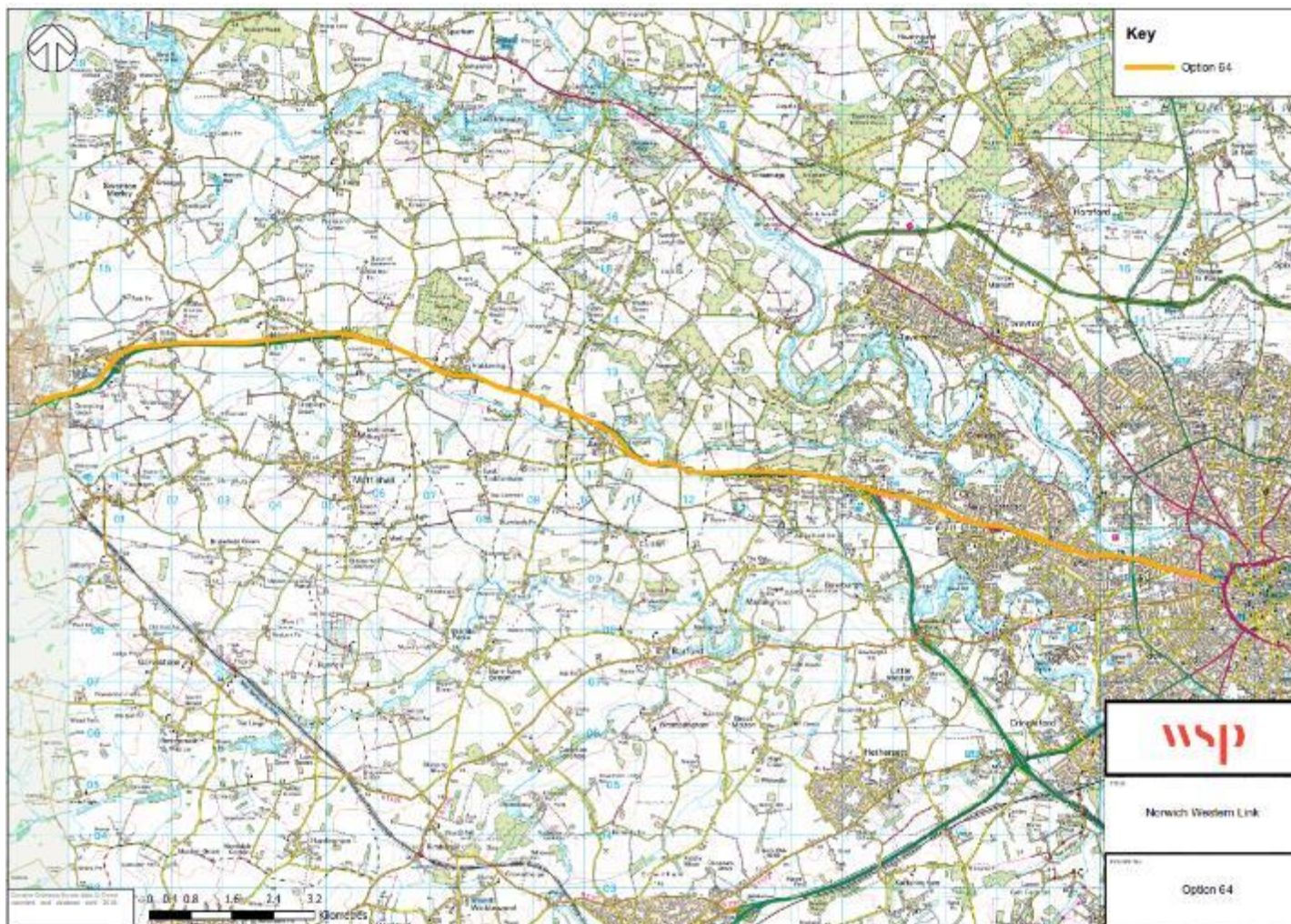
Long (8+ years)

Cost

Estimated 2017 costs:
£100-£150 million

OPTION 64

PROVISION OF SPRINT SERVICES: A47 / A1074



Description

Provision of a new sprint bus service (distinctly branded Sprint vehicles) on the A47 / A1074 corridor connecting Norwich City Centre with western quadrant locations, possibly as far as Dereham.

The sprint service would have high reliability and competitive journey time targets.

Where possible high-quality bus shelters, bus lanes / busways and bus priority measures would be provided to make it an attractive method of travel.

Timeline

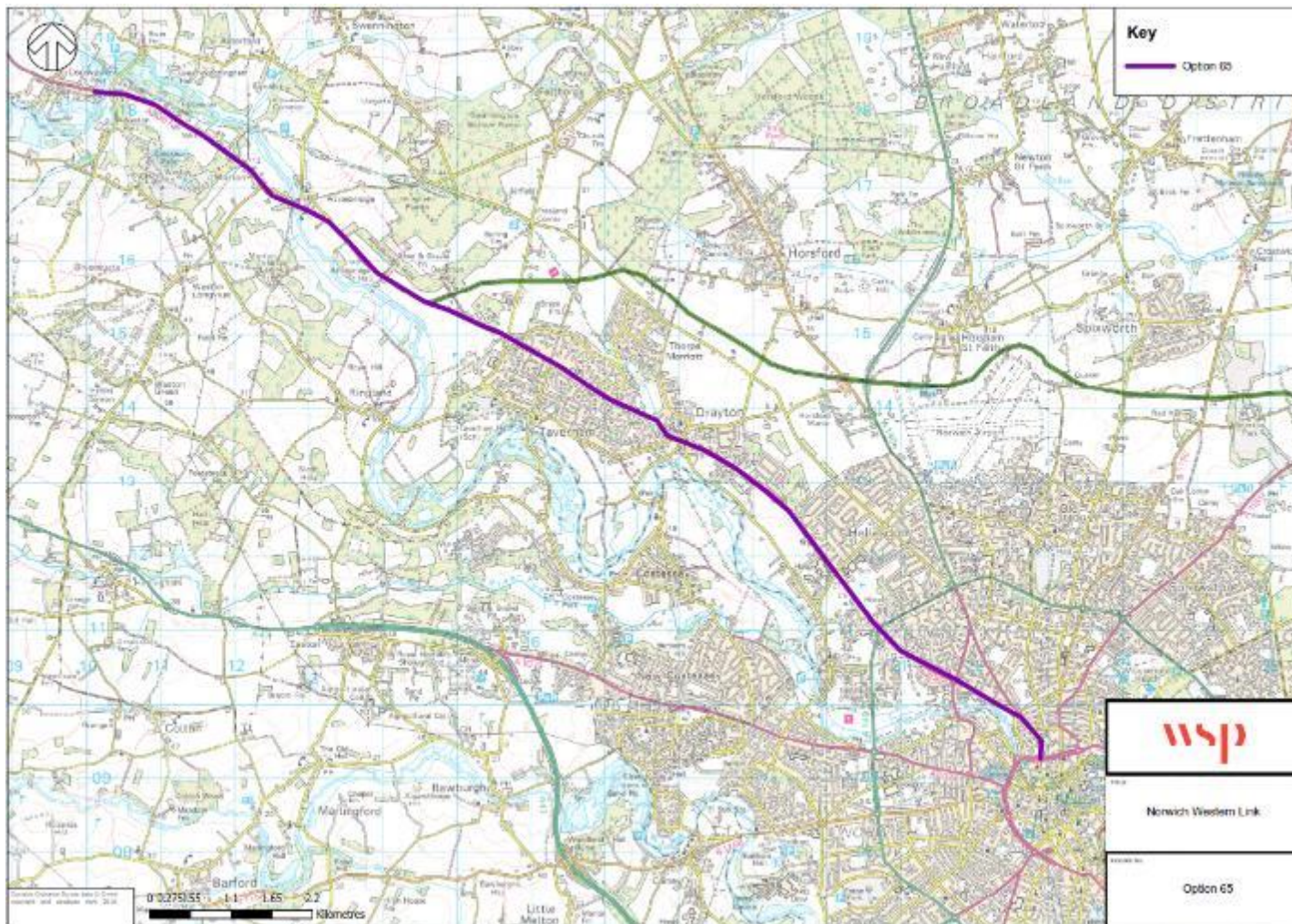
Medium (3-8 years)

Cost

£35-£50 million, based upon analysis of capital cost for Sprint

OPTION 65

PROVISION OF SPRINT SERVICES: A1067 CORRIDOR



Description

Provision of a new sprint bus service (distinctly branded Sprint vehicles) on the A1067 corridor connecting Norwich City Centre with western quadrant locations, possibly as far as Bawdeswell.

The sprint service would have high reliability and competitive journey time targets.

Where possible high-quality bus shelters, bus lanes / busways and bus priority measures would be provided to make it an attractive method of travel.

Timeline

Medium (3-8 years)

Cost

£35-£50 million, based upon analysis of capital cost for Sprint

OPTION 66

PROVISION OF A SUSTAINABLE URBAN DISTRIBUTION CENTRE



Description

Provision of a sustainable urban distribution centre on the outskirts of the city.

All local deliveries are made to the distribution centre and are thereafter delivered in more carbon efficient vehicles and routing patterns.

Timeline

Medium (3-8 years)

Cost

Estimated cost of £10-£20 million (costs associated with new infrastructure, delivery vehicles, consultation and technology)

OPTION 67

PROVISION OF IMPROVED FREIGHT ROUTE INTELLIGENCE



Description

Provision of improved freight route intelligence to improve route choice and deter rat-running and unnecessary Heavy Good Vehicle (HGV) movements.

Timeline

Short (1-2 years)

Cost

Estimated 2017 costs:

£1-£2 million

OPTION 68

LORRY MANAGEMENT STRATEGY



Description

Development of an overarching lorry management strategy for the Norwich area.

The strategy could include:

- Creation of a lorry route network
- Restriction of lorry movement
- Speed management and traffic calming
- Accessibility measures
- Route suitability assessments
- Managing lorry deliveries
- Lorry parking facilities
- Communication of information strategy
- Partnerships with key hauliers and associations (Road Haulage Association / Freight Transport Association)

Timeline

Short (1-2 years)

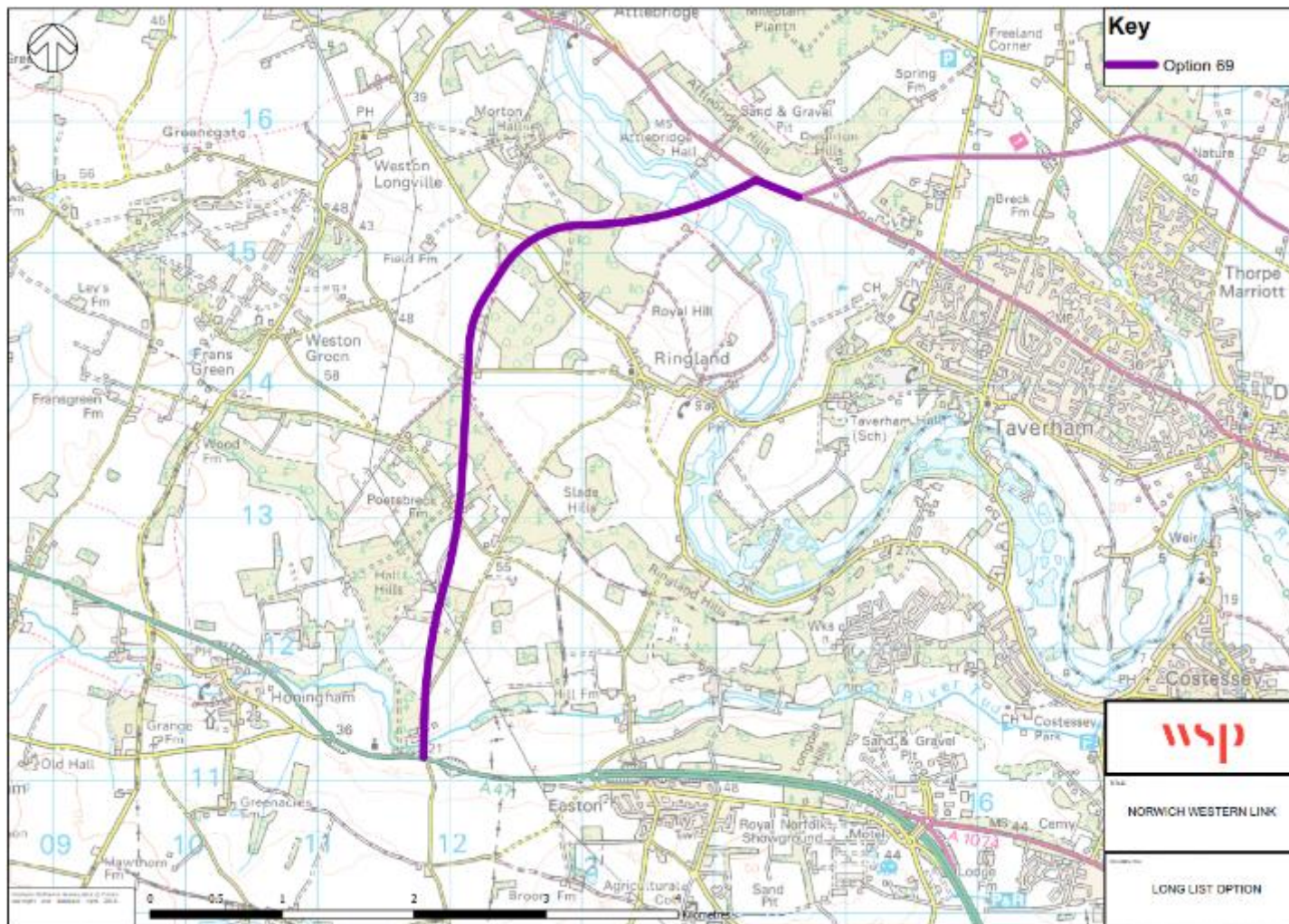
Cost

Estimated 2017 costs:

£0-£1 million

OPTION 69

PURPLE LINE (2018 PUBLIC CONSULTATION), SINGLE CARRIAGEWAY



Description

From the A1067, west of the junction with the A1270 at Deighton Hills, Option 69 heads south-west, crossing the River Wensum and Ringland Lane.

The route then heads south crossing Weston Road, near Breck Barn Cottages to the west of Ringland, passing through Blackbreck Plantation and crossing The Broadway.

Option 69 continues south to tie-in with Taverham Road following the alignment for approximately 300 metres (over the River Tud) to connect with the A47 at the junction with Blind Lane.

Option 69 would be of single carriageway standard.

Timeline

Medium (3-8 years)

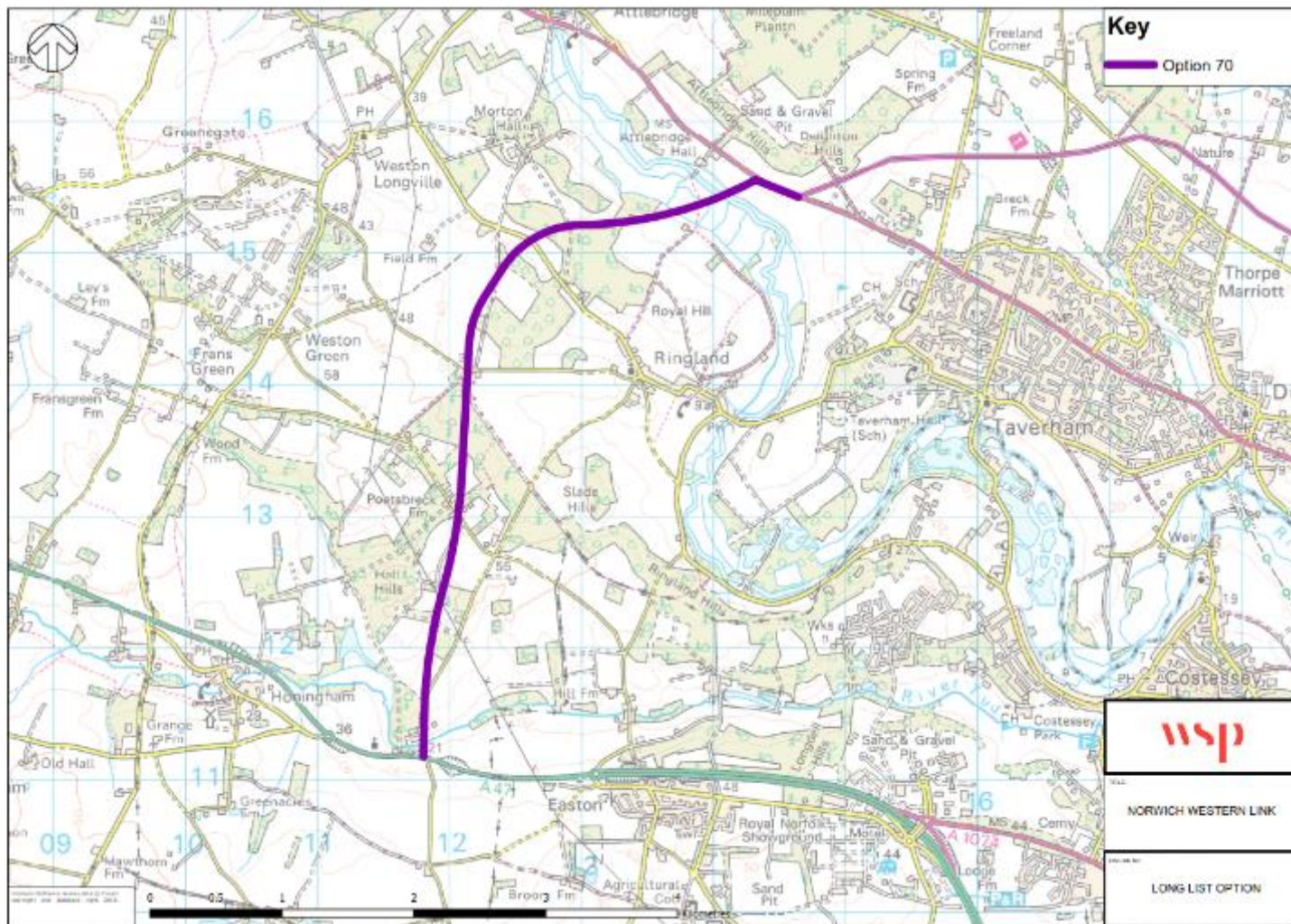
Cost

Estimated 2017 costs:

£100-£150 million

OPTION 70

PURPLE LINE (2018 PUBLIC CONSULTATION), DUAL CARRIAGEWAY



Description

From the A1067, west of the junction with the A1270 at Deighton Hills, Option 70 heads south-west, crossing the River Wensum and Ringland Lane.

The route then heads south crossing Weston Road, near Breck Barn Cottages to the west of Ringland, passing through Blackbreck Plantation and crossing The Broadway.

Option 70 continues south to tie-in with Taverham Road following the alignment for approximately 300 metres (over the River Tud) to connect with the A47 at the junction with Blind Lane.

Option 70 would be of dual carriageway standard. Upgrades to the A1067 to dual carriageway standard may also be required.

Timeline

Medium (3-8 years)

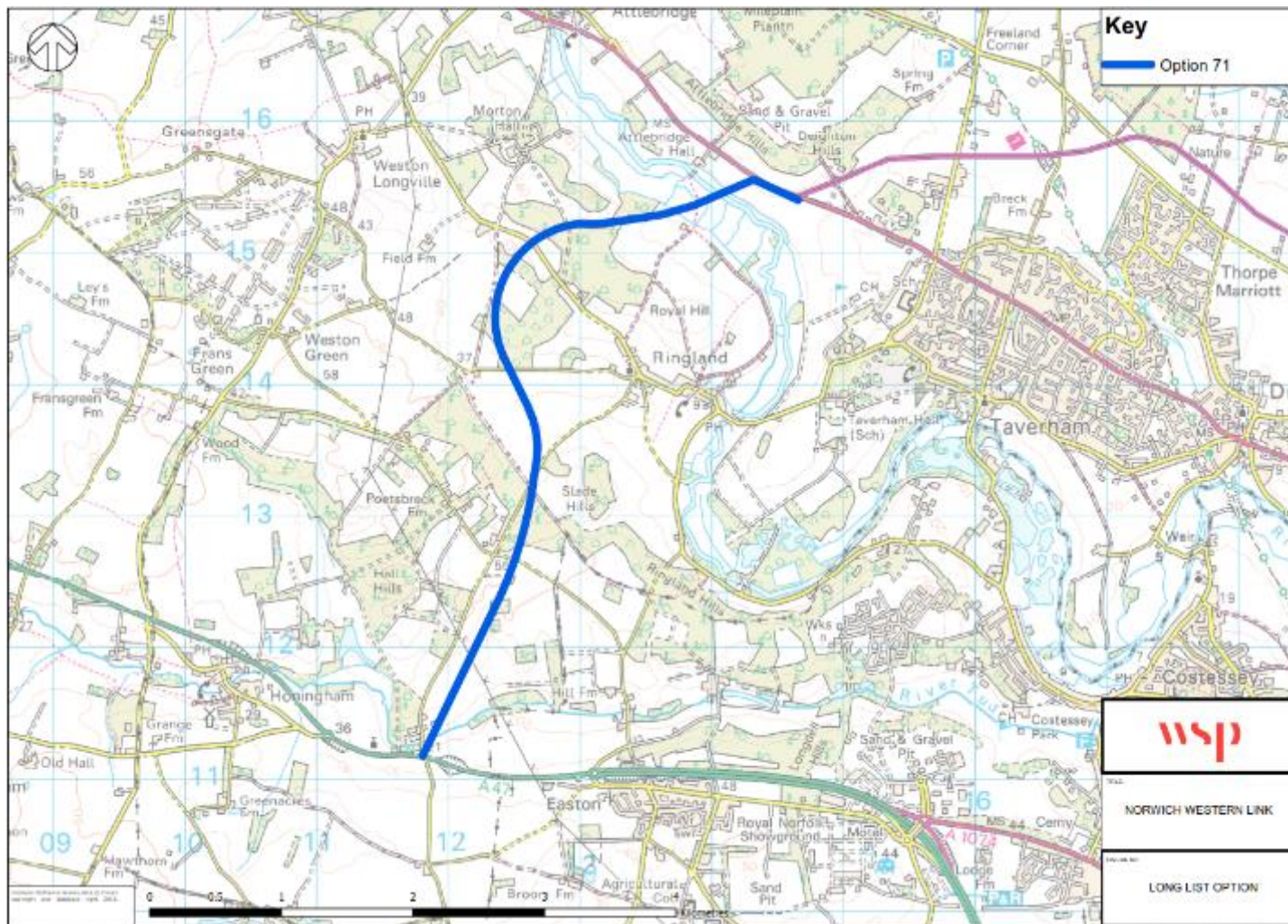
Cost

Estimated 2017 costs:

£150-£200 million

OPTION 71

BLUE LINE (2018 PUBLIC CONSULTATION), SINGLE CARRIAGEWAY



Description

From the A1067, west of the junction with the A1270 at Deighton Hills, Option 71 heads south-west, crossing the River Wensum and Ringland Lane passing through Primrose Grove.

The route then heads south crossing the northern Weston Road to the west of Ringland before crossing Honingham Lane passing through Poets Breck and Plantation to the southern Weston Road.

Option 71 then heads west to cross Taverham Road before routing south and running parallel to Taverham Road. Option 71 then crosses the River Tud to connect with the A47 to the west of Easton at the existing Taverham Road junction.

Option 71 would be of single carriageway standard.

Timeline

Medium (3-8 years)

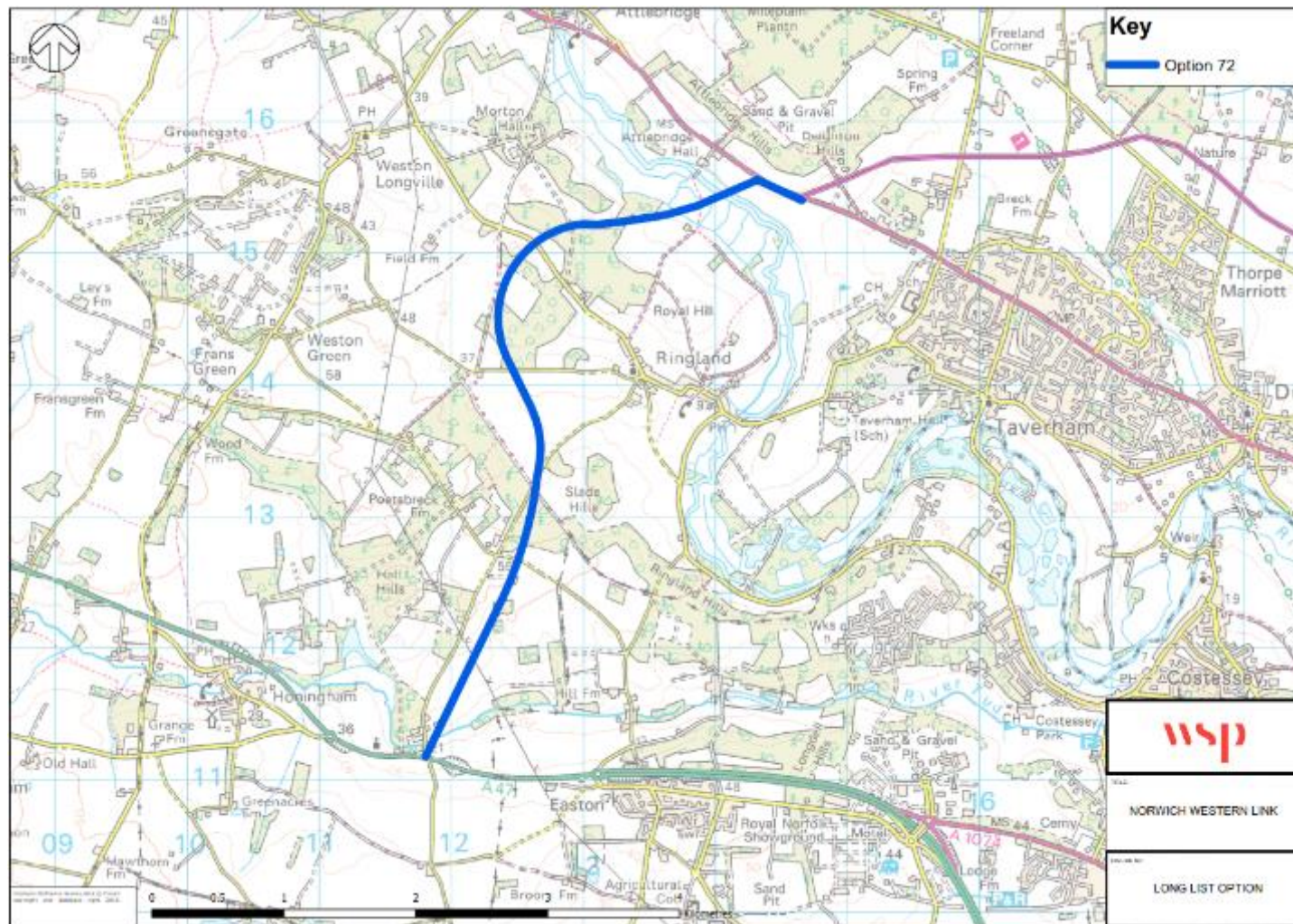
Cost

Estimated 2017 costs:

£150-£200 million

OPTION 72

BLUE LINE (2018 PUBLIC CONSULTATION), DUAL CARRIAGEWAY



Description

From the A1067, west of the junction with the A1270 at Deighton Hills, Option 72 heads south-west, crossing the River Wensum and Ringland Lane passing through Primrose Grove.

The route then heads south crossing the northern Weston Road to the west of Ringland before crossing Honingham Lane passing through Poets Breck and Plantation to the southern Weston Road.

Option 72 then heads west to cross Taverham Road before routing south and running parallel to Taverham Road. Option 72 then crosses the River Tud to connect with the A47 to the west of Easton at the existing Taverham Road junction.

Option 72 would be of dual carriageway standard. Upgrades to the A1067 to dual carriageway standard may also be required.

Timeline

Medium (3-8 years)

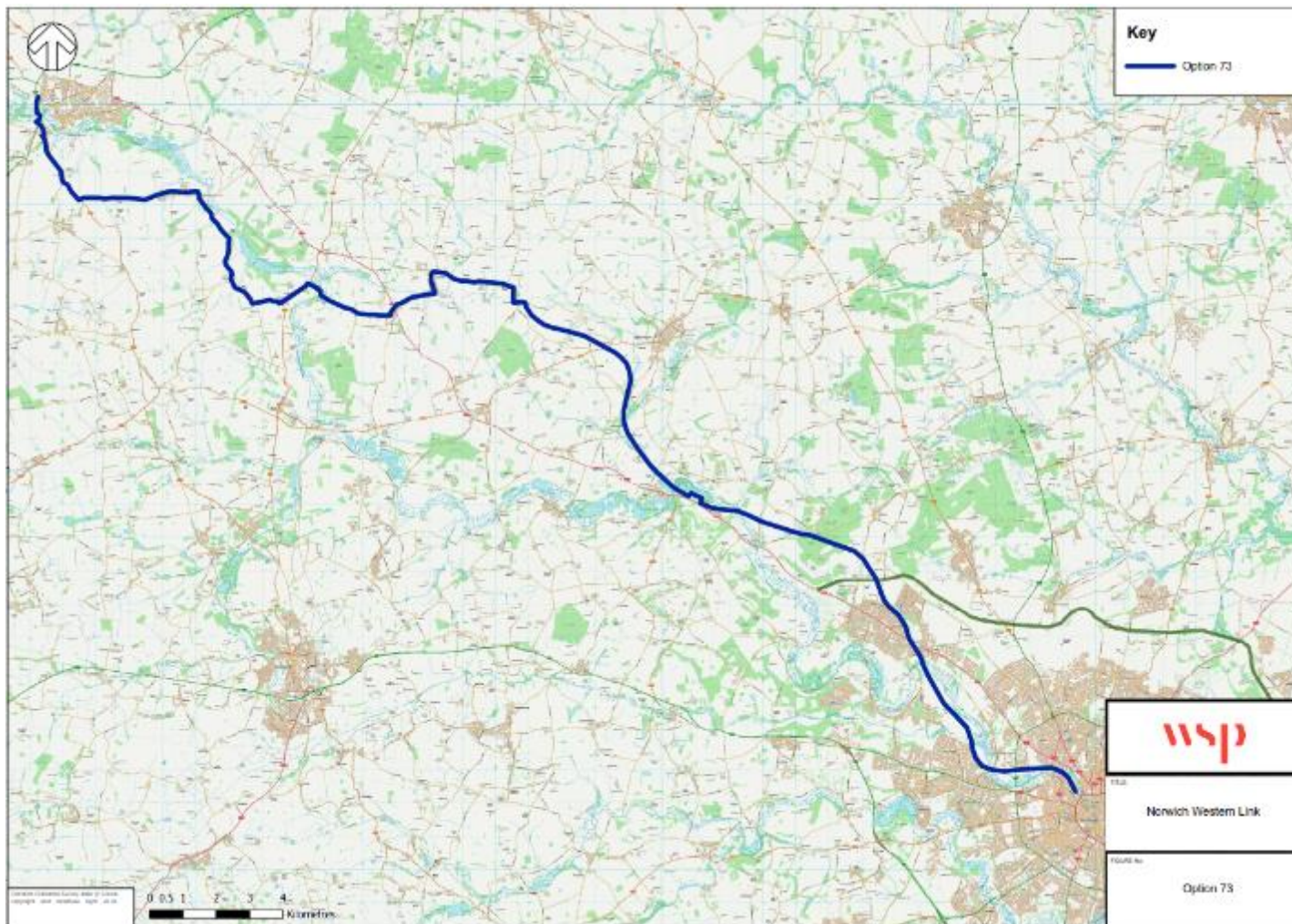
Cost

Estimated 2017 costs:

£100-£150 million

OPTION 73

RELAY FAKENHAM TO NORWICH RAIL LINE



Description

This option considers the relaying and reopening of the Fakenham to Norwich Railway Line to provide services to Norwich City Centre from the outer districts, encouraging modal shift.

The route heads north-west out of Norwich City Centre, crossing the River Wensum on three occasions to Drayton. The route then crosses the A1270 and follow the alignment of Reepham Road diverting away west, passing north of Attlebridge and Lenwade toward Reepham.

The route to Fakenham then uses the existing cycle network to Foulsham (Kerdiston Road / Reepham Road), Bintree (Claypit Road / Gunn Street / Bintree Road), Great Ryburgh (Mill Road / B1110 Bridge Road) to Fakenham (Fakenham Road / B1146 Dereham Road).

Timeline

Long (8+ years)

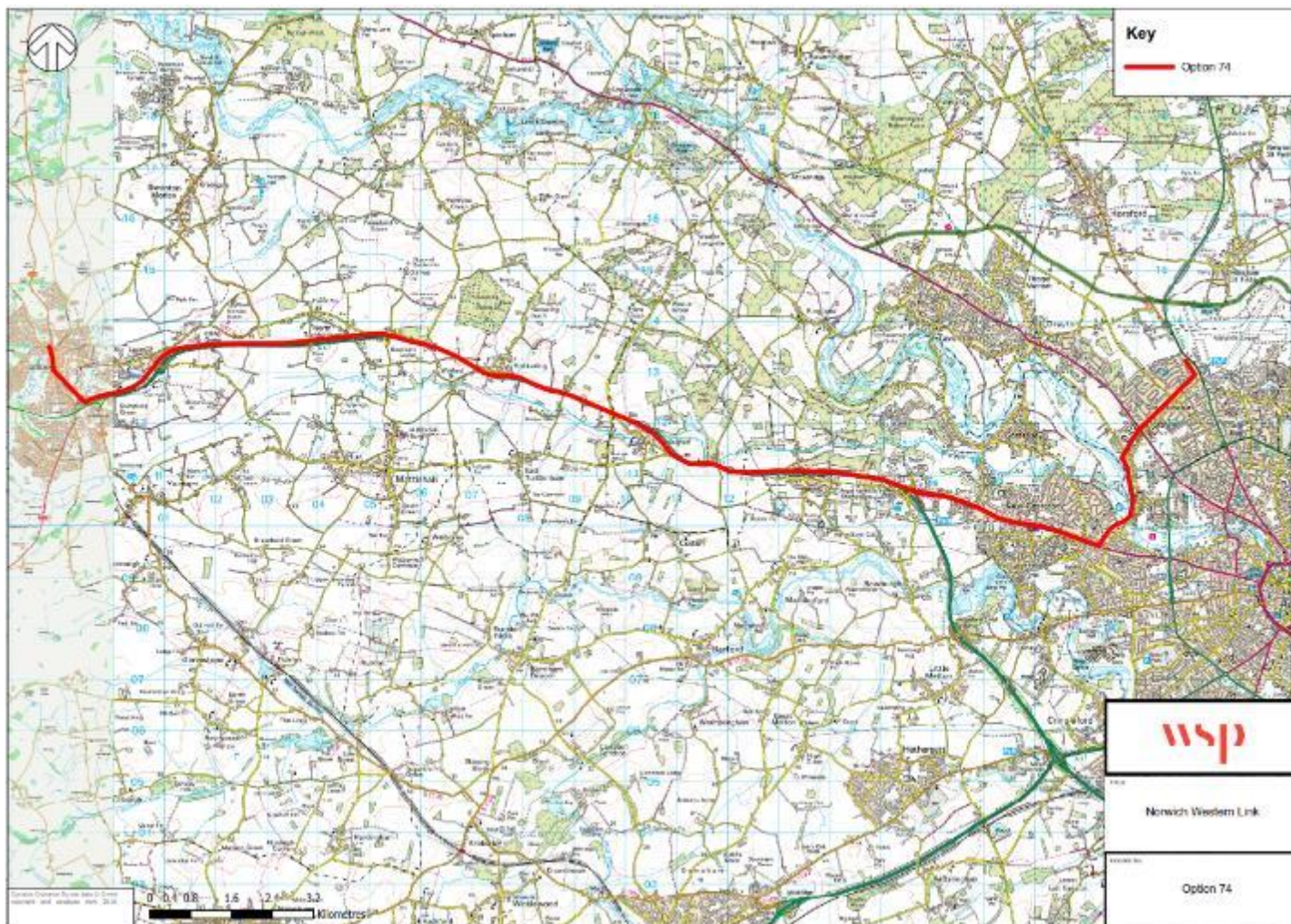
Cost

Estimated 2017 costs:

£500-£600 million

OPTION 74

NEW BUS ROUTE CONNECTING DEREHAM, HELLESDON AND NORWICH AIRPORT



Description

Provision of a new bus route connecting Dereham, Hellesdon and Norwich International Airport (with the potential to connect in to development to the north of Norwich). The service would use smaller, more manoeuvrable vehicles running every 15 minutes.

From Dereham the bus route would largely use the A47 toward Norwich, passing Hockering, Honington and Easton. The bus route would then use the A1074 Dereham Road through Longwater and New Costessey before heading north on Marl Pit Lane / Hellesdon Road, crossing the River Wensum, to serve Hellesdon.

The route would continue along Low Road, onto Hospital Lane, then Middletons Lane before joining the A140 Holt Road and connecting to Norwich International Airport.

Timeline

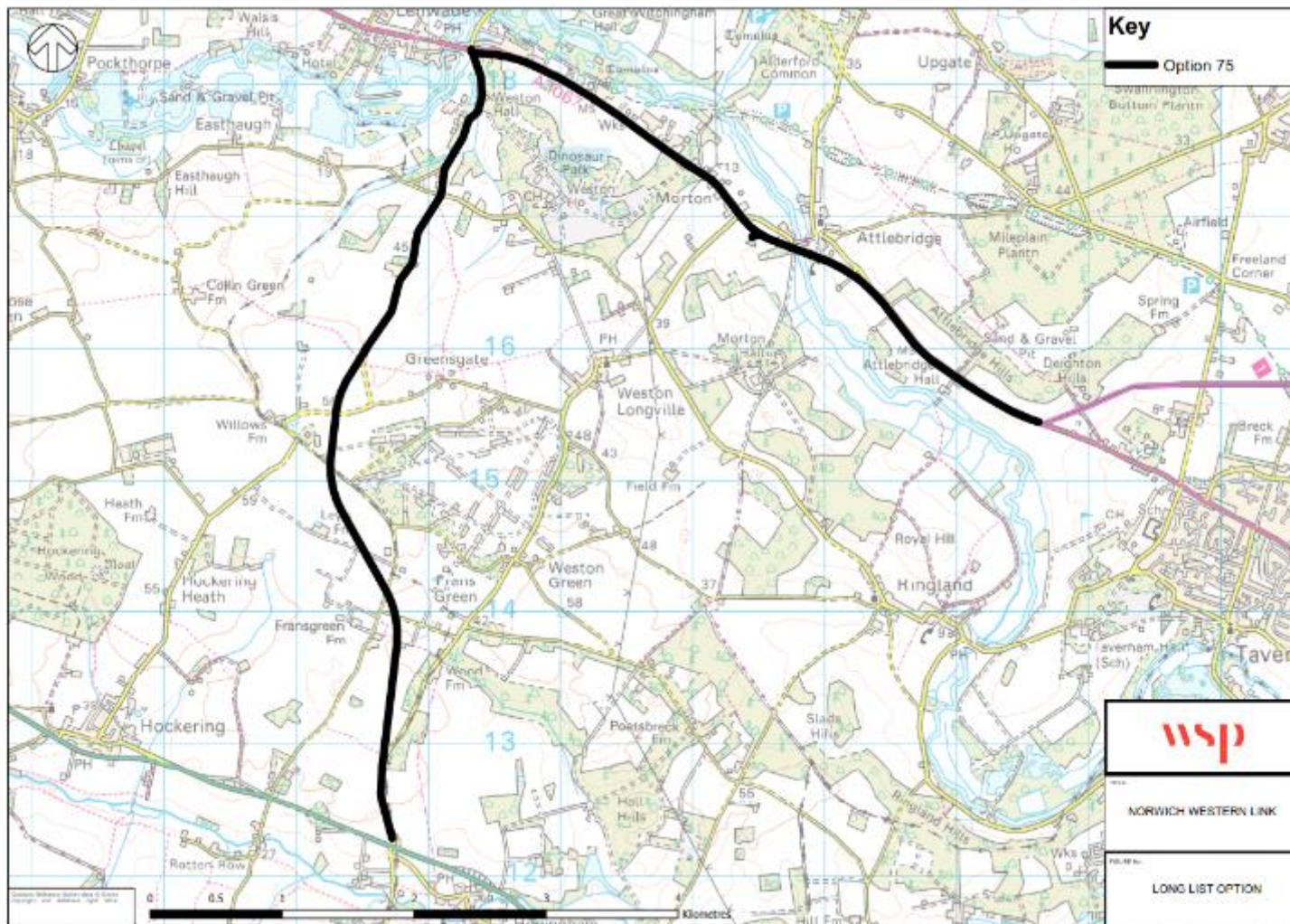
Short (1-2 years)

Cost

£2-£5 million (dependent upon route length and frequency – peak vehicle requirement and staff costs drive revenue costs)

OPTION 75

BLACK LINE (2018 PUBLIC CONSULTATION) EXISTING ROUTE, SINGLE CARRIAGEWAY



Description

Upgrading the existing road network between the A1067 at Lenwade (Porter's Lane junction) to the A47 east of Hockering.

From the A1067 Porter's Lane junction at Lenwade, Option 75 upgrades the B1535 to the junction with Rectory Road. The B1535 heads west for a short distance before routing south-east to the junction with Wood Lane.

The existing B1535 exhibits a series of sharp bends at junctions with Collin Green Lane and Sandy Lane. The route then connects with the A47 to the north-west of Honingham at Wood Lane / Berrys Lane junction.

Option 75 would be of single carriageway standard.

Timeline

Medium (3-8 years)

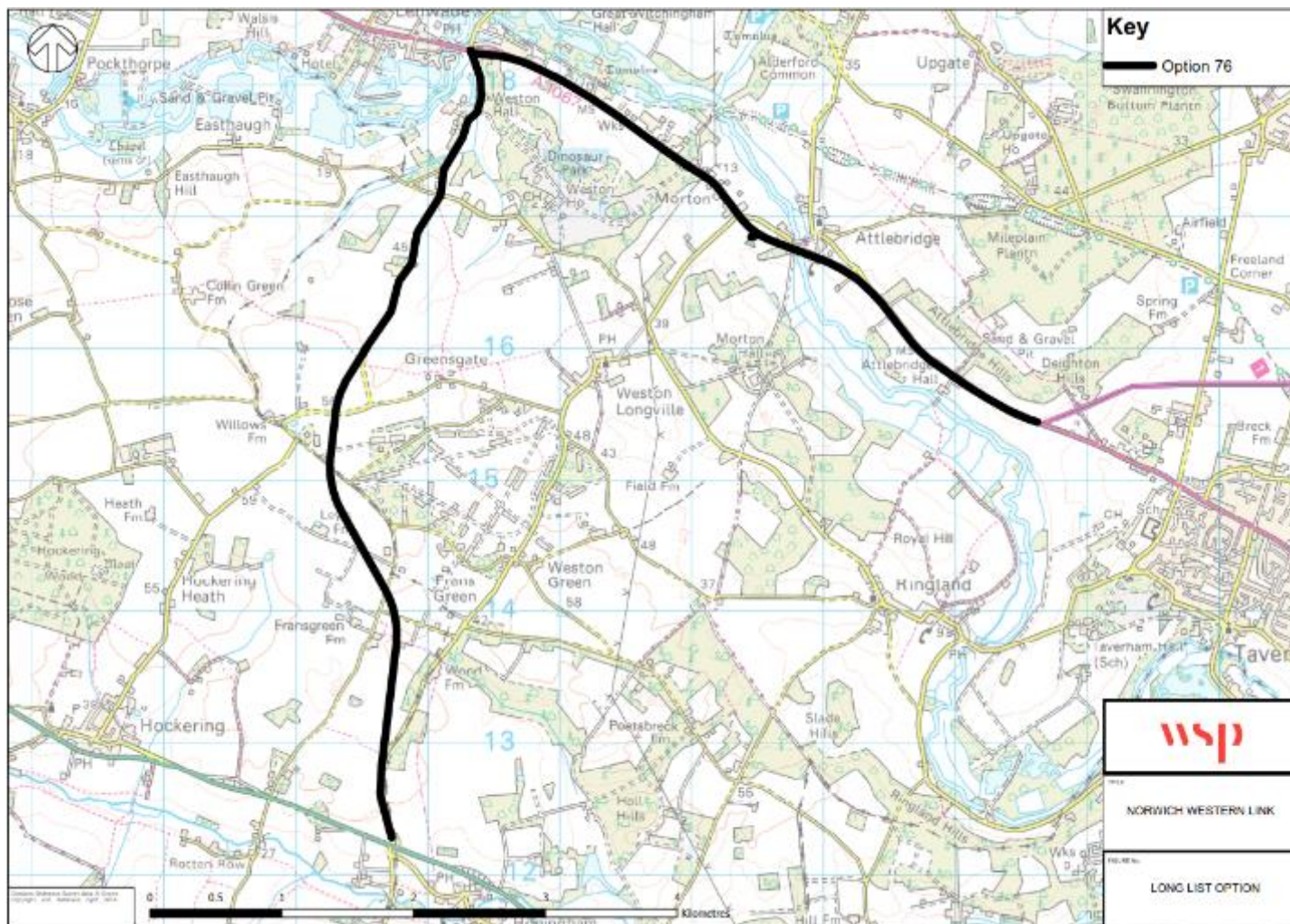
Cost

Estimated 2017 costs:

£25-£50 million

OPTION 76

BLACK LINE (2018 PUBLIC CONSULTATION) EXISTING ROUTE, DUAL CARRIAGEWAY



Description

Upgrading the existing road network between the A1067 at Lenwade (Porter's Lane junction) to the A47 east of Hockering.

From the A1067 Porter's Lane junction at Lenwade, Option 76 upgrades the B1535 to the junction with Rectory Road. The B1535 heads west for a short distance before routing south-east to the junction with Wood Lane.

The existing B1535 exhibits a series of sharp bends at junctions with Collin Green Lane and Sandy Lane. The route then connects with the A47 to the north-west of Honingham at Wood Lane / Berrys Lane junction.

Option 76 would be of dual carriageway standard. Upgrades to the A1067 to dual carriageway standard may also be required.

Timeline

Medium (3-8 years)

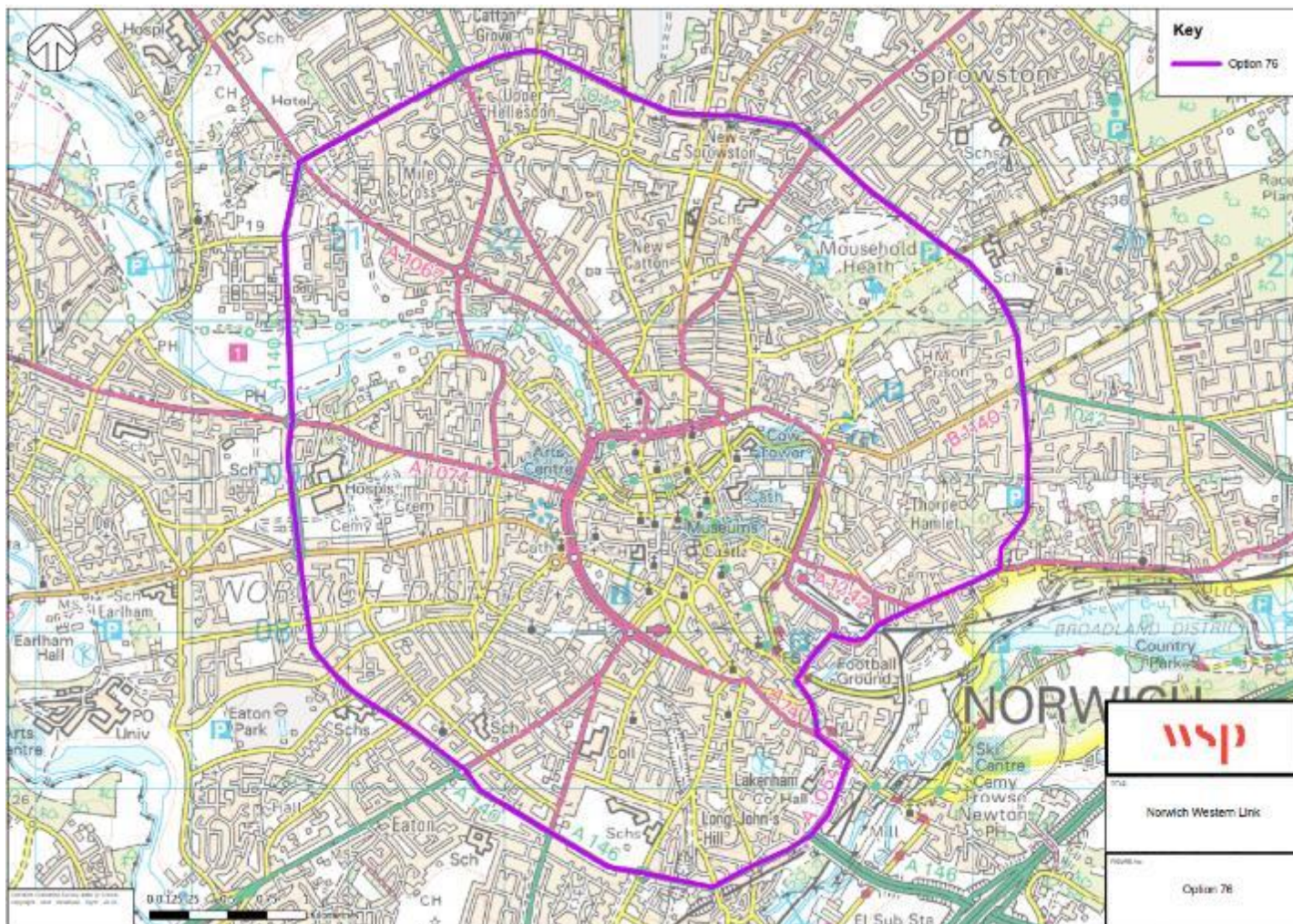
Cost

Estimated 2017 costs:

£50-£75 million

OPTION 77

OUTER RING ROAD WIDENING



Description

Widening of the existing outer ring road (A47 / A146 / A140 / A1042) to improve capacity, connectivity journey time and reliability, while improving access to Norwich from the western quadrant.

Timeline

Medium (3-8 years)

Cost

Estimated 2017 costs:
£200-£250 million

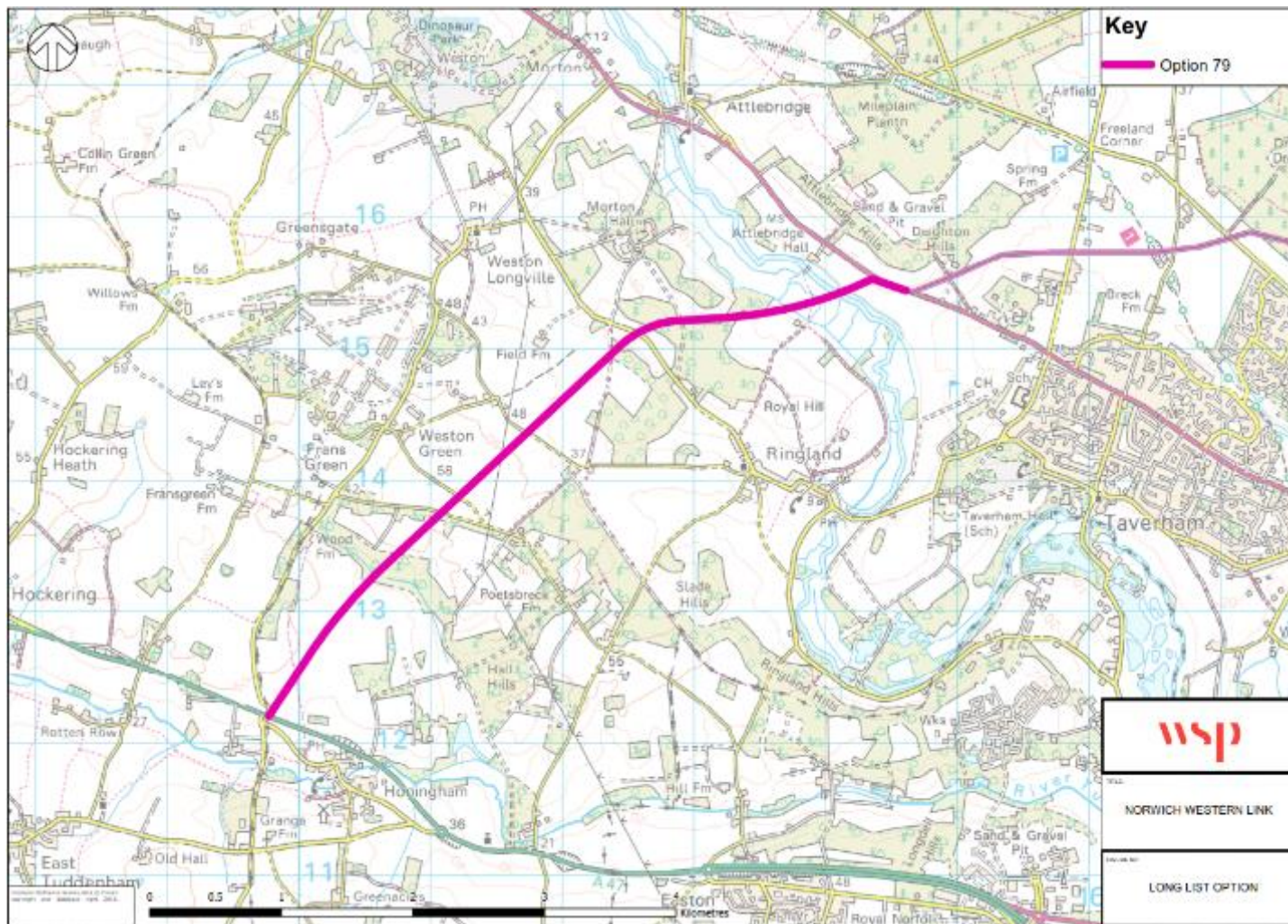
OPTION 78

DO NOTHING

	Description
	No change
	Timeline
	N/A
	Cost
	N/A

OPTION 79

PINK LINE (2018), SINGLE CARRIAGEWAY



Description

From the A1067, west of the junction with the A1270 at Deighton Hills, Option 79 heads west, crossing the River Wensum, before routing south-west crossing a number of local roads (Ringland Lane, Weston Road).

The route then passes east of Weston Green, before, crossing Breck Road and The Broadway to connect with the A47 to the north-west of Honingham at the existing Wood Lane / Berry's Lane junction.

Option 79 would be of single carriageway standard.

Timeline

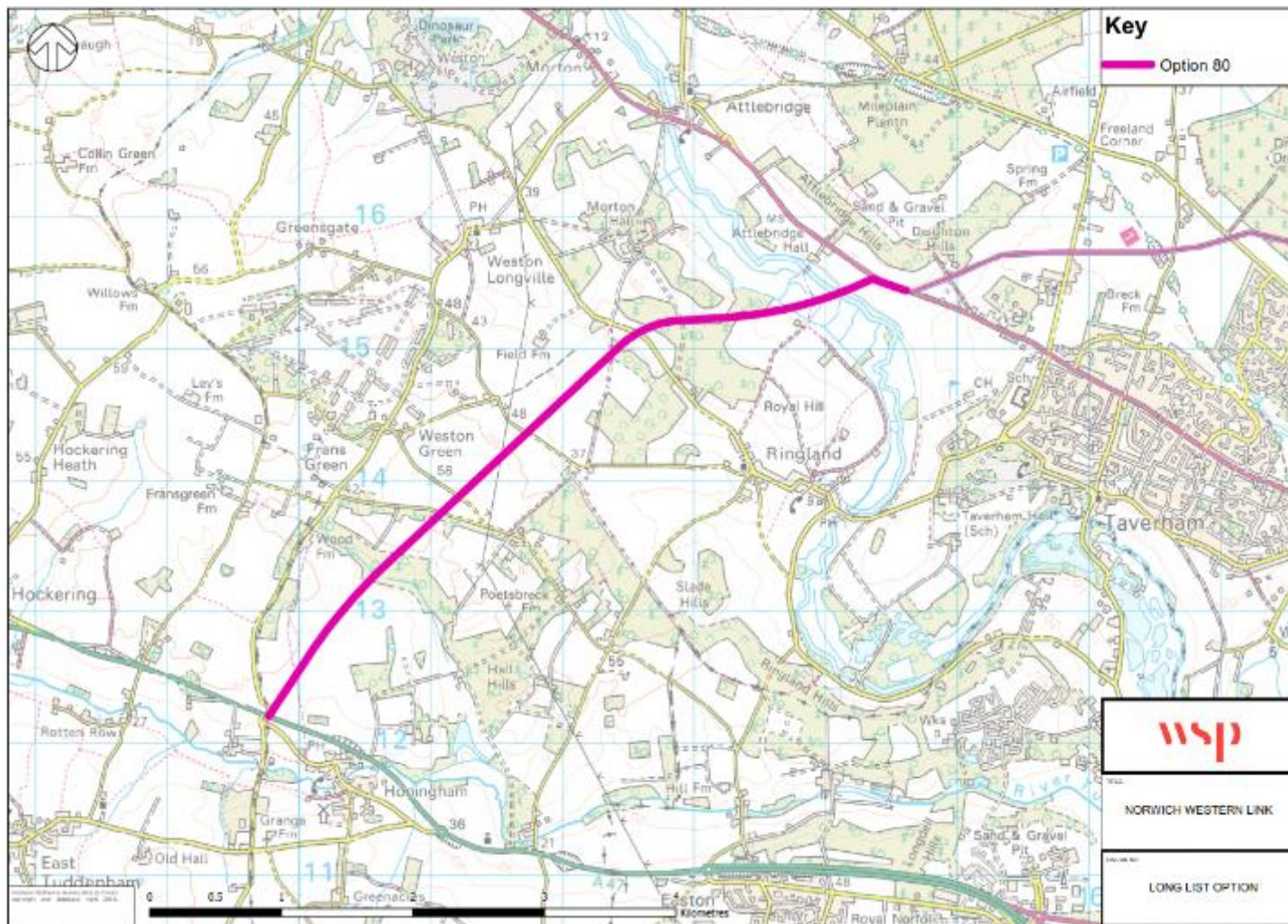
Medium (3-8 years)

Cost

Estimated costs:
£50-£100 million

OPTION 80

PINK LINE (2018), DUAL CARRIAGEWAY



Description

From the A1067, west of the junction with the A1270 at Deighton Hills, Option 80 heads west, crossing the River Wensum, before routing south-west crossing a number of local roads (Ringland Lane, Weston Road).

The route then passes east of Weston Green, before, crossing Breck Road and The Broadway to connect with the A47 to the north-west of Hovingham at the existing Wood Lane / Berry's Lane junction.

Option 80 would be of dual carriageway standard. Upgrades to the A1067 to dual carriageway standard may also be required.

Timeline

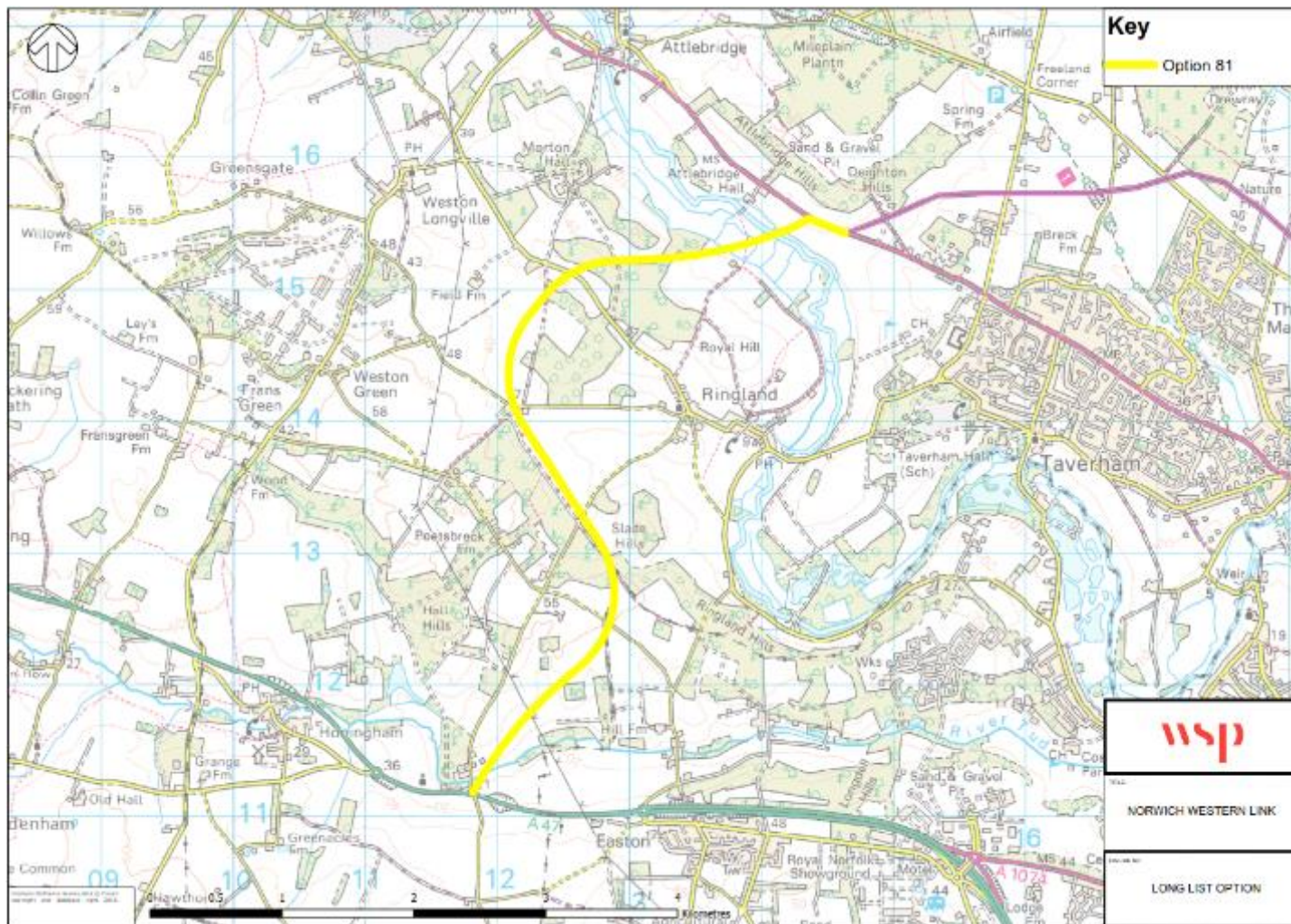
Medium (3-8 years)

Cost

Estimated costs:
£100-£150 million

OPTION 81

YELLOW LINE (2018) – SINGLE CARRIAGEWAY



Description

From the A1067, west of the junction with the A1270 at Deighton Hills, Option 81 heads west, crossing the River Wensum and Ringland Lane, before routing south-east crossing Weston Road and skirting to the east of Blackbreck Plantation and Poets Breck.

The route then heads south-west crossing Weston Road for a second time, before passing west of Hill Farm. Option 81 then crosses the River Tud to connect with the A47 to the west of Easton at the existing Taverham Road junction.

Option 81 would be of single carriageway standard.

Timeline

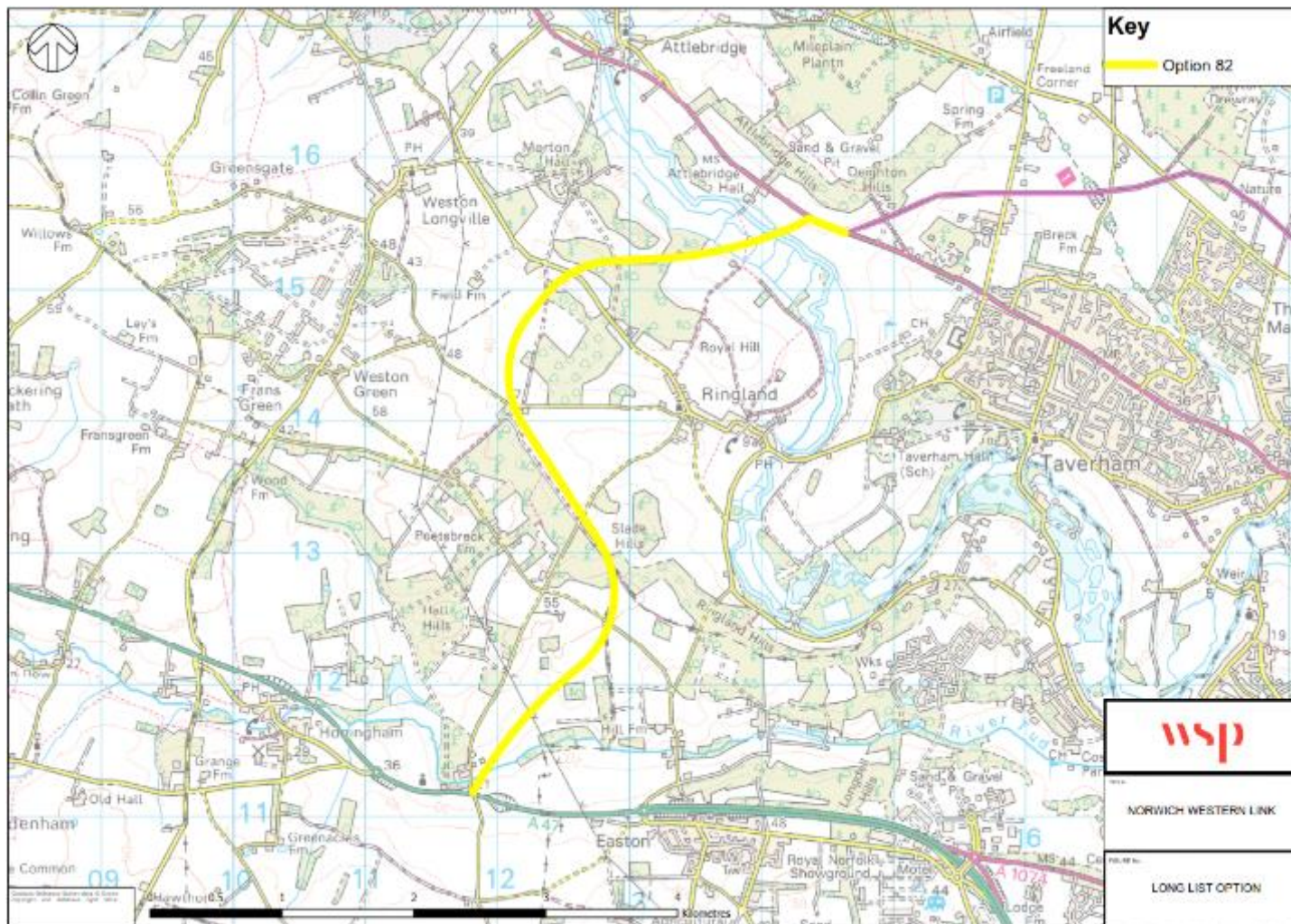
Medium (3-8 years)

Cost

Estimated costs:
£50-£100 million

OPTION 82

'YELLOW LINE (2018) – DUAL CARRIAGEWAY



Description

From the A1067, west of the junction with the A1270 at Deighton Hills, Option 82 heads west, crossing the River Wensum and Ringland Lane, before routing south-east crossing Weston Road and skirting to the east of Blackbreck Plantation and Poets Breck.

The route then heads south-west crossing Weston Road for a second time, before passing west of Hill Farm. Option 82 then crosses the River Tud to connect with the A47 to the west of Easton at the existing Taverham Road junction.

Option 82 would be of dual carriageway standard. Upgrades to the A1067 to dual carriageway standard may also be required.

Timeline

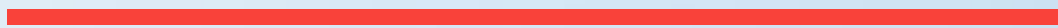
Medium (3-8 years)

Cost

Estimated costs:
£100-£150 million

Appendix E

EAST OUTPUT



Early Assessment and Sifting Tool

Option name/no.	Option 1: A1067 Attlebridge to A47 west of Honingham; 2014 Purple (1A), single carriageway	
Description	From the A1067 at Attlebridge, Option 1 runs parallel to Marl Hill Road, before crossing Ringland Lane to pass east of Weston Longville. Option 1 then routes south along an alignment approximately following the pylons, and crosses Weston Road. The route then passes east of Weston Green, before routing south-west, crossing Breck Road and The Broadway to connect with the A47 to the north-west of Honingham at the existing Wood Lane / Berry's Lane junction. Option 1 would be of single carriageway standard.	

Strategic

Scale of impact against specific objectives	4	
Fit with high-level objectives	3	Supports the creation of a stronger, cleaner and more productive economy by improving links to local economy and sources of employment across the network. Connects people and places, and will help to encourage investment into the west of Norwich including, for example, tourism. Will improve journey time reliability on the local road network, as well as the A47 and A1067, transferring trips from existing local roads to a new high-speed high-standard link designed to the latest safety standards. Provides strong regional economic links for the future. It can be assumed that the provision of a dualled version of this route will further improve resilience and reliability.
Degree of consensus	4	Public consultation has taken place with high degree of consensus that a new highway link would address the current network issues. Considerations that the council should take into account, according to respondents, included: reducing congestion, rat running, shortening journey times and providing better journey time reliability together with improved road safety.

Economic

Economic growth	4	Provides increased accessibility, reliability and resilience however, furthest west of the 2014 highway options from the Norwich Highway area and will attract lower number of trips reducing impact on connectivity and resilience. Limited access to housing or proposed housing development in comparison with other link options. Potential to link into the proposed realigned dualled A47 junction at the intersection of the A47 and Paddy's Lane. Will help to encourage Tourism locally through improved transport links and reduced congestion.
Socio-distributional impacts and the regions	3	Improved accessibility for groups with access to a car. Severance currently related to rat running would be reduced improving conditions for Non-Motorised Users. Limited benefit for elderly, disabled and low income groups in general. Improved access to business would help to encourage employment and address perceived economic imbalances.
Local environment	2	<i>Separate, additional Environmental Appraisal undertaken</i>
Well being	3	Will reduce severance with reassignment of traffic from rat run routes in the West of the study area and improve access to goods and services for non motorised users encouraging physical activity in rural locations currently suffering from rat running. Expected to improve access to goods and services for private vehicle owners in terms of improved JT on network. New road would have a lower accident rate associated with improved design and conditions.
Expected VfM category	3. Medium 1.5-2	

Managerial

Implementation timetable	Medium (3-8 Years)	Assumed construction start 2022. Assumed completion 2026.
Public acceptability	4	An initial round of public consultation in May-July 2018 based on high level key issues seeking to identify the need for the scheme and extent of public support for a potential solution in principle was undertaken. This did not include any specific scheme options or lines on a plan, however broad support was noted for a highways option as a solution to existing issues. There are established stakeholder groups actively engaged in the project – this includes a Member Working Group (Council Members) and a Local Liaison Group (Parish council reps). Engagement with Natural England, the Environment Agency and Highways England was also undertaken.
Practical feasibility	4	Option has been tested via modelling. No new crossing of Wensum required however environmental concerns and planning process will determine legal feasibility of the option. NCC would construct and maintain option and have the required statutory powers. The option runs parallel to Marl Hill Road during its route and would require diversion / shuttle running increasing delays /construction time. The EHV overhead power lines have a minor impact during construction. The design would be limited by fixed pylons locations; building bridges near them has further challenges. High Voltage Power Line Orsted Cable cannot be re-routed to accommodate our proposals. However crossing the cable would require protection measures to be installed below the ground – for example reinforced concrete slab bridging over the cable trench. These works are expected to have a cost of upto £250-£300K per crossing point.
What is the quality of the supporting evidence?	4	Initial modelling and appraisal carried out in 2014, further modelling undertaken in 2018.
Key uncertainties	Land take requirements with reluctant landowners may result in higher costs and time delay. Environmental constraints again may result in higher costs and time delay. Extensive public consultation and stakeholder engagement underway in order to mitigate potential issues. Extensive review of options undertaken with high level of expert involvement early in the process. Engagement with Natural England, the Environment Agency and Highways England undertaken.	

Financial

Affordability	3	Budgetary options are still being investigated.
Capital Cost (£m)	£25-£50 million	
Overall cost risk	3	

Commercial

Flexibility of option	3	Little opportunity to change alignment later in design phase. Once in operation option can not be changed or closed without significant financial penalties.
Where is funding coming from?	None specifically set aside. Funding sources to be considered.	
Any income generated? (£m)	No	N/A

Early Assessment and Sifting Tool

Option name/no.	Option 2: A1067 Attlebridge to A47 west of Honingham; 2014 Purple (1A), dual carriageway	
Description	From the A1067 at Attlebridge, Option 2 runs parallel to Marl Hill Road, before crossing Ringland Lane to pass east of Weston Longville. Option 2 then routes south along an alignment approximately following the pylons, and crosses Weston Road. The route then passes east of Weston Green, before routing south-west, crossing Breck Road and The Broadway to connect with the A47 to the north-west of Honingham at the existing Wood Lane / Berry's Lane junction. Option 2 would be of dual carriageway standard. Upgrades to the A1067 to dual carriageway standard may also be required.	

Strategic

Scale of impact against specific objectives	4	
Fit with high-level objectives	4	Supports the creation of a stronger, cleaner and more productive economy by improving links to local economy and sources of employment across the network. Connects people and places, and will help to encourage investment into the west of Norwich including, for example, tourism. Will improve journey time reliability on the local road network, as well as the A47 and A1067, transferring trips from existing local roads to a new high-speed high-standard link designed to the latest safety standards. Provides strong regional economic links for the future.
Degree of consensus	5	Public consultation has taken place with high degree of consensus that a new highway link would address the current network issues. Considerations that the council should take into account, according to respondents, included: reducing congestion, rat running, shortening journey times and providing better journey time reliability together with improved road safety.

Economic

Economic growth	4	Provides increased accessibility, reliability and resilience however, furthest west of the 2014 highway options from the Norwich Highway area and will attract lower number of trips reducing impact on connectivity and resilience. Limited access to housing or proposed housing development in comparison with other link options. Potential to link into the proposed realigned duelled A47 junction at the intersection of the A47 and Paddy's Lane. Will help to encourage Tourism locally through improved transport links and reduced congestion.
Socio-distributional impacts and the regions	3	Improved accessibility for groups with access to a car. Severance currently related to rat running would be reduced improving conditions for Non-Motorised Users. Limited benefit for elderly, disabled and low income groups in general. Improved access to business would help to encourage employment and address perceived economic imbalances.
Local environment	2	<i>Separate, additional Environmental Appraisal undertaken</i>
Well being	4	Will reduce severance with reassignment of traffic from rat run routes in the West of the study area and improve access to goods and services for non motorised users encouraging physical activity in rural locations currently suffering from rat running. Expected to improve access to goods and services for private vehicle owners in terms of improved JT on network. New road would have a lower accident rate associated with improved design and conditions.
Expected VfM category	3. Medium 1.5-2	

Managerial

Implementation timetable	Medium (3-8 Years)	Assumed construction start 2022. Assumed completion 2026.
Public acceptability	4	An initial round of public consultation in May-July 2018 based on high level key issues seeking to identify the need for the scheme and extent of public support for a potential solution in principle was undertaken. This did not include any specific scheme options or lines on a plan, however broad support was noted for a highways option as a solution to existing issues. There are established stakeholder groups actively engaged in the project – this includes a Member Working Group (Council Members) and a Local Liaison Group (Parish council reps). Engagement with Natural England, the Environment Agency and Highways England was also undertaken.
Practical feasibility	4	Option has been tested via modelling. No new crossing of Wensum required however environmental concerns and planning process will determine legal feasibility of the option. NCC would construct and maintain option and have the required statutory powers. The option runs parallel to Marl Hill Road during its route and would require diversion / shuttle running increasing delays /construction time. The EHV overhead power lines have a minor impact during construction. The design would be limited by fixed pylons locations; building bridges near them has further challenges. High Voltage Power Line Orsted Cable cannot be re-routed to accommodate our proposals. However crossing the cable would require protection measures to be installed below the ground – for example reinforced concrete slab bridging over the cable trench. These works are expected to have a cost of upto £250-£300K per crossing point.
What is the quality of the supporting evidence?	4	Initial modelling and appraisal carried out in 2014, further modelling undertaken in 2018.
Key uncertainties	Land take requirements with reluctant landowners may result in higher costs and time delay. Environmental constraints again may result in higher costs and time delay. Extensive public consultation and stakeholder engagement underway in order to mitigate potential issues. Extensive review of options undertaken with high level of expert involvement early in the process. Engagement with Natural England, the Environment Agency and Highways England undertaken.	

Financial

Affordability	3	Budgetary options are still being investigated.
Capital Cost (£m)	£50-£100 million	
Overall cost risk	3	

Commercial

Flexibility of option	3	Little opportunity to change alignment later in design phase. Once in operation option can not be changed or closed without significant financial penalties.
Where is funding coming from?	None specifically set aside. Funding sources to be considered.	
Any income generated? (£m)	No	N/A

Early Assessment and Sifting Tool

Option name/no.	Option 3: A1067 Attlebridge to A47 west of Honingham; 2014 Purple (2A), single carriageway	
Description	From the A1067 at Attlebridge, Option 3 runs parallel to Marl Hill Road, before crossing Ringland Lane to pass east of Weston Longville. Option 3 then routes south along an alignment approximately following the pylons, and crosses Weston Road. The route then passes east of Weston Green, continuing south to cross The Broadway. Option 3 passes east of Hall Farm, and crosses the River Tud, before joining into the A47 and Norwich Road. Option 3 would be of single carriageway standard.	

Strategic

Scale of impact against specific objectives	4	
Fit with high-level objectives	3	Supports the creation of a stronger, cleaner and more productive economy by improving links to local economy and sources of employment across the network. Connects people and places, and will help to encourage investment into the west of Norwich including, for example, tourism. Will improve journey time reliability on the local road network, as well as the A47 and A1067, transferring trips from existing local roads to a new high-speed high-standard link designed to the latest safety standards. Provides strong regional economic links for the future. It can be assumed that the provision of a dualled version of this route will further improve resilience and reliability.
Degree of consensus	5	Public consultation has taken place with high degree of consensus that a new highway link would address the current network issues. Considerations that the council should take into account, according to respondents, included: reducing congestion, rat running, shortening journey times and providing better journey time reliability together with improved road safety.

Economic

Economic growth	4	Provides increased accessibility, reliability and resilience however, further west than some of the 2014 highway options from the Norwich Highway area and will attract lower number of trips reducing impact on connectivity and resilience. Limited access to housing or proposed housing development in comparison with other link options. Potential to link into the proposed realigned dualled A47 junction at the intersection of the A47 and Paddy's Lane. Will help to encourage Tourism locally through improved transport links and reduced congestion.
Socio-distributional impacts and the regions	3	Improved accessibility for groups with access to a car. Severance currently related to rat running would be reduced improving conditions for Non-Motorised Users. Limited benefit for elderly, disabled and low income groups in general. Improved access to business would help to encourage employment and address perceived economic imbalances. Would be expected to provide relief to Weston Longville and Honingham.
Local environment	2	<i>Separate, additional Environmental Appraisal undertaken</i>
Well being	3	Will reduce severance with reassignment of traffic from rat run routes in the West of the study area and improve access to goods and services for non motorised users encouraging physical activity in rural locations currently suffering from rat running. Expected to improve access to goods and services for private vehicle owners in terms of improved JT on network. New road would have a lower accident rate associated with improved design and conditions.
Expected VfM category	3. Medium 1.5-2	

Managerial

Implementation timetable	Medium (3-8 Years)	Assumed construction start 2022. Assumed completion 2026.
Public acceptability	4	An initial round of public consultation in May-July 2018 based on high level key issues seeking to identify the need for the scheme and extent of public support for a potential solution in principle was undertaken. This did not include any specific scheme options or lines on a plan, however broad support was noted for a highways option as a solution to existing issues. There are established stakeholder groups actively engaged in the project – this includes a Member Working Group (Council Members) and a Local Liaison Group (Parish council reps). Engagement with Natural England, the Environment Agency and Highways England was also undertaken.
Practical feasibility	4	Option has been tested via modelling. No new crossing of Wensum required however environmental concerns and planning process will determine legal feasibility of the option. NCC would construct and maintain option and have the required statutory powers. The option runs parallel to Marl Hill Road during its route and would require diversion / shuttle running increasing delays /construction time. The EHV overhead power lines have a minor impact during construction. The design would be limited by fixed pylons locations; building bridges near them has further challenges. High Voltage Power Line Orsted Cable cannot be re-routed to accommodate our proposals. However crossing the cable would require protection measures to be installed below the ground – for example reinforced concrete slab bridging over the cable trench. These works are expected to have a cost of upto £250-£300K per crossing point.
What is the quality of the supporting evidence?	4	Initial modelling and appraisal carried out in 2014, further modelling undertaken in 2018.
Key uncertainties	Land take requirements with reluctant landowners may result in higher costs and time delay. Environmental constraints again may result in higher costs and time delay. Extensive public consultation and stakeholder engagement underway in order to mitigate potential issues. Extensive review of options undertaken with high level of expert involvement early in the process. Engagement with Natural England, the Environment Agency and Highways England undertaken.	

Financial

Affordability	3	Budgetary options are still being investigated.
Capital Cost (£m)	£25-£50 million	
Overall cost risk	3	

Commercial

Flexibility of option	3	Little opportunity to change alignment later in design phase. Once in operation option can not be changed or closed without significant financial penalties.
Where is funding coming from?	None specifically set aside. Funding sources to be considered.	
Any income generated? (£m)	No	N/A

Early Assessment and Sifting Tool

Option name/no.	Option 4: A1067 Attlebridge to A47 west of Honingham; 2014 Purple (2A), dual carriageway	
Description	From the A1067 at Attlebridge, Option 4 runs parallel to Marl Hill Road, before crossing Ringland Lane to pass east of Weston Longville. Option 4 then routes south along an alignment approximately following the pylons, and crosses Weston Road. The route then passes east of Weston Green, continuing south to cross The Broadway. Option 4 passes east of Hall Farm, and crosses the River Tud, before joining into the A47 and Norwich Road. Option 4 would be of dual carriageway standard. Upgrades to the A1067 to dual carriageway standard may also be required.	

Strategic

Scale of impact against specific objectives	4	
Fit with high-level objectives	4	Supports the creation of a stronger, cleaner and more productive economy by improving links to local economy and sources of employment across the network. Connects people and places, and will help to encourage investment into the west of Norwich including, for example, tourism. Will improve journey time reliability on the local road network, as well as the A47 and A1067, transferring trips from existing local roads to a new high-speed high-standard link designed to the latest safety standards. Provides strong regional economic links for the future.
Degree of consensus	5	Public consultation has taken place with high degree of consensus that a new highway link would address the current network issues. Considerations that the council should take into account, according to respondents, included: reducing congestion, rat running, shortening journey times and providing better journey time reliability together with improved road safety.

Economic

Economic growth	4	Provides increased accessibility, reliability and resilience, however furthest west of the 2014 highway options from the Norwich Highway area and will attract lower number of trips reducing impact on connectivity and resilience. Limited access to housing or proposed housing development in comparison with other link options. Potential to link into the proposed realigned dualled A47 junction at the intersection of the A47 and Paddy's Lane. Will help to encourage Tourism locally through improved transport links and reduced congestion.
Socio-distributional impacts and the regions	3	Improved accessibility for groups with access to a car. Severance currently related to rat running would be reduced improving conditions for Non-Motorised Users. Limited benefit for elderly, disabled and low income groups in general. Improved access to business would help to encourage employment and address perceived economic imbalances. Would be expected to provide relief to Weston Longville and Honingham.
Local environment	2	<i>Separate, additional Environmental Appraisal undertaken</i>
Well being	4	Will reduce severance with reassignment of traffic from rat run routes in the West of the study area and improve access to goods and services for non motorised users encouraging physical activity in rural locations currently suffering from rat running. Expected to improve access to goods and services for private vehicle owners in terms of improved JT on network. New road would have a lower accident rate associated with improved design and conditions.
Expected VfM category	3. Medium 1.5-2	

Managerial

Implementation timetable	Medium (3-8 Years)	Assumed construction start 2022. Assumed completion 2026.
Public acceptability	4	An initial round of public consultation in May-July 2018 based on high level key issues seeking to identify the need for the scheme and extent of public support for a potential solution in principle was undertaken. This did not include any specific scheme options or lines on a plan, however broad support was noted for a highways option as a solution to existing issues. There are established stakeholder groups actively engaged in the project – this includes a Member Working Group (Council Members) and a Local Liaison Group (Parish council reps). Engagement with Natural England, the Environment Agency and Highways England was also undertaken.
Practical feasibility	4	Option has been tested via modelling. New crossing over the River Tud required, although mitigation measures are expected to reduce the potential impacts. Environmental concerns and planning process will determine legal feasibility of the option. NCC would construct and maintain option and have the required statutory powers. The EHV overhead power lines have a minor impact during construction. The design would be limited by fixed pylons locations; building bridges near them has further challenges. This option crosses the HP gas main and thus there will be a c.£3 million cost impact. Protection works or pipe upgrades will be needed for crossing the gas main with an additional £1.2 million stopple charge. Furthermore, there are likely to be further limitations where a route runs within 80 of the gas main or cable route for more than a length of 80m. High Voltage Power Line Orsted Cable cannot be re-routed to accommodate our proposals. However crossing the cable would require protection measures to be installed below the ground – for example reinforced concrete slab bridging over the cable trench. These works are expected to have a cost of upto £250-£300K per crossing point.
What is the quality of the supporting evidence?	4	Initial modelling and appraisal carried out in 2014, further modelling undertaken in 2018.
Key uncertainties	Land take requirements with reluctant landowners may result in higher costs and time delay. Environmental constraints again may result in higher costs and time delay. Extensive public consultation and stakeholder engagement underway in order to mitigate potential issues. Extensive review of options undertaken with high level of expert involvement early in the process. Engagement with Natural England, the Environment Agency and Highways England undertaken.	

Financial

Affordability	3	Budgetary options are still being investigated.
Capital Cost (£m)	£50-£100 million	
Overall cost risk	3	

Commercial

Flexibility of option	3	Little opportunity to change alignment later in design phase. Once in operation option can not be changed or closed without significant financial penalties.
Where is funding coming from?	None specifically set aside. Funding sources to be considered.	
Any income generated? (£m)	No	N/A

Early Assessment and Sifting Tool

Option name/no.	Option 5: A1067 Attlebridge to A47 west of Easton; 2014 Brown, single carriageway	
Description	From the A1067 at Attlebridge, Option 5 runs parallel to Marl Hill Road, before crossing Ringland Lane to pass east of Weston Longville. Option 5 then routes south along an alignment approximately following the pylons, and crosses Weston Road. The route then passes east of Weston Green, crossing The Broadway, before routing south-east, passing through Hall Hill before crossing Taverham Road. Option 5 crosses the River Tud, to connect with the A47 via Taverham Road to the west of Easton on the single carriageway section, close to the existing lay-by. Option 5 would be of single carriageway standard.	

Strategic

Scale of impact against specific objectives	4	
Fit with high-level objectives	4	Supports the creation of a stronger, cleaner and more productive economy by improving links to local economy and sources of employment across the network. Connects people and places, and will help to encourage investment into the west of Norwich including, for example, tourism. Will improve journey time reliability on the local road network, as well as the A47 and A1067, transferring trips from existing local roads to a new high-speed high-standard link designed to the latest safety standards. Provides strong regional economic links for the future. It can be assumed that the provision of a dualled version of this route will further improve resilience and reliability. Previous study undertaken during 2017 considered potential mitigation options addressing environmental concerns.
Degree of consensus	5	Public consultation has taken place with high degree of consensus that a new highway link would address the current network issues. Considerations that the council should take into account, according to respondents, included: reducing congestion, rat running, shortening journey times and providing better journey time reliability together with improved road safety.

Economic

Economic growth	4	Provides increased accessibility, reliability and resilience. Linking to the A47 to the West of Easton will encourage proposed housing development while significantly improving access to proposed Food Hub. Will help to encourage Tourism locally through improved transport links and reduced congestion.
Socio-distributional impacts and the regions	3	Improved accessibility for groups with access to a car. Severance currently related to rat running would be reduced improving conditions for Non-Motorised Users. Limited benefit for elderly, disabled and low income groups in general. Improved access to business would help to encourage employment and address perceived economic imbalances.
Local environment	2	<i>Separate, additional Environmental Appraisal undertaken</i>
Well being	3	Will reduce severance with reassignment of traffic from rat run routes from more central route options in the study area between the A1067 and A47. Will improve access to goods and services for non motorised users encouraging physical activity in specific locations. Expected to improve access to goods and services for private vehicle owners in terms of improved JT on network. New road would have a lower accident rate associated with improved design and conditions.
Expected VfM category	3. Medium 1.5-2	

Managerial

Implementation timetable	Medium (3-8 Years)	Assumed construction start 2022. Assumed completion 2026.
Public acceptability	4	An initial round of public consultation in May-July 2018 based on high level key issues seeking to identify the need for the scheme and extent of public support for a potential solution in principle was undertaken. This did not include any specific scheme options or lines on a plan, however broad support was noted for a highways option as a solution to existing issues. There are established stakeholder groups actively engaged in the project – this includes a Member Working Group (Council Members) and a Local Liaison Group (Parish council reps). Engagement with Natural England, the Environment Agency and Highways England was also undertaken.
Practical feasibility	4	Option has been tested via modelling. New crossing over the River Tud required, although mitigation measures are expected to reduce the potential impacts. Environmental concerns and planning process will determine legal feasibility of the option. NCC would construct and maintain option and have the required statutory powers. The EHV overhead power lines have a minor impact during construction. The design would be limited by fixed pylons locations; building bridges near them has further challenges. This option crosses the HP gas main and thus there will be a c.£3 million cost impact. Protection works or pipe upgrades will be needed for crossing the gas main with an additional £1.2 million stopple charge. Furthermore, there are likely to be further limitations where a route runs within 80 of the gas main or cable route for more than a length of 80m. High Voltage Power Line Orsted Cable cannot be re-routed to accommodate our proposals. However crossing the cable would require protection measures to be installed below the ground – for example reinforced concrete slab bridging over the cable trench. These works are expected to have a cost of upto £250-£300K per crossing point.
What is the quality of the supporting evidence?	4	Initial modelling and appraisal carried out in 2014, further modelling undertaken in 2018.
Key uncertainties	Land take requirements with reluctant landowners may result in higher costs and time delay. Environmental constraints again may result in higher costs and time delay. Extensive public consultation and stakeholder engagement underway in order to mitigate potential issues. Extensive review of options undertaken with high level of expert involvement early in the process. Engagement with Natural England, the Environment Agency and Highways England undertaken. Possible to accommodate a compliant single carriageway without modification at Longwater Lane, however,	

Financial

Affordability	3	Budgetary options are still being investigated.
Capital Cost (£m)	£25-£50 million	
Overall cost risk	3	

Commercial

Flexibility of option	3	Little opportunity to change alignment later in design phase. Once in operation option can not be changed or closed without significant financial penalties.
Where is funding coming from?	None specifically set aside. Funding sources to be considered.	
Any income generated? (£m)	No	N/A

Early Assessment and Sifting Tool

Option name/no.	Option 6: A1067 Attlebridge to A47 west of Easton; 2014 Brown, dual carriageway	
Description	From the A1067 at Attlebridge, Option 6 runs parallel to Marl Hill Road, before crossing Ringland Lane to pass east of Weston Longville. Option 6 then routes south along an alignment approximately following the pylons, and crosses Weston Road. The route then passes east of Weston Green, crossing The Broadway, before routing south-east, passing through Hall Hill before crossing Taverham Road. Option 6 crosses the River Tud, to connect with the A47 to the west of Easton on the single carriageway section, close to the existing lay-by via Taverham Road. Option 6 would be of dual carriageway standard. Upgrades to the A1067 to dual carriageway standard may also be required.	

Strategic

Scale of impact against specific objectives	4	
Fit with high-level objectives	4	Supports the creation of a stronger, cleaner and more productive economy by improving links to local economy and sources of employment across the network. Connects people and places, and will help to encourage investment into the west of Norwich including, for example, tourism. Will improve journey time reliability on the local road network, as well as the A47 and A1067, transferring trips from existing local roads to a new high-speed high-standard link designed to the latest safety standards. Provides strong regional economic links for the future. Previous study undertaken during 2017 considered potential mitigation options addressing environmental concerns.
Degree of consensus	5	Public consultation has taken place with high degree of consensus that a new highway link would address the current network issues. Considerations that the council should take into account, according to respondents, included: reducing congestion, rat running, shortening journey times and providing better journey time reliability together with improved road safety.

Economic

Economic growth	5	Provides increased accessibility, reliability and resilience with dualled option. Linking to the A47 to the West of Easton will encourage proposed housing development while significantly improving access to proposed Food Hub. Will help to encourage Tourism locally through improved transport links and reduced congestion. Dualling would be expected to further improve resilience reliability beyond that associated with single carriageway option.
Socio-distributional impacts and the regions	3	Improved accessibility for groups with access to a car. Severance currently related to rat running would be reduced improving conditions for Non-Motorised Users. Limited benefit for elderly, disabled and low income groups in general. Improved access to business would help to encourage employment and address perceived economic imbalances.
Local environment	2	<i>Separate, additional Environmental Appraisal undertaken</i>
Well being	4	Will reduce severance with reassignment of traffic from rat run routes from more central route options in the study area between the A1067 and A47. Will improve access to goods and services for non motorised users encouraging physical activity in specific locations. Expected to improve access to goods and services for private vehicle owners in terms of improved JT on network. New road would have a lower accident rate associated with improved design and conditions.
Expected VfM category	3. Medium 1.5-2	

Managerial

Implementation timetable	Medium (3-8 Years)	Assumed construction start 2022. Assumed completion 2026.
Public acceptability	4	An initial round of public consultation in May-July 2018 based on high level key issues seeking to identify the need for the scheme and extent of public support for a potential solution in principle was undertaken. This did not include any specific scheme options or lines on a plan, however broad support was noted for a highways option as a solution to existing issues. There are established stakeholder groups actively engaged in the project – this includes a Member Working Group (Council Members) and a Local Liaison Group (Parish council reps). Engagement with Natural England, the Environment Agency and Highways England was also undertaken.
Practical feasibility	4	Option has been tested via modelling. New crossing over the River Tud required, although mitigation measures are expected to reduce the potential impacts. Environmental concerns and planning process will determine legal feasibility of the option. NCC would construct and maintain option and have the required statutory powers. The EHV overhead power lines have a minor impact during construction. The design would be limited by fixed pylons locations; building bridges near them has further challenges. This option crosses the HP gas main and thus there will be a c.£3 million cost impact. Protection works or pipe upgrades will be needed for crossing the gas main with an additional £1.2 million stopple charge. Furthermore, there are likely to be further limitations where a route runs within 80 of the gas main or cable route for more than a length of 80m. High Voltage Power Line Orsted Cable cannot be re-routed to accommodate our proposals. However crossing the cable would require protection measures to be installed below the ground – for example reinforced concrete slab bridging over the cable trench. These works are expected to have a cost of upto £250-£300K per crossing point.
What is the quality of the supporting evidence?	4	Initial modelling and appraisal carried out in 2014, further modelling undertaken in 2018.
Key uncertainties	Land take requirements with reluctant landowners may result in higher costs and time delay. Environmental constraints again may result in higher costs and time delay. Extensive public consultation and stakeholder engagement underway in order to mitigate potential issues. Extensive review of options undertaken with high level of expert involvement early in the process. Engagement with Natural England, the Environment Agency and Highways England undertaken. Possible to accommodate a compliant single carriageway without modification at Longwater Lane, however issues with dual carriageway may be more problematic. Construction details need to be verified as current verge area may have substandard capacity.	

Financial

Affordability	3	Budgetary options are still being investigated.
Capital Cost (£m)	£50-£100 million	
Overall cost risk	3	

Commercial

Flexibility of option	3	Little opportunity to change alignment later in design phase. Once in operation option can not be changed or closed without significant financial penalties.
Where is funding coming from?	None specifically set aside. Funding sources to be considered.	
Any income generated? (£m)	No	N/A

Early Assessment and Sifting Tool

Option name/no.	Option 7: A1067 (west of A1067 / A1270 junction) to A47 west of Easton; 2014 Red, single carriageway	
Description	From the A1067, west of the junction with the A1270 at Deighton Hills, Option 7 heads south-west, crossing the River Wensum, before passing west of Ringland, crossing a number of local roads (Ringland Lane, Weston Road and Honingham Lane). The route then heads south crossing Weston Road for a second time, before passing west of Hill Farm. Option 7 then crosses the River Tud to connect with the A47 to the west of Easton at the existing Taverham Road junction. Option 7 would be of single carriageway standard.	

Strategic

Scale of impact against specific objectives	4	
Fit with high-level objectives	4	Supports the creation of a stronger, cleaner and more productive economy by improving links to local economy and sources of employment across the network. Connects people and places, and will help to encourage investment into the west of Norwich including, for example, tourism. Will improve journey time reliability on the local road network, as well as the A47 and A1067, transferring trips from existing local roads to a new high-speed high-standard link designed to the latest safety standards. Provides strong regional economic links for the future. It can be assumed that the provision of a dualled version of this route will further improve resilience and reliability. Previous study undertaken during 2017 considered potential mitigation options addressing environmental concerns.
Degree of consensus	5	Public consultation has taken place with high degree of consensus that a new highway link would address the current network issues. Considerations that the council should take into account, according to respondents, included: reducing congestion, rat running, shortening journey times and providing better journey time reliability together with improved road safety.

Economic

Economic growth	4	Provides increased accessibility, reliability and resilience to the network. Linking the A47 to the west of Easton to the A1067 400m west of the NDR Junction. Will encourage proposed housing development while significantly improving access to proposed Food Hub. Will help to encourage Tourism locally through improved transport links and reduced congestion. It would provide some relief in the Costessey and Taverham areas, but not sufficient to enable the provision of a second access for Queens Hills onto the existing local road network thereby limiting impact on delivery of housing.
Socio-distributional impacts and the regions	3	Improved accessibility for groups with access to a car. Severance currently related to rat running would be reduced improving conditions for Non-Motorised Users. Limited benefit for elderly, disabled and low income groups in general. Improved access to business would help to encourage employment and address perceived economic imbalances.
Local environment	2	<i>Separate, additional Environmental Appraisal undertaken</i>
Well being	3	Will reduce severance with reassignment of traffic from rat run routes over a wider area due to central location and improve access to goods and services for non motorised users encouraging physical activity. Expected to improve access to goods and services for private vehicle owners in terms of improved JT on network. New road would have a lower accident rate associated with improved design and conditions.
Expected VfM category	2. Good 2-4.5	

Managerial

Implementation timetable	Medium (3-8 Years)	Assumed construction start 2022. Assumed completion 2026.
Public acceptability	4	An initial round of public consultation in May-July 2018 based on high level key issues seeking to identify the need for the scheme and extent of public support for a potential solution in principle was undertaken. This did not include any specific scheme options or lines on a plan, however broad support was noted for a highways option as a solution to existing issues. There are established stakeholder groups actively engaged in the project – this includes a Member Working Group (Council Members) and a Local Liaison Group (Parish council reps). Engagement with Natural England, the Environment Agency and Highways England was also undertaken.
Practical feasibility	4	Option has been tested via modelling. New crossing over the River Tud required, although mitigation measures are expected to reduce the potential impacts. Environmental concerns and planning process will determine legal feasibility of the option. NCC would construct and maintain option and have the required statutory powers. The EHV overhead power lines have a minor impact during construction. The design would be limited by fixed pylons locations; building bridges near them has further challenges. This option crosses the HP gas main and thus there will be a c.£3 million cost impact. Protection works or pipe upgrades will be needed for crossing the gas main with an additional £1.2 million stopple charge. Furthermore, there are likely to be further limitations where a route runs within 80 of the gas main or cable route for more than a length of 80m. High Voltage Power Line Orsted Cable cannot be re-routed to accommodate our proposals. However crossing the cable would require protection measures to be installed below the ground – for example reinforced concrete slab bridging over the cable trench. These works are expected to have a cost of upto £250-£300K per crossing point.
What is the quality of the supporting evidence?	4	Initial modelling and appraisal carried out in 2014, further modelling undertaken in 2018.
Key uncertainties	Land take requirements with reluctant landowners may result in higher costs and time delay. Environmental constraints again may result in higher costs and time delay. Extensive public consultation and stakeholder engagement underway in order to mitigate potential issues. Extensive review of options undertaken with high level of expert involvement early in the process. Engagement with Natural England, the Environment Agency and Highways England undertaken.	

Financial

Affordability	3	Budgetary options are still being investigated.
Capital Cost (£m)	£50-£100 million	
Overall cost risk	3	

Commercial

Flexibility of option	3	Little opportunity to change alignment later in design phase, however at this stage option can be scaled up or down. When in operation option can not be changed or closed without significant financial penalties.
Where is funding coming from?	None specifically set aside. Funding sources to be considered.	
Any income generated? (£m)	No	N/A

Early Assessment and Sifting Tool

Option name/no.	Option 8: A1067 (west of A1067 / A1270 junction) to A47 west of Easton; 2014 Red, dual carriageway	
Description	From the A1067, west of the junction with the A1270 at Deighton Hills, Option 8 heads south-west, crossing the River Wensum, before passing west of Ringland, crossing a number of local roads (Ringland Lane, Weston Road and Honingham Lane). The route then heads south crossing Weston Road for a second time, before passing west of Hill Farm. Option 8 then crosses the River Tud to connect with the A47 to the west of Easton at the existing Taverham Road junction. Option 8 would be of dual carriageway standard. Upgrades to the A1067 to dual carriageway standard may also be required.	

Strategic

Scale of impact against specific objectives	4	
Fit with high-level objectives	4	Supports the creation of a stronger, cleaner and more productive economy by improving links to local economy and sources of employment across the network. Connects people and places, and will help to encourage investment into the west of Norwich including, for example, tourism. Will improve journey time reliability on the local road network, as well as the A47 and A1067, transferring trips from existing local roads to a new high-speed high-standard link designed to the latest safety standards. Provides strong regional economic links for the future. Previous study undertaken during 2017 considered potential mitigation options addressing environmental concerns.
Degree of consensus	5	Public consultation has taken place with high degree of consensus that a new highway link would address the current network issues. Considerations that the council should take into account, according to respondents, included: reducing congestion, rat running, shortening journey times and providing better journey time reliability together with improved road safety.

Economic

Economic growth	5	Provides increased accessibility, reliability and resilience to the network. Linking the A47 to the west of Easton to the A1067 400m west of the NDR Junction. Will encourage proposed housing development while significantly improving access to proposed Food Hub. Will help to encourage Tourism locally through improved transport links and reduced congestion. It would provide some relief in the Costessey and Taverham areas, but not sufficient to enable the provision of a second access for Queens Hills onto the existing local road network thereby limiting impact on delivery of housing.
Socio-distributional impacts and the regions	3	Improved accessibility for groups with access to a car. Severance currently related to rat running would be reduced improving conditions for Non-Motorised Users. Limited benefit for elderly, disabled and low income groups in general. Improved access to business would help to encourage employment and address perceived economic imbalances.
Local environment	2	<i>Separate, additional Environmental Appraisal undertaken</i>
Well being	4	Will reduce severance with reassignment of traffic from rat run routes over a wider area due to central location and improve access to goods and services for non motorised users encouraging physical activity. Expected to improve access to goods and services for private vehicle owners in terms of improved JT on network. New road would have a lower accident rate associated with improved design and conditions.
Expected VfM category	2. Good 2-4.5	

Managerial

Implementation timetable	Medium (3-8 Years)	Assumed construction start 2022. Assumed completion 2026.
Public acceptability	4	An initial round of public consultation in May-July 2018 based on high level key issues seeking to identify the need for the scheme and extent of public support for a potential solution in principle was undertaken. This did not include any specific scheme options or lines on a plan, however broad support was noted for a highways option as a solution to existing issues. There are established stakeholder groups actively engaged in the project – this includes a Member Working Group (Council Members) and a Local Liaison Group (Parish council reps). Engagement with Natural England, the Environment Agency and Highways England was also undertaken.
Practical feasibility	4	Option has been tested via modelling. New crossing over the River Tud, River Wensum and minor stream required although mitigation measures expected to reduce impact. Environmental concerns and planning process will determine legal feasibility of the option. NCC would construct and maintain option and have the required statutory powers. The EHV overhead power lines have a minor impact during construction. The design would be limited by fixed pylons locations; building bridges near them has further challenges. This option crosses the HP gas main and thus there will be a c.£3 million cost impact. Protection works or pipe upgrades will be needed for crossing the gas main with an additional £1.2 million stopple charge. Furthermore, there are likely to be further limitations where a route runs within 80 of the gas main or cable route for more than a length of 80m. High Voltage Power Line Orsted Cable cannot be re-routed to accommodate our proposals. However crossing the cable would require protection measures to be installed below the ground – for example reinforced concrete slab bridging over the cable trench. These works are expected to have a cost of upto £250-£300K per crossing point.
What is the quality of the supporting evidence?	4	Initial modelling and appraisal carried out in 2014, further modelling undertaken in 2018.
Key uncertainties	Land take requirements with reluctant landowners may result in higher costs and time delay. Environmental constraints again may result in higher costs and time delay. Extensive public consultation and stakeholder engagement underway in order to mitigate potential issues. Extensive review of options undertaken with high level of expert involvement early in the process. Engagement with Natural England, the Environment Agency and Highways England undertaken.	

Financial

Affordability	3	Budgetary options are still being investigated.
Capital Cost (£m)	£100-£150 million	
Overall cost risk	3	

Commercial

Flexibility of option	3	Little opportunity to change alignment later in design phase, however at this stage option can be scaled up or down. When in operation option can not be changed or closed without significant financial penalties.
Where is funding coming from?	None specifically set aside. Funding sources to be considered.	
Any income generated? (£m)	No	N/A

Early Assessment and Sifting Tool

Option name/no.	Option 9: A1067 (east of A1067 / A1270 junction) to A47 west of Easton; 2014 Blue (1), single carriageway	
Description	From the A1067, east of the junction with the A1270 at Deighton Hills, Option 9 skirts the north-west edge of Taverham before crossing Ringland Road. The route then turns south-west and crosses the River Wensum and Costessey Lane to the south of Ringland. Option 9 continues in a south-western direction through Ringland Hills, crossing Weston Road, before heading south, passing west of Hill Farm. The route crosses the River Tud to connect with the A47 to the west of Easton at the existing Taverham Road junction. Option 9 would be of single carriageway standard.	

Strategic

Scale of impact against specific objectives	4	
Fit with high-level objectives	4	Supports the creation of a stronger, cleaner and more productive economy by improving links to local economy and sources of employment across the network. Connects people and places, and will help to encourage investment into the west of Norwich including, for example, tourism. Will improve journey time reliability on the local road network, as well as the A47 and A1067, transferring trips from existing local roads to a new high-speed high-standard link designed to the latest safety standards. Provides strong regional economic links for the future. It can be assumed that the provision of a dualled version of this route will further improve resilience and reliability. Previous study undertaken during 2017 considered potential mitigation options addressing environmental concerns.
Degree of consensus	5	Public consultation has taken place with high degree of consensus that a new highway link would address the current network issues. Considerations that the council should take into account, according to respondents, included: reducing congestion, rat running, shortening journey times and providing better journey time reliability together with improved road safety.

Economic

Economic growth	4	Provides increased accessibility, reliability and resilience to the network. Linking to the A47 west of Easton, to the A1067 400m East of the NDR Junction. Will encourage proposed housing development while significantly improving access to proposed Food Hub. Will help to encourage Tourism locally through improved transport links and reduced congestion.
Socio-distributional impacts and the regions	3	Improved accessibility for groups with access to a car. Severance currently related to rat running would be reduced improving conditions for Non-Motorised Users. Limited benefit for elderly, disabled and low income groups in general. Improved access to business would help to encourage employment and address perceived economic imbalances.
Local environment	2	<i>Separate, additional Environmental Appraisal undertaken</i>
Well being	3	Will reduce severance with reassignment of traffic from rat run routes over a wider area due to central location and improve access to goods and services for non motorised users encouraging physical activity in specific locations. Expected to improve access to goods and services for private vehicle owners in terms of improved JT on network. New road would have a lower accident rate associated with improved design and conditions.
Expected VfM category	2. Good 2-4.5	

Managerial

Implementation timetable	Medium (3-8 Years)	Assumed construction start 2022. Assumed completion 2026.
Public acceptability	4	An initial round of public consultation in May-July 2018 based on high level key issues seeking to identify the need for the scheme and extent of public support for a potential solution in principle was undertaken. This did not include any specific scheme options or lines on a plan, however broad support was noted for a highways option as a solution to existing issues. There are established stakeholder groups actively engaged in the project – this includes a Member Working Group (Council Members) and a Local Liaison Group (Parish council reps). Engagement with Natural England, the Environment Agency and Highways England was also undertaken.
Practical feasibility	4	Option has been tested via modelling. New crossing over the River Tud and River Wensum required, although mitigation measures are expected to reduce the potential impacts. Environmental concerns and planning process will determine legal feasibility of the option. NCC would construct and maintain option and have the required statutory powers. The EHV overhead power lines have a minor impact during construction. The design would be limited by fixed pylons locations; building bridges near them has further challenges. High Voltage Power Line Orsted Cable cannot be re-routed to accommodate our proposals. However crossing the cable would require protection measures to be installed below the ground – for example reinforced concrete slab bridging over the cable trench. These works are expected to have a cost of upto £250-£300K per crossing point.
What is the quality of the supporting evidence?	4	Initial modelling and appraisal carried out in 2014, further modelling undertaken in 2018.
Key uncertainties	Land take requirements with reluctant landowners may result in higher costs and time delay. Environmental constraints again may result in higher costs and time delay. Extensive public consultation and stakeholder engagement underway in order to mitigate potential issues. Extensive review of options undertaken with high level of expert involvement early in the process. Engagement with Natural England, the Environment Agency and Highways England undertaken. Commercial impacts on the Golf Course has the potential to result in significant additional costs and delay.	

Financial

Affordability	3	Budgetary options are still being investigated.
Capital Cost (£m)	£100-£150 million	
Overall cost risk	3	

Commercial

Flexibility of option	3	Little opportunity to change alignment later in design phase, however at this stage option can be scaled up or down. When in operation option can not be changed or closed without significant financial penalties.
Where is funding coming from?	None specifically set aside. Funding sources to be considered.	
Any income generated? (£m)	No	N/A

Early Assessment and Sifting Tool

Option name/no.	Option 10: A1067 (east of A1067 / A1270 junction) to A47 west of Easton; 2014 Blue (1), dual carriageway	
Description	From the A1067, east of the junction with the A1270 at Deighton Hills, Option 10 skirts the north-west edge of Taverham before crossing Ringland Road. The route then turns south-west and crosses the River Wensum and Costessey Lane to the south of Ringland. Option 10 continues in a south-western direction through Ringland Hills, crossing Weston Road, before heading south, passing west of Hill Farm. The route crosses the River Tud to connect with the A47 to the west of Easton at the existing Taverham Road junction. Option 10 would be of dual carriageway standard. Upgrades to the A1067 to dual carriageway standard may also be required.	

Strategic

Scale of impact against specific objectives	4	
Fit with high-level objectives	4	Supports the creation of a stronger, cleaner and more productive economy by improving links to local economy and sources of employment across the network. Connects people and places, and will help to encourage investment into the west of Norwich including, for example, tourism. Will improve journey time reliability on the local road network, as well as the A47 and A1067, transferring trips from existing local roads to a new high-speed high-standard link designed to the latest safety standards. Provides strong regional economic links for the future. Previous study undertaken during 2017 considered potential mitigation options addressing environmental concerns.
Degree of consensus	5	Public consultation has taken place with high degree of consensus that a new highway link would address the current network issues. Considerations that the council should take into account, according to respondents, included: reducing congestion, rat running, shortening journey times and providing better journey time reliability together with improved road safety.

Economic

Economic growth	5	Provides increased accessibility, reliability and resilience to the network. Linking to the A47 west of Easton, to the A1067 400m East of the NDR Junction. Will encourage proposed housing development while significantly improving access to proposed Food Hub. Will help to encourage Tourism locally through improved transport links and reduced congestion.
Socio-distributional impacts and the regions	3	Improved accessibility for groups with access to a car. Severance currently related to rat running would be reduced improving conditions for Non-Motorised Users. Limited benefit for elderly, disabled and low income groups in general. Improved access to business would help to encourage employment and address perceived economic imbalances.
Local environment	2	<i>Separate, additional Environmental Appraisal undertaken</i>
Well being	4	Will reduce severance with reassignment of traffic from rat run routes over a wider area due to central location and improve access to goods and services for non motorised users encouraging physical activity in specific locations. Expected to improve access to goods and services for private vehicle owners in terms of improved JT on network. New road would have a lower accident rate associated with improved design and conditions.
Expected VfM category	2. Good 2-4.5	

Managerial

Implementation timetable	Medium (3-8 Years)	Assumed construction start 2022. Assumed completion 2026.
Public acceptability	4	An initial round of public consultation in May-July 2018 based on high level key issues seeking to identify the need for the scheme and extent of public support for a potential solution in principle was undertaken. This did not include any specific scheme options or lines on a plan, however broad support was noted for a highways option as a solution to existing issues. There are established stakeholder groups actively engaged in the project – this includes a Member Working Group (Council Members) and a Local Liaison Group (Parish council reps). Engagement with Natural England, the Environment Agency and Highways England was also undertaken.
Practical feasibility	4	Option has been tested via modelling. New crossing over the River Tud and River Wensum required, although mitigation measures are expected to reduce the potential impacts. Environmental concerns and planning process will determine legal feasibility of the option. NCC would construct and maintain option and have the required statutory powers. The EHV overhead power lines have a minor impact during construction. The design would be limited by fixed pylons locations; building bridges near them has further challenges. High Voltage Power Line Orsted Cable cannot be re-routed to accommodate our proposals. However crossing the cable would require protection measures to be installed below the ground – for example reinforced concrete slab bridging over the cable trench. These works are expected to have a cost of upto £250-£300K per crossing point.
What is the quality of the supporting evidence?	4	Initial modelling and appraisal carried out in 2014, further modelling undertaken in 2018.
Key uncertainties	Land take requirements with reluctant landowners may result in higher costs and time delay. Environmental constraints again may result in higher costs and time delay. Extensive public consultation and stakeholder engagement underway in order to mitigate potential issues. Extensive review of options undertaken with high level of expert involvement early in the process. Engagement with Natural England, the Environment Agency and Highways England undertaken. Commercial impacts on the Golf Course has the potential to result in significant additional costs and delay.	

Financial

Affordability	3	Budgetary options are still being investigated.
Capital Cost (£m)	£150-£250 million	
Overall cost risk	2	

Commercial

Flexibility of option	3	Little opportunity to change alignment later in design phase, however at this stage option can be scaled up or down. When in operation option can not be changed or closed without significant financial penalties.
Where is funding coming from?	None specifically set aside. Funding sources to be considered.	
Any income generated? (£m)	No	N/A

Early Assessment and Sifting Tool		
Option name/no.	Option 11: A1067 / A1270 junction to A47 west of Easton; 2014 Blue (2), single carriageway	
Description	From the A1067 junction with the A1270 at Deighton Hills, Option 11 heads south, crossing Ringland Road, to the west of Taverham. The route then turns south-west and crosses the River Wensum and Costessey Lane to the south of Ringland. Option 11 continues in a south-western direction through Ringland Hills, crossing Weston Road, before heading south, passing west of Hill Farm. The route crosses the River Tud to connect with the A47 to the west of Easton at the existing Taverham Road junction. Option 11 would be of single carriageway standard.	
Strategic		
Scale of impact against specific objectives	4	
Fit with high-level objectives	4	Supports the creation of a stronger, cleaner and more productive economy by improving links to local economy and sources of employment across the network. Connects people and places, and will help to encourage investment into the west of Norwich including, for example, tourism. Will improve journey time reliability on the local road network, as well as the A47 and A1067, transferring trips from existing local roads to a new high-speed high-standard link designed to the latest safety standards. Provides strong regional economic links for the future. It can be assumed that the provision of a dualled version of this route will further improve resilience and reliability. Previous study undertaken during 2017 considered potential mitigation options addressing environmental concerns.
Degree of consensus	5	Public consultation has taken place with high degree of consensus that a new highway link would address the current network issues. Considerations that the council should take into account, according to respondents, included: reducing congestion, rat running, shortening journey times and providing better journey time reliability together with improved road safety.
Economic		
Economic growth	4	Provides increased accessibility, reliability and resilience to the network. Linking to the A47 to the west of Easton this option links directly in to the NDR A1067 junction. Providing a direct link into the NDR and within 400m of Easton, it is assumed that this option will encourage proposed housing development while significantly improving access to proposed Food Hub. Will help to encourage Tourism locally through improved transport links and reduced congestion.
Socio-distributional impacts and the regions	3	Improved accessibility for groups with access to a car. Severance currently related to rat running would be reduced improving conditions for Non-Motorised Users. Limited benefit for elderly, disabled and low income groups in general. Improved access to business would help to encourage employment and address perceived economic imbalances.
Local environment	2	<i>Separate, additional Environmental Appraisal undertaken</i>
Well being	3	Will reduce severance with reassignment of traffic from rat run routes over a wider area due to central location. Will improve access to goods and services for non motorised users encouraging physical activity in specific locations. Expected to improve access to goods and services for private vehicle owners in terms of improved JT on network. New road would have a lower accident rate associated with improved design and conditions.
Expected VfM category	2. Good 2-4.5	
Managerial		
Implementation timetable	Medium (3-8 Years)	Assumed construction start 2022. Assumed completion 2026.
Public acceptability	4	An initial round of public consultation in May-July 2018 based on high level key issues seeking to identify the need for the scheme and extent of public support for a potential solution in principle was undertaken. This did not include any specific scheme options or lines on a plan, however broad support was noted for a highways option as a solution to existing issues. There are established stakeholder groups actively engaged in the project – this includes a Member Working Group (Council Members) and a Local Liaison Group (Parish council reps). Engagement with Natural England, the Environment Agency and Highways England was also undertaken.
Practical feasibility	4	Option has been tested via modelling. New crossing over the River Tud and River Wensum required, although mitigation measures are expected to reduce the potential impacts. Environmental concerns and planning process will determine legal feasibility of the option. Option runs close to an existing water body / farm and would require further investigation. NCC would construct and maintain option and have the required statutory powers. The EHV overhead power lines have a minor impact during construction. The design would be limited by fixed pylons locations; building bridges near them has further challenges. This option crosses the HP gas main and thus there will be a c.£3 million cost impact. Protection works or pipe upgrades will be needed for crossing the gas main with an additional £1.2 million stopple charge. Furthermore, there are likely to be further limitations where a route runs within 80 of the gas main or cable route for more than a length of 80m. High Voltage Power Line Orsted Cable cannot be re-routed to accommodate our proposals. However crossing the cable would require protection measures to be installed below the ground – for example reinforced concrete slab bridging over the cable trench. These works are expected to have a cost of upto £250-£300K per crossing point. High Voltage Power Line Orsted Cable cannot be re-routed to accommodate our proposals. However crossing the cable would require protection measures to be installed below the ground – for example reinforced concrete slab bridging over the cable trench. These works are expected to have a cost of upto £250-£300K per crossing point.
What is the quality of the supporting evidence?	4	Initial modelling and appraisal carried out in 2014, further modelling undertaken in 2018.
Key uncertainties	Land take requirements with reluctant landowners may result in higher costs and time delay. Environmental constraints again may result in higher costs and time delay - the provision of a length of route directly adjacent to the River Wensum would increase potential for objections on environmental grounds. Extensive public consultation and stakeholder engagement underway in order to mitigate potential issues. Extensive review of options undertaken with high level of expert involvement early in the process. Engagement with Natural England, the Environment Agency and Highways England undertaken. Commercial impacts on the Golf Course has the potential to result in significant additional costs and delay.	
Financial		
Affordability	3	Budgetary options are still being investigated.
Capital Cost (£m)	£100-£150 million	
Overall cost risk	2	
Commercial		
Flexibility of option	3	Little opportunity to change alignment later in design phase, however at this stage option can be scaled up or down. When in operation option can not be changed or closed without significant financial penalties.
Where is funding coming from?	None specifically set aside. Funding sources to be considered.	
Any income generated?	No	N/A

Early Assessment and Sifting Tool

Option name/no.	Option 12: A1067 / A1270 junction to A47 west of Easton; 2014 Blue (2), dual carriageway	
Description	From the A1067 junction with the A1270 at Deighton Hills, Option 12 heads south, crossing Ringland Road, to the west of Taverham. The route then turns south-west and crosses the River Wensum and Costessey Lane to the south of Ringland. Option 12 continues in a south-western direction through Ringland Hills, crossing Weston Road, before heading south, passing west of Hill Farm. The route crosses the River Tud to connect with the A47 to the west of Easton at the existing Taverham Road junction. Option 12 would be of dual carriageway standard.	

Strategic

Scale of impact against specific objectives	4	
Fit with high-level objectives	4	Supports the creation of a stronger, cleaner and more productive economy by improving links to local economy and sources of employment across the network. Connects people and places, and will help to encourage investment into the west of Norwich including, for example, tourism. Will improve journey time reliability on the local road network, as well as the A47 and A1067, transferring trips from existing local roads to a new high-speed high-standard link designed to the latest safety standards. Provides strong regional economic links for the future. Previous study undertaken during 2017 considered potential mitigation options addressing environmental concerns.
Degree of consensus	5	Public consultation has taken place with high degree of consensus that a new highway link would address the current network issues. Considerations that the council should take into account, according to respondents, included: reducing congestion, rat running, shortening journey times and providing better journey time reliability together with improved road safety.

Economic

Economic growth	5	Provides increased accessibility, reliability and resilience to the network. Linking to the A47 to the west of Easton this option links directly in to the NDR A1067 junction. Providing a direct link into the NDR and within 400m of Easton, it is assumed that this option will encourage proposed housing development while significantly improving access to proposed Food Hub. Will help to encourage Tourism locally through improved transport links and reduced congestion.
Socio-distributional impacts and the regions	3	Improved accessibility for groups with access to a car. Severance currently related to rat running would be reduced improving conditions for Non-Motorised Users. Limited benefit for elderly, disabled and low income groups in general. Improved access to business would help to encourage employment and address perceived economic imbalances.
Local environment	2	<i>Separate, additional Environmental Appraisal undertaken</i>
Well being	4	Will reduce severance with reassignment of traffic from rat run routes over a wider area due to central location. Will improve access to goods and services for non motorised users encouraging physical activity in specific locations. Expected to improve access to goods and services for private vehicle owners in terms of improved JT on network. New road would have a lower accident rate associated with improved design and conditions.
Expected VfM category	2. Good 2-4.5	

Managerial

Implementation timetable	Medium (3-8 Years)	Assumed construction start 2022. Assumed completion 2026.
Public acceptability	4	An initial round of public consultation in May-July 2018 based on high level key issues seeking to identify the need for the scheme and extent of public support for a potential solution in principle was undertaken. This did not include any specific scheme options or lines on a plan, however broad support was noted for a highways option as a solution to existing issues. There are established stakeholder groups actively engaged in the project – this includes a Member Working Group (Council Members) and a Local Liaison Group (Parish council reps). Engagement with Natural England, the Environment Agency and Highways England was also undertaken.
Practical feasibility	4	Option has been tested via modelling. New crossing over the River Tud and River Wensum required, although mitigation measures are expected to reduce the potential impacts. Environmental concerns and planning process will determine legal feasibility of the option. Option runs close to an existing water body / farm and would require further investigation. NCC would construct and maintain option and have the required statutory powers. The EHV overhead power lines have a minor impact during construction. The design would be limited by fixed pylons locations; building bridges near them has further challenges. This option crosses the HP gas main and thus there will be a c.£3 million cost impact. Protection works or pipe upgrades will be needed for crossing the gas main with an additional £1.2 million stopple charge. Furthermore, there are likely to be further limitations where a route runs within 80 of the gas main or cable route for more than a length of 80m. High Voltage Power Line Orsted Cable cannot be re-routed to accommodate our proposals. However crossing the cable would require protection measures to be installed below the ground – for example reinforced concrete slab bridging over the cable trench. These works are expected to have a cost of upto £250-£300K per crossing point. High Voltage Power Line Orsted Cable cannot be re-routed to accommodate our proposals. However crossing the cable would require protection measures to be installed below the ground – for example reinforced concrete slab bridging over the cable trench. These works are expected to have a cost of upto £250-£300K per crossing point.
What is the quality of the supporting evidence?	4	Initial modelling and appraisal carried out in 2014, further modelling undertaken in 2018.
Key uncertainties	Land take requirements with reluctant landowners may result in higher costs and time delay. Environmental constraints again may result in higher costs and time delay - the provision of a length of route directly adjacent to the River Wensum would increase potential for objections on environmental grounds. Extensive public consultation and stakeholder engagement underway in order to mitigate potential issues. Extensive review of options undertaken with high level of expert involvement early in the process. Engagement with Natural England, the Environment Agency and Highways England undertaken. Commercial impacts on the Golf Course has the potential to result in significant additional costs and delay.	

Financial

Affordability	3	Budgetary options are still being investigated.
Capital Cost (£m)	£150-£250 million	
Overall cost risk	2	

Commercial

Flexibility of option	3	Little opportunity to change alignment later in design phase, however at this stage option can be scaled up or down. When in operation option can not be changed or closed without significant financial penalties.
Where is funding coming from?	None specifically set aside. Funding sources to be considered.	
Any income generated?	No	N/A

Early Assessment and Sifting Tool

Option name/no.	Option 13: A1067 (east of A1067 / A1270 junction) to A47 / A1074 Longwater interchange; 2014 Orange (1), single carriageway	
Description	From the A1067, east of the junction with the A1270 at Deighton Hills, Option 13 skirts the north-west edge of Taverham before crossing Ringland Road. The route then turns south and crosses the River Wensum and Costessey Lane to the south-east of Ringland. Option 13 continues south through Ringland Hills to the west of Queen's Hill before crossing the River Tud. The route passes through the Longwater employment area to connect with the A47 / A1074 Longwater Interchange. Option 13 would be of single carriageway standard.	

Strategic

Scale of impact against specific objectives	4	
Fit with high-level objectives	3	Supports the creation of a stronger, cleaner and more productive economy by improving links to local economy and sources of employment across the network. Connects people and places, and will help to encourage investment into the west of Norwich including, for example, tourism. Will improve journey time reliability on the local road network, as well as the A47 and A1067, transferring trips from existing local roads to a new high-speed high-standard link designed to the latest safety standards. Provides strong regional economic links for the future. It can be assumed that the provision of a dualled version of this route will further improve resilience and reliability. Previous study undertaken during 2017 considered potential mitigation options addressing environmental concerns.
Degree of consensus	5	Public consultation has taken place with high degree of consensus that a new highway link would address the current network issues. Considerations that the council should take into account, according to respondents, included: reducing congestion, rat running, shortening journey times and providing better journey time reliability together with improved road safety.

Economic

Economic growth	4	Provides increased accessibility, reliability and resilience to the network. Connecting directly into the Longwater Industrial and Retail Estates this option will increase access to employment and business, however there will be a direct impact on Longwater Interchange via increased traffic, which may lead to increased congestion. Limited improvement to housing access. Improved WEI through agglomeration though again this maybe limited by impacts on the Longwater interchange.
Socio-distributional impacts and the regions	2	Improved accessibility for groups with access to a car. Severance currently related to rat running would be reduced improving conditions for Non-Motorised Users. Limited benefit for elderly, disabled and low income groups in general. Improved access to business would help to encourage employment and address perceived economic imbalances. Expected to reduce rat running in the Taverham, Costessey, Easton, Ringland and Weston Longville areas. However this option will have a very limited effect on rat running further west.
Local environment	2	<i>Separate, additional Environmental Appraisal undertaken</i>
Well being	3	Will reduce severance with reassignment of traffic from rat run routes over a wider area due to central location. Will improve access to goods and services for non motorised users encouraging physical activity in specific locations. Expected to improve access to goods and services for private vehicle owners in terms of improved JT on network. New road would have a lower accident rate associated with improved design and conditions.
Expected VfM category	2. Good 2-4.5	

Managerial

Implementation timetable	Medium (3-8 Years)	Assumed construction start 2022. Assumed completion 2026.
Public acceptability	4	An initial round of public consultation in May-July 2018 based on high level key issues seeking to identify the need for the scheme and extent of public support for a potential solution in principle was undertaken. This did not include any specific scheme options or lines on a plan, however broad support was noted for a highways option as a solution to existing issues. There are established stakeholder groups actively engaged in the project – this includes a Member Working Group (Council Members) and a Local Liaison Group (Parish council reps). Engagement with Natural England, the Environment Agency and Highways England was also undertaken.
Practical feasibility	4	Option has been tested via modelling. New crossing over the River Tud and River Wensum required, although mitigation measures are expected to reduce the potential impacts. Environmental concerns and planning process will determine legal feasibility of the option. NCC would construct and maintain option and have the required statutory powers.
What is the quality of the supporting evidence?	4	Initial modelling and appraisal carried out in 2014, further modelling undertaken in 2018.
Key uncertainties	Land take requirements with reluctant landowners may result in higher costs and time delay. Environmental constraints again may result in higher costs and time delay. Extensive public consultation and stakeholder engagement underway in order to mitigate potential issues. Extensive review of options undertaken with high level of expert involvement early in the process. Engagement with Natural England, the Environment Agency and Highways England undertaken. Commercial impacts on the Golf Course has the potential to result in significant additional costs and delay.	

Financial

Affordability	3	Budgetary options are still being investigated.
Capital Cost (£m)	£100-£150 million	
Overall cost risk	2	

Commercial

Flexibility of option	3	Little opportunity to change alignment later in design phase, however at this stage option can be scaled up or down. When in operation option can not be changed or closed without significant financial penalties.
Where is funding coming from?	None specifically set aside. Funding sources to be considered.	
Any income generated?	No	N/A

Early Assessment and Sifting Tool

Option name/no.	Option 14: A1067 (east of A1067 / A1270 junction) to A47 / A1074 Longwater interchange; 2014 Orange (1), dual carriageway	
Description	From the A1067, east of the junction with the A1270 at Deighton Hills, Option 14 skirts the north-west edge of Taverham before crossing Ringland Road. The route then turns south and crosses the River Wensum and Costessey Lane to the south-east of Ringland. Option 14 continues south through Ringland Hills to the west of Queen's Hill before crossing the River Tud. The route passes through the Longwater employment area to connect with the A47 / A1074 Longwater Interchange. Option 14 would be of dual carriageway standard. Upgrades to the A1067 to dual carriageway standard may also be required.	

Strategic

Scale of impact against specific objectives	4	
Fit with high-level objectives	4	Supports the creation of a stronger, cleaner and more productive economy by improving links to local economy and sources of employment across the network. Connects people and places, and will help to encourage investment into the west of Norwich including, for example, tourism. Will improve journey time reliability on the local road network, as well as the A47 and A1067, transferring trips from existing local roads to a new high-speed high-standard link designed to the latest safety standards. Provides strong regional economic links for the future. Previous study undertaken during 2017 considered potential mitigation options addressing environmental concerns.
Degree of consensus	5	Public consultation has taken place with high degree of consensus that a new highway link would address the current network issues. Considerations that the council should take into account, according to respondents, included: reducing congestion, rat running, shortening journey times and providing better journey time reliability together with improved road safety.

Economic

Economic growth	4	Provides increased accessibility, reliability and resilience to the network. Connecting directly into the Longwater Industrial and Retail Estates this option will increase access to employment and business, however there will be a direct impact on Longwater Interchange via increased traffic, which may lead to increased congestion. Limited improvement to housing access. Improved WEI through agglomeration though again this maybe limited by impacts on the Longwater interchange.
Socio-distributional impacts and the regions	2	Improved accessibility for groups with access to a car. Severance currently related to rat running would be reduced improving conditions for Non-Motorised Users. Limited benefit for elderly, disabled and low income groups in general. Improved access to business would help to encourage employment and address perceived economic imbalances. Expected to reduce rat running in the Taverham, Costessey, Easton, Ringland and Weston Longville areas. However this option will have a very limited effect on rat running further west.
Local environment	2	<i>Separate, additional Environmental Appraisal undertaken</i>
Well being	4	Will reduce severance with reassignment of traffic from rat run routes over a wider area due to central location. Will improve access to goods and services for non motorised users encouraging physical activity in specific locations. Expected to improve access to goods and services for private vehicle owners in terms of improved JT on network. New road would have a lower accident rate associated with improved design and conditions.
Expected VfM category	2. Good 2-4.5	

Managerial

Implementation timetable	Medium (3-8 Years)	Assumed construction start 2022. Assumed completion 2026.
Public acceptability	4	An initial round of public consultation in May-July 2018 based on high level key issues seeking to identify the need for the scheme and extent of public support for a potential solution in principle was undertaken. This did not include any specific scheme options or lines on a plan, however broad support was noted for a highways option as a solution to existing issues. There are established stakeholder groups actively engaged in the project – this includes a Member Working Group (Council Members) and a Local Liaison Group (Parish council reps). Engagement with Natural England, the Environment Agency and Highways England was also undertaken.
Practical feasibility	4	Option has been tested via modelling. New crossing over the River Tud and River Wensum required, although mitigation measures are expected to reduce the potential impacts. Environmental concerns and planning process will determine legal feasibility of the option. NCC would construct and maintain option and have the required statutory powers.
What is the quality of the supporting evidence?	4	Initial modelling and appraisal carried out in 2014, further modelling undertaken in 2018.
Key uncertainties	Land take requirements with reluctant landowners may result in higher costs and time delay. Environmental constraints again may result in higher costs and time delay. Extensive public consultation and stakeholder engagement underway in order to mitigate potential issues. Extensive review of options undertaken with high level of expert involvement early in the process. Engagement with Natural England, the Environment Agency and Highways England undertaken. Commercial impacts on the Golf Course has the potential to result in significant additional costs and delay.	

Financial

Affordability	3	Budgetary options are still being investigated.
Capital Cost (£m)	£150-£250 million	
Overall cost risk	2	

Commercial

Flexibility of option	3	Little opportunity to change alignment later in design phase, however at this stage option can be scaled up or down. When in operation option can not be changed or closed without significant financial penalties.
Where is funding coming from?	None specifically set aside. Funding sources to be considered.	
Any income generated?	No	N/A

Early Assessment and Sifting Tool

Option name/no.	Option 15: A1067 / A1270 junction to A47 / A1074 Longwater interchange; 2014 Orange (2), single carriageway	
Description	From the A1067 junction with the A1270 at Deighton Hills, Option 15 heads south, crossing Ringland Road, to the west of Taverham. The route continues south and crosses the River Wensum and Costessey Lane to the south-east of Ringland. Option 15 passes through Ringland Hills to the west of Queen's Hill before crossing the River Tud. The route passes through the Longwater employment area to connect with the A47 / A1074 Longwater Interchange. Option 15 would be of single carriageway standard.	

Strategic

Scale of impact against specific objectives	4	
Fit with high-level objectives	3	Supports the creation of a stronger, cleaner and more productive economy by improving links to local economy and sources of employment across the network. Connects people and places, and will help to encourage investment into the west of Norwich including, for example, tourism. Will improve journey time reliability on the local road network, as well as the A47 and A1067, transferring trips from existing local roads to a new high-speed high-standard link designed to the latest safety standards. Provides strong regional economic links for the future. It can be assumed that the provision of a dualled version of this route will further improve resilience and reliability. Previous study undertaken during 2017 considered potential mitigation options addressing environmental concerns.
Degree of consensus	5	Public consultation has taken place with high degree of consensus that a new highway link would address the current network issues. Considerations that the council should take into account, according to respondents, included: reducing congestion, rat running, shortening journey times and providing better journey time reliability together with improved road safety.

Economic

Economic growth	4	Provides increased accessibility, reliability and resilience to the network. Links directly from the Longwater employment area directly into the NDR/ A1067 junction. Will reduce journey length and distance. Will help to encourage tourism locally through improved transport links and reduced congestion. However will significantly impact the Longwater interchange where strategic traffic will routed through the junction. Direct access to the NDR will improve opportunities for employment and agglomeration.
Socio-distributional impacts and the regions	2	Improved accessibility for groups with access to a car. Severance currently related to rat running would be reduced improving conditions for Non-Motorised Users. Limited benefit for elderly, disabled and low income groups in general. Improved access to business would help to encourage employment and address perceived economic imbalances. Expected to reduce rat running in the Taverham, Costessey, Easton, Ringland and Weston Longville areas. However this option will have a very limited effect on rat running further west.
Local environment	2	<i>Separate, additional Environmental Appraisal undertaken</i>
Well being	3	Will reduce severance with reassignment of traffic from rat run routes over a wider area due to central location and improve access to goods and services for non motorised users encouraging physical activity in specific locations. Expected to improve access to goods and services for private vehicle owners in terms of improved JT on network. New road would have a lower accident rate associated with improved design and conditions.
Expected VfM category	2. Good 2-4.5	

Managerial

Implementation timetable	Medium (3-8 Years)	Assumed construction start 2022. Assumed completion 2026.
Public acceptability	4	An initial round of public consultation in May-July 2018 based on high level key issues seeking to identify the need for the scheme and extent of public support for a potential solution in principle was undertaken. This did not include any specific scheme options or lines on a plan, however broad support was noted for a highways option as a solution to existing issues. There are established stakeholder groups actively engaged in the project – this includes a Member Working Group (Council Members) and a Local Liaison Group (Parish council reps). Engagement with Natural England, the Environment Agency and Highways England was also undertaken.
Practical feasibility	4	Option has been tested via modelling. New crossing over the River Tud required, although mitigation measures are expected to reduce the potential impacts. Environmental concerns and planning process will determine legal feasibility of the option. NCC would construct and maintain option and have the required statutory powers. This option crosses the HP gas main and thus there will be a c.£3 million cost impact. Protection works or pipe upgrades will be needed for crossing the gas main with an additional £1.2 million stopple charge. Furthermore, there are likely to be further limitations where a route runs within 80 of the gas main or cable route for more than a length of 80m.
What is the quality of the supporting evidence?	4	Initial modelling and appraisal carried out in 2014, further modelling undertaken in 2018.
Key uncertainties	Land take requirements with reluctant landowners may result in higher costs and time delay. Environmental constraints again may result in higher costs and time delay. Extensive public consultation and stakeholder engagement underway in order to mitigate potential issues. Extensive review of options undertaken with high level of expert involvement early in the process. Engagement with Natural England, the Environment Agency and Highways England undertaken. Commercial impacts on the Golf Course has the potential to result in significant additional costs and delay.	

Financial

Affordability	3	Budgetary options are still being investigated.
Capital Cost (£m)	£100-£150 million	
Overall cost risk	2	

Commercial

Flexibility of option	3	Little opportunity to change alignment later in design phase, however at this stage option can be scaled up or down. When in operation option can not be changed or closed without significant financial penalties.
Where is funding coming from?	None specifically set aside. Funding sources to be considered.	
Any income generated?	No	N/A

Early Assessment and Sifting Tool

Option name/no.	Option 16: A1067 / A1270 junction to A47 / A1074 Longwater interchange; 2014 Orange (2), dual carriageway	
Description	From the A1067 junction with the A1270 at Deighton Hills, Option 16 heads south, crossing Ringland Road, to the west of Taverham. The route continues south and crosses the River Wensum and Costessey Lane to the south-east of Ringland. Option 16 passes through Ringland Hills to the west of Queen's Hill before crossing the River Tud. The route passes through the Longwater employment area to connect with the A47 / A1074 Longwater Interchange. Option 16 would be of dual carriageway standard.	

Strategic

Scale of impact against specific objectives	4	
Fit with high-level objectives	4	Supports the creation of a stronger, cleaner and more productive economy by improving links to local economy and sources of employment across the network. Connects people and places, and will help to encourage investment into the west of Norwich including, for example, tourism. Will improve journey time reliability on the local road network, as well as the A47 and A1067, transferring trips from existing local roads to a new high-speed high-standard link designed to the latest safety standards. Provides strong regional economic links for the future. Previous study undertaken during 2017 considered potential mitigation options addressing environmental concerns.
Degree of consensus	5	Public consultation has taken place with high degree of consensus that a new highway link would address the current network issues. Considerations that the council should take into account, according to respondents, included: reducing congestion, rat running, shortening journey times and providing better journey time reliability together with improved road safety.

Economic

Economic growth	5	Provides increased accessibility, reliability and resilience to the network. Links directly from the Longwater employment area directly into the NDR/ A1067 junction. Will reduce journey length and distance. Will help to encourage tourism locally through improved transport links and reduced congestion. However will significantly impact the Longwater interchange where strategic traffic will routed through the junction. Direct access to the NDR will improve opportunities for employment and agglomeration.
Socio-distributional impacts and the regions	2	Improved accessibility for groups with access to a car. Severance currently related to rat running would be reduced improving conditions for Non-Motorised Users. Limited benefit for elderly, disabled and low income groups in general. Improved access to business would help to encourage employment and address perceived economic imbalances. Expected to reduce rat running in the Taverham, Costessey, Easton, Ringland and Weston Longville areas. However this option will have a very limited effect on rat running further west.
Local environment	2	<i>Separate, additional Environmental Appraisal undertaken</i>
Well being	4	Will reduce severance with reassignment of traffic from rat run routes over a wider area due to central location and improve access to goods and services for non motorised users encouraging physical activity in specific locations. Expected to improve access to goods and services for private vehicle owners in terms of improved JT on network. New road would have a lower accident rate associated with improved design and conditions.
Expected VfM category	2. Good 2-4.5	

Managerial

Implementation timetable	Medium (3-8 Years)	Assumed construction start 2022. Assumed completion 2026.
Public acceptability	4	An initial round of public consultation in May-July 2018 based on high level key issues seeking to identify the need for the scheme and extent of public support for a potential solution in principle was undertaken. This did not include any specific scheme options or lines on a plan, however broad support was noted for a highways option as a solution to existing issues. There are established stakeholder groups actively engaged in the project – this includes a Member Working Group (Council Members) and a Local Liaison Group (Parish council reps). Engagement with Natural England, the Environment Agency and Highways England was also undertaken.
Practical feasibility	4	Option has been tested via modelling. New crossing over the River Tud required, although mitigation measures are expected to reduce the potential impacts. Environmental concerns and planning process will determine legal feasibility of the option. NCC would construct and maintain option and have the required statutory powers. This option crosses the HP gas main and thus there will be a c.£3 million cost impact. Protection works or pipe upgrades will be needed for crossing the gas main with an additional £1.2 million stopple charge. Furthermore, there are likely to be further limitations where a route runs within 80 of the gas main or cable route for more than a length of 80m.
What is the quality of the supporting evidence?	4	Initial modelling and appraisal carried out in 2014, further modelling undertaken in 2018.
Key uncertainties	Land take requirements with reluctant landowners may result in higher costs and time delay. Environmental constraints again may result in higher costs and time delay. Extensive public consultation and stakeholder engagement underway in order to mitigate potential issues. Extensive review of options undertaken with high level of expert involvement early in the process. Engagement with Natural England, the Environment Agency and Highways England undertaken. Commercial impacts on the Golf Course has the potential to result in significant additional costs and delay.	

Financial

Affordability	3	Budgetary options are still being investigated.
Capital Cost (£m)	£150-£250 million	
Overall cost risk	2	

Commercial

Flexibility of option	3	Little opportunity to change alignment later in design phase, however at this stage option can be scaled up or down. When in operation option can not be changed or closed without significant financial penalties.
Where is funding coming from?	None specifically set aside. Funding sources to be considered.	
Any income generated?	No	N/A

Early Assessment and Sifting Tool

Option name/no.	Option 17: A1067 (east of A1067 / A1270 junction) to A47 / A1074 Longwater interchange; 2014 Orange (3), single carriageway	
Description	From the A1067, east of the junction with the A1270 at Deighton Hills, Option 17 skirts the north-west edge of Taverham before crossing Ringland Road. The route turns south-east and crosses the River Wensum and Costessey Lane to the south of Taverham. Option 17 then passes between Queen's Hill and Costessey, before crossing the River Tud. The route passes through the Longwater employment area to connect with the A47 / A1074 Longwater Interchange. Option 17 would be of single carriageway standard.	

Strategic

Scale of impact against specific objectives	4	
Fit with high-level objectives	4	Supports the creation of a stronger, cleaner and more productive economy by improving links to local economy and sources of employment across the network. Connects people and places, and will help to encourage investment into the west of Norwich including, for example, tourism. Will improve journey time reliability on the local road network, as well as the A47 and A1067, transferring trips from existing local roads to a new high-speed high-standard link designed to the latest safety standards. Provides strong regional economic links for the future. It can be assumed that the provision of a dualled version of this route will further improve resilience and reliability. Previous study undertaken during 2017 considered potential mitigation options addressing environmental concerns.
Degree of consensus	5	Public consultation has taken place with high degree of consensus that a new highway link would address the current network issues. Considerations that the council should take into account, according to respondents, included: reducing congestion, rat running, shortening journey times and providing better journey time reliability together with improved road safety.

Economic

Economic growth	4	Provides increased accessibility, reliability and resilience to the network. Links directly from the Longwater employment area to the A1067 east of the NDR junction. Will help to encourage Tourism locally through improved transport links and reduced congestion. However will significantly impact the Longwater interchange where strategic traffic will be routed through the junction. Direct access to the NDR will improve opportunities for employment and agglomeration. Dualled option will improve potential for increased resilience and journey length.
Socio-distributional impacts and the regions	2	Improved accessibility for groups with access to a car. Severance currently related to rat running would be reduced improving conditions for Non-Motorised Users. Limited benefit for elderly, disabled and low income groups in general. Improved access to business would help to encourage employment and address perceived economic imbalances. Expected to reduce rat running in the Taverham, Costessey, Easton, Ringland and Weston Longville areas. However this option will have a very limited effect on rat running further west.
Local environment	2	<i>Separate, additional Environmental Appraisal undertaken</i>
Well being	3	Will reduce severance with reassignment of traffic from rat run routes over a wider area due to central location and improve access to goods and services for non motorised users encouraging physical activity in specific locations. Expected to improve access to goods and services for private vehicle owners in terms of improved JT on network. New road would have a lower accident rate associated with improved design and conditions.
Expected VfM category	2. Good 2-4.5	

Managerial

Implementation timetable	Medium (3-8 Years)	Assumed construction start 2022. Assumed completion 2026.
Public acceptability	4	An initial round of public consultation in May-July 2018 based on high level key issues seeking to identify the need for the scheme and extent of public support for a potential solution in principle was undertaken. This did not include any specific scheme options or lines on a plan, however broad support was noted for a highways option as a solution to existing issues. There are established stakeholder groups actively engaged in the project – this includes a Member Working Group (Council Members) and a Local Liaison Group (Parish council reps). Engagement with Natural England, the Environment Agency and Highways England was also undertaken.
Practical feasibility	4	Option has been tested via modelling. New crossing over the River Tud and River Wensum required, although mitigation measures are expected to reduce the potential impacts. Environmental concerns and planning process will determine legal feasibility of the option. NCC would construct and maintain option and have the required statutory powers.
What is the quality of the supporting evidence?	4	Initial modelling and appraisal carried out in 2014, further modelling undertaken in 2018.
Key uncertainties	Land take requirements with reluctant landowners may result in higher costs and time delay. Environmental constraints again may result in higher costs and time delay. Extensive public consultation and stakeholder engagement underway in order to mitigate potential issues. Extensive review of options undertaken with high level of expert involvement early in the process. Engagement with Natural England, the Environment Agency and Highways England undertaken. Commercial impacts on the Golf Course has the potential to result in significant additional costs and delay.	

Financial

Affordability	3	Budgetary options are still being investigated.
Capital Cost (£m)	£100-£150 million	
Overall cost risk	2	

Commercial

Flexibility of option	3	Little opportunity to change alignment later in design phase, however at this stage option can be scaled up or down. When in operation option can not be changed or closed without significant financial penalties.
Where is funding coming from?	None specifically set aside. Funding sources to be considered.	
Any income generated?	No	N/A

Early Assessment and Sifting Tool

Option name/no.	Option 18: A1067 (east of A1067 / A1270 junction) to A47 / A1074 Longwater interchange; 2014 Orange (3), dual carriageway	
Description	From the A1067, east of the junction with the A1270 at Deighton Hills, Option 18 skirts the north-west edge of Taverham before crossing Ringland Road. The route turns south-east and crosses the River Wensum and Costessey Lane to the south of Taverham. Option 18 then passes between Queen's Hill and Costessey, before crossing the River Tud. The route passes through the Longwater employment area to connect with the A47 / A1074 Longwater Interchange. Option 18 would be of dual carriageway standard. Upgrades to the A1067 to dual carriageway standard may also be required.	

Strategic

Scale of impact against specific objectives	4	
Fit with high-level objectives	4	Supports the creation of a stronger, cleaner and more productive economy by improving links to local economy and sources of employment across the network. Connects people and places, and will help to encourage investment into the west of Norwich including, for example, tourism. Will improve journey time reliability on the local road network, as well as the A47 and A1067, transferring trips from existing local roads to a new high-speed high-standard link designed to the latest safety standards. Provides strong regional economic links for the future. Previous study undertaken during 2017 considered potential mitigation options addressing environmental concerns.
Degree of consensus	5	Public consultation has taken place with high degree of consensus that a new highway link would address the current network issues. Considerations that the council should take into account, according to respondents, included: reducing congestion, rat running, shortening journey times and providing better journey time reliability together with improved road safety.

Economic

Economic growth	4	Provides increased accessibility, reliability and resilience to the network. Links directly from the Longwater employment area to the A1067 east of the NDR junction. Will help to encourage Tourism locally through improved transport links and reduced congestion. However will significantly impact the Longwater interchange where strategic traffic will routed through the junction. Direct access to the NDR will improve opportunities for employment and agglomeration. Dualled option will improve potential for increased resilience reliability and journey length.
Socio-distributional impacts and the regions	2	Improved accessibility for groups with access to a car. Severance currently related to rat running would be reduced improving conditions for Non-Motorised Users. Limited benefit for elderly, disabled and low income groups in general. Improved access to business would help to encourage employment and address perceived economic imbalances. Expected to reduce rat running in the Taverham, Costessey, Easton, Ringland and Weston Longville areas. However this option will have a very limited effect on rat running further west.
Local environment	2	<i>Separate, additional Environmental Appraisal undertaken</i>
Well being	4	Will reduce severance with reassignment of traffic from rat run routes over a wider area due to central location and improve access to goods and services for non motorised users encouraging physical activity in specific locations. Expected to improve access to goods and services for private vehicle owners in terms of improved JT on network. New road would have a lower accident rate associated with improved design and conditions.
Expected VfM category	2. Good 2-4.5	

Managerial

Implementation timetable	Medium (3-8 Years)	Assumed construction start 2022. Assumed completion 2026.
Public acceptability	4	An initial round of public consultation in May-July 2018 based on high level key issues seeking to identify the need for the scheme and extent of public support for a potential solution in principle was undertaken. This did not include any specific scheme options or lines on a plan, however broad support was noted for a highways option as a solution to existing issues. There are established stakeholder groups actively engaged in the project – this includes a Member Working Group (Council Members) and a Local Liaison Group (Parish council reps). Engagement with Natural England, the Environment Agency and Highways England was also undertaken.
Practical feasibility	4	Option has been tested via modelling. New crossing over the River Tud and River Wensum required, although mitigation measures are expected to reduce the potential impacts. Environmental concerns and planning process will determine legal feasibility of the option. NCC would construct and maintain option and have the required statutory powers.
What is the quality of the supporting evidence?	4	Initial modelling and appraisal carried out in 2014, further modelling undertaken in 2018.
Key uncertainties	Land take requirements with reluctant landowners may result in higher costs and time delay. Environmental constraints again may result in higher costs and time delay. Extensive public consultation and stakeholder engagement underway in order to mitigate potential issues. Extensive review of options undertaken with high level of expert involvement early in the process. Engagement with Natural England, the Environment Agency and Highways England undertaken. Commercial impacts on the Golf Course has the potential to result in significant additional costs and delay.	

Financial

Affordability	3	Budgetary options are still being investigated.
Capital Cost (£m)	£150-£250 million	
Overall cost risk	2	

Commercial

Flexibility of option	3	Little opportunity to change alignment later in design phase, however at this stage option can be scaled up or down. When in operation option can not be changed or closed without significant financial penalties.
Where is funding coming from?	None specifically set aside. Funding sources to be considered.	
Any income generated?	No	N/A

Early Assessment and Sifting Tool

Option name/no.	Option 19: A1067 / A1270 junction to A47 / A1074 Longwater interchange; 2014 Orange (4), single carriageway	
Description	From the A1067 junction with the A1270 at Deighton Hills, Option 19 heads south, crossing Ringland Road, to the west of Taverham. The route turns south-east and crosses the River Wensum and Costessey Lane to the south of Taverham. Option 19 then passes between Queen's Hill and Costessey, before crossing the River Tud. The route passes through the Longwater employment area to connect with the A47 / A1074 Longwater Interchange. Option 19 would be of single carriageway standard.	

Strategic

Scale of impact against specific objectives	4	
Fit with high-level objectives	4	Supports the creation of a stronger, cleaner and more productive economy by improving links to local economy and sources of employment across the network. Connects people and places, and will help to encourage investment into the west of Norwich including, for example, tourism. Will improve journey time reliability on the local road network, as well as the A47 and A1067, transferring trips from existing local roads to a new high-speed high-standard link designed to the latest safety standards. Provides strong regional economic links for the future. It can be assumed that the provision of a dualled version of this route will further improve resilience and reliability. Previous study undertaken during 2017 considered potential mitigation options addressing environmental concerns.
Degree of consensus	5	Public consultation has taken place with high degree of consensus that a new highway link would address the current network issues. Considerations that the council should take into account, according to respondents, included: reducing congestion, rat running, shortening journey times and providing better journey time reliability together with improved road safety.

Economic

Economic growth	4	Provides increased accessibility, reliability and resilience to the network. Links directly from the Longwater employment area directly into the NDR/ A1067 junction and will reduce journey length and distance. Will help to encourage tourism locally through improved transport links and reduced congestion. However will significantly impact the Longwater interchange where strategic traffic will route through the junction. Direct access to the NDR will improve opportunities for employment and agglomeration.
Socio-distributional impacts and the regions	2	Improved accessibility for groups with access to a car. Severance currently related to rat running would be reduced improving conditions for Non-Motorised Users. Limited benefit for elderly, disabled and low income groups in general. Improved access to business would help to encourage employment and address perceived economic imbalances. Expected to reduce rat running in the Taverham, Costessey, Easton, Ringland and Weston Longville areas. However this option will have a very limited effect on rat running further west.
Local environment	2	<i>Separate, additional Environmental Appraisal undertaken</i>
Well being	3	Will reduce severance with reassignment of traffic from rat run routes over a wider area due to central location and improve access to goods and services for non motorised users encouraging physical activity in specific locations. Expected to improve access to goods and services for private vehicle owners in terms of improved JT on network. New road would have a lower accident rate associated with improved design and conditions.
Expected VfM category	2. Good 2-4.5	

Managerial

Implementation timetable	Medium (3-8 Years)	Assumed construction start 2022. Assumed completion 2026.
Public acceptability	4	An initial round of public consultation in May-July 2018 based on high level key issues seeking to identify the need for the scheme and extent of public support for a potential solution in principle was undertaken. This did not include any specific scheme options or lines on a plan, however broad support was noted for a highways option as a solution to existing issues. There are established stakeholder groups actively engaged in the project – this includes a Member Working Group (Council Members) and a Local Liaison Group (Parish council reps). Engagement with Natural England, the Environment Agency and Highways England was also undertaken.
Practical feasibility	4	Option has been tested via modelling. New crossing over the River Tud required, although mitigation measures are expected to reduce the potential impacts. Environmental concerns and planning process will determine legal feasibility of the option. NCC would construct and maintain option and have the required statutory powers. This option crosses the HP gas main and thus there will be a c.£3 million cost impact. Protection works or pipe upgrades will be needed for crossing the gas main with an additional £1.2 million stopple charge. Furthermore, there are likely to be further limitations where a route runs within 80 of the gas main or cable route for more than a length of 80m.
What is the quality of the supporting evidence?	4	Initial modelling and appraisal carried out in 2014, further modelling undertaken in 2018.
Key uncertainties	Land take requirements with reluctant landowners may result in higher costs and time delay. Environmental constraints again may result in higher costs and time delay. Extensive public consultation and stakeholder engagement underway in order to mitigate potential issues. Extensive review of options undertaken with high level of expert involvement early in the process. Engagement with Natural England, the Environment Agency and Highways England undertaken. Commercial impacts on the Golf Course has the potential to result in significant additional costs and delay.	

Financial

Affordability	3	Budgetary options are still being investigated.
Capital Cost (£m)	£150-£250 million	
Overall cost risk	2	

Commercial

Flexibility of option	3	Little opportunity to change alignment later in design phase, however at this stage option can be scaled up or down. When in operation option can not be changed or closed without significant financial penalties.
Where is funding coming from?	None specifically set aside. Funding sources to be considered.	
Any income generated?	No	N/A

Early Assessment and Sifting Tool

Option name/no.	Option 20: A1067 / A1270 junction to A47 / A1074 Longwater interchange; 2014 Orange (4), dual carriageway	
Description	From the A1067 junction with the A1270 at Deighton Hills, Option 20 heads south, crossing Ringland Road, to the west of Taverham. The route turns south-east and crosses the River Wensum and Costessey Lane to the south of Taverham. Option 20 then passes between Queen's Hill and Costessey, before crossing the River Tud. The route passes through the Longwater employment area to connect with the A47 / A1074 Longwater Interchange. Option 20 would be of dual carriageway standard.	

Strategic

Scale of impact against specific objectives	4	
Fit with high-level objectives	4	Supports the creation of a stronger, cleaner and more productive economy by improving links to local economy and sources of employment across the network. Connects people and places, and will help to encourage investment into the west of Norwich including, for example, tourism. Will improve journey time reliability on the local road network, as well as the A47 and A1067, transferring trips from existing local roads to a new high-speed high-standard link designed to the latest safety standards. Provides strong regional economic links for the future. Previous study undertaken during 2017 considered potential mitigation options addressing environmental concerns.
Degree of consensus	5	Public consultation has taken place with high degree of consensus that a new highway link would address the current network issues. Considerations that the council should take into account, according to respondents, included: reducing congestion, rat running, shortening journey times and providing better journey time reliability together with improved road safety.

Economic

Economic growth	5	Provides increased accessibility, reliability and resilience to the network. Links directly from the Longwater employment area directly into the NDR/ A1067 junction and will reduce journey length and distance. Will help to encourage tourism locally through improved transport links and reduced congestion. However will significantly impact the Longwater interchange where strategic traffic will route through the junction. Direct access to the NDR will improve opportunities for employment and agglomeration. Dualled option will improve potential for increased resilience reliability and journey length.
Socio-distributional impacts and the regions	2	Improved accessibility for groups with access to a car. Severance currently related to rat running would be reduced improving conditions for Non-Motorised Users. Limited benefit for elderly, disabled and low income groups in general. Improved access to business would help to encourage employment and address perceived economic imbalances. Expected to reduce rat running in the Taverham, Costessey, Easton, Ringland and Weston Longville areas. However this option will have a very limited effect on rat running further west.
Local environment	2	<i>Separate, additional Environmental Appraisal undertaken</i>
Well being	4	Will reduce severance with reassignment of traffic from rat run routes over a wider area due to central location and improve access to goods and services for non motorised users encouraging physical activity in specific locations. Expected to improve access to goods and services for private vehicle owners in terms of improved JT on network. New road would have a lower accident rate associated with improved design and conditions.
Expected VfM category	2. Good 2-4.5	

Managerial

Implementation timetable	Medium (3-8 Years)	Assumed construction start 2022. Assumed completion 2026.
Public acceptability	4	An initial round of public consultation in May-July 2018 based on high level key issues seeking to identify the need for the scheme and extent of public support for a potential solution in principle was undertaken. This did not include any specific scheme options or lines on a plan, however broad support was noted for a highways option as a solution to existing issues. There are established stakeholder groups actively engaged in the project – this includes a Member Working Group (Council Members) and a Local Liaison Group (Parish council reps). Engagement with Natural England, the Environment Agency and Highways England was also undertaken.
Practical feasibility	4	Option has been tested via modelling. New crossing over the River Tud required, although mitigation measures are expected to reduce the potential impacts. Environmental concerns and planning process will determine legal feasibility of the option. NCC would construct and maintain option and have the required statutory powers. This option crosses the HP gas main and thus there will be a c.£3 million cost impact. Protection works or pipe upgrades will be needed for crossing the gas main with an additional £1.2 million stopple charge. Furthermore, there are likely to be further limitations where a route runs within 80 of the gas main or cable route for more than a length of 80m.
What is the quality of the supporting evidence?	4	Initial modelling and appraisal carried out in 2014, further modelling undertaken in 2018.
Key uncertainties	Land take requirements with reluctant landowners may result in higher costs and time delay. Environmental constraints again may result in higher costs and time delay. Extensive public consultation and stakeholder engagement underway in order to mitigate potential issues. Extensive review of options undertaken with high level of expert involvement early in the process. Engagement with Natural England, the Environment Agency and Highways England undertaken. Commercial impacts on the Golf Course has the potential to result in significant additional costs and delay.	

Financial

Affordability	3	Budgetary options are still being investigated.
Capital Cost (£m)	£150-£250 million	
Overall cost risk	2	

Commercial

Flexibility of option	3	Little opportunity to change alignment later in design phase, however at this stage option can be scaled up or down. When in operation option can not be changed or closed without significant financial penalties.
Where is funding coming from?	None specifically set aside. Funding sources to be considered.	
Any income generated?	No	N/A

Early Assessment and Sifting Tool

Option name/no.	Option 21: A1067 (east of A1067 / A1270 junction) to A1074 east of Longwater; 2014 Orange (5), single carriageway	
Description	From the A1067, east of the junction with the A1270 at Deighton Hills, Option 21 skirts the north-west edge of Taverham before crossing Ringland Road. The route turns south-east and crosses the River Wensum and Costessey Lane to the south of Taverham. Option 21 then passes between Queen's Hill and Costessey, before crossing the River Tud. The route passes to the east of the Longwater employment area to connect with the A1074 between Longwater and New Costessey. Option 21 would be of single carriageway standard.	

Strategic

Scale of impact against specific objectives	4	
Fit with high-level objectives	4	Supports the creation of a stronger, cleaner and more productive economy by improving links to local economy and sources of employment across the network. Connects people and places, and will help to encourage investment into the west of Norwich including, for example, tourism. Will improve journey time reliability on the local road network, as well as the A47 and A1067, transferring trips from existing local roads to a new high-speed high-standard link designed to the latest safety standards. Provides strong regional economic links for the future. It can be assumed that the provision of a dualled version of this route will further improve resilience and reliability. Previous study undertaken during 2017 considered potential mitigation options addressing environmental concerns.
Degree of consensus	5	Public consultation has taken place with high degree of consensus that a new highway link would address the current network issues. Considerations that the council should take into account, according to respondents, included: reducing congestion, rat running, shortening journey times and providing better journey time reliability together with improved road safety.

Economic

Economic growth	4	Provides increased accessibility, reliability and resilience to the network. Links directly from the Longwater employment area to the A1067 east of the NDR junction. Will help to encourage Tourism locally through improved transport links and reduced congestion. However will significantly impact the Longwater interchange where strategic traffic will routed through the junction. Direct access to the NDR will improve opportunities for employment and agglomeration.
Socio-distributional impacts and the regions	2	Improved accessibility for groups with access to a car. Severance currently related to rat running would be reduced improving conditions for Non-Motorised Users. Limited benefit for elderly, disabled and low income groups in general. Improved access to business would help to encourage employment and address perceived economic imbalances. Expected to reduce rat running in the Taverham, Costessey, Easton, Ringland and Weston Longville areas. However this option will have a very limited effect on rat running further west.
Local environment	2	<i>Separate, additional Environmental Appraisal undertaken</i>
Well being	3	Will reduce severance with reassignment of traffic from rat run routes over a wider area due to central location and improve access to goods and services for non motorised users encouraging physical activity in specific locations. Expected to improve access to goods and services for private vehicle owners in terms of improved JT on network. New road would have a lower accident rate associated with improved design and conditions.
Expected VfM category	2. Good 2-4.5	

Managerial

Implementation timetable	Medium (3-8 Years)	Assumed construction start 2022. Assumed completion 2026.
Public acceptability	4	An initial round of public consultation in May-July 2018 based on high level key issues seeking to identify the need for the scheme and extent of public support for a potential solution in principle was undertaken. This did not include any specific scheme options or lines on a plan, however broad support was noted for a highways option as a solution to existing issues. There are established stakeholder groups actively engaged in the project – this includes a Member Working Group (Council Members) and a Local Liaison Group (Parish council reps). Engagement with Natural England, the Environment Agency and Highways England was also undertaken.
Practical feasibility	4	Option has been tested via modelling. New crossing over the River Tud and River Wensum required, although mitigation measures are expected to reduce the potential impacts. Environmental concerns and planning process will determine legal feasibility of the option. NCC would construct and maintain option and have the required statutory powers.
What is the quality of the supporting evidence?	4	Initial modelling and appraisal carried out in 2014, further modelling undertaken in 2018.
Key uncertainties	Land take requirements with reluctant landowners may result in higher costs and time delay. Environmental constraints again may result in higher costs and time delay. Extensive public consultation and stakeholder engagement underway in order to mitigate potential issues. Extensive review of options undertaken with high level of expert involvement early in the process. Engagement with Natural England, the Environment Agency and Highways England undertaken. Commercial impacts on the Golf Course has the potential to result in significant additional costs and delay.	

Financial

Affordability	3	Budgetary options are still being investigated.
Capital Cost (£m)	£100-£150 million	
Overall cost risk	2	

Commercial

Flexibility of option	3	Little opportunity to change alignment later in design phase, however at this stage option can be scaled up or down. When in operation option can not be changed or closed without significant financial penalties.
Where is funding coming from?	None specifically set aside. Funding sources to be considered.	
Any income generated?	No	N/A

Early Assessment and Sifting Tool

Option name/no.	Option 22: A1067 (east of A1067 / A1270 junction) to A1074 east of Longwater; 2014 Orange (5), dual carriageway	
Description	From the A1067, east of the junction with the A1270 at Deighton Hills, Option 22 skirts the north-west edge of Taverham before crossing Ringland Road. The route turns south-east and crosses the River Wensum and Costessey Lane to the south of Taverham. Option 22 then passes between Queen's Hill and Costessey, before crossing the River Tud. The route passes to the east of the Longwater employment area to connect with the A1074 between Longwater and New Costessey. Option 22 would be of dual carriageway standard. Upgrades to the A1067 and A1074 to dual carriageway standard may also be required.	

Strategic

Scale of impact against specific objectives	4	
Fit with high-level objectives	4	Supports the creation of a stronger, cleaner and more productive economy by improving links to local economy and sources of employment across the network. Connects people and places, and will help to encourage investment into the west of Norwich including, for example, tourism. Will improve journey time reliability on the local road network, as well as the A47 and A1067, transferring trips from existing local roads to a new high-speed high-standard link designed to the latest safety standards. Provides strong regional economic links for the future. Previous study undertaken during 2017 considered potential mitigation options addressing environmental concerns.
Degree of consensus	5	Public consultation has taken place with high degree of consensus that a new highway link would address the current network issues. Considerations that the council should take into account, according to respondents, included: reducing congestion, rat running, shortening journey times and providing better journey time reliability together with improved road safety.

Economic

Economic growth	4	Provides increased accessibility, reliability and resilience to the network. Links directly from the Longwater employment area to the A1067 east of the NDR junction. Will help to encourage Tourism locally through improved transport links and reduced congestion. However will significantly impact the Longwater interchange where strategic traffic will routed through the junction. Direct access to the NDR will improve opportunities for employment and agglomeration.
Socio-distributional impacts and the regions	2	Improved accessibility for groups with access to a car. Severance currently related to rat running would be reduced improving conditions for Non-Motorised Users. Limited benefit for elderly, disabled and low income groups in general. Improved access to business would help to encourage employment and address perceived economic imbalances. Expected to reduce rat running in the Taverham, Costessey, Easton, Ringland and Weston Longville areas. However this option will have a very limited effect on rat running further west.
Local environment	2	<i>Separate, additional Environmental Appraisal undertaken</i>
Well being	4	Will reduce severance with reassignment of traffic from rat run routes over a wider area due to central location and improve access to goods and services for non motorised users encouraging physical activity in specific locations. Expected to improve access to goods and services for private vehicle owners in terms of improved JT on network. New road would have a lower accident rate associated with improved design and conditions.
Expected VfM category	2. Good 2-4.5	

Managerial

Implementation timetable	Medium (3-8 Years)	Assumed construction start 2022. Assumed completion 2026.
Public acceptability	4	An initial round of public consultation in May-July 2018 based on high level key issues seeking to identify the need for the scheme and extent of public support for a potential solution in principle was undertaken. This did not include any specific scheme options or lines on a plan, however broad support was noted for a highways option as a solution to existing issues. There are established stakeholder groups actively engaged in the project – this includes a Member Working Group (Council Members) and a Local Liaison Group (Parish council reps). Engagement with Natural England, the Environment Agency and Highways England was also undertaken.
Practical feasibility	4	Option has been tested via modelling. New crossing over the River Tud and River Wensum required, although mitigation measures are expected to reduce the potential impacts. Environmental concerns and planning process will determine legal feasibility of the option. NCC would construct and maintain option and have the required statutory powers.
What is the quality of the supporting evidence?	4	Initial modelling and appraisal carried out in 2014, further modelling undertaken in 2018.
Key uncertainties	Land take requirements with reluctant landowners may result in higher costs and time delay. Environmental constraints again may result in higher costs and time delay. Extensive public consultation and stakeholder engagement underway in order to mitigate potential issues. Extensive review of options undertaken with high level of expert involvement early in the process. Engagement with Natural England, the Environment Agency and Highways England undertaken. Commercial impacts on the Golf Course has the potential to result in significant additional costs and delay.	

Financial

Affordability	3	Budgetary options are still being investigated.
Capital Cost (£m)	£150-£250 million	
Overall cost risk	2	

Commercial

Flexibility of option	3	Little opportunity to change alignment later in design phase, however at this stage option can be scaled up or down. When in operation option can not be changed or closed without significant financial penalties.
Where is funding coming from?	None specifically set aside. Funding sources to be considered.	
Any income generated?	No	N/A

Early Assessment and Sifting Tool

Option name/no.	Option 23: A1067 / A1270 junction to A1074 east of Longwater; 2014 Orange (6), single carriageway	
Description	From the A1067 junction with the A1270 at Deighton Hills, Option 23 heads south, crossing Ringland Road, to the west of Taverham. The route turns south-east and crosses the River Wensum and Costessey Lane to the south of Taverham. Option 23 then passes between Queen's Hill and Costessey, before crossing the River Tud. The route passes to the east of the Longwater employment area to connect with the A1074 between Longwater and New Costessey. Option 23 would be of single carriageway standard.	

Strategic

Scale of impact against specific objectives	4	
Fit with high-level objectives	4	Supports the creation of a stronger, cleaner and more productive economy by improving links to local economy and sources of employment across the network. Connects people and places, and will help to encourage investment into the west of Norwich including, for example, tourism. Will improve journey time reliability on the local road network, as well as the A47 and A1067, transferring trips from existing local roads to a new high-speed high-standard link designed to the latest safety standards. Provides strong regional economic links for the future. It can be assumed that the provision of a dualled version of this route will further improve resilience and reliability. Previous study undertaken during 2017 considered potential mitigation options addressing environmental concerns.
Degree of consensus	5	Public consultation has taken place with high degree of consensus that a new highway link would address the current network issues. Considerations that the council should take into account, according to respondents, included: reducing congestion, rat running, shortening journey times and providing better journey time reliability together with improved road safety.

Economic

Economic growth	4	Provides increased accessibility, reliability and resilience to the network. Links from the A1074 directly in to the NDR/A1067 junction. Does not provide access to the Longwater employment area and routes east of Queens Hill. Will help to encourage tourism locally through improved transport links and reduced congestion. However will significantly impact the Longwater interchange where traffic will route through the junction. Direct access to the NDR will improve opportunities for employment and agglomeration. Dualled option will improve potential for increased resilience reliability and journey length.
Socio-distributional impacts and the regions	2	Improved accessibility for groups with access to a car. Severance currently related to rat running would be reduced improving conditions for Non-Motorised Users. Limited benefit for elderly, disabled and low income groups in general. Improved access to business would help to encourage employment and address perceived economic imbalances. Expected to reduce rat running in the Taverham, Costessey, Easton, Ringland and Weston Longville areas. However this option will have a very limited effect on rat running further west.
Local environment	2	<i>Separate, additional Environmental Appraisal undertaken</i>
Well being	3	Will reduce severance with reassignment of traffic from rat run routes over a wider area due to central location and improve access to goods and services for non motorised users encouraging physical activity in specific locations. Expected to improve access to goods and services for private vehicle owners in terms of improved JT on network. New road would have a lower accident rate associated with improved design and conditions.
Expected VfM category	2. Good 2-4.5	

Managerial

Implementation timetable	Medium (3-8 Years)	Assumed construction start 2022. Assumed completion 2026.
Public acceptability	4	An initial round of public consultation in May-July 2018 based on high level key issues seeking to identify the need for the scheme and extent of public support for a potential solution in principle was undertaken. This did not include any specific scheme options or lines on a plan, however broad support was noted for a highways option as a solution to existing issues. There are established stakeholder groups actively engaged in the project – this includes a Member Working Group (Council Members) and a Local Liaison Group (Parish council reps). Engagement with Natural England, the Environment Agency and Highways England was also undertaken.
Practical feasibility	4	Option has been tested via modelling. New crossing over the River Tud required, although mitigation measures are expected to reduce the potential impacts. Environmental concerns and planning process will determine legal feasibility of the option. NCC would construct and maintain option and have the required statutory powers. This option crosses the HP gas main and thus there will be a c.£3 million cost impact. Protection works or pipe upgrades will be needed for crossing the gas main with an additional £1.2 million stopple charge. Furthermore, there are likely to be further limitations where a route runs within 80 of the gas main or cable route for more than a length of 80m.
What is the quality of the supporting evidence?	4	Initial modelling and appraisal carried out in 2014, further modelling undertaken in 2018.
Key uncertainties	Land take requirements with reluctant landowners may result in higher costs and time delay. Environmental constraints again may result in higher costs and time delay. Extensive public consultation and stakeholder engagement underway in order to mitigate potential issues. Extensive review of options undertaken with high level of expert involvement early in the process. Engagement with Natural England, the Environment Agency and Highways England undertaken. Commercial impacts on the Golf Course has the potential to result in significant additional costs and delay.	

Financial

Affordability	3	Budgetary options are still being investigated.
Capital Cost (£m)	£100-£150 million	
Overall cost risk	2	

Commercial

Flexibility of option	3	Little opportunity to change alignment later in design phase, however at this stage option can be scaled up or down. When in operation option can not be changed or closed without significant financial penalties.
Where is funding coming from?	None specifically set aside. Funding sources to be considered.	
Any income generated?	No	N/A

Early Assessment and Sifting Tool

Option name/no.	Option 24: A1067 / A1270 junction to A1074 east of Longwater; 2014 Orange (6), dual carriageway	
Description	From the A1067 junction with the A1270 at Deighton Hills, Option 24 heads south, crossing Ringland Road, to the west of Taverham. The route turns south-east and crosses the River Wensum and Costessey Lane to the south of Taverham. Option 24 then passes between Queen's Hill and Costessey, before crossing the River Tud. The route passes to the east of the Longwater employment area to connect with the A1074 between Longwater and New Costessey. Option 24 would be of dual carriageway standard. Upgrades to the A1074 to dual carriageway standard may also be required.	

Strategic

Scale of impact against specific objectives	4	
Fit with high-level objectives	4	Supports the creation of a stronger, cleaner and more productive economy by improving links to local economy and sources of employment across the network. Connects people and places, and will help to encourage investment into the west of Norwich including, for example, tourism. Will improve journey time reliability on the local road network, as well as the A47 and A1067, transferring trips from existing local roads to a new high-speed high-standard link designed to the latest safety standards. Provides strong regional economic links for the future. Previous study undertaken during 2017 considered potential mitigation options addressing environmental concerns.
Degree of consensus	5	Public consultation has taken place with high degree of consensus that a new highway link would address the current network issues. Considerations that the council should take into account, according to respondents, included: reducing congestion, rat running, shortening journey times and providing better journey time reliability together with improved road safety.

Economic

Economic growth	4	Provides increased accessibility, reliability and resilience to the network. Links from the A1074 directly in to the NDR/A1067 junction. Does not provide access to the Longwater employment area and routes east of Queens Hill. Will help to encourage tourism locally through improved transport links and reduced congestion. However will significantly impact the Longwater interchange where traffic will route through the junction. Direct access to the NDR will improve opportunities for employment and agglomeration. Dualled option will improve potential for increased resilience reliability and journey length.
Socio-distributional impacts and the regions	2	Improved accessibility for groups with access to a car. Severance currently related to rat running would be reduced improving conditions for Non-Motorised Users. Limited benefit for elderly, disabled and low income groups in general. Improved access to business would help to encourage employment and address perceived economic imbalances. Expected to reduce rat running in the Taverham, Costessey, Easton, Ringland and Weston Longville areas. However this option will have a very limited effect on rat running further west.
Local environment	2	<i>Separate, additional Environmental Appraisal undertaken</i>
Well being	4	Will reduce severance with reassignment of traffic from rat run routes over a wider area due to central location and improve access to goods and services for non motorised users encouraging physical activity in specific locations. Expected to improve access to goods and services for private vehicle owners in terms of improved JT on network. New road would have a lower accident rate associated with improved design and conditions.
Expected VfM category	2. Good 2-4.5	

Managerial

Implementation timetable	Medium (3-8 Years)	Assumed construction start 2022. Assumed completion 2026.
Public acceptability	4	An initial round of public consultation in May-July 2018 based on high level key issues seeking to identify the need for the scheme and extent of public support for a potential solution in principle was undertaken. This did not include any specific scheme options or lines on a plan, however broad support was noted for a highways option as a solution to existing issues. There are established stakeholder groups actively engaged in the project – this includes a Member Working Group (Council Members) and a Local Liaison Group (Parish council reps). Engagement with Natural England, the Environment Agency and Highways England was also undertaken.
Practical feasibility	4	Option has been tested via modelling. New crossing over the River Tud required, although mitigation measures are expected to reduce the potential impacts. Environmental concerns and planning process will determine legal feasibility of the option. NCC would construct and maintain option and have the required statutory powers. This option crosses the HP gas main and thus there will be a c.£3 million cost impact. Protection works or pipe upgrades will be needed for crossing the gas main with an additional £1.2 million stopple charge. Furthermore, there are likely to be further limitations where a route runs within 80 of the gas main or cable route for more than a length of 80m.
What is the quality of the supporting evidence?	4	Initial modelling and appraisal carried out in 2014, further modelling undertaken in 2018.
Key uncertainties	Land take requirements with reluctant landowners may result in higher costs and time delay. Environmental constraints again may result in higher costs and time delay. Extensive public consultation and stakeholder engagement underway in order to mitigate potential issues. Extensive review of options undertaken with high level of expert involvement early in the process. Engagement with Natural England, the Environment Agency and Highways England undertaken. Commercial impacts on the Golf Course has the potential to result in significant additional costs and delay.	

Financial

Affordability	3	Budgetary options are still being investigated.
Capital Cost (£m)	£150-£250 million	
Overall cost risk	2	

Commercial

Flexibility of option	3	Little opportunity to change alignment later in design phase, however at this stage option can be scaled up or down. When in operation option can not be changed or closed without significant financial penalties.
Where is funding coming from?	None specifically set aside. Funding sources to be considered.	
Any income generated?	No	N/A

Early Assessment and Sifting Tool

Option name/no.	Option 25: A140 / A1270 junction to A1074 east of Longwater; 2014 Green, single carriageway	
Description	From the A140 junction with the A1270, Option 25 heads south-west, passing Hellesdon to the north-west crossing Reepham Road. The route continues in a south-western direction crossing the A1067, Low Road and the River Wensum. Option 25 then routes west, crossing Town House Road, passing to the south of Costessey, crossing Longwater Lane and the River Tud, before connecting to the A1074 between Longwater and New Costessey. Option 25 would be of single carriageway standard.	

Strategic

Scale of impact against specific objectives	4	
Fit with high-level objectives	4	Supports the creation of a stronger, cleaner and more productive economy by improving links to local economy and sources of employment across the network. Connects people and places, and will help to encourage investment into the west of Norwich including, for example, tourism. Will improve journey time reliability on the local road network, as well as the A47 and A1067, transferring trips from existing local roads to a new high-speed high-standard link designed to the latest safety standards. Provides strong regional economic links for the future. It can be assumed that the provision of a dualled version of this route will further improve resilience and reliability. Previous study undertaken during 2017 considered potential mitigation options addressing environmental concerns.
Degree of consensus	5	Public consultation has taken place with high degree of consensus that a new highway link would address the current network issues. Considerations that the council should take into account, according to respondents, included: reducing congestion, rat running, shortening journey times and providing better journey time reliability together with improved road safety.

Economic

Economic growth	4	Links in to the A1074 east of the Longwater interchange before heading north east and linking in to B1149 NDR junction providing access to the airport and potential development sites adjacent the NDR. Access to the airport will improve connectivity of the region to the airport and will help link the Longwater area to the NDR. The route will reduce journey times improve network resilience and reliability. Additional stress will be added to the Longwater Interchange.
Socio-distributional impacts and the regions	2	Improved accessibility for groups with access to a car. Severance currently related to rat running would likely reduce improving conditions for Non-Motorised Users in the Drayton and Costessey areas. It will also reduce trip rates on the Norwich Ring Road (Boundary Road / Sweet Briar Road / Colman Road) providing a boost to businesses in the area by reducing journey times and increasing resilience in the network.
Local environment	2	<i>Separate, additional Environmental Appraisal undertaken</i>
Well being	3	May reduce severance with reassignment of traffic from rat run routes and improve access to goods and services for non motorised users encouraging physical activity in rural communities currently suffering severance due to rat running. Expected to improve access to goods and services for private vehicle owners in terms of improved JT on network. New road would have a lower accident rate associated with improved design and conditions.
Expected VfM category	3. Medium 1.5-2	

Managerial

Implementation timetable	Medium (3-8 Years)	Assumed construction start 2022. Assumed completion 2026.
Public acceptability	4	An initial round of public consultation in May-July 2018 based on high level key issues seeking to identify the need for the scheme and extent of public support for a potential solution in principle was undertaken. This did not include any specific scheme options or lines on a plan, however broad support was noted for a highways option as a solution to existing issues. There are established stakeholder groups actively engaged in the project – this includes a Member Working Group (Council Members) and a Local Liaison Group (Parish council reps). Engagement with Natural England, the Environment Agency and Highways England was also undertaken.
Practical feasibility	2	Option has been tested via modelling. New crossing over the River Tud and River Wensum required, although mitigation measures are expected to reduce the potential impacts. Environmental concerns and planning process will determine legal feasibility of the option. NCC would construct and maintain option and have the required statutory powers.
What is the quality of the supporting evidence?	4	Initial modelling and appraisal carried out in 2014, further modelling undertaken in 2018.
Key uncertainties	Land take requirements with reluctant landowners may result in higher costs and time delay. Environmental constraints again may result in higher costs and time delay. Extensive public consultation and stakeholder engagement underway in order to mitigate potential issues. Extensive review of options undertaken with high level of expert involvement early in the process. Engagement with Natural England, the Environment Agency and Highways England undertaken.	

Financial

Affordability	3	Budgetary options are still being investigated.
Capital Cost (£m)	£100-£150 million	
Overall cost risk	3	

Commercial

Flexibility of option	3	Little opportunity to change alignment later in design phase, however at this stage option can be scaled up or down. When in operation option can not be changed or closed without significant financial penalties.
Where is funding coming from?	None specifically set aside. Funding sources to be considered.	
Any income generated?	No	N/A

Early Assessment and Sifting Tool

Option name/no.	Option 26: A140 / A1270 junction to A1074 east of Longwater; 2014 Green, dual carriageway	
Description	From the A140 junction with the A1270, Option 26 heads south-west, passing Hellesdon to the north-west crossing Reepham Road. The route continues in a south-western direction crossing the A1067, Low Road and the River Wensum. Option 26 then routes west, crossing Town House Road, passing to the south of Costessey, crossing Longwater Lane and the River Tud, before connecting to the A1074 between Longwater and New Costessey. Option 26 would be of dual carriageway standard. Upgrades to the A1074 to dual carriageway standard may also be required.	

Strategic

Scale of impact against specific objectives	4	
Fit with high-level objectives	4	Supports the creation of a stronger, cleaner and more productive economy by improving links to local economy and sources of employment across the network. Connects people and places, and will help to encourage investment into the west of Norwich including, for example, tourism. Will improve journey time reliability on the local road network, as well as the A47 and A1067, transferring trips from existing local roads to a new high-speed high-standard link designed to the latest safety standards. Provides strong regional economic links for the future. Previous study undertaken during 2017 considered potential mitigation options addressing environmental concerns.
Degree of consensus	5	Public consultation has taken place with high degree of consensus that a new highway link would address the current network issues. Considerations that the council should take into account, according to respondents, included: reducing congestion, rat running, shortening journey times and providing better journey time reliability together with improved road safety.

Economic

Economic growth	4	Links in to the A1074 east of the Longwater interchange before heading north east and linking in to B1149 NDR junction providing access to the airport and potential development sites adjacent the NDR. Access to the airport will improve connectivity of the region to the airport and will help link the Longwater area to the NDR. The route will reduce journey times improve network resilience and reliability. Additional stress will be added to the Longwater Interchange.
Socio-distributional impacts and the regions	2	Improved accessibility for groups with access to a car. Severance currently related to rat running would likely reduce improving conditions for Non-Motorised Users in the Drayton and Costessey areas. It will also reduce trip rates on the Norwich Ring Road (Boundary Road / Sweet Briar Road / Colman Road) providing a boost to businesses in the area by reducing journey times and increasing resilience in the network.
Local environment	2	<i>Separate, additional Environmental Appraisal undertaken</i>
Well being	4	May reduce severance with reassignment of traffic from rat run routes and improve access to goods and services for non motorised users encouraging physical activity in rural communities currently suffering severance due to rat running. Expected to improve access to goods and services for private vehicle owners in terms of improved JT on network. New road would have a lower accident rate associated with improved design and conditions.
Expected VfM category	3. Medium 1.5-2	

Managerial

Implementation timetable	Medium (3-8 Years)	Assumed construction start 2022. Assumed completion 2026.
Public acceptability	4	An initial round of public consultation in May-July 2018 based on high level key issues seeking to identify the need for the scheme and extent of public support for a potential solution in principle was undertaken. This did not include any specific scheme options or lines on a plan, however broad support was noted for a highways option as a solution to existing issues. There are established stakeholder groups actively engaged in the project – this includes a Member Working Group (Council Members) and a Local Liaison Group (Parish council reps). Engagement with Natural England, the Environment Agency and Highways England was also undertaken.
Practical feasibility	2	Option has been tested via modelling. New crossing over the River Tud and River Wensum required, although mitigation measures are expected to reduce the potential impacts. Environmental concerns and planning process will determine legal feasibility of the option. NCC would construct and maintain option and have the required statutory powers.
What is the quality of the supporting evidence?	4	Initial modelling and appraisal carried out in 2014, further modelling undertaken in 2018.
Key uncertainties	Land take requirements with reluctant landowners may result in higher costs and time delay. Environmental constraints again may result in higher costs and time delay. Extensive public consultation and stakeholder engagement underway in order to mitigate potential issues. Extensive review of options undertaken with high level of expert involvement early in the process. Engagement with Natural England, the Environment Agency and Highways England undertaken.	

Financial

Affordability	3	Budgetary options are still being investigated.
Capital Cost (£m)	£150-£250 million	
Overall cost risk	3	

Commercial

Flexibility of option	3	Little opportunity to change alignment later in design phase, however at this stage option can be scaled up or down. When in operation option can not be changed or closed without significant financial penalties.
Where is funding coming from?	None specifically set aside. Funding sources to be considered.	
Any income generated?	No	N/A

Early Assessment and Sifting Tool

Option name/no.	Option 27: North Tuddenham via Attlebridge; 2018 Road Alignment (1), single carriageway	
Description	From the A1067, west of Attlebridge, Option 27 heads west crossing Marl Hill Road and Morton Lane and the B1535 toward Collin Green Farm. The route then heads south-west passing between Collin Green Farm (north of alignment) and the solar farm (south of the alignment), before crossing Blind Lane. Option 27 routes south running parallel to Lyng Road. It crosses Stone Road passing west of Hockering Wood to connect with the A47 east of North Tuddenham. Option 27 would be of single carriageway standard.	

Strategic

Scale of impact against specific objectives	3	
Fit with high-level objectives	3	Supports the creation of a stronger, cleaner and more productive economy by improving links to local economy and sources of employment across the network. Connects people and places, and will help to encourage investment into the west of Norwich including, for example, tourism. Will improve journey time reliability on the local road network, as well as the A47 and A1067, transferring trips from existing local roads to a new high-speed high-standard link designed to the latest safety standards. Provides strong regional economic links for the future. It can be assumed that the provision of a dualled version of this route will further improve resilience and reliability. Previous study undertaken during 2017 considered potential mitigation options addressing environmental concerns.
Degree of consensus	5	Public consultation has taken place with high degree of consensus that a new highway link would address the current network issues. Considerations that the council should take into account, according to respondents, included: reducing congestion, rat running, shortening journey times and providing better journey time reliability together with improved road safety.

Economic

Economic growth	3	Most indirect route of the new options would have the longest distance and would have limited improvement in terms of the encouragement of housing. Improvement to connectivity and resilience. Would have little impact in terms of delivering housing in the East or connections of the Food Hub, Research Park or Longwater Employment Area.
Socio-distributional impacts and the regions	4	Slightly improved accessibility for groups with access to a car. Severance currently related to rat running would be reduced giving minor improvements to conditions for Non-Motorised Users in the Weston Longville and Ringland areas.
Local environment	3	<i>Separate, additional Environmental Appraisal undertaken</i>
Well being	3	May reduce severance with reassignment of traffic from rat run routes and improve access to goods and services for non motorised users encouraging physical activity in specific locations. Expected to improve access to goods and services for private vehicle owners in terms of improved JT on network. New road would have a lower accident rate associated with improved design and conditions.
Expected VfM category	3. Medium 1.5-2	

Managerial

Implementation timetable	Medium (3-8 Years)	Assumed construction start 2022. Assumed completion 2026.
Public acceptability	4	An initial round of public consultation in May-July 2018 based on high level key issues seeking to identify the need for the scheme and extent of public support for a potential solution in principle was undertaken. This did not include any specific scheme options or lines on a plan, however broad support was noted for a highways option as a solution to existing issues. There are established stakeholder groups actively engaged in the project – this includes a Member Working Group (Council Members) and a Local Liaison Group (Parish council reps). Engagement with Natural England, the Environment Agency and Highways England was also undertaken.
Practical feasibility	2	Longest route and would likely have significant hurdles. The option runs parallel to Heath Rd during its route and would require diversion/shuttle running increasing delays/construction time. The EHV overhead power lines have a minor impact during construction. The design would be limited by fixed pylons locations; building bridges near them has further challenges. High Voltage Power line Orsted Cable cannot be re-routed to accommodate our proposals. However crossing the cable would require protection measures to be installed below the ground – for example reinforced concrete slab bridging over the cable trench. These works are expected to have a cost of upto £250-£300K per crossing point.
What is the quality of the supporting evidence?	4	Not modelled in 2014 though similar to previous options. Modelling undertaken in 2018.
Key uncertainties	Environmental constraints, low public support and scheme cost.	

Financial

Affordability	2	Budgetary options are still being investigated.
Capital Cost (£m)	£50-£100 million	
Overall cost risk	3	

Commercial

Flexibility of option	3	Little opportunity to change alignment later in design phase, however at this stage option can be scaled up or down. When in operation option can not be changed or closed without significant financial penalties.
Where is funding coming from?	None specifically set aside. Funding sources to be considered.	
Any income generated?	No	N/A

Early Assessment and Sifting Tool

Option name/no.	Option 28: North Tuddenham via Attlebridge; 2018 Road Alignment (1), dual carriageway	
Description	From the A1067, west of Attlebridge, Option 28 heads west crossing Marl Hill Road and Morton Lane and the B1535 toward Collin Green Farm. The route then heads south-west passing between Collin Green Farm (north of alignment) and the solar farm (south of the alignment), before crossing Blind Lane. Option 28 routes south running parallel to Lyng Road. It crosses Stone Road passing west of Hockering Wood to connect with the A47 east of North Tuddenham. Option 28 would be of dual carriageway standard. Upgrades to the A1067 to dual carriageway standard may also be required.	

Strategic

Scale of impact against specific objectives	4	
Fit with high-level objectives	4	Supports the creation of a stronger, cleaner and more productive economy by improving links to local economy and sources of employment across the network. Connects people and places, and will help to encourage investment into the west of Norwich including, for example, tourism. Will improve journey time reliability on the local road network, as well as the A47 and A1067, transferring trips from existing local roads to a new high-speed high-standard link designed to the latest safety standards. Provides strong regional economic links for the future. Previous study undertaken during 2017 considered potential mitigation options addressing environmental concerns.
Degree of consensus	5	Public consultation has taken place with high degree of consensus that a new highway link would address the current network issues. Considerations that the council should take into account, according to respondents, included: reducing congestion, rat running, shortening journey times and providing better journey time reliability together with improved road safety.

Economic

Economic growth	4	Most indirect route of the new options would have the longest distance and would have limited improvement in terms of the encouragement of housing. Improvement to connectivity and resilience. Would have little impact in terms of delivering housing in the East or connections of the Food Hub, Research Park or Longwater Employment Area.
Socio-distributional impacts and the regions	4	Slightly improved accessibility for groups with access to a car. Severance currently related to rat running would be reduced giving minor improvements to conditions for Non-Motorised Users in the Weston Longville and Ringland areas.
Local environment	3	<i>Separate, additional Environmental Appraisal undertaken</i>
Well being	4	May reduce severance with reassignment of traffic from rat run routes and improve access to goods and services for non motorised users encouraging physical activity in specific locations. Expected to improve access to goods and services for private vehicle owners in terms of improved JT on network. New road would have a lower accident rate associated with improved design and conditions.
Expected VfM category	3. Medium 1.5-2	

Managerial

Implementation timetable	Medium (3-8 Years)	Assumed construction start 2022. Assumed completion 2026.
Public acceptability	4	An initial round of public consultation in May-July 2018 based on high level key issues seeking to identify the need for the scheme and extent of public support for a potential solution in principle was undertaken. This did not include any specific scheme options or lines on a plan, however broad support was noted for a highways option as a solution to existing issues. There are established stakeholder groups actively engaged in the project – this includes a Member Working Group (Council Members) and a Local Liaison Group (Parish council reps). Engagement with Natural England, the Environment Agency and Highways England was also undertaken.
Practical feasibility	2	Longest route and would likely have significant hurdles. The option runs parallel to Heath Rd during its route and would require diversion/shuttle running increasing delays/construction time. The EHV overhead power lines have a minor impact during construction. The design would be limited by fixed pylons locations; building bridges near them has further challenges. High Voltage Power line Orsted Cable cannot be re-routed to accommodate our proposals. However crossing the cable would require protection measures to be installed below the ground – for example reinforced concrete slab bridging over the cable trench. These works are expected to have a cost of upto £250-£300K per crossing point.
What is the quality of the supporting evidence?	4	Not modelled in 2014 though similar to previous options. Modelling undertaken in 2018.
Key uncertainties	Environmental constraints, low public support and scheme cost.	

Financial

Affordability	2	Budgetary options are still being investigated.
Capital Cost (£m)	£100-£150 million	
Overall cost risk	3	

Commercial

Flexibility of option	3	Little opportunity to change alignment later in design phase, however at this stage option can be scaled up or down. When in operation option can not be changed or closed without significant financial penalties.
Where is funding coming from?	None specifically set aside. Funding sources to be considered.	
Any income generated?	No	N/A

Early Assessment and Sifting Tool

Option name/no.	Option 29: A47 Honingham to Attlebridge (1); 2018 Road Alignment (2), single carriageway	
Description	From the A1067 west of Attlebridge, Option 29 runs parallel to Marl Hill Road, before crossing Ringland Lane to pass east of Weston Longville. Option 29 then routes south along an alignment approximately following the pylons, and crosses Weston Road. The route then passes east of Weston Green, before routing south-west, crossing Breck Road and The Broadway. The route runs parallel to Wood Lane to connect with the A47 to the north-west of Honingham at the existing Wood Lane / Berrys Lane junction. Option 29 would be of single carriageway standard.	

Strategic

Scale of impact against specific objectives	4	
Fit with high-level objectives	3	Supports the creation of a stronger, cleaner and more productive economy by improving links to local economy and sources of employment across the network. Connects people and places, and will help to encourage investment into the west of Norwich including, for example, tourism. Will improve journey time reliability on the local road network, as well as the A47 and A1067, transferring trips from existing local roads to a new high-speed high-standard link designed to the latest safety standards. Provides strong regional economic links for the future. It can be assumed that the provision of a dualled version of this route will further improve resilience and reliability. Previous study undertaken during 2017 considered potential mitigation options addressing environmental concerns.
Degree of consensus	5	Public consultation has taken place with high degree of consensus that a new highway link would address the current network issues. Considerations that the council should take into account, according to respondents, included: reducing congestion, rat running, shortening journey times and providing better journey time reliability together with improved road safety.

Economic

Economic growth	4	Provides increased accessibility, reliability and resilience, similar to the purple line. Limited access to housing or proposed housing development. Potential to link into the proposed realigned dualled A47 junction at the intersection of the A47 and Paddy's Lane. Will help to encourage Tourism locally through improved transport links and reduced congestion.
Socio-distributional impacts and the regions	3	Slightly improved accessibility for groups with access to a car. Severance currently related to rat running would be reduced giving minor improvements to conditions for Non-Motorised Users in the Weston Longville and Ringland areas.
Local environment	2	<i>Separate, additional Environmental Appraisal undertaken</i>
Well being	3	May reduce severance with reassignment of traffic from rat run routes and improve access to goods and services for non motorised users encouraging physical activity in specific locations. Expected to improve access to goods and services for private vehicle owners in terms of improved JT on network. New road would have a lower accident rate associated with improved design and conditions.
Expected VfM category	3. Medium 1.5-2	

Managerial

Implementation timetable	Medium (3-8 Years)	Assumed construction start 2022. Assumed completion 2026.
Public acceptability	4	An initial round of public consultation in May-July 2018 based on high level key issues seeking to identify the need for the scheme and extent of public support for a potential solution in principle was undertaken. This did not include any specific scheme options or lines on a plan, however broad support was noted for a highways option as a solution to existing issues. There are established stakeholder groups actively engaged in the project – this includes a Member Working Group (Council Members) and a Local Liaison Group (Parish council reps). Engagement with Natural England, the Environment Agency and Highways England was also undertaken.
Practical feasibility	3	Option has not been tested via modelling, however similar to other options so estimated can be made. No new crossing of Wensum required however environmental concerns and planning process will determine legal feasibility of the option. NCC would construct and maintain option and have the required statutory powers. The EHV overhead power lines have a minor impact during construction. The design would be limited by fixed pylons locations; building bridges near them has further challenges. High Voltage Power line Orsted Cable cannot be re-routed to accommodate our proposals. However crossing the cable would require protection measures to be installed below the ground – for example reinforced concrete slab bridging over the cable trench. These works are expected to have a cost of upto £250-£300K per crossing point. Running parallel to the High Voltage Power line Orsted Cable would need to be adequately separated from the cable and positioned outside of the easement which is expected to be c12m each side of each cable noting there are at least four cables being installed (the hazard zone extents are likely to be wider than the easement the cable route land extents being purchased extend to about 55m each side, therefore any options running within 60m on each side of the cable route centreline may be considered to be at risk).
What is the quality of the supporting evidence?	4	Not modelled in 2014 though similar to previous options. Modelling undertaken in 2018.
Key uncertainties	Lack of evidence, public acceptability, land take requirements and environmental constraints.	

Financial

Affordability	3	Budgetary options are still being investigated.
Capital Cost (£m)	£50-£100 million	
Overall cost risk	3	

Commercial

Flexibility of option	3	Little opportunity to change alignment later in design phase, however at this stage option can be scaled up or down. When in operation option can not be changed or closed without significant financial penalties.
Where is funding coming from?	None specifically set aside. Funding sources to be considered.	
Any income generated?	No	N/A

Early Assessment and Sifting Tool

Option name/no.	Option 30: A47 Honingham to Attlebridge (1); 2018 Road Alignment (2), dual carriageway	
Description	From the A1067 west of Attlebridge, Option 30 runs parallel to Marl Hill Road, before crossing Ringland Lane to pass east of Weston Longville. Option 30 then routes south along an alignment approximately following the pylons, and crosses Weston Road. The route then passes east of Weston Green, before routing south-west, crossing Breck Road and The Broadway. The route runs parallel to Wood Lane to connect with the A47 to the north-west of Honingham at the existing Wood Lane / Berrys Lane junction. Option 30 would be of dual carriageway standard. Upgrades to the A1067 to dual carriageway standard may also be required.	

Strategic

Scale of impact against specific objectives	4	
Fit with high-level objectives	4	Supports the creation of a stronger, cleaner and more productive economy by improving links to local economy and sources of employment across the network. Connects people and places, and will help to encourage investment into the west of Norwich including, for example, tourism. Will improve journey time reliability on the local road network, as well as the A47 and A1067, transferring trips from existing local roads to a new high-speed high-standard link designed to the latest safety standards. Provides strong regional economic links for the future. Previous study undertaken during 2017 considered potential mitigation options addressing environmental concerns.
Degree of consensus	5	Public consultation has taken place with high degree of consensus that a new highway link would address the current network issues. Considerations that the council should take into account, according to respondents, included: reducing congestion, rat running, shortening journey times and providing better journey time reliability together with improved road safety.

Economic

Economic growth	4	Provides increased accessibility, reliability and resilience, similar to the purple line. Limited access to housing or proposed housing development. Potential to link into the proposed realigned dualled A47 junction at the intersection of the A47 and Paddy's Lane. Will help to encourage Tourism locally through improved transport links and reduced congestion.
Socio-distributional impacts and the regions	3	Slightly improved accessibility for groups with access to a car. Severance currently related to rat running would be reduced giving minor improvements to conditions for Non-Motorised Users in the Weston Longville and Ringland areas.
Local environment	2	<i>Separate, additional Environmental Appraisal undertaken</i>
Well being	4	May reduce severance with reassignment of traffic from rat run routes and improve access to goods and services for non motorised users encouraging physical activity in specific locations. Expected to improve access to goods and services for private vehicle owners in terms of improved JT on network. New road would have a lower accident rate associated with improved design and conditions.
Expected VfM category	3. Medium 1.5-2	

Managerial

Implementation timetable	Medium (3-8 Years)	Assumed construction start 2022. Assumed completion 2026.
Public acceptability	4	An initial round of public consultation in May-July 2018 based on high level key issues seeking to identify the need for the scheme and extent of public support for a potential solution in principle was undertaken. This did not include any specific scheme options or lines on a plan, however broad support was noted for a highways option as a solution to existing issues. There are established stakeholder groups actively engaged in the project – this includes a Member Working Group (Council Members) and a Local Liaison Group (Parish council reps). Engagement with Natural England, the Environment Agency and Highways England was also undertaken.
Practical feasibility	4	Option has not been tested via modelling, however similar to other options so estimated can be made. No new crossing of Wensum required however environmental concerns and planning process will determine legal feasibility of the option. NCC would construct and maintain option and have the required statutory powers. The EHV overhead power lines have a minor impact during construction. The design would be limited by fixed pylons locations; building bridges near them has further challenges. High Voltage Power line Orsted Cable cannot be re-routed to accommodate our proposals. However crossing the cable would require protection measures to be installed below the ground – for example reinforced concrete slab bridging over the cable trench. These works are expected to have a cost of upto £250-£300K per crossing point. Running parallel to the High Voltage Power line Orsted Cable would need to be adequately separated from the cable and positioned outside of the easement which is expected to be c12m each side of each cable noting there are at least four cables being installed (the hazard zone extents are likely to be wider than the easement the cable route land extents being purchased extend to about 55m each side, therefore any options running within 60m on each side of the cable route centreline may be considered to be at risk).
What is the quality of the supporting evidence?	4	Not modelled in 2014 though similar to previous options. Modelling undertaken in 2018.
Key uncertainties	Lack of evidence, public acceptability, land take requirements and environmental constraints.	

Financial

Affordability	3	Budgetary options are still being investigated.
Capital Cost (£m)	£50-£100 million	
Overall cost risk	3	

Commercial

Flexibility of option	3	Little opportunity to change alignment later in design phase, however at this stage option can be scaled up or down. When in operation option can not be changed or closed without significant financial penalties.
Where is funding coming from?	None specifically set aside. Funding sources to be considered.	
Any income generated?	No	N/A

Early Assessment and Sifting Tool

Option name/no.	Option 31: A47 to Attlebridge (2), 2018 Road Alignment (3), single carriageway	
Description	From the A1067 west of Attlebridge, Option 31 runs parallel to Marl Hill Road, before crossing Ringland Lane to pass east of Weston Longville. Option 31 then routes south along an alignment approximately following the pylons, and crosses Weston Road. The route continues south passing east of Weston Green and crossing Breck Road and The Broadway. Option 31 then heads south-west just north of Hall Hills to connect with the A47 to the north-west of Honingham at the existing Wood Lane / Berrys Lane junction. Option 31 would be of single carriageway standard.	

Strategic

Scale of impact against specific objectives	4	
Fit with high-level objectives	3	Supports the creation of a stronger, cleaner and more productive economy by improving links to local economy and sources of employment across the network. Connects people and places, and will help to encourage investment into the west of Norwich including, for example, tourism. Will improve journey time reliability on the local road network, as well as the A47 and A1067, transferring trips from existing local roads to a new high-speed high-standard link designed to the latest safety standards. Provides strong regional economic links for the future. It can be assumed that the provision of a dualled version of this route will further improve resilience and reliability. Previous study undertaken during 2017 considered potential mitigation options addressing environmental concerns.
Degree of consensus	5	Public consultation has taken place with high degree of consensus that a new highway link would address the current network issues. Considerations that the council should take into account, according to respondents, included: reducing congestion, rat running, shortening journey times and providing better journey time reliability together with improved road safety.

Economic

Economic growth	4	Provides increased accessibility, reliability and resilience similar to the purple line. Limited access to housing or proposed housing development. Potential to link into the proposed realigned dualled A47 junction at the intersection of the A47 and Paddy's Lane. Will help to encourage tourism locally through improved transport links and reduced congestion. Dualled option would be expected to provide greater resilience and journey time reliability.
Socio-distributional impacts and the regions	3	Slightly improved accessibility for groups with access to a car. Severance currently related to rat running would be reduced giving minor improvements to conditions for Non-Motorised Users in the Weston Longville and Ringland areas.
Local environment	2	<i>Separate, additional Environmental Appraisal undertaken</i>
Well being	3	May reduce severance with reassignment of traffic from rat run routes and improve access to goods and services for non motorised users encouraging physical activity in specific locations. Expected to improve access to goods and services for private vehicle owners in terms of improved JT on network. New road would have a lower accident rate associated with improved design and conditions.
Expected VfM category	3. Medium 1.5-2	

Managerial

Implementation timetable	Medium (3-8 Years)	Assumed construction start 2022. Assumed completion 2026.
Public acceptability	4	An initial round of public consultation in May-July 2018 based on high level key issues seeking to identify the need for the scheme and extent of public support for a potential solution in principle was undertaken. This did not include any specific scheme options or lines on a plan, however broad support was noted for a highways option as a solution to existing issues. There are established stakeholder groups actively engaged in the project – this includes a Member Working Group (Council Members) and a Local Liaison Group (Parish council reps). Engagement with Natural England, the Environment Agency and Highways England was also undertaken.
Practical feasibility	3	Similar to previous options in 2014. The EHV overhead power lines have a minor impact during construction. The design would be limited by fixed pylons locations; building bridges near them has further challenges. This option crosses the HP gas main and thus there will be a c£3m cost impact. Protection works or pipe upgrade will be needed if we are to cross the HP gas main and £1.2m stopple charges for stopping the main gas supply to East Anglia during the works. Furthermore there are likely to be further limitations where a route runs within 80m of HP gas main or cable route for more than a length of 80m. High Voltage Power line Orsted Cable cannot be re-routed to accommodate our proposals. However crossing the cable would require protection measures to be installed below the ground – for example reinforced concrete slab bridging over the cable trench. These works are expected to have a cost of upto £250-£300K per crossing point. Running parallel to the High Voltage Power line Orsted Cable would need to be adequately separated from the cable and positioned outside of the easement which is expected to be c12m each side of each cable noting there are at least four cables being installed (the hazard zone extents are likely to be wider than the easement the cable route land extents being purchased extend to about 55m each side, therefore any options running within 60m on each side of the cable route centreline may be considered to be at risk).
What is the quality of the supporting evidence?	4	Not modelled in 2014 though similar to previous options. Modelling undertaken in 2018.
Key uncertainties	Public acceptability, land take requirements and environmental constraints.	

Financial

Affordability	3	Budgetary options are still being investigated.
Capital Cost (£m)	£50-£100 million	
Overall cost risk	3	

Commercial

Flexibility of option	3	Little opportunity to change alignment later in design phase, however at this stage option can be scaled up or down. When in operation option can not be changed or closed without significant financial penalties.
Where is funding coming from?	None specifically set aside. Funding sources to be considered.	
Any income generated?	No	N/A

Early Assessment and Sifting Tool

Option name/no.	Option 32: A47 to Attlebridge (2), 2018 Road Alignment (3), dual carriageway	
Description	From the A1067 west of Attlebridge, Option 32 runs parallel to Marl Hill Road, before crossing Ringland Lane to pass east of Weston Longville. Option 32 then routes south along an alignment approximately following the pylons, and crosses Weston Road. The route continues south passing east of Weston Green and crossing Breck Road and The Broadway. Option 32 then heads south-west just north of Hall Hills to connect with the A47 to the north-west of Honingham at the existing Wood Lane / Berrys Lane junction. Option 32 would be of dual carriageway standard. Upgrades to the A1067 to dual carriageway standard may also be required.	

Strategic

Scale of impact against specific objectives	4	
Fit with high-level objectives	4	Supports the creation of a stronger, cleaner and more productive economy by improving links to local economy and sources of employment across the network. Connects people and places, and will help to encourage investment into the west of Norwich including, for example, tourism. Will improve journey time reliability on the local road network, as well as the A47 and A1067, transferring trips from existing local roads to a new high-speed high-standard link designed to the latest safety standards. Provides strong regional economic links for the future. Previous study undertaken during 2017 considered potential mitigation options addressing environmental concerns.
Degree of consensus	5	Public consultation has taken place with high degree of consensus that a new highway link would address the current network issues. Considerations that the council should take into account, according to respondents, included: reducing congestion, rat running, shortening journey times and providing better journey time reliability together with improved road safety.

Economic

Economic growth	4	Provides increased accessibility, reliability and resilience similar to the purple line. Limited access to housing or proposed housing development. Potential to link into the proposed realigned dualled A47 junction at the intersection of the A47 and Paddy's Lane. Will help to encourage tourism locally through improved transport links and reduced congestion. Dualled option would be expected to provide greater resilience and journey time reliability.
Socio-distributional impacts and the regions	3	Slightly improved accessibility for groups with access to a car. Severance currently related to rat running would be reduced giving minor improvements to conditions for Non-Motorised Users in the Weston Longville and Ringland areas.
Local environment	2	<i>Separate, additional Environmental Appraisal undertaken</i>
Well being	4	May reduce severance with reassignment of traffic from rat run routes and improve access to goods and services for non motorised users encouraging physical activity in specific locations. Expected to improve access to goods and services for private vehicle owners in terms of improved JT on network. New road would have a lower accident rate associated with improved design and conditions.
Expected VfM category	3. Medium 1.5-2	

Managerial

Implementation timetable	Medium (3-8 Years)	Assumed construction start 2022. Assumed completion 2026.
Public acceptability	4	An initial round of public consultation in May-July 2018 based on high level key issues seeking to identify the need for the scheme and extent of public support for a potential solution in principle was undertaken. This did not include any specific scheme options or lines on a plan, however broad support was noted for a highways option as a solution to existing issues. There are established stakeholder groups actively engaged in the project – this includes a Member Working Group (Council Members) and a Local Liaison Group (Parish council reps). Engagement with Natural England, the Environment Agency and Highways England was also undertaken.
Practical feasibility	4	Similar to previous options in 2014. The EHV overhead power lines have a minor impact during construction. The design would be limited by fixed pylons locations; building bridges near them has further challenges. This option crosses the HP gas main and thus there will be a c£3m cost impact. Protection works or pipe upgrade will be needed if we are to cross the HP gas main and £1.2m stopple charges for stopping the main gas supply to East Anglia during the works. Furthermore there are likely to be further limitations where a route runs within 80m of HP gas main or cable route for more than a length of 80m. High Voltage Power line Orsted Cable cannot be re-routed to accommodate our proposals. However crossing the cable would require protection measures to be installed below the ground – for example reinforced concrete slab bridging over the cable trench. These works are expected to have a cost of upto £250-£300K per crossing point. Running parallel to the High Voltage Power line Orsted Cable would need to be adequately separated from the cable and positioned outside of the easement which is expected to be c12m each side of each cable noting there are at least four cables being installed (the hazard zone extents are likely to be wider than the easement the cable route land extents being purchased extend to about 55m each side, therefore any options running within 60m on each side of the cable route centreline may be considered to be at risk).
What is the quality of the supporting evidence?	4	Not modelled in 2014 though similar to previous options. Modelling undertaken in 2018.
Key uncertainties	Public acceptability, land take requirements and environmental constraints.	

Financial

Affordability	3	Budgetary options are still being investigated.
Capital Cost (£m)	£100-£150 million	
Overall cost risk	3	

Commercial

Flexibility of option	3	Little opportunity to change alignment later in design phase, however at this stage option can be scaled up or down. When in operation option can not be changed or closed without significant financial penalties.
Where is funding coming from?	None specifically set aside. Funding sources to be considered.	
Any income generated?	No	N/A

Early Assessment and Sifting Tool

Option name/no.	Option 33: A47 Easton to A1067 / A1270 junction; 2018 Road Alignment (4), single carriageway	
Description	From the A1067 junction with the A1270 at Deighton Hills, Option 33 heads south-west, crossing the River Wensum. The route continues, crossing Ringland Lane, Weston Road and Honingham Lane. The route then heads south crossing Weston Road and the River Tud to connect with the A47 at the existing Taverham Road junction. Option 33 would be of single carriageway standard.	

Strategic

Scale of impact against specific objectives	4	
Fit with high-level objectives	4	Supports the creation of a stronger, cleaner and more productive economy by improving links to local economy and sources of employment across the network. Connects people and places, and will help to encourage investment into the west of Norwich including, for example, tourism. Will improve journey time reliability on the local road network, as well as the A47 and A1067, transferring trips from existing local roads to a new high-speed high-standard link designed to the latest safety standards. Provides strong regional economic links for the future. It can be assumed that the provision of a dualled version of this route will further improve resilience and reliability. Previous study undertaken during 2017 considered potential mitigation options addressing environmental concerns.
Degree of consensus	5	Public consultation has taken place with high degree of consensus that a new highway link would address the current network issues. Considerations that the council should take into account, according to respondents, included: reducing congestion, rat running, shortening journey times and providing better journey time reliability together with improved road safety.

Economic

Economic growth	4	Running from Easton to the NDR this option creates excellent links into the food zone linking people and potential employment while creating excellent business links. Will also provide more direct link to existing and proposed housing in the Easton area.
Socio-distributional impacts and the regions	3	Slightly improved accessibility for groups with access to a car. Severance currently related to rat running would be reduced giving minor improvements to conditions for Non-Motorised Users in the Ringland and Taverham areas.
Local environment	2	<i>Separate, additional Environmental Appraisal undertaken</i>
Well being	3	May reduce severance with reassignment of traffic from rat run routes and improve access to goods and services for non motorised users encouraging physical activity in specific locations. Expected to improve access to goods and services for private vehicle owners in terms of improved JT on network. New road would have a lower accident rate associated with improved design and conditions.
Expected VfM category	3. Medium 1.5-2	

Managerial

Implementation timetable	Medium (3-8 Years)	Assumed construction start 2022. Assumed completion 2026.
Public acceptability	4	An initial round of public consultation in May-July 2018 based on high level key issues seeking to identify the need for the scheme and extent of public support for a potential solution in principle was undertaken. This did not include any specific scheme options or lines on a plan, however broad support was noted for a highways option as a solution to existing issues. There are established stakeholder groups actively engaged in the project – this includes a Member Working Group (Council Members) and a Local Liaison Group (Parish council reps). Engagement with Natural England, the Environment Agency and Highways England was also undertaken.
Practical feasibility	2	Not tested in a model but assumed to be practical in operation. However it runs close to an existing water body/farm and would require further investigation. The EHV overhead power lines have a minor impact during construction. The design would be limited by fixed pylons locations; building bridges near them has further challenges. This option crosses the HP gas main and thus there will be a c£3m cost impact. Protection works or pipe upgrade will be needed if we are to cross the HP gas main and £1.2m stopple charges for stopping the main gas supply to East Anglia during the works. Furthermore there are likely to be further limitations where a route runs within 80m of HP gas main or cable route for more than a length of 80m. High Voltage Power line Orsted Cable cannot be re-routed to accommodate our proposals. However crossing the cable would require protection measures to be installed below the ground – for example reinforced concrete slab bridging over the cable trench. These works are expected to have a cost of upto £250-£300K per crossing point.
What is the quality of the supporting evidence?	4	Not modelled in 2014 though similar to previous options. Modelling undertaken in 2018.
Key uncertainties	Public acceptability, land take requirements and environmental constraints.	

Financial

Affordability	3	Budgetary options are still being investigated.
Capital Cost (£m)	£100-£150 million	
Overall cost risk	3	

Commercial

Flexibility of option	3	Little opportunity to change alignment later in design phase, however at this stage option can be scaled up or down. When in operation option can not be changed or closed without significant financial penalties.
Where is funding coming from?	None specifically set aside. Funding sources to be considered.	
Any income generated?	No	N/A

Early Assessment and Sifting Tool

Option name/no.	Option 34: A47 Easton to A1067 / A1270 junction; 2018 Road Alignment (4), dual carriageway	
Description	From the A1067 junction with the A1270 at Deighton Hills, Option 34 heads south-west, crossing the River Wensum. The route continues, crossing Ringland Lane, Weston Road and Honingham Lane. The route then heads south crossing Weston Road and the River Tud to connect with the A47 at the existing Taverham Road junction. Option 34 would be of dual carriageway standard.	

Strategic

Scale of impact against specific objectives	4	
Fit with high-level objectives	4	Supports the creation of a stronger, cleaner and more productive economy by improving links to local economy and sources of employment across the network. Connects people and places, and will help to encourage investment into the west of Norwich including, for example, tourism. Will improve journey time reliability on the local road network, as well as the A47 and A1067, transferring trips from existing local roads to a new high-speed high-standard link designed to the latest safety standards. Provides strong regional economic links for the future. Previous study undertaken during 2017 considered potential mitigation options addressing environmental concerns.
Degree of consensus	5	Public consultation has taken place with high degree of consensus that a new highway link would address the current network issues. Considerations that the council should take into account, according to respondents, included: reducing congestion, rat running, shortening journey times and providing better journey time reliability together with improved road safety.

Economic

Economic growth	4	Running from Easton to the NDR this option creates excellent links into the food zone linking people and potential employment while creating excellent business links. Will also provide more direct link to existing and proposed housing in the Easton area.
Socio-distributional impacts and the regions	3	Slightly improved accessibility for groups with access to a car. Severance currently related to rat running would be reduced giving minor improvements to conditions for Non-Motorised Users in the Ringland and Taverham areas.
Local environment	2	<i>Separate, additional Environmental Appraisal undertaken</i>
Well being	4	May reduce severance with reassignment of traffic from rat run routes and improve access to goods and services for non motorised users encouraging physical activity in specific locations. Expected to improve access to goods and services for private vehicle owners in terms of improved JT on network. New road would have a lower accident rate associated with improved design and conditions.
Expected VfM category	3. Medium 1.5-2	

Managerial

Implementation timetable	Medium (3-8 Years)	Assumed construction start 2022. Assumed completion 2026.
Public acceptability	4	An initial round of public consultation in May-July 2018 based on high level key issues seeking to identify the need for the scheme and extent of public support for a potential solution in principle was undertaken. This did not include any specific scheme options or lines on a plan, however broad support was noted for a highways option as a solution to existing issues. There are established stakeholder groups actively engaged in the project – this includes a Member Working Group (Council Members) and a Local Liaison Group (Parish council reps). Engagement with Natural England, the Environment Agency and Highways England was also undertaken.
Practical feasibility	2	Not tested in a model but assumed to be practical in operation. However it runs close to an existing water body/farm and would require further investigation. The EHV overhead power lines have a minor impact during construction. The design would be limited by fixed pylons locations; building bridges near them has further challenges. This option crosses the HP gas main and thus there will be a c£3m cost impact. Protection works or pipe upgrade will be needed if we are to cross the HP gas main and £1.2m stopple charges for stopping the main gas supply to East Anglia during the works. Furthermore there are likely to be further limitations where a route runs within 80m of HP gas main or cable route for more than a length of 80m. High Voltage Power line Orsted Cable cannot be re-routed to accommodate our proposals. However crossing the cable would require protection measures to be installed below the ground – for example reinforced concrete slab bridging over the cable trench. These works are expected to have a cost of upto £250-£300K per crossing point.
What is the quality of the supporting evidence?	4	Not modelled in 2014 though similar to previous options. Modelling undertaken in 2018.
Key uncertainties	Public acceptability, land take requirements and environmental constraints.	

Financial

Affordability	3	Budgetary options are still being investigated.
Capital Cost (£m)	£150-£250 million	
Overall cost risk	3	

Commercial

Flexibility of option	3	Little opportunity to change alignment later in design phase, however at this stage option can be scaled up or down. When in operation option can not be changed or closed without significant financial penalties.
Where is funding coming from?	None specifically set aside. Funding sources to be considered.	
Any income generated?	No	N/A

Early Assessment and Sifting Tool

Option name/no.	Option 35: A47 Easton to A1067 / A1270 junction; 2018 Road Alignment (5), single carriageway	
Description	From the A1067 junction with the A1270 at Deighton Hills, Option 35 heads south, crossing Ringland Road to the west of Taverham. The route then turns south-west and crosses the River Wensum and connects to the Costessey Lane / Ringland Lane junction to the south of Ringland. Option 35 continues in a south-western direction following Ringland Road through Ringland Hills, before passing north of Hill Farm. The route crosses the River Tud to connect with the A47 to the west of Easton at the existing Taverham Road junction. Option 35 would be of single carriageway standard.	

Strategic

Scale of impact against specific objectives	4	
Fit with high-level objectives	4	Supports the creation of a stronger, cleaner and more productive economy by improving links to local economy and sources of employment across the network. Connects people and places, and will help to encourage investment into the west of Norwich including, for example, tourism. Will improve journey time reliability on the local road network, as well as the A47 and A1067, transferring trips from existing local roads to a new high-speed high-standard link designed to the latest safety standards. Provides strong regional economic links for the future. It can be assumed that the provision of a dualled version of this route will further improve resilience and reliability. Previous study undertaken during 2017 considered potential mitigation options addressing environmental concerns.
Degree of consensus	5	Public consultation has taken place with high degree of consensus that a new highway link would address the current network issues. Considerations that the council should take into account, according to respondents, included: reducing congestion, rat running, shortening journey times and providing better journey time reliability together with improved road safety.

Economic

Economic growth	4	Running from Easton to the NDR this option creates excellent connectivity into the food zone linking people and potential employment while creating excellent business links. Will also provide more direct link to existing and proposed housing in the Easton area.
Socio-distributional impacts and the regions	3	Slightly improved accessibility for groups with access to a car. Severance currently related to rat running would be reduced giving minor improvements to conditions for Non-Motorised Users in the Ringland and Taverham areas. Overall increase in accessibility expected.
Local environment	2	<i>Separate, additional Environmental Appraisal undertaken</i>
Well being	3	May reduce severance with reassignment of traffic from rat run routes and improve access to goods and services for non motorised users encouraging physical activity in specific locations. Expected to improve access to goods and services for private vehicle owners in terms of improved JT on network. New road would have a lower accident rate associated with improved design and conditions.
Expected VfM category	3. Medium 1.5-2	

Managerial

Implementation timetable	Medium (3-8 Years)	Assumed construction start 2022. Assumed completion 2026.
Public acceptability	4	An initial round of public consultation in May-July 2018 based on high level key issues seeking to identify the need for the scheme and extent of public support for a potential solution in principle was undertaken. This did not include any specific scheme options or lines on a plan, however broad support was noted for a highways option as a solution to existing issues. There are established stakeholder groups actively engaged in the project – this includes a Member Working Group (Council Members) and a Local Liaison Group (Parish council reps). Engagement with Natural England, the Environment Agency and Highways England was also undertaken.
Practical feasibility	2	Not tested in a model but assumed to be practical in operation. The EHV overhead power lines have a minor impact during construction. The design would be limited by fixed pylons locations; building bridges near them has further challenges. This option crosses the HP gas main and thus there will be a c£3m cost impact. Protection works or pipe upgrade will be needed if we are to cross the HP gas main and £1.2m stopple charges for stopping the main gas supply to East Anglia during the works. Furthermore there are likely to be further limitations where a route runs within 80m of HP gas main or cable route for more than a length of 80m. High Voltage Power line Orsted Cable cannot be re-routed to accommodate our proposals. However crossing the cable would require protection measures to be installed below the ground – for example reinforced concrete slab bridging over the cable trench. These works are expected to have a cost of upto £250-£300K per crossing point.
What is the quality of the supporting evidence?	4	Not modelled in 2014 though similar to previous options. Modelling undertaken in 2018.
Key uncertainties	Risks relate to the environment, modelling, public acceptability and land take requirements. Possible to accommodate a compliant single carriageway without modification at Longwater Lane, however issues with dual carriageway may be more problematic. Construction details need to be verified as current verge area may have substandard capacity.	

Financial

Affordability	3	Budgetary options are still being investigated.
Capital Cost (£m)	£100-£150 million	
Overall cost risk	3	

Commercial

Flexibility of option	3	Little opportunity to change alignment later in design phase, however at this stage option can be scaled up or down. When in operation option can not be changed or closed without significant financial penalties.
Where is funding coming from?	None specifically set aside. Funding sources to be considered.	
Any income generated?	No	N/A

Early Assessment and Sifting Tool

Option name/no.	Option 36: A47 Easton to A1067 / A1270 junction; 2018 Road Alignment (5), dual carriageway	
Description	From the A1067 junction with the A1270 at Deighton Hills, Option 36 heads south, crossing Ringland Road to the west of Taverham. The route then turns south-west and crosses the River Wensum and connects to the Costessey Lane / Ringland Lane junction to the south of Ringland. Option 36 continues in a south-western direction following Ringland Road through Ringland Hills, before passing north of Hill Farm. The route crosses the River Tud to connect with the A47 to the west of Easton at the existing Taverham Road junction. Option 36 would be of dual carriageway standard.	

Strategic

Scale of impact against specific objectives	4	
Fit with high-level objectives	4	Supports the creation of a stronger, cleaner and more productive economy by improving links to local economy and sources of employment across the network. Connects people and places, and will help to encourage investment into the west of Norwich including, for example, tourism. Will improve journey time reliability on the local road network, as well as the A47 and A1067, transferring trips from existing local roads to a new high-speed high-standard link designed to the latest safety standards. Provides strong regional economic links for the future. Previous study undertaken during 2017 considered potential mitigation options addressing environmental concerns.
Degree of consensus	5	Public consultation has taken place with high degree of consensus that a new highway link would address the current network issues. Considerations that the council should take into account, according to respondents, included: reducing congestion, rat running, shortening journey times and providing better journey time reliability together with improved road safety.

Economic

Economic growth	5	Running from Easton to the NDR this option creates excellent connectivity into the food zone linking people and potential employment while creating excellent business links. Will also provide more direct link to existing and proposed housing in the Easton area.
Socio-distributional impacts and the regions	3	Slightly improved accessibility for groups with access to a car. Severance currently related to rat running would be reduced giving minor improvements to conditions for Non-Motorised Users in the Ringland and Taverham areas. Overall increase in accessibility expected.
Local environment	2	<i>Separate, additional Environmental Appraisal undertaken</i>
Well being	4	May reduce severance with reassignment of traffic from rat run routes and improve access to goods and services for non motorised users encouraging physical activity in specific locations. Expected to improve access to goods and services for private vehicle owners in terms of improved JT on network. New road would have a lower accident rate associated with improved design and conditions.
Expected VfM category	3. Medium 1.5-2	

Managerial

Implementation timetable	Medium (3-8 Years)	Assumed construction start 2022. Assumed completion 2026.
Public acceptability	4	An initial round of public consultation in May-July 2018 based on high level key issues seeking to identify the need for the scheme and extent of public support for a potential solution in principle was undertaken. This did not include any specific scheme options or lines on a plan, however broad support was noted for a highways option as a solution to existing issues. There are established stakeholder groups actively engaged in the project – this includes a Member Working Group (Council Members) and a Local Liaison Group (Parish council reps). Engagement with Natural England, the Environment Agency and Highways England was also undertaken.
Practical feasibility	2	Not tested in a model but assumed to be practical in operation. The EHV overhead power lines have a minor impact during construction. The design would be limited by fixed pylons locations; building bridges near them has further challenges. This option crosses the HP gas main and thus there will be a c£3m cost impact. Protection works or pipe upgrade will be needed if we are to cross the HP gas main and £1.2m stopple charges for stopping the main gas supply to East Anglia during the works. Furthermore there are likely to be further limitations where a route runs within 80m of HP gas main or cable route for more than a length of 80m. High Voltage Power line Orsted Cable cannot be re-routed to accommodate our proposals. However crossing the cable would require protection measures to be installed below the ground – for example reinforced concrete slab bridging over the cable trench. These works are expected to have a cost of upto £250-£300K per crossing point.
What is the quality of the supporting evidence?	4	Not modelled in 2014 though similar to previous options. Modelling undertaken in 2018.
Key uncertainties	Risks relate to the environment, modelling, public acceptability and land take requirements. Possible to accommodate a compliant single carriageway without modification at Longwater Lane, however issues with dual carriageway may be more problematic. Construction details need to be verified as current verge area may have substandard capacity.	

Financial

Affordability	3	Budgetary options are still being investigated.
Capital Cost (£m)	£150-£250 million	
Overall cost risk	3	

Commercial

Flexibility of option	3	Little opportunity to change alignment later in design phase, however at this stage option can be scaled up or down. When in operation option can not be changed or closed without significant financial penalties.
Where is funding coming from?	None specifically set aside. Funding sources to be considered.	
Any income generated?	No	N/A

Early Assessment and Sifting Tool

Option name/no.	Option 37: Tolled routes / bridges	
Description	Tolled routes / bridges to reduce traffic flow on routes used as alternatives to avoid delays and congestion ("rat-runs"). Currently no locations have been developed as these would be dependent on a number of factors.	

Strategic

Scale of impact against specific objectives	2	
Fit with high-level objectives	2	Will potentially reduce local emissions, has little impact network wide. Reduces productivity by increasing journey times and associated costs. Fails to connect people and places, and unlikely to encourage investment. Will not improve journey time reliability on the local road network or the A47 and A1067, though would reduce traffic increasing safety on the tolled routes.
Degree of consensus	2	Public consultation has taken place with little discussion of tolling as a option.

Economic

Economic growth	1	Reduced connectivity as journeys become more expensive especially for lower income groups and business. Dependent on tolling options journeys times may increase. It is assumed that reliability would improve on tolled routes as trips were moved from the route however, these trips would be reassigned elsewhere reducing reliability. The number of accidents would go down locally as would be expected with reduction in traffic volumes. There would be an expected reduction in accessibility and connectivity for business through increased costs which would limit potential agglomeration. With reduced connectivity there would be an overall negative impact on the delivery of housing locally.
Socio-distributional impacts and the regions	2	Would decrease accessibility to vulnerable social groups, such as low income groups and the disabled, with additional costs associated with travel. Would potentially increase regional or local imbalance and would distort affordability in local areas.
Local environment	3	<i>Separate, additional Environmental Appraisal undertaken</i>
Well being	2	May reduce severance for pedestrians by reducing traffic flows locally, but again reassignment may result in increased flows elsewhere. May increase opportunity for physical activity, will increase access to goods and services, however this may reduce elsewhere.
Expected VfM category	5. Poor <1	

Managerial

Implementation timetable	Medium (3-8 Years)	Consultation period would be extensive due to potential objections.
Public acceptability	1	Public acceptability of Tolling is perceived to be very low (MIRO). Option was not considered by general public and no stakeholder engagement in relation to this option has been undertaken.
Practical feasibility	4	Operationally very easy to implement though legally difficult. Either toll operator or council would operate tolling and collect fees. Multiple examples of technology exist.
What is the quality of the supporting evidence?	5	Several studies and multiple reports including Briefing Paper Number SN442, 29 November 2017, Road tolls and https://www.racfoundation.org/wp-content/uploads/2017/11/acceptability_of_road_pricing-walker-2011.pdf
Key uncertainties	Politically sensitive - back lash from local community. Impact on business. System does not work and rat runs appear in more and more obscure locations. Systems not compatible with EET system after Brexit may produce issues for tourism.	

Financial

Affordability	3	No current funding sources.
Capital Cost (£m)	£0-£5 million	
Overall cost risk	3	

Commercial

Flexibility of option	3	Scheme can be easily scaled up or down. Easily stopped as little physical infrastructure in place.
Where is funding coming from?	None specifically set aside. Funding sources to be considered.	
Any income generated?	Yes	Any estimate would require a modelling exercise to be carried out specifically for tolled roads.

Early Assessment and Sifting Tool

Option name/no.	Option 38: Improvements to existing routes	
Description	Improvements to the existing A1074 route to increase capacity and improve traffic flow. This could include localised widening, upgrading the A1074 from the A140 Sweet Briar Road / Guardian Road junction to the A47 Norwich Southern Bypass to dual carriageway standard. This, in turn, would align with the Highways England A47 Road Investment Strategy scheme.	

Strategic

Scale of impact against specific objectives	3	
Fit with high-level objectives	3	Supports the creation of a stronger, cleaner and more productive economy by improving links to local economy and sources of employment across the network. Connects people and places, and will help to encourage investment into the west of Norwich including, for example, tourism. Will improve journey time reliability on the local road network, as well as the A47 and A1067, transferring trips from existing local roads to a new high-speed high-standard link designed to the latest safety standards. Provides strong regional economic links for the future.
Degree of consensus	4	During public consultation improving existing routes received the 2nd highest level of support as a solution to existing issues. Considerations that the council should take into account, according to respondents, included; reducing congestion, rat running, shortening journey times, providing better journey time reliability together with improved road safety.

Economic

Economic growth	4	Improves connectivity, reliability and resilience of network. Journey distance while remaining the same for commercial vehicles would see journey time savings associated with increased network capacity. Improved links would potentially encourage delivery of housing.
Socio-distributional impacts and the regions	3	Improved journey times and improved access to goods and services, however potential road widening will create increased severance for Non-Motorised User groups. Improved journey times will help local businesses reduce transport associated costs and attract new business.
Local environment	3	<i>Separate, additional Environmental Appraisal undertaken</i>
Well being	3	Improved access to goods and services with closer ties to employment zones and linkage to housing.
Expected VfM category	3. Medium 1.5-2	

Managerial

Implementation timetable	Medium (3-8 Years)	Assumed construction start 2020. Assumed completion 2022.
Public acceptability	3	An initial round of public consultation in May-July 2018 based on high level key issues seeking to identify the need for the scheme and extent of public support for a potential solution in principle was undertaken. This did not include any specific scheme options or lines on a plan, however improvements to existing highway infrastructure did score highly. This generally related to routes between the A47 and A1067. Potential construction delay would require mitigation to avoid poor perception of services. There are established stakeholder groups actively engaged in the project – this includes a Member Working Group (Council Members) and a Local Liaison Group (Parish council reps). Engagement with Natural England, the Environment Agency and Highways England was also undertaken. This option would see the number of stakeholders increased significantly.
Practical feasibility	4	Option has not been tested via modelling. Environmental concerns linked to potential land take are limited. NCC would construct and maintain option and have the required statutory powers.
What is the quality of the supporting evidence?	3	No modelling undertaken to date, though this will be undertaken if progressed.
Key uncertainties	Construction delay issues, however, long term campaign advising users of works may see some change in behaviour mitigating potential issues. Land requirement issues and potential environmental concerns mean mitigation would be required. Dereham Road: existing bridge carries a dual carriageway - no structural modification is necessary for the proposed options, existing parapet needs upgrading to provide appropriate height for cyclists.	

Financial

Affordability	3	No current funding sources. Option may tie in with A47 RIS scheme.
Capital Cost (£m)	£10-£25 million	
Overall cost risk	3	

Commercial

Flexibility of option	3	Slight changes to alignment and potential to package.
Where is funding coming from?	No funding source at present.	
Any income generated?	No	N/A

Early Assessment and Sifting Tool

Option name/no.	Option 39: Improvements to existing junctions	
Description	Improvements to existing junctions to maximise capacity, improve traffic flow and address safety issues. The potential locations for junction improvements include: A1074 Dereham Road / Marl Pit Lane / Larkman Lane, A140 Sweet Briar Road / A1074 Dereham Road / A140 Guardian Road, A140 Boundary Road / A1067 Drayton Road / A140 Sweet Briar Road / A1067 Drayton High Road, A1067 Drayton High Road / Middletons Lane / Hospital Lane	

Strategic

Scale of impact against specific objectives	3	
Fit with high-level objectives	3	Supports the creation of a stronger, cleaner and more productive economy by improving junctions. Will improve journey time reliability on the local road network, as well as the A47 and A1067. Improved safety at junctions.
Degree of consensus	4	During public consultation improving existing routes received the 2nd highest level of support as a solution to existing issues. Considerations that the council should take into account, according to respondents, included; reducing congestion, rat running, shortening journey times, providing better journey time reliability together with improved road safety.

Economic

Economic growth	3	Some improvement in access to housing as journey times will be improved on the network. Improved reliability and resilience would be expected. Will not significantly encourage delivery of housing but would not hinder delivery.
Socio-distributional impacts and the regions	3	Junction improvements will improve conditions all users through improved junction capacity and improved junction crossing opportunities.
Local environment	3	<i>Separate, additional Environmental Appraisal undertaken</i>
Well being	4	Does not significantly improve access to goods and services other than through improved journey time. May encourage physical activity through design incorporating bus cycle and pedestrian considerations.
Expected VfM category	3. Medium 1.5-2	

Managerial

Implementation timetable	Short (1-2 Years)	Not yet understood.
Public acceptability	3	An initial round of public consultation in May-July 2018 based on high level key issues seeking to identify the need for the scheme and extent of public support for a potential solution in principle was undertaken. This did not include any specific scheme options or lines on a plan, however improvements to existing highway infrastructure did score highly. This generally related to routes between the A47 and A1067. Potential construction delay would require mitigation to avoid poor perception of services. There are established stakeholder groups actively engaged in the project – this includes a Member Working Group (Council Members) and a Local Liaison Group (Parish council reps). Engagement with Natural England, the Environment Agency and Highways England was also undertaken. This option would see the number of stakeholders increased significantly.
Practical feasibility	4	Option has not been tested via modelling. Environmental concerns linked to potential land take are limited. NCC would construct and maintain option and have the required statutory powers.
What is the quality of the supporting evidence?	2	Little supporting evidence – previous modelling may provide indication of potential improvement.
Key uncertainties	Construction delay issues, however, long term campaign advising users of works may see some change in behaviour mitigating potential issues. Land requirement issues and potential environmental concerns mean mitigation would be required.	

Financial

Affordability	3	No current funding sources.
Capital Cost (£m)	£0-£5 million	
Overall cost risk	3	

Commercial

Flexibility of option	3	Slight changes to alignment and potential to package.
Where is funding coming from?	No funding source at present.	
Any income generated?	No	N/A

Early Assessment and Sifting Tool

Option name/no.	Option 40: Signing and lining improvements	
Description	Improvements to existing signing and road markings to improve route choice and deter rat-running and unnecessary Heavy Good Vehicle (HGV) movements. This includes the potential for the introduction of Variable Message Signs (VMS) to warn drivers of congestion, accidents, roadwork zones, speed limits and car park availability.	

Strategic

Scale of impact against specific objectives	3	
Fit with high-level objectives	3	Supports the creation of a stronger, cleaner and more productive economy by improving signage and lining. Will improve journey time reliability on the local road network, as well as the A47 and A1067. Will help to deliver growth, through improved perception of the area for businesses and tourism.
Degree of consensus	4	During public consultation improving existing routes received the 2nd highest level of support as a solution to existing issues. Considerations that the council should take into account, according to respondents, included; reducing congestion, rat running, shortening journey times, providing better journey time reliability together with improved road safety.

Economic

Economic growth	3	Would improve network flow improving journey times and improving journey time reliability and resilience. Would help to improve accessibility on the network of employment and goods and services. Reducing HGV rat running would encourage tourism and improve safety.
Socio-distributional impacts and the regions	3	The removal of heavy vehicles from current rat-running routes would encourage Non-Motorised Users as well as elderly and disabled groups.
Local environment	4	<i>Separate, additional Environmental Appraisal undertaken</i>
Well being	4	Improves severance by reducing HGV movements in local routes while reducing accident severity. Improves conditions for non motorised users such as cyclists and pedestrians increasing physical activity.
Expected VfM category	3. Medium 1.5-2	

Managerial

Implementation timetable	Short (1-2 Years)	Would require additional study followed by implementation period.
Public acceptability	4	An initial round of public consultation in May-July 2018 based on high level key issues seeking to identify the need for the scheme and extent of public support for a potential solution in principle was undertaken. This did not include any specific scheme options or lines on a plan, however improvements to existing highway infrastructure did score highly. This generally related to routes between the A47 and A1067. Potential construction delay would require mitigation to avoid poor perception of services. There are established stakeholder groups actively engaged in the project – this includes a Member Working Group (Council Members) and a Local Liaison Group (Parish council reps). Engagement with Natural England, the Environment Agency and Highways England was also undertaken. This option would see the number of stakeholders increased significantly.
Practical feasibility	3	Option has not been tested via modelling. Environmental concerns linked to potential land take are limited. NCC would construct and maintain option and have the required statutory powers.
What is the quality of the supporting evidence?	4	Little supporting evidence – previous modelling may provide indication of potential improvement.
Key uncertainties	Construction delay issues, however, long term campaign advising users of works may see some change in behaviour mitigating potential issues. Land requirement issues and potential environmental concerns mean mitigation would be required.	

Financial

Affordability	3	No current funding sources.
Capital Cost (£m)	£0-£5 million	
Overall cost risk	3	

Commercial

Flexibility of option	3	Slight changes to alignment and potential to package.
Where is funding coming from?	No funding source at present.	
Any income generated?	No	N/A

Early Assessment and Sifting Tool

Option name/no.	Option 41: Signal improvements	
Description	Improvements to signalised junctions to improve the connectivity and reliability of the network by improving junction efficiency and capacity. Improvements could potentially include bus priority signals and greater and coordination on junctions.	

Strategic

Scale of impact against specific objectives	2	
Fit with high-level objectives	2	Supports the creation of a stronger, cleaner and more productive economy by improving junctions and signals. Will improve journey time reliability on the local road network, as well as the A47 and A1067. Improved safety at junctions.
Degree of consensus	3	During public consultation improving existing routes received the 2nd highest level of support as a solution to existing issues. Considerations that the council should take into account, according to respondents, included; reducing congestion, rat running, shortening journey times, providing better journey time reliability together with improved road safety.

Economic

Economic growth	3	Some improvement in access to housing as journey times will be improved on the network. Improved reliability and resilience would be expected. Will not significantly encourage delivery of housing but would not hinder delivery.
Socio-distributional impacts and the regions	3	Improved journey times and improved access to goods and services, however potential road widening will create increased severance for Non-Motorised User groups. Improved journey times will help local businesses reduce transport associated costs and attract new business.
Local environment	4	<i>Separate, additional Environmental Appraisal undertaken</i>
Well being	4	Does not significantly improve access to goods and services other than through improved journey time. May encourage physical activity design incorporating bus cycle and pedestrian considerations.
Expected VfM category	3. Medium 1.5-2	

Managerial

Implementation timetable	Short (1-2 Years)	Relatively short study and turnaround.
Public acceptability	3	An initial round of public consultation in May-July 2018 based on high level key issues seeking to identify the need for the scheme and extent of public support for a potential solution in principle was undertaken. This did not include any specific scheme options or lines on a plan, however improvements to existing highway infrastructure did score highly. This generally related to routes between the A47 and A1067. Potential construction delay would require mitigation to avoid poor perception of services. There are established stakeholder groups actively engaged in the project – this includes a Member Working Group (Council Members) and a Local Liaison Group (Parish council reps). Engagement with Natural England, the Environment Agency and Highways England was also undertaken. This option would see the number of stakeholders increased significantly.
Practical feasibility	4	Option has not been tested via modelling. Environmental concerns linked to potential land take are limited. NCC would construct and maintain option and have the required statutory powers.
What is the quality of the supporting evidence?	3	Little supporting evidence – previous modelling may provide indication of potential improvement.
Key uncertainties	Most significant risk would be a lack of current modelling of this option.	

Financial

Affordability	4	No current funding sources. Relatively cheap option.
Capital Cost (£m)	£0-£5 million	
Overall cost risk	3	

Commercial

Flexibility of option	3	Slight changes to alignment and potential to package.
Where is funding coming from?	No funding source at present.	
Any income generated?	No	N/A

Early Assessment and Sifting Tool

Option name/no.	Option 42: Speed limit changes	
Description	Changes to speed limits, to improve traffic flow, routing decisions and safety. Potential areas for speed limit changes include: Dereham Road (connecting to the A47, passing through Easton), Norwich Road / Town House Road (from the A1074 in New Costessey towards Costessey), Sandy Lane / Taverham Lane (A1067 to Costessey), Ringland (Costessey Lane / Field Road / The Street), Weston Longville (Marl Hill / Church Street / Honingham Road / Field Road, Hockering (The Street / Heath Road), North Tuddenham (Norwich Road / Low Road), Lyng (Lyng Road / The Street / The Common / Rectory Road)	

Strategic

Scale of impact against specific objectives	3	
Fit with high-level objectives	2	Reduces speed, therefore reducing the severity of accidents. Also likely to move trips onto the A1067 and A47 which would limit potential for growth.
Degree of consensus	1	During public consultation traffic calming on existing routes did gain limited consensus, however speed limits were not supported.

Economic

Economic growth	1	Reduces journey time and therefore accessibility. However improves access of non motorised users with removal of excessive speeding vehicles. Does not improve access to economic attractors but may increase tourism. Would see a decrease in the number and severity of accidents locally.
Socio-distributional impacts and the regions	4	Likely to improve access and connectivity for Non-Motorised Users, including elderly and disabled groups suffering from severance. Would be limited by number of indigenous in the area. Unlikely to provide any economic benefits other than for tourism.
Local environment	4	<i>Separate, additional Environmental Appraisal undertaken</i>
Well being	3	Will reduce severance by reducing rat running and may improve access to goods and services for vulnerable groups locally. Reduction in the severity of accidents would be expected as speed decrease. Likely to encourage modal shift to more PT and active forms of Transport. Neutral impacts in terms of access to services and goods.
Expected VfM category	4. Low 1-1.5	

Managerial

Implementation timetable	Short (1-2 Years)	Dependent on TRO process and objections. However assumption would be in less than 3 years.
Public acceptability	1	An initial round of public consultation in May-July 2018 based on high level key issues seeking to identify the need for the scheme and extent of public support for a potential solution in principle was undertaken. This did not include any specific scheme options or lines on a plan, however improvements to existing highway infrastructure did score highly. This generally related to routes between the A47 and A1067. Potential construction delay would require mitigation to avoid poor perception of services. There are established stakeholder groups actively engaged in the project – this includes a Member Working Group (Council Members) and a Local Liaison Group (Parish council reps). Engagement with Natural England, the Environment Agency and Highways England was also undertaken. This option would see the number of stakeholders increased significantly.
Practical feasibility	3	Option has not been tested to date. Council would operate and would be responsible for enforcement. Some locals may be reluctant to follow new limits. Speed Cameras would be required.
What is the quality of the supporting evidence?	3	Significant supporting evidence from implementation of speed limits on UK roads.
Key uncertainties		Politically sensitive - TRO. Ignored by drivers and increase in accidents through accident migration. Limited impact on rat running.

Financial

Affordability	3	Budgetary options are still being investigated.
Capital Cost (£m)	£0-£5 million	
Overall cost risk	3	

Commercial

Flexibility of option	3	Option can be scaled up or down using TRO. Can be removed if required.
Where is funding coming from?		None specifically set aside. Funding sources to be considered.
Any income generated?	No	N/A

Early Assessment and Sifting Tool

Option name/no.	Option 43: Directional traffic management schemes	
Description	Directional management schemes which focus on locations where rat-running occurs. Schemes could include changing two-way sections of road altered to one-way only sections. Potential locations include: Dereham Road (connecting to the A47, passing through Easton), Norwich Road / Town House Road (from the A1074 in New Costessey towards Costessey), Sandy Lane / Taverham Lane (A1067 to Costessey), Ringland (Costessey Lane / Field Road / The Street), Weston Longville (Marl Hill / Church Street / Honingham Road / Field Road, Hockering (The Street / Heath Road), North Tuddenham (Norwich Road / Low Road), Lyng (Lyng Road / The Street / The Common / Rectory Road)	

Strategic

Scale of impact against specific objectives	3	
Fit with high-level objectives	2	Reduction of possible routes would likely increase journey times locally, and may result in sever traffic issues in other locations, as trips reassign. Would help to reduce severity of accidents through reduced head-on collision crashes. Would not support future growth due to limit on potential route options and increase in journey length and time.
Degree of consensus	1	During public consultation traffic calming on existing routes did gain limited consensus, however removal of route options would prove difficult in terms of gaining local support.

Economic

Economic growth	1	Increased journey time and reduced vehicular accessibility will not improve access to housing, employment, education or encourage delivery of housing. May encourage tourism with reduction of traffic flow. Issues may arise as drivers continue to use fewer routes leading to increased rural congestion.
Socio-distributional impacts and the regions	3	Improves accessibility of vulnerable social groups by reducing severance, but would reduce accessibility for other users who would be required to re-route.
Local environment	4	<i>Separate, additional Environmental Appraisal undertaken</i>
Well being	2	Will reduce severance by reducing rat running and may improve access to goods and services for vulnerable groups locally. Would increase severance to goods and services overall. May reduce severity of accidents with reduced head on collisions in local network.
Expected VfM category	3. Medium 1.5-2	

Managerial

Implementation timetable	Short (1-2 Years)	Dependent on TRO process and objections. However assumption would be in less than 3 years.
Public acceptability	1	An initial round of public consultation in May-July 2018 based on high level key issues seeking to identify the need for the scheme and extent of public support for a potential solution in principle was undertaken. During public consultation rat running was the 2nd most frequently mentioned issue, however in terms of solutions while traffic calming did gain some support, it is through specific directional management, which would prove very controversial. As some locals would see increased vehicle lengths requiring a change in behaviour. There are established stakeholder groups actively engaged in the project – this includes a Member Working Group (Council Members) and a Local Liaison Group (Parish council reps). NCC ecology and planning has been consulted as well as specific meetings held with Natural England and the Environment Agency.
Practical feasibility	3	Option has not been tested to date. Council would operate manage. Enforcement due to rural location would be difficult and likely discontent with the idea would prove difficult in terms of support.
What is the quality of the supporting evidence?	2	Limited evidence available.
Key uncertainties	Likely to be unpopular resulting in objections. Will result in increased journey length and times for locals. Locals may chose to ignore resulting in dangerous behaviour.	

Financial

Affordability	3	No current funding sources.
Capital Cost (£m)	£0-£5 million	
Overall cost risk	3	

Commercial

Flexibility of option	3	Option can be scaled up or down using TRO. Can be removed if required.
Where is funding coming from?	None specifically set aside. Funding sources to be considered.	
Any income generated?	No	N/A

Early Assessment and Sifting Tool

Option name/no.	Option 44: New / improved crossing points	
Description	New / improved crossing points to improve safety and accessibility for all users. Crossing could include controlled and uncontrolled crossings, for example pelican / puffin crossings and refuge islands.	

Strategic

Scale of impact against specific objectives	3	
Fit with high-level objectives	3	Would significantly improve safety, may reduce journey times but would be dependent on modal shift through increased access to public transport terminus.
Degree of consensus	3	During public consultation improved walking routes did receive a limited level of support.

Economic

Economic growth	3	Will increase accessibility to employment and housing for non motorised users and PT patrons by improving crossing points and reducing severance however, would likely increase vehicle journey times associated with increased crossings. Does not contribute directly to improved resilience or reliability but may reduce pedestrian accidents. Would help to encourage tourism.
Socio-distributional impacts and the regions	4	Would significantly improve accessibility for vulnerable social groups, such as the disabled, the elderly and children, and would be expected to reduce accident rates and reduce the opportunity for pedestrian-vehicular conflict. Would help to regenerate the area in terms of connectivity for these groups.
Local environment	4	<i>Separate, additional Environmental Appraisal undertaken</i>
Well being	3	Reduces severance and accidents, promotes physical activity. Improves access to goods and service for more vulnerable groups.
Expected VfM category	3. Medium 1.5-2	

Managerial

Implementation timetable	Short (1-2 Years)	Simple to execute, would require additional study, analysis and design and construction.
Public acceptability	3	An initial round of public consultation in May-July 2018 based on high level key issues seeking to identify the need for the scheme and extent of public support for a potential solution in principle was undertaken. During public consultation road safety was a significant issues, and a number of locations were identified as possible crossing /pedestrian bridge locations. There are established stakeholder groups actively engaged in the project – this includes a Member Working Group (Council Members) and a Local Liaison Group (Parish council reps). NCC ecology and NCC planning has been consulted.
Practical feasibility	3	Option has not been tested to date. Council would operate and maintain.
What is the quality of the supporting evidence?	3	Multiple road safety studies exist to show benefits.
Key uncertainties	Construction delay and land requirements.	

Financial

Affordability	3	No current funding sources.
Capital Cost (£m)	£0-£5 million	
Overall cost risk	3	

Commercial

Flexibility of option	3	Dependent on study area.
Where is funding coming from?	No funding source at present.	
Any income generated?	No	N/A

Early Assessment and Sifting Tool

Option name/no.	Option 45: New wider footpath	
Description	New wider footpath to improve accessibility and promote modal shift away from cars towards alternative modes of transport. A new wider footpath would provide better care for pedestrians including those with disabilities.	

Strategic

Scale of impact against specific objectives	2	
Fit with high-level objectives	2	Does not support the economy or promote future growth. Promotes sustainable access to places and people. Has a limited impact on journey times.
Degree of consensus	3	During public consultation improved walking routes did receive a limited level of support.

Economic

Economic growth	2	Will increase accessibility to employment and housing for non motorised users and PT patrons by improving active travel and connectivity, reducing severance but not private vehicles. Does not contribute directly to improved resilience or reliability and would not reduce rat running or road accidents. May help to encourage tourism.
Socio-distributional impacts and the regions	3	Would significantly improve accessibility for vulnerable social groups, such as the disabled, the elderly and children. However, limited impact in relation to rebalancing the regional economy.
Local environment	4	<i>Separate, additional Environmental Appraisal undertaken</i>
Well being	4	May reduce severance for pedestrians however would be dependent on improved crossing facilities. Would improve opportunity for physical activity. Limited improvement in relation to access to goods and services.
Expected VfM category	3. Medium 1.5-2	

Managerial

Implementation timetable	Short (1-2 Years)	Relatively quick to implement.
Public acceptability	3	An initial round of public consultation in May-July 2018 based on high level key issues seeking to identify the need for the scheme and extent of public support for a potential solution in principle was undertaken. Poor walking routes were identified during the public consultation process. There are established stakeholder groups actively engaged in the project – this includes a Member Working Group (Council Members) and a Local Liaison Group (Parish council reps). NCC ecology and NCC planning has been consulted.
Practical feasibility	3	Option has not been tested to date. Council would operate.
What is the quality of the supporting evidence?	3	Studies have shown that widened footpaths can encourage modal shift.
Key uncertainties	Environmental issues and land requirements.	

Financial

Affordability	3	No current funding sources.
Capital Cost (£m)	£0-£5 million	
Overall cost risk	3	

Commercial

Flexibility of option	2	Dependent on study area.
Where is funding coming from?	No funding source at present.	
Any income generated?	No	N/A

Early Assessment and Sifting Tool

Option name/no.	Option 46: New cycling links to key facilities and services	
Description	New cycling links to key facilities and services, for example schools and employment areas. There is potential to include both on-line and off-line cycle routes. Tying in with existing cycle links would be advantageous. The cycle network could include the following: Thorpe Marriot to Drayton (linking to the A1270), Norwich to Easton (along the A1074), Taverham to Norwich (along the A1067), Taverham to New Costessey (via Costessey)	

Strategic

Scale of impact against specific objectives	3	
Fit with high-level objectives	2	Has a limited role to play in relation to local economy and future growth. Connects people and places in a sustainable manner, and will help to encourage investment in to the west of Norwich in tourism. May improve journey time reliability on the local road network, as well as the A47 and A1067, transferring trips from car to bicycle.
Degree of consensus	3	During public consultation poor cycling networks was considered as an issue, and a new cycling route linking the A47 to the A1270 and improving cycling routes were considered as solutions to be explored.

Economic

Economic growth	2	Does not help with delivery of housing and services for most but would increase opportunity for modal shift and reduced traffic flows increasing network resilience and reliability but to a limited extent.
Socio-distributional impacts and the regions	3	Improves accessibility of vulnerable social groups by reducing severance and improving affordable, non-motorised transport options. May help to bring further tourism to the local area.
Local environment	3	<i>Separate, additional Environmental Appraisal undertaken</i>
Well being	3	Reduces severance. Encourages physical activity. Does not in general increase access to goods and services other than to cyclists.
Expected VfM category	3. Medium 1.5-2	

Managerial

Implementation timetable	Medium (3-8 Years)	Relatively quick to implement.
Public acceptability	4	An initial round of public consultation in May-July 2018 based on high level key issues seeking to identify the need for the scheme and extent of public support for a potential solution in principle was undertaken. During public consultation it was found that there was significant support from cyclists for new and improved cycling routes. There are established stakeholder groups actively engaged in the project – this includes a Member Working Group (Council Members) and a Local Liaison Group (Parish council reps). Engagement with Natural England, the Environment Agency and Highways England was also undertaken. Further engagement with cycling groups would be undertaken as this scheme advances as part of a package.
Practical feasibility	3	Would be dependent on ability to link in with existing infrastructure.
What is the quality of the supporting evidence?	4	Studies have shown that after construction, at least initially, modal shift occurs to cycling. However, this often comes at the expense of public transport.
Key uncertainties	Land take requirements and low public support. Risks would be reduced as part of an overall package. Dereham Road: existing bridge carries a dual carriageway - no structural modification is necessary for the proposed options, existing parapet needs upgrading to provide appropriate height for cyclists. Sir Alfred Munnings Road: currently 4m wide foot / cycle way provided to the east of the carriageway, subject to the current bridge capacity, no structural modification may be necessary to carry a very light rail system up to 40 tonnes. Mile Cross Road A1024 (Mile Cross Road Bridge): currently 1.7m wide footway / verge each side of the carriageway. If the carriageway width is to remain unchanged, bridge widening will be required to provide a compliant foot / cycleway. Bridge in fair condition with minor to moderate concrete defects needing repair. Costessey Road (Taverham Bridge) has similar issues in terms of width, existing parapet needs upgrading to provide appropriate height for cyclists. Dereham Road Footbridge may also require widening.	

Financial

Affordability	3	No current funding sources.
Capital Cost (£m)	£0-£5 million	
Overall cost risk	3	

Commercial

Flexibility of option	2	Dependent on study area.
Where is funding coming from?	No funding source at present.	
Any income generated?	No	N/A

Early Assessment and Sifting Tool

Option name/no.	Option 47: Cycle parking facilities	
Description	New improved cycle parking provision at key facilities and services, for example schools and employment areas. Improved cycle parking would improve accessibility and safety, as well as encouraging cycling as a viable alternative mode of transport.	

Strategic

Scale of impact against specific objectives	2	
Fit with high-level objectives	2	Has a limited role to play in relation to local economy and future growth. Connects people and places in a sustainable manner, and will help to encourage investment in to the west of Norwich in tourism. May improve journey time reliability on the local road network, as well as the A47 and A1067, transferring trips from car to bicycle.
Degree of consensus	3	During public consultation poor cycling networks was considered as an issue, and a new cycling route linking the A47 to the A1270 and improving cycling routes were considered as solutions to be explored.

Economic

Economic growth	1	No impact on connectivity, reliability or network resilience in terms of road network. Will improve accessibility of employment and services for cyclists. Will not improve or encourage the delivery of housing in a significant way.
Socio-distributional impacts and the regions	3	Improves accessibility of vulnerable social groups by reducing severance through removal of private vehicle trips. Provides cheaper transport option for low income groups. May improve and encourage tourism.
Local environment	4	<i>Separate, additional Environmental Appraisal undertaken</i>
Well being	3	Reduces severance for groups with access and ability to use bicycles improving that groups access to goods and services and encourages physical activity, however limited by number of potential users.
Expected VfM category	3. Medium 1.5-2	

Managerial

Implementation timetable	Medium (3-8 Years)	Would require additional study, design and construction.
Public acceptability	3	An initial round of public consultation in May-July 2018 based on high level key issues seeking to identify the need for the scheme and extent of public support for a potential solution in principle was undertaken. This did not include any specific scheme options or lines on a plan, however however significant support was noted for improved cycling routes though this was predominantly from cyclists. If impact reduces carriageway width there would be some negative attitudes from drivers. There are established stakeholder groups actively engaged in the project – this includes a Member Working Group (Council Members) and a Local Liaison Group (Parish council reps). Engagement with Natural England, the Environment Agency and Highways England was also undertaken. Further engagement with cycling groups would be undertaken is this scheme advances as part of a package.
Practical feasibility	3	Option has been not tested via modelling. Little impact in terms of environmental concerns, though this would depend on land take. NCC would construct and maintain option and have the required statutory powers.
What is the quality of the supporting evidence?	2	While a large body of evidence does support improved cycling facilities this is normally related to urban high density populations.
Key uncertainties	Land take requirements, low patronage, where online potential for increased vehicular-cycle conflict. Environmental constraints may result in higher costs and time delay. Engagement with Natural England, the Environment Agency and Highways England undertaken.	

Financial

Affordability	5	No current funding sources.
Capital Cost (£m)	£0-£5 million	
Overall cost risk	3	

Commercial

Flexibility of option	2	Dependent on study area.
Where is funding coming from?	No funding source at present.	
Any income generated?	No	N/A

Early Assessment and Sifting Tool

Option name/no.	Option 48: New orbital bus route	
Description	A new orbital bus route connecting towns in the western quadrant and proposed business parks. A route has not yet been identified.	

Strategic

Scale of impact against specific objectives	3	
Fit with high-level objectives	3	Supports the creation of a stronger, cleaner and more productive economy by improving links to local economy and sources of employment across the network. Connects people and places, and will help to encourage investment into the west of Norwich including, for example, tourism. Will improve help to remove private vehicle trips from the network. Provides strong regional economic links for the future. Previous study undertaken during 2017 considered potential mitigation options addressing environmental concerns.
Degree of consensus	3	During public consultation improving public transport gained the 4th highest level of support.

Economic

Economic growth	3	May provide increased accessibility, reliability and resilience through modal shift and a reduction of low occupancy trips. Would potentially tackle rat run trips by offering alternative mode of transport. Could link to housing, new housing and employment zones however this would increase journey time. Will help to encourage Tourism locally through improved transport links and reduced congestion. Will improve connectivity of sustainable modes. Limited impact overall.
Socio-distributional impacts and the regions	3	Would Improve connectivity and accessibility of vulnerable social groups, such as the elderly, low income groups, the disabled and children. However, this would be limited by number of potential patrons on the route. Would have limited impact in terms of economy.
Local environment	4	<i>Separate, additional Environmental Appraisal undertaken</i>
Well being	3	Reduces severance. Improves access to goods and services through improved routing and connects local communities. Improve the opportunity for physical activity for NMUs.
Expected VfM category	4. Low 1-1.5	

Managerial

Implementation timetable	Short (1-2 Years)	This would be dependent on the operator.
Public acceptability	3	An initial round of public consultation in May-July 2018 based on high level key issues seeking to identify the need for the scheme and extent of public support for a potential solution in principle was undertaken. This did not include any specific scheme options or lines on a plan, however public transport solutions gained the 3rd highest level of support (but significantly less than highways options). There are established stakeholder groups actively engaged in the project – this includes a Member Working Group (Council Members) and a Local Liaison Group (Parish council reps). NCC ecology and planning has been consulted as well as specific meetings held with Natural England and the Environment Agency.
Practical feasibility	3	Local operator may not be interested. Costs associated with new buses and infrastructure.
What is the quality of the supporting evidence?	2	No modelling or public transport study carried out to date.
Key uncertainties	May require subsidies initially. Low potential patronage and failure of service to become commercially viable. A significant media campaign could be introduced to encourage patronage and initial subsidy could be used to reduce fares.	

Financial

Affordability	3	No current funding sources. Potential for subsidy.
Capital Cost (£m)	£0-£5 million	
Overall cost risk	2	

Commercial

Flexibility of option	3	Route can be changed to take potential demand in to account.
Where is funding coming from?	No funding source at present.	
Any income generated?	Yes	Income would be operator income only.

Early Assessment and Sifting Tool

Option name/no.	Option 49: Improvements to existing bus services (28, 29 and X29)	
Description	Improvements to the existing 28, 29 and X29 bus services, including increased frequencies during the evening and weekend. Improving bus services will increase accessibility and connectivity of public transport that is more reliable, potentially contributing to modal shift away from car use.	

Strategic

Scale of impact against specific objectives	3	
Fit with high-level objectives	3	Supports the creation of a stronger, cleaner and more productive economy by improving links to local economy and sources of employment across the network. Connects people and places, and will help to encourage investment into the west of Norwich including, for example, tourism. Would attract people to public transport options by creating a more robust service. Little impact on future growth in terms of movement of goods and services.
Degree of consensus	3	During public consultation improving public transport gained the 4th highest level of support.

Economic

Economic growth	3	Will improve connectivity and reliability of PT further into the evening and at weekends and increasing the frequency of services. Would encourage delivery of new housing through improved transport links and connectivity. Would not reroute as this would have an adverse impact on JT. However service would help to encourage housing through provision of stronger transport links to employment, goods and services.
Socio-distributional impacts and the regions	3	Improves accessibility of vulnerable social groups by reducing severance through removal of private vehicle trips. Provides a cheaper transport option for low income groups. May improve and encourage tourism.
Local environment	4	<i>Separate, additional Environmental Appraisal undertaken</i>
Well being	3	Reduces severance and increases access to goods and services through the promotion of affordable transport. Encourages more physical multimodal transport choices.
Expected VfM category	3. Medium 1.5-2	

Managerial

Implementation timetable	Short (1-2 Years)	This would be dependent on the operator.
Public acceptability	3	An initial round of public consultation in May-July 2018 based on high level key issues seeking to identify the need for the scheme and extent of public support for a potential solution in principle was undertaken. This did not include any specific scheme options or lines on a plan, however public transport solutions gained the 3rd highest level of support (but significantly less than highways options). There are established stakeholder groups actively engaged in the project – this includes a Member Working Group (Council Members) and a Local Liaison Group (Parish council reps). NCC ecology and planning has been consulted as well as specific meetings held with Natural England and the Environment Agency.
Practical feasibility	3	Option has not been tested. Limited environmental costs associated with routing. Local operator would be required to agree to service. Subsidy may be required to encourage operation. Option is an extension of an existing service therefore many issues related to new routes would be removed and public understanding of route and service would already be strong.
What is the quality of the supporting evidence?	3	Existing service. Operator would be expected to have significant understanding of required costs revenue and potential for success in terms of increased patronage.
Key uncertainties	May require subsidies initially. Low potential patronage and failure of service to become commercially viable. A significant media campaign could be introduced to encourage patronage and initial subsidy could be used to reduce fares.	

Financial

Affordability	3	No current funding sources. Potential for subsidy.
Capital Cost (£m)	£0-£5 million	
Overall cost risk	3	

Commercial

Flexibility of option	3	Route is fixed however frequency can be adjusted. Quickly rolled out and easily changed.
Where is funding coming from?	No funding source at present.	
Any income generated?	Yes	Income would be operator income only.

Early Assessment and Sifting Tool

Option name/no.	Option 50: Improvements to existing bus services (23, 23A, 24 and 24A)	
Description	Improvements to the existing 23, 23A, 24 and 24A bus services, including increased frequencies during the evening and weekend. Improving bus services will increase accessibility and connectivity of public transport that is more reliable, potentially contributing to modal shift away from car use.	

Strategic

Scale of impact against specific objectives	3	
Fit with high-level objectives	3	Supports the creation of a stronger, cleaner and more productive economy by improving links to local economy and sources of employment across the network. Connects people and places, and will help to encourage investment into the west of Norwich including, for example, tourism. Would attract people to public transport options by creating a more robust service. Little impact on future growth in terms of movement of goods and services.
Degree of consensus	3	During public consultation improving public transport gained the 4th highest level of support.

Economic

Economic growth	3	Will improve connectivity and reliability of PT further into the evening and at weekends and increasing the frequency of services. Would encourage delivery of new housing through improved transport links and connectivity. Would not reroute as this would have an adverse impact on JT. However service would help to encourage housing through provision of stronger transport links to employment, goods and services.
Socio-distributional impacts and the regions	3	Improves accessibility of vulnerable social groups by reducing severance through removal of private vehicle trips. Provides a cheaper transport option for low income groups. May improve and encourage tourism.
Local environment	4	<i>Separate, additional Environmental Appraisal undertaken</i>
Well being	3	Reduces severance and increases access to goods and services through the promotion of affordable transport. Encourages more physical multimodal transport choices.
Expected VfM category	3. Medium 1.5-2	

Managerial

Implementation timetable	Short (1-2 Years)	This would be dependent on the operator.
Public acceptability	3	An initial round of public consultation in May-July 2018 based on high level key issues seeking to identify the need for the scheme and extent of public support for a potential solution in principle was undertaken. This did not include any specific scheme options or lines on a plan, however public transport solutions gained the 3rd highest level of support (but significantly less than highways options). There are established stakeholder groups actively engaged in the project – this includes a Member Working Group (Council Members) and a Local Liaison Group (Parish council reps). NCC ecology and planning has been consulted as well as specific meetings held with Natural England and the Environment Agency.
Practical feasibility	3	Option has not been tested. Limited environmental costs associated with routing. Local operator would be required to agree to service. Subsidy may be required to encourage operation. Option is an extension of an existing service therefore many issues related to new routes would be removed and public understanding of route and service would already be strong.
What is the quality of the supporting evidence?	3	Existing service. Operator would be expected to have significant understanding of required costs revenue and potential for success in terms of increased patronage.
Key uncertainties	May require subsidies initially. Low potential patronage and failure of service to become commercially viable. A significant media campaign could be introduced to encourage patronage and initial subsidy could be used to reduce fares.	

Financial

Affordability	3	No current funding sources. Potential for subsidy.
Capital Cost (£m)	£0-£5 million	
Overall cost risk	3	

Commercial

Flexibility of option	3	Route is fixed however frequency can be adjusted. Quickly rolled out and easily changed.
Where is funding coming from?	No funding source at present.	
Any income generated?	Yes	Income would be operator income only.

Early Assessment and Sifting Tool

Option name/no.	Option 51: Improved public transport information: real-time app	
Description	Improved public transport information in the form of improved online real-time apps to encourage modal shift. Real-time apps will increase accessibility and connectivity of public transport that is more reliable, potentially contributing to modal shift away from car use. The use of real-time apps is dependent on the option and current technological roll out – there are currently multiple projects within the UK and EU.	

Strategic

Scale of impact against specific objectives	3	
Fit with high-level objectives	3	Encourages modal shift, moving trips from private vehicle to high occupancy modes, improving journey times to a limited extent. Medium impact on future growth. Improved technology improving access for all to public transport services.
Degree of consensus	3	During public consultation improving public transport gained the 4th highest level of support.

Economic

Economic growth	3	Will improve accessibility to PT encouraging shift from low occupancy trips to multi modal and high occupancy trips. Would increase perception of connectivity between housing and employment/goods and services. Limited in ability to improve JTs on the network or address issues such as access to business.
Socio-distributional impacts and the regions	3	Improves accessibility of vulnerable social groups such as, low income groups, the disabled, the elderly and children, by providing better information and access to public transport. May help to encourage tourism.
Local environment	4	<i>Separate, additional Environmental Appraisal undertaken</i>
Well being	3	By moving trips to PT from private vehicles severance on local roads would be reduced, physical activity would also be encouraged such as walking and cycling through reduced noise and emissions. Better understanding of PT provides increased access to goods and services for NMU. Does not increase access for motorised users.
Expected VfM category	3. Medium 1.5-2	

Managerial

Implementation timetable	Short (1-2 Years)	Dependent on API available tech on services.
Public acceptability	3	An initial round of public consultation in May-July 2018 based on high level key issues seeking to identify the need for the scheme and extent of public support for a potential solution in principle was undertaken. This did not include any specific scheme options or lines on a plan, however public transport solutions gained the 3rd highest level of support (but significantly less than highways options). There are established stakeholder groups actively engaged in the project – this includes a Member Working Group (Council Members) and a Local Liaison Group (Parish council reps). NCC ecology and planning has been consulted as well as specific meetings held with Natural England and the Environment Agency.
Practical feasibility	3	Would require significant campaign to encourage use of application, however applications when supported with roll out campaign and would be expected to gain significant usage. API technology on existing bus fleet required.
What is the quality of the supporting evidence?	4	Multiple projects in the UK have been undertaken with varying levels of success.
Key uncertainties	May require subsidies initially. Low potential patronage and failure of service to become commercially viable. A significant media campaign could be introduced to encourage patronage and initial subsidy could be used to reduce fares.	

Financial

Affordability	3	No current funding sources. Costs are limited.
Capital Cost (£m)	£0-£5 million	
Overall cost risk	3	

Commercial

Flexibility of option	2	Quickly rolled out but costs would be wasted if stopped.
Where is funding coming from?	No funding source at present.	
Any income generated?	No	N/A

Early Assessment and Sifting Tool

Option name/no.	Option 52: Improved public transport information: real-time information at stops	
Description	Improved public transport information in the form of real-time information at bus stops to encourage the use of bus services and subsequently modal shift. Real-time information at bus stops will increase accessibility and connectivity of public transport that is more reliable.	

Strategic

Scale of impact against specific objectives	3	
Fit with high-level objectives	3	Encourages modal shift, moving trips from private vehicle to high occupancy modes, improving journey times to a limited extent. Medium impact on future growth. Improved technology improving access for all to public transport services. Limited impact on motorised users and business.
Degree of consensus	3	During public consultation improving public transport gained the 4th highest level of support.

Economic

Economic growth	3	Will improve accessibility to PT encouraging shift from low occupancy trips to multi modal and high occupancy trips. Would increase perception of connectivity between housing and employment/goods and services. Limited in ability to improve JTs on the network and access for business.
Socio-distributional impacts and the regions	3	Improves accessibility of vulnerable social groups such as, low income groups, the disabled, the elderly and children, by providing better information and access to public transport. May help to encourage tourism.
Local environment	4	<i>Separate, additional Environmental Appraisal undertaken</i>
Well being	3	By moving trips to PT from private vehicle severance on local roads would be reduced. Physical activity would be encouraged. Better understanding of PT provides increased access to goods and services.
Expected VfM category	3. Medium 1.5-2	

Managerial

Implementation timetable	Short (1-2 Years)	Dependent on API available tech on services.
Public acceptability	3	An initial round of public consultation in May-July 2018 based on high level key issues seeking to identify the need for the scheme and extent of public support for a potential solution in principle was undertaken. This did not include any specific scheme options or lines on a plan, however public transport solutions gained the 3rd highest level of support (but significantly less than highways options). Campaigns would be required to encourage people to upload the application to smart phones and computers. There are established stakeholder groups actively engaged in the project – this includes a Member Working Group (Council Members) and a Local Liaison Group (Parish council reps).
Practical feasibility	3	Would require significant campaign to encourage use of application, however applications when supported with roll out campaign and would be expected to gain significant usage. API technology on existing bus fleet required.
What is the quality of the supporting evidence?	3	Multiple projects in the UK have been undertaken with varying levels of success.
Key uncertainties		Low usage due to failure of roll out campaign. This would be part of a city wide campaign so risks would be city wide. Required API technology on services.

Financial

Affordability	3	No current funding sources. Costs are limited.
Capital Cost (£m)	£0-£5 million	
Overall cost risk	3	

Commercial

Flexibility of option	2	Quickly rolled out but costs would be wasted if stopped.
Where is funding coming from?	No funding source at present.	
Any income generated?	No	N/A

Early Assessment and Sifting Tool

Option name/no.	Option 53: Update the digital road map	
Description	Update the digital road map to provide better navigation information, improving routing, connectivity and journey reliability.	

Strategic

Scale of impact against specific objectives	3	
Fit with high-level objectives	4	Significant improvement in terms of regional economy and future proofing the local network. Improves safety by reducing rat-running, including inappropriate HGV movements, from the local road network. Connects people to places and employment. Improved technology improving access for all to public transport services.
Degree of consensus	3	Considerations that the council should take into account, according to respondents, included; reducing congestion, rat running, shortening journey times, providing better journey time reliability together with improved road safety.

Economic

Economic growth	4	Improves connectivity and reliability through improved routing. Does not improve delivery of housing but reduces rat running and associated issues in rural areas. Will improve access to business reducing costs and improving access to customers.
Socio-distributional impacts and the regions	2	Improves accessibility of vulnerable social groups by reducing rat running, especially of HGV movements.
Local environment	4	<i>Separate, additional Environmental Appraisal undertaken</i>
Well being	3	Reduces severance and encourages physical activity through reduced rat running. Improves access to goods and services.
Expected VfM category	3. Medium 1.5-2	

Managerial

Implementation timetable	Short (1-2 Years)	Relatively short.
Public acceptability	3	An initial round of public consultation in May-July 2018 based on high level key issues seeking to identify the need for the scheme and extent of public support for a potential solution in principle was undertaken. This did not include any specific scheme options or lines on a plan. This option was not considered as a solution by the general public, however it is thought the option would have been viewed in a positive manner. There are established stakeholder groups actively engaged in the project – this includes a Member Working Group (Council Members) and a Local Liaison Group (Parish council reps).
Practical feasibility	3	Initial costs may be a concern as this will provide resource for a private enterprise. Technology already exists and similar updates have been carried out before.
What is the quality of the supporting evidence?	3	Multiple projects in the UK have been undertaken with varying levels of success.
Key uncertainties	Low uptake of technology, drivers ignoring on-screen advice, local drivers (including HGVs) would be unlikely to use GPS and would be unlikely to adhere to instructions.	

Financial

Affordability	3	No current funding sources.
Capital Cost (£m)	£0-£5 million	
Overall cost risk	3	

Commercial

Flexibility of option	2	Option can be rolled out to bus stops dependent on funding. Scheme can be stopped at anytime. Technology often requires upgrades.
Where is funding coming from?	No funding source at present.	
Any income generated?	No	N/A

Early Assessment and Sifting Tool

Option name/no.	Option 54: Develop local cycling and walking infrastructure plan	
Description	Develop a Local Cycling and Walking Infrastructure Plan (LCWIP). This is a strategic approach to identifying cycling and walking improvements required at the local level. An LCWIP would enable a long-term approach to developing local cycling and walking networks (ideally over a 10-year period), in order to encourage modal shift – increasing the number of trips made of foot or by cycle, and reduce vehicular trips and associated congestion and rat-running. The LCWIP would form the planning element of a package containing walking and cycling options.	

Strategic

Scale of impact against specific objectives	2	
Fit with high-level objectives	3	Has a limited role to play in relation to local economy and future growth. Connects people and places in a sustainable manner, and will help to encourage investment in to the west of Norwich in tourism. May improve journey time reliability on the local road network, as well as the A47 and A1067, transferring trips from car to bicycle.
Degree of consensus	3	During public consultation poor cycling networks was considered as an issue, and a new cycling route linking the A47 to the A1270 and improving cycling routes were considered as solutions to be explored.

Economic

Economic growth	2	Does not in itself deliver any economic growth in terms of housing, tourism, industry or access to goods and services, but forms a basis for a cohesive plan which enables active travel to contribute to these areas. This would however be limited by distance and potential user numbers.
Socio-distributional impacts and the regions	3	Would be used to focus on diversity, providing access to all groups.
Local environment	4	<i>Separate, additional Environmental Appraisal undertaken</i>
Well being	3	Purpose is to improve physical activity and reduce severance. Will produce improved access to goods and services in the long run. Limited impact in terms of elderly and disabled groups.
Expected VfM category	3. Medium 1.5-2	

Managerial

Implementation timetable	Short (1-2 Years)	Relatively short.
Public acceptability	3	An initial round of public consultation in May-July 2018 based on high level key issues seeking to identify the need for the scheme and extent of public support for a potential solution in principle was undertaken. Both improved walking and cycling options were considered as potential options and gained support. However, a specific plan was not considered, but these options would become part of a package or measures.
Practical feasibility	2	Option would be developed, constructed and maintained by council. Issue with potential low usage due to low density and long distances covered.
What is the quality of the supporting evidence?	4	No modelling or study has been undertaken so far in order to ascertain whether this option would be required.
Key uncertainties	There is little risk in undertaking study.	

Financial

Affordability	3	No current funding sources. Active travel measures may allow access to alternative funding streams.
Capital Cost (£m)	£0-£5 million	
Overall cost risk	3	

Commercial

Flexibility of option	3	Plan only - can be stopped.
Where is funding coming from?	No funding source at present.	
Any income generated?	No	N/A

Early Assessment and Sifting Tool

Option name/no.	Option 55: Promote cycling schemes	
Description	Promote cycling schemes (for example Cyclescheme www.cyclescheme.co.uk) to increase the uptake of cycling in the area and encourage modal shift subsequently reducing the number of vehicular trips. The promotion of cycling schemes would generally be an element of a package of cycling schemes.	

Strategic

Scale of impact against specific objectives	2	
Fit with high-level objectives	3	Has a limited role to play in relation to local economy and future growth. Connects people and places in a sustainable manner, and will help to encourage investment in to the west of Norwich in tourism. May improve journey time reliability on the local road network, as well as the A47 and A1067, transferring trips from car to bicycle.
Degree of consensus	3	During public consultation poor cycling networks was considered as an issue, and a new cycling route linking the A47 to the A1270 and improving cycling routes were considered as solutions to be explored.

Economic

Economic growth	2	Does not in itself deliver any economic growth in terms of housing, tourism, industry or access to goods and services, but forms a basis for modal shift to cycling, reducing reliance on low occupancy private vehicle trips. Does not promote economic growth directly, but improves physical activity of workers leading to better mental and physical health improving productivity. Does not encourage delivery of housing.
Socio-distributional impacts and the regions	3	Improves accessibility of vulnerable social groups to affordable and healthier options. May reduce rat running and would help to encourage further tourism in the River Wensum Valley.
Local environment	4	<i>Separate, additional Environmental Appraisal undertaken</i>
Well being	3	Reduces severance and accidents but may be neutral in terms of access to services. Limited impact in terms of elderly and disabled groups.
Expected VfM category	3. Medium 1.5-2	

Managerial

Implementation timetable	Short (1-2 Years)	Dependent on other cycling schemes. Would operate better within a package of measures.
Public acceptability	3	An initial round of public consultation in May-July 2018 based on high level key issues seeking to identify the need for the scheme and extent of public support for a potential solution in principle was undertaken. Both improved walking and cycling options were considered as potential options and gained support. However, a specific plan was not considered, but these options would become part of a package or measures.
Practical feasibility	2	Study would be undertaken by council followed by promotion campaign. Opportunity to include existing cycling groups.
What is the quality of the supporting evidence?	4	No analysis specifically for this project. Best practice and advice available based on previous projects.
Key uncertainties	Use of new technology, such as social media, would allow maximum exposure for the least funding, however this does not automatically result in success.	

Financial

Affordability	3	No current funding sources. Active travel measures may allow access to alternative funding streams.
Capital Cost (£m)	£0-£5 million	
Overall cost risk	3	

Commercial

Flexibility of option	4	Easily changed.
Where is funding coming from?	No funding source at present.	
Any income generated?	No	N/A

Early Assessment and Sifting Tool

Option name/no.	Option 56: Develop green lung schemes	
Description	A Green Lung is an designated area of natural parkland (usually within an urban region) which replenishes the air with oxygen and provides improved air quality. Implementation of green lung schemes, particularly adjacent to proposed development, would improve access to green space and encourage modal shift towards walking and cycling.	

Strategic

Scale of impact against specific objectives	3	
Fit with high-level objectives	2	Little impact in terms of the local economy and ability to prepare for future growth.
Degree of consensus	1	During public consultation green lung schemes were not considered.

Economic

Economic growth	1	Does not directly improve access to new development but may improve JT. May encourage housing delivery and may encourage move toward sustainable transport options. Does not specifically tackle network issues.
Socio-distributional impacts and the regions	3	Improves access to green areas for all groups and encourages modal shift to active travel and public transport, dependent on location.
Local environment	4	<i>Separate, additional Environmental Appraisal undertaken</i>
Well being	2	Limited impact on severance as a measure on its own. Does encourage physical activity but does not directly improve access to goods and services.
Expected VfM category	4. Low 1-1.5	

Managerial

Implementation timetable	Medium (3-8 Years)	Unknown.
Public acceptability	4	Would be expected to suffer from low public acceptability as the scheme would be relatively unique and would not directly address issues.
Practical feasibility	2	Would be developed as part of housing and employment in area. May deter developers.
What is the quality of the supporting evidence?	4	No analysis specifically for this project. Best practice and advice available based on previous projects.
Key uncertainties	Unknowns from previous schemes.	

Financial

Affordability	4	Would be introduced by developers.
Capital Cost (£m)	£0-£5 million	
Overall cost risk	3	

Commercial

Flexibility of option	3	Very flexible option though once created environmental issues would make change difficult potentially.
Where is funding coming from?	No funding source at present.	
Any income generated?	No	N/A

Early Assessment and Sifting Tool

Option name/no.	Option 57: Bike-on-bus schemes	
Description	Implement bike-on-bus schemes to encourage modal shift and active travel by combining both cycling and public transport use. Bike-on-bus scheme would make public transport more accessible and improve connectivity, with the potential for improved journey times.	

Strategic

Scale of impact against specific objectives	3	
Fit with high-level objectives	2	Provides increased accessibility for cyclists but possibly at the expense of others, as bus capacity is reduced to make way for bikes. Encouraged cycling will help to reduce emissions, although this is a smaller demographic.
Degree of consensus	2	During public consultation possible solutions to issues raised included both cycling and public transport improvements.

Economic

Economic growth	3	Seeks to shift road users from low occupancy travel to active travel & public transport. Provides an opportunity to reduce journey time for both private vehicle users and non private vehicles through modal shift thereby improving reliability and resilience. Would encourage cycling tourism in the area but would have little impact on delivery of housing and on access to employment services.
Socio-distributional impacts and the regions	3	Improves access to vulnerable social groups such as children and low income families to affordable and active travel options. May encourage cycling tourism.
Local environment	4	<i>Separate, additional Environmental Appraisal undertaken</i>
Well being	3	Reduces severance by removing trips from the network though this would be limited. Increases opportunity for physical activity.
Expected VfM category	3. Medium 1.5-2	

Managerial

Implementation timetable	Short (1-2 Years)	Dependent on public transport operators view on investment.
Public acceptability	3	An initial round of public consultation in May-July 2018 based on high level key issues seeking to identify the need for the scheme and extent of public support for a potential solution in principle was undertaken. Both improved walking and cycling options were considered as potential options and gained support. However, a specific plan was not considered, but these options would become part of a package or measures.
Practical feasibility	2	High capital expenditure due to either new bus fleet or existing bus retrofit. Would require some subsidy to encourage operator.
What is the quality of the supporting evidence?	3	Limited evidence available.
Key uncertainties	Operator unprepared to pay / lose capacity, low patronage, loss of capacity on services due to space requirements. A study will be required to estimate patronage and likely BCR. Grant may be required.	

Financial

Affordability	3	Very high cost for low patronage.
Capital Cost (£m)	£5-£10 million	
Overall cost risk	3	

Commercial

Flexibility of option	2	Once scheme has begun, in terms of infrastructure, it would be difficult to stop without significant losses.
Where is funding coming from?	Private public funding mechanism could be used.	
Any income generated?	Yes	Unknown

Early Assessment and Sifting Tool

Option name/no.	Option 58: Mobility as a service scheme	
Description	Mobility as a Service schemes combines public and private transportation methods into a unified platform as services, where trips can be managed. Implementing Mobility as a Service schemes improves access for all groups and to all areas, leading to modal shift away from privately owned modes of transport, and reduced journey times.	

Strategic

Scale of impact against specific objectives	3	
Fit with high-level objectives	3	Supports the creation of a stronger, cleaner and more productive economy by improving links to local economy and sources of employment across the network. Connects people and places, and will help to encourage investment into the west of Norwich including, for example, tourism.
Degree of consensus	3	During public consultation mobility as a service was not directly mentioned as a solution to the issues raised, but contains elements of several solutions.

Economic

Economic growth	3	Improves accessibility options of new development and may improve JTs by reducing private vehicle trips. Does not however directly encourage new development in terms of housing or employment. Focused on locals will have limited impact on tourism.
Socio-distributional impacts and the regions	4	Improves access and connectivity for vulnerable social groups to goods and services and encourages them to interact in the local economy in a more visual way.
Local environment	4	<i>Separate, additional Environmental Appraisal undertaken</i>
Well being	4	Reduces severance and accidents and improves access to goods and services while encouraging more PT orientated and high occupancy options.
Expected VfM category	3. Medium 1.5-2	

Managerial

Implementation timetable	Medium (3-8 Years)	Would be dependent on engagement with stakeholders and operators.
Public acceptability	2	An initial round of public consultation in May-July 2018 based on high level key issues seeking to identify the need for the scheme and extent of public support for a potential solution in principle was undertaken. This did not include any specific scheme option. While this option did not gain a high score in terms of solutions, it is assumed that it would not score negatively due to the increased access it provides to the elderly and disabled. There are established stakeholder groups actively engaged in the project – this includes a Member Working Group (Council Members) and a Local Liaison Group (Parish council reps).
Practical feasibility	2	Dependent on buying from multiple operators and stakeholders. Funding likely to be an issue.
What is the quality of the supporting evidence?	3	Relatively new transport service with much research but little analysis of existing systems.
Key uncertainties	There are few examples of profitable MaaS-style business models operating at scale. Operators may show indifference to supporting MaaS growth if it means a change to long-established business models. However, attitudes to innovation are beginning to shift in the transport sector as there is evidence that new mobility models can lead to the increased use of public transport. Risks linked to the power of the incumbents are the risks associated with access to data and sharing of data.	

Financial

Affordability	3	Capex costs associated with IT setup including software and hardware.
Capital Cost (£m)	£0-£5 million	
Overall cost risk	3	

Commercial

Flexibility of option	3	Difficult to scale back due to contractual obligations.
Where is funding coming from?	Private public funding mechanism could be used.	
Any income generated?	Yes	Unknown

Early Assessment and Sifting Tool

Option name/no.	Option 59: Light rail	
Description	A light rail service connecting all locations from the A147 St Crispins Road / A147 Barn Road / Barker Street roundabout to Fir Covert Road, following the alignment of the Marriott's Way (disused railway path). The route leaves Norwich City Centre heading north-west crossing the River Wensum, before turning west, skirting between Heigham Grove and Sweet Briar Industrial Estate. The light rail alignment would cross the River Wensum for a second time before heading north-west, passing west of Hellesdon. The route continues through the River Wensum Valley up to Drayton (crossing the River Wensum for a third time), before crossing the A1067 passing through Thorpe Marriot (north of Taverham) and connecting with Fir Covert Road.	

Strategic

Scale of impact against specific objectives	3	
Fit with high-level objectives	3	Supports the creation of a stronger, cleaner and more productive economy by improving links to local economy and sources of employment across the network. Connects people and places, and will help to encourage investment into the west of Norwich including, for example, tourism. Will improve journey time reliability on the local road network, as well as the A47 and A1067, transferring trips from private vehicle to a more sustainable mode.
Degree of consensus	3	During public consultation improving public transport gained the 4th highest level of support.

Economic

Economic growth	3	Improves accessibility and connectivity, dependent on route may encourage delivery of housing through improved transport links. Supports greater access to education, training and employment opportunities by public transport in the wider area however, does not connect directly into Longwater, the Food Zone or the Research Park. Would help to encourage local tourism. Trips removed from the highway network would reduce congestion and journey time improving network reliability.
Socio-distributional impacts and the regions	3	Improves access of vulnerable social groups in the area to improved public transport and to goods and services in the wider region. However, does not specifically improve the economic situation of the local area.
Local environment	3	<i>Separate, additional Environmental Appraisal undertaken</i>
Well being	3	Modal shift reduces severance and improves accessibility for vulnerable social groups such as disabled, elderly and children. Helps to promote multi modal trips encouraging physical activity. Enables access to increased range of goods and services. Access would be based on number of stops as would connectivity.
Expected VfM category	4. Low 1-1.5	

Managerial

Implementation timetable	Medium (3-8 Years)	Long term project with planning consultation and design expected to take 3 to 5 years before construction.
Public acceptability	3	An initial round of public consultation in May-July 2018 based on high level key issues seeking to identify the need for the scheme and extent of public support for a potential solution in principle was undertaken. This did not include any specific scheme option. Improved public transport did score relatively well. With high costs, public acceptability would be related to sourcing of additional funding from central government. There are established stakeholder groups actively engaged in the project – this includes a Member Working Group (Council Members) and a Local Liaison Group (Parish council reps).
Practical feasibility	2	The option has not been tested using modelling at this stage and a further appraisal would be required to estimate potential patronage and customers.
What is the quality of the supporting evidence?	2	No modelling undertaken in terms of public transport, however multiple light rail projects rolled out in recent years. Evidence of success varies dependent on the project costs and potential patronage but provides a robust evidential bases in terms of theoretical implications.
Key uncertainties	Significant cost implications associated with new infrastructure. Project management would reduce potential for cost over-runs but would not be able to reduce costs. Necessary demand for the option to be feasible. Ensuring that the most beneficial and feasible route is targeted. Public and political acceptance. Marriotts Way (A Frame Bridge over River Wensum): originally a railway bridge built in 1893 that has since been converted to a footbridge. Existing deck width and structural capacity may be sufficient to carry proposed rail options, depending on chosen design and subject to renovation and maintenance repainting. Vertical cracks in abutments suggest possible defects in substructure and foundations, which may require strengthening work. Alternatively, a new railway bridge may be required at this location. Marriotts Way (Hellesdon A Frame Bridge over River Wensum): originally a railway bridge built in 1893 that has since been converted to a footbridge. Existing deck width and structural capacity may be sufficient to carry proposed rail options, depending on chosen design and subject to renovation and maintenance repainting. The secondary deck elements (i.e. jack arches) near the abutments were previously reported as unsafe, which, if not already addressed, requires repair. Marriotts Way (Dragon Crossing Footbridge): steel footbridge constructed in 2000, currently in good condition with minor cracking to concrete abutment. Existing deck width and structural capacity are substandard to carry the proposed rail options. A new railway bridge will be required.	

Financial

Affordability	1	Capital expenditure would be significant.
Capital Cost (£m)	£250-£500 million	
Overall cost risk	1	

Commercial

Flexibility of option	1. Static	Once option is approved there would be little opportunity to scale back without significantly impacting potential patronage and desired outcome.
Where is funding coming from?	Private public funding mechanism could be used.	
Any income generated?	Yes	Unknown

Early Assessment and Sifting Tool

Option name/no.	Option 60: Very light rail	
Description	A very light rail service connecting Longwater, Queen's Hill and Costessey to Norwich City Centre. The route follows the existing A1074 from Norwich City Centre westward, passing Clover Hill, New Costessey, and Longwater. where it meets the A47 Norwich Southern Bypass. The very light rail would then head north through the Longwater Industrial Estate following Sir Alfred Munnings Road to serve Queen's Hill. The service would then join West End at the junction with Ringland Lane and Taverham Lane following this to Costessey, before connecting back to the A1074 via Town House Road and Norwich Road.	

Strategic

Scale of impact against specific objectives	3	
Fit with high-level objectives	3	Supports the creation of a stronger, cleaner and more productive economy by improving links to local economy and sources of employment across the network. Connects people and places, and will help to encourage investment into the west of Norwich including, for example, tourism. Will improve journey time reliability on the local road network, as well as the A47 and A1067, transferring trips from private vehicle to a more sustainable mode.
Degree of consensus	3	During public consultation improving public transport gained the 4th highest level of support.

Economic

Economic growth	3	Improves accessibility and connectivity to employment, may encourage development and provide greater access to education, training and employment opportunities with Longwater as a potential stop. Route could be extended to food zone.
Socio-distributional impacts and the regions	4	Improves accessibility with minimal severance penalties by improving access to improved public transport for disabled elderly and children.
Local environment	3	<i>Separate, additional Environmental Appraisal undertaken</i>
Well being	3	Modal shift leading to reduced accidents, improving physical activity and providing increased access to goods and services for vulnerable groups.
Expected VfM category	4. Low 1-1.5	

Managerial

Implementation timetable	Long Term (8+ Years)	Long term project with planning consultation and design expected to take 3 to 5 years before construction.
Public acceptability	3	An initial round of public consultation in May-July 2018 based on high level key issues seeking to identify the need for the scheme and extent of public support for a potential solution in principle was undertaken. This did not include any specific scheme option. Improved public transport did score relatively well. With high costs, public acceptability would be related to sourcing of additional funding from central government. There are established stakeholder groups actively engaged in the project – this includes a Member Working Group (Council Members) and a Local Liaison Group (Parish council reps).
Practical feasibility	2	The option has not been tested using modelling at this stage and a further appraisal would be required to estimate potential patronage and customers.
What is the quality of the supporting evidence?	1	No modelling has been carried out at this stage. VLR is a relatively new option.
Key uncertainties	Necessary demand for the options to be feasible. Ensuring that the most beneficial and feasible route is targeted. Public and political acceptance. Sir Alfred Munnings Road: currently 4m wide foot / cycle way provided to the east of the carriageway, subject to the current bridge capacity, no structural modification may be necessary to carry a very light rail system up to 40 tonnes. The highway bridge on Norwich Road has a similar issue.	

Financial

Affordability	3	No current funding sources.
Capital Cost (£m)	£100-£150 million	
Overall cost risk	3	

Commercial

Flexibility of option	2	Once a route has been chosen there is limited scope for change.
Where is funding coming from?	Private public funding mechanism could be used.	
Any income generated?	Yes	Unknown

Early Assessment and Sifting Tool

Option name/no.	Option 61: Offline busway	
Description	Provision of offline busways (including partial and full options). These would be installed alongside key highway corridors with localised widening. There are several route options available, including: A1074 corridor: between Norwich Road and A1074 / Breckland Road / Wendene / Barnard Road Roundabout, A1074 corridor: between Longwater Lane and Easton, crossing the A47 and utilising Dereham Road, A1067 corridor: between the A1067 / A1402 junction Drayton Wood Road.	

Strategic

Scale of impact against specific objectives	3	
Fit with high-level objectives	3	Supports the creation of a stronger, cleaner and more productive economy by improving links to local economy and sources of employment across the network. Connects people and places, and will help to encourage investment into the west of Norwich including, for example, tourism. Will improve journey time reliability on the local road network, as well as the A47 and A1067, transferring trips from private vehicle to a more sustainable mode.
Degree of consensus	3	During public consultation improving public transport gained the 4th highest level of support.

Economic

Economic growth	3	The removal of bus services from the road network encourages modal shift to a more competitive PT option. This option also allows Sprint services to be developed on the basis of their use of the Busway. By removing bus trips from the network to off line sections, the bus way option improves bus journey times and on line private vehicle journey times. Would improve access to employment zones using PT as a travel option. Improved journey times would allow better connectivity with employment and educational areas. May also help to encourage local tourism.
Socio-distributional impacts and the regions	4	Improves accessibility for vulnerable social groups such as the disabled, low income groups and the elderly. May help to encourage tourism, raising the profile of the River Wensum Valley.
Local environment	3	<i>Separate, additional Environmental Appraisal undertaken</i>
Well being	3	Modal shift leading to reduced accidents, improving physical activity and providing increased access to goods and services for vulnerable groups.
Expected VfM category	4. Low 1-1.5	

Managerial

Implementation timetable	Long Term (8+ Years)	Long term project with potential significant network impact in relation to construction.
Public acceptability	3	An initial round of public consultation in May-July 2018 based on high level key issues seeking to identify the need for the scheme and extent of public support for a potential solution in principle was undertaken. During public consultation, public transport options, while scoring less than a highways option, did score relatively well. High costs associated with public infrastructure for a privately operated service may cause some concern.
Practical feasibility	2	Dependent on buy in from multiple operators and stakeholders and land holders. The infrastructure would be developed and operated by NCC while local bus operators would operate services.
What is the quality of the supporting evidence?	3	No modelling undertaken at this stage, but multiple existing projects provide a theoretical evidential base.
Key uncertainties	Construction delay issues, however, long term campaign advising users of works may see some change in behaviour mitigating potential issues. Necessary demand for the options to be feasible - need for a patronage study to ensure the most beneficial and feasible route is targeted. Potential lack of enthusiasm from operators. Environmental issues from required land take. Public and political acceptance.	

Financial

Affordability	2	Significant spend.
Capital Cost (£m)	£100-£150 million	
Overall cost risk	2	

Commercial

Flexibility of option	2	Once a route has been chosen there is limited scope for change.
Where is funding coming from?	Private public funding mechanism could be used.	
Any income generated?	Yes	Unknown

Early Assessment and Sifting Tool

Option name/no.	Option 62: New orbital rail line	
Description	The orbital rail line would follow the alignment of the Marriott's Way (disused railway path) from Norwich City Centre out north-west to Fir Covert Road, north of Taverham – crossing the River Wensum on three occasions. The rail line would then extend to cross the A1270 and Reepham Road before routing east, passing south of Felthorpe, and Horsford following the A1270 alignment. The route then crosses the A140, passing north of Norwich International Airport connecting with the proposed development south of Horsham St Faith. The route then passes south of Spixworth, before crossing the B1150. It passes north of Rackheath crossing Wroxham Road connecting with the existing railway line north of Salhouse Station to the north-east of Norwich.	

Strategic

Scale of impact against specific objectives	3	
Fit with high-level objectives	3	Supports the creation of a stronger, cleaner and more productive economy by improving links to local economy and sources of employment across the network. Connects people and places, and will help to encourage investment into the west of Norwich including, for example, tourism. Will improve journey time reliability on the local road network, as well as the A47 and A1067, transferring trips from private vehicle to a more sustainable mode.
Degree of consensus	3	During public consultation improving public transport gained the 4th highest level of support.

Economic

Economic growth	4	Can improve connectivity and reliability of PT services . May help to encourage access to employment and housing through better transport links. May reduce rat running in the east of the study area. Removal of trips via modal shift would improve journey time.
Socio-distributional impacts and the regions	3	Improves accessibility for vulnerable social groups such as the disabled, low income groups and the elderly. May help to encourage tourism, raising the profile of the River Wensum Valley. Ability to help the region perform better would be related to connectivity between stations and economic contributors such as the proposed Food Enterprise Zone and the Longwater Industrial Estate.
Local environment	3	<i>Separate, additional Environmental Appraisal undertaken</i>
Well being	3	Modal shift leading to reduced accidents, improving physical activity and providing increased access to goods and services for vulnerable groups.
Expected VfM category	5. Poor <1	

Managerial

Implementation timetable	Long Term (8+ Years)	Long term project requiring long terms planning while Transport and Works Act 1992 process would be required.
Public acceptability	3	An initial round of public consultation in May-July 2018 based on high level key issues seeking to identify the need for the scheme and extent of public support for a potential solution in principle was undertaken. During public consultation, public transport options, while scoring less than a highways option, did score relatively well. High costs associated with new heavy rail may dampen public support as the scheme does not address all issues.
Practical feasibility	2	Dependent on buy in from multiple operators and stakeholders and land holders. The infrastructure would be developed at least partially by NCC, maintained by Network Rail and operated by private operator. Potential issues with project governance. Existing alignment does still exist which will reduce risks associated with land take,
What is the quality of the supporting evidence?	2	No modelling undertaken at this stage, but multiple existing projects provide a theoretical evidential base.
Key uncertainties	Significant cost implications associated with new infrastructure. Project management would reduce potential for cost over-runs but would not be able to reduce costs. Necessary demand for the option to be feasible. Ensuring that the most beneficial and feasible route is targeted. Public and political acceptance. Marriotts Way (A Frame Bridge over River Wensum): originally a railway bridge built in 1893 that has since been converted to a footbridge. Existing deck width and structural capacity may be sufficient to carry proposed rail options, depending on chosen design and subject to renovation and maintenance repainting. Vertical cracks in abutments suggest possible defects in substructure and foundations, which may require strengthening work. Alternatively, a new railway bridge may be required at this location. Marriotts Way (Hellesdon A Frame Bridge over River Wensum): originally a railway bridge built in 1893 that has since been converted to a footbridge. Existing deck width and structural capacity may be sufficient to carry proposed rail options, depending on chosen design and subject to renovation and maintenance repainting. The secondary deck elements (i.e. jack arches) near the abutments were previously reported as unsafe, which, if not already addressed, requires repair. Marriotts Way (Dragon Crossing Footbridge): steel footbridge constructed in 2000, currently in good condition with minor cracking to concrete abutment. Existing deck width and structural capacity are substandard to carry the proposed rail options. A new railway bridge will be required.	

Financial

Affordability	2	No current funding sources.
Capital Cost (£m)	£250-£500 million	
Overall cost risk	1	

Commercial

Flexibility of option	2	Route already in place, length of route could be scaled back before design phase.
Where is funding coming from?	Private public funding mechanism could be used.	
Any income generated?	Yes	Unknown

Early Assessment and Sifting Tool

Option name/no.	Option 63: Inner ring road widening	
Description	Widening of the existing inner ring road (A147) to improve capacity, connectivity journey time and reliability, while improving access to Norwich from the western quadrant.	

Strategic

Scale of impact against specific objectives	2	
Fit with high-level objectives	3	Supports the creation of a stronger, cleaner and more productive economy by improving links to local economy and sources of employment across the network. Connects people and places, and will help to encourage investment into the west of Norwich including, for example, tourism. Will improve journey time reliability on the local road network, as well as the A47 and A1067. Limited impact on local economy of the study area.
Degree of consensus	3	During public consultation improving existing routes received the 2nd highest level of support as a solution to existing issues. Considerations that the council should take into account, according to respondents, included; reducing congestion, rat running, shortening journey times, providing better journey time reliability together with improved road safety.

Economic

Economic growth	3	Potential to improve journey time and reliability of the Norwich inner ring road reducing delay and congestion on approach and producing a more direct competitive route between western and eastern suburbs.
Socio-distributional impacts and the regions	2	Little impact on vulnerable social groups, especially in the study area. Would not encourage physical activity and may increase emissions leading to localised health risks. Would have little impact on the economy of study area.
Local environment	2	<i>Separate, additional Environmental Appraisal undertaken</i>
Well being	3	Increased severance likely. Scheme may see a potential increase in accidents due to potential increase in trips. Would improve access to goods and services in the Norwich area.
Expected VfM category	5. Poor <1	

Managerial

Implementation timetable	Long Term (8+ Years)	Long term project
Public acceptability	3	Polarized views expected. Potential anger at long term construction delay costs while others may see the long term benefit as more important.
Practical feasibility	2	To be tested within the validated model. Not covered in previous study. Significant construction delay disbenefits to users.
What is the quality of the supporting evidence?	3	No modelling undertaken to date, though this will be undertaken if progressed.
Key uncertainties	Costs - would require significant design, planning and construction costs consideration. Strict project management would be required. Carrow Road (Carrow Road River Bridge): structure in fair condition with minor cracking to concrete and some localised corrosion to steel members, structure contains a bespoke steel rolling bascule span for which widening to support a compliant single / dual carriageway will not be possible. A new bridge will be required. St Crispins Road: currently carrying a dual carriageway, further bridge widening is possible but may be constrained by the lower level highway and properties to the south.	

Financial

Affordability	2	No current funding sources.
Capital Cost (£m)	£50-£100 million	
Overall cost risk	2	

Commercial

Flexibility of option	2	Once complete any change would require significant additional cost. Costs would likely spiral as design change is required mid-way through design process.
Where is funding coming from?	Private public funding mechanism could be used.	
Any income generated?	Yes	Unknown

Early Assessment and Sifting Tool

Option name/no.	Option 64: Provision of sprint services: A47 / A1074	
Description	Provision of a new sprint bus service (distinctly branded Sprint vehicles) on the A47 / A1074 corridor connecting Norwich City Centre with western quadrant locations, possibly as far as Dereham. The sprint service would have high reliability and competitive journey time targets. Where possible high-quality bus shelters, bus lanes / busways and bus priority measures would be provided to make it an attractive method of travel.	

Strategic

Scale of impact against specific objectives	3	
Fit with high-level objectives	3	Supports the creation of a stronger, cleaner and more productive economy by improving links to local economy and sources of employment across the network. Connects people and places, and will help to encourage investment into the west of Norwich. Will improve journey time reliability on the local road network, as well as the A47 and A1067. Will use new technology throughout its design to help encourage future growth locally.
Degree of consensus	3	During public consultation improving public transport gained the 4th highest level of support.

Economic

Economic growth	3	Improved connectivity and reliability of PT, does not specifically help in the delivery new housing but may encourage it. Supports greater access to education, training and employment opportunities by public transport. Service could be routed to stop adjacent the Food Zone and Longwater retail and industrial zone. Reducing private vehicle trips would lead to improved journey time on the network and may help reduce rat running encouraging economic growth locally.
Socio-distributional impacts and the regions	2	Provides improved access for vulnerable social groups to affordable transport and improved connectivity. May help promote the River Wensum Valley area for local tourism.
Local environment	4	<i>Separate, additional Environmental Appraisal undertaken</i>
Well being	3	Reduced severance with reduction on traffic flow. Improves physical activity through promotion of multi modal journeys. Improved access for vulnerable groups to good and services.
Expected VfM category	3. Medium 1.5-2	

Managerial

Implementation timetable	Medium (3-8 Years)	Dependent on local operators and delivery of physical infrastructure such as bus ways, improved stops and information.
Public acceptability	3	An initial round of public consultation in May-July 2018 based on high level key issues seeking to identify the need for the scheme and extent of public support for a potential solution in principle was undertaken. During public consultation, public transport options, while scoring less than a highways option, did score relatively well. There are established stakeholder groups actively engaged in the project – this includes a Member Working Group (Council Members) and a Local Liaison Group (Parish council reps).
Practical feasibility	2	Not tested within a model but Sprint services have been rolled out successfully for example in Loughborough. Service would be operated by a private operator or potentially through a municipal private partnership. Large costs associated with new infrastructure.
What is the quality of the supporting evidence?	2	Not modelled, but existing Sprint Services in the UK have been developed, allowing an insight in to the likely strengths and weaknesses of the option.
Key uncertainties	Significant cost implications associated with new infrastructure. Project management would reduce potential for cost over-runs but would not be able to reduce costs. Low public support and low patronage (dependent on placement of stops). Similar schemes would allow greater understanding of potential issues. Ensuring the most beneficial and feasible route is targeted will help to increase support for this option.	

Financial

Affordability	2	No current funding sources.
Capital Cost (£m)	£25-£50 million	
Overall cost risk	3	

Commercial

Flexibility of option	2	Once delivered routing could change. Stopping service however would be an issues due to capex costs and construction of infrastructure.
Where is funding coming from?	Private public funding mechanism could be used.	
Any income generated?	Yes	Unknown

Early Assessment and Sifting Tool

Option name/no.	Option 65: Provision of sprint services: A1067 corridor	
Description	Provision of a new sprint bus service (distinctly branded Sprint vehicles) on the A1067 corridor connecting Norwich City Centre with western quadrant locations, possibly as far as Bawdeswell. The sprint service would have high reliability and competitive journey time targets. Where possible high-quality bus shelters, bus lanes / busways and bus priority measures would be provided to make it an attractive method of travel.	

Strategic

Scale of impact against specific objectives	3	
Fit with high-level objectives	3	Supports the creation of a stronger, cleaner and more productive economy by improving links to local economy and sources of employment across the network. Connects people and places, and will help to encourage investment into the west of Norwich. Will improve journey time reliability on the local road network, as well as the A47 and A1067. Will use new technology throughout its design to help encourage future growth locally.
Degree of consensus	3	During public consultation improving public transport gained the 4th highest level of support.

Economic

Economic growth	3	Improved connectivity and reliability of PT, does not specifically help in the delivery new housing but may encourage it. Supports greater access to education, training and employment opportunities by public transport. Service could be routed to stop adjacent the Food Zone and Longwater retail and industrial zone. Reducing private vehicle trips would lead to improved journey times on the network and may help reduce rat running.
Socio-distributional impacts and the regions	2	Provides improved access for vulnerable social groups to affordable transport and improved connectivity. May help promote the River Wensum Valley area for local tourism.
Local environment	4	<i>Separate, additional Environmental Appraisal undertaken</i>
Well being	3	Reduced severance with reduction on traffic flow. Improves physical activity through promotion of multi modal journeys. Improved access for vulnerable groups to good and services.
Expected VfM category	3. Medium 1.5-2	

Managerial

Implementation timetable	Medium (3-8 Years)	Dependent on local operators and delivery of physical infrastructure such as bus ways, improved stops and information.
Public acceptability	3	An initial round of public consultation in May-July 2018 based on high level key issues seeking to identify the need for the scheme and extent of public support for a potential solution in principle was undertaken. During public consultation, public transport options, while scoring less than a highways option, did score relatively well. There are established stakeholder groups actively engaged in the project – this includes a Member Working Group (Council Members) and a Local Liaison Group (Parish council reps).
Practical feasibility	2	Not tested within a model but Sprint services have been rolled out successfully for example in Loughborough. Service would be operated by a private operator or potentially through a municipal private partnership.
What is the quality of the supporting evidence?	2	Not modelled, but existing Sprint Services in the UK have been developed, allowing an insight in to the likely strengths and weaknesses of the option.
Key uncertainties	Significant cost implications associated with new infrastructure. Project management would reduce potential for cost over-runs but would not be able to reduce costs. Low public support and low patronage (dependent on placement of stops). Similar schemes would allow greater understanding of potential issues. Ensuring the most beneficial and feasible route is targeted will help to increase support for this option.	

Financial

Affordability	2	No current funding sources.
Capital Cost (£m)	£25-£50 million	
Overall cost risk	3	

Commercial

Flexibility of option	2	Once delivered routing could change. Stopping service however would be an issues due to capex costs and construction of infrastructure.
Where is funding coming from?	Private public funding mechanism could be used.	
Any income generated?	Yes	Unknown

Early Assessment and Sifting Tool

Option name/no.	Option 66: Provision of a sustainable urban distribution centre	
Description	Provision of a sustainable urban distribution centre on the outskirts of the city. All local deliveries are made to the distribution centre and are thereafter delivered in more carbon efficient vehicles and routing patterns.	

Strategic

Scale of impact against specific objectives	3	
Fit with high-level objectives	4	Supports the creation of a stronger, cleaner and more productive economy by improving links to local economy and sources of employment across the network, by removing HGVs and reducing accident severity and encouraging use of more active more sustainable travel modes. Connects people and places, and will help to encourage investment into the west of Norwich. Will improve journey time reliability on the local road network, as well as the A47 and A1067, transferring trips from private vehicle to a more sustainable mode.
Degree of consensus	3	During public consultation management of HGV routes was not considered as solution by respondents, however amongst considerations for the council was rat running and inappropriate use of the network by HGVs was considered an actual issue.

Economic

Economic growth	4	Would reduce HGV movements on the local road network reducing HGV associated severance. Would help to improve reliability and produce improved connectivity and accessibility of goods and services. Would do little to encourage housing. But would help to encourage tourism by removing HGVs. Does not help in the delivery of housing.
Socio-distributional impacts and the regions	4	Would reduce Heavy Goods Vehicle movements reducing severance on local roads. Would help to establish specific business models in the region.
Local environment	3	<i>Separate, additional Environmental Appraisal undertaken</i>
Well being	3	Reduced severance leads to increase in physical activity by making non motorised travel more attractive. Reduces severity of accidents by removing HGV movements and associated HGV accidents.
Expected VfM category	3. Medium 1.5-2	

Managerial

Implementation timetable	Medium (3-8 Years)	New technology requiring buy in would make the process relatively long.
Public acceptability	3	Removal of HGV rat running would gain support from locals, however as this would be a new system, it would be expected that some push back would come from local business owners as a group.
Practical feasibility	2	There are no known SUDC in existence though consolidation depots are a similar idea and are widespread though operated by private sector. The ability to gain support from all parties would be difficult and costs for running, maintenance, a new fleet of delivery vehicles and insurance would all be significant obstacles.
What is the quality of the supporting evidence?	1	Very little to date in terms of evidence.
Key uncertainties	This option has never been tested before. Significant issues relating to gaining agreement with all parties. Issues relating to insurance for movement of goods between centre and vehicles. Council would be required to control and run general operations bringing in potentially 3rd parties to undertake deliveries. Potential to run at a loss if lack of enthusiasm from hauliers. Council would be required to engage with all stakeholders in order to reduce potential negative attitudes.	

Financial

Affordability	2	Funding would be required upfront for significant investment in infrastructure. Potential to operate under a private public
Capital Cost (£m)	£10-£25 million	
Overall cost risk	3	

Commercial

Flexibility of option	2	Ability to scale back before delivery, however, limited due to physical infrastructure both in terms of fleet of vehicles and consolidation facility.
Where is funding coming from?	Private public funding mechanism could be used.	
Any income generated?	Yes	Unknown

Early Assessment and Sifting Tool

Option name/no.	Option 67: Provision of improved freight route intelligence	
Description	Provision of improved freight route intelligence to improve route choice and deter rat-running and unnecessary Heavy Good Vehicle (HGV) movements.	

Strategic

Scale of impact against specific objectives	3	
Fit with high-level objectives	4	Supports the creation of a stronger, cleaner and more productive economy by improving links to local economy and sources of employment across the network, by removing HGVs and reducing accident severity and encouraging use of more active more sustainable travel modes. Connects people and places, and will help to encourage investment into the west of Norwich. Will improve journey time reliability on the local road network, as well as the A47 and A1067, transferring trips from private vehicle to a more sustainable mode.
Degree of consensus	3	During public consultation management of HGV routes was not considered as solution by respondents, however amongst considerations for the council was rat running and inappropriate use of the network by HGVs was considered an actual issue.

Economic

Economic growth	4	Improved delivery of goods. Reduced severance and increased access to local goods and services. Network reliability would be increased reducing journey times. Does not encourage housing but would potentially encourage tourism and local business.
Socio-distributional impacts and the regions	3	Vulnerable social groups may see improvements through reduced severance.
Local environment	4	<i>Separate, additional Environmental Appraisal undertaken</i>
Well being	3	Reduces severance by limiting routes for freight movement and increasing conditions for active travel. Will reduce severity of injuries by removing freight movements from local roads and opportunity for heavy vehicle pedestrian conflict and heavy vehicle to vehicle conflict.
Expected VfM category	2. Good 2-4.5	

Managerial

Implementation timetable	Short (1-2 Years)	Study required followed by the provision of analysis and data to the FTA and providers of intelligence.
Public acceptability	3	Removal of HGV rat running would gain support from locals, and issues related to HGV rat running in the study area are significant.
Practical feasibility	2	Council would be required to gather routing data and pass data on the FTA and associated providers of freight intelligence.
What is the quality of the supporting evidence?	3	System has gained significant support from the industry as it generally saves costs.
Key uncertainties	A lack of interest / input from HGV operators.	

Financial

Affordability	4	It is thought costs would not be significant and would be converged within future budgets.
Capital Cost (£m)	£0-£5 million	
Overall cost risk	3	

Commercial

Flexibility of option	2	Considered flexible.
Where is funding coming from?	Council budget would be able to cover costs.	
Any income generated?	No	N/A

Early Assessment and Sifting Tool

Option name/no.	Option 68: Lorry management strategy	
Description	Development of an overarching lorry management strategy for the Norwich area. The strategy could include: creation of a lorry route network, restriction of lorry movement, speed management and traffic calming, accessibility measures, route suitability assessments, managing lorry deliveries, lorry parking facilities, communication of information strategy, partnerships with key hauliers and associations (Road Haulage Association / Freight Transport Association)	

Strategic

Scale of impact against specific objectives	3	
Fit with high-level objectives	4	Supports the creation of a stronger, cleaner and more productive economy by improving links to local economy and sources of employment across the network, by removing HGVs and reducing accident severity and encouraging use of more active more sustainable travel modes. Connects people and places, and will help to encourage investment into the west of Norwich. Will improve journey time reliability on the local road network, as well as the A47 and A1067, transferring trips from private vehicle to a more sustainable mode.
Degree of consensus	3	During public consultation management of HGV routes was not considered as solution by respondents, however amongst considerations for the council was rat running and inappropriate use of the network by HGVs was considered an actual issue.

Economic

Economic growth	4	Improved delivery of goods will increase economic activity but unlikely to encourage delivery of housing. Potential to remove rat running HGVs from Norwich area and produce more defined routing for freight and deliveries. Would not encourage housing, but would help to deliver economic growth. Would help to encourage tourism by removing HGVs from local roads.
Socio-distributional impacts and the regions	3	Removal of excess lorry trips from local road network will reduce journey time.
Local environment	4	<i>Separate, additional Environmental Appraisal undertaken</i>
Well being	3	Reduces severance by limiting routes for freight movement and increasing conditions for active travel. Will reduce severity of injuries by removing freight movements from local roads and opportunity for heavy vehicle pedestrian conflict and heavy vehicle to vehicle conflict.
Expected VfM category	2. Good 2-4.5	

Managerial

Implementation timetable	Short (1-2 Years)	Study required followed by the provision of analysis and data to the FTA and local operators.
Public acceptability	3	An initial round of public consultation in May-July 2018 based on high level key issues seeking to identify the need for the scheme and extent of public support for a potential solution in principle was undertaken. During discussions, issues with rat running was a consideration for improvement as was improved road safety, this option would help to tackle both HGV rat running and road safety issues.
Practical feasibility	2	Council would be required to undertake study and consultation with Hauliers and local business to understand current issues and thereafter provide a strategy. Council would govern strategy however there is no guarantee that individuals will adhere to the resulting policy.
What is the quality of the supporting evidence?	2	Supporting evidence is related to strategies carried out by other councils.
Key uncertainties	Requires support and buy in from residents, employers and hauliers. Major risks relate to individuals not adhering to specific policies which come from the strategy.	

Financial

Affordability	4	Low cost expected.
Capital Cost (£m)	£0-£5 million	
Overall cost risk	3	

Commercial

Flexibility of option	3	Considered flexible as option can be scaled back and rolled out with ease.
Where is funding coming from?	Private public funding mechanism could be used.	
Any income generated?	No	N/A

Early Assessment and Sifting Tool

Option name/no.	Option 69: Purple line (2018 public consultation), single carriageway	
Description	From the A1067, west of the junction with the A1270 at Deighton Hills, Option 69 heads south-west, crossing the River Wensum and Ringland Lane. The route then heads south crossing Weston Road, near Breck Barn Cottages to the west of Ringland, passing through Blackbreck Plantation and crossing The Broadway. Option 69 continues south to tie-in with Taverham Road following the alignment for approximately 300 metres (over the River Tud) to connect with the A47 at the junction with Blind Lane. Option 69 would be of single carriageway standard.	

Strategic

Scale of impact against specific objectives	4	
Fit with high-level objectives	4	Supports the creation of a stronger, cleaner and more productive economy by improving links to local economy and sources of employment across the network. Connects people and places, and will help to encourage investment into the west of Norwich including, for example, tourism. Will improve journey time reliability on the local road network, as well as the A47 and A1067, transferring trips from existing local roads to a new high-speed high-standard link designed to the latest safety standards. Provides strong regional economic links for the future. It can be assumed that the provision of a dualled version of this route will further improve resilience and reliability.
Degree of consensus	5	Public consultation has taken place with high degree of consensus that a new highway link would address the current network issues. Considerations that the council should take into account, according to respondents, included: reducing congestion, rat running, shortening journey times and providing better journey time reliability together with improved road safety.

Economic

Economic growth	4	Provides connectivity directly between the A47 and A1067. Improves south to north journey time and improves network resilience. Compliments delivery of housing in the Easton area. Provides new access to employment opportunities to the north.
Socio-distributional impacts and the regions	3	No direct impact on accessibility of vulnerable social groups, but improvement in network reliability and resilience and will improve journey times for all user groups.
Local environment	2	<i>Separate, additional Environmental Appraisal undertaken</i>
Well being	4	Reduces severance on existing routes by attracting existing traffic, would be expected to attract rat running HGVs from local roads
Expected VfM category	3. Medium 1.5-2	

Managerial

Implementation timetable	Medium (3-8 Years)	Assumed construction start 2022. Assumed completion 2026.
Public acceptability	4	An initial round of public consultation in May-July 2018 based on high level key issues seeking to identify the need for the scheme and extent of public support for a potential solution in principle was undertaken. This did not include any specific scheme options or lines on a plan, however broad support was noted for a highways option as a solution to existing issues. There are established stakeholder groups actively engaged in the project – this includes a Member Working Group (Council Members) and a Local Liaison Group (Parish council reps). Engagement with Natural England, the Environment Agency and Highways England was also undertaken.
Practical feasibility	4	New crossing required, Town and Country Planning. Option is similar to earlier options and would produce similar modelling outputs - The EHV overhead power lines have a minor impact during construction. The design would be limited by fixed pylons locations; building bridges near them has further challenges. This option crosses the HP gas main and thus there will be a c£3m cost impact. Protection works or pipe upgrade will be needed if we are to cross the HP gas main and £1.2m stopple charges for stopping the main gas supply to East Anglia during the works. Furthermore there are likely to be further limitations where a route runs within 80m of HP gas main or cable route for more than a length of 80m. High Voltage Power line Orsted Cable cannot be re-routed to accommodate our proposals. However crossing the cable would require protection measures to be installed below the ground – for example reinforced concrete slab bridging over the cable trench. These works are expected to have a cost of upto £250-£300K per crossing point. Running parallel to the High Voltage Power line Orsted Cable would need to be adequately separated from the cable and positioned outside of the easement which is expected to be c12m each side of each cable noting there are at least four cables being installed (the hazard zone extents are likely to be wider than the easement the cable route land extents being purchased extend to about 55m each side, therefore any options running within 60m on each side of the cable route centreline may be considered to be at risk).
What is the quality of the supporting evidence?	4	Not modelled in 2014 though similar to previous options.
Key uncertainties	Planning and environmental concerns. Taverham Road highway bridge: current width insufficient to accommodate a compliant single / dual carriageway. Bridge widening or a new bridge will be required.	

Financial

Affordability	3	No current funding sources.
Capital Cost (£m)	£50-£100 million	
Overall cost risk	4	

Commercial

Flexibility of option	3	One of several route options.
Where is funding coming from?	Funding from several sources of local and central government expected.	
Any income generated?	Yes	Unknown

Early Assessment and Sifting Tool

Option name/no.	Option 70: Purple line (2018 public consultation), dual carriageway	
Description	From the A1067, west of the junction with the A1270 at Deighton Hills, Option 70 heads south-west, crossing the River Wensum and Ringland Lane. The route then heads south crossing Weston Road, near Breck Barn Cottages to the west of Ringland, passing through Blackbreck Plantation and crossing The Broadway. Option 70 continues south to tie-in with Taverham Road following the alignment for approximately 300 metres (over the River Tud) to connect with the A47 at the junction with Blind Lane. Option 70 would be of dual carriageway standard. Upgrades to the A1067 to dual carriageway standard may also be required.	

Strategic

Scale of impact against specific objectives	4	
Fit with high-level objectives	4	Supports the creation of a stronger, cleaner and more productive economy by improving links to local economy and sources of employment across the network. Connects people and places, and will help to encourage investment into the west of Norwich including, for example, tourism. Will improve journey time reliability on the local road network, as well as the A47 and A1067, transferring trips from existing local roads to a new high-speed high-standard link designed to the latest safety standards. Provides strong regional economic links for the future.
Degree of consensus	5	Public consultation has taken place with high degree of consensus that a new highway link would address the current network issues. Considerations that the council should take into account, according to respondents, included: reducing congestion, rat running, shortening journey times and providing better journey time reliability together with improved road safety.

Economic

Economic growth	4	Provides connectivity directly between the A47 and A1067. Improves south to north journey time and improves network resilience. Compliments delivery of housing in Easton area. Provides new access to employment opportunities to the north .
Socio-distributional impacts and the regions	3	No direct impact on accessibility of vulnerable social groups, but improvement in network reliability and resilience and will improve journey times for all user groups.
Local environment	2	<i>Separate, additional Environmental Appraisal undertaken</i>
Well being	4	Reduces severance on existing routes by attracting existing traffic, would be expected to attract rat running HGVs from local roads and reduce accident severity
Expected VfM category	3. Medium 1.5-2	

Managerial

Implementation timetable	Medium (3-8 Years)	Assumed construction start 2022. Assumed completion 2026.
Public acceptability	4	An initial round of public consultation in May-July 2018 based on high level key issues seeking to identify the need for the scheme and extent of public support for a potential solution in principle was undertaken. This did not include any specific scheme options or lines on a plan, however broad support was noted for a highways option as a solution to existing issues. There are established stakeholder groups actively engaged in the project – this includes a Member Working Group (Council Members) and a Local Liaison Group (Parish council reps). Engagement with Natural England, the Environment Agency and Highways England was also undertaken.
Practical feasibility	4	New crossing required, Town and Country Planning The EHV overhead power lines have a minor impact during construction. The design would be limited by fixed pylons locations; building bridges near them has further challenges. This option crosses the HP gas main and thus there will be a c£3m cost impact. Protection works or pipe upgrade will be needed if we are to cross the HP gas main and £1.2m stopple charges for stopping the main gas supply to East Anglia during the works. Furthermore there are likely to be further limitations where a route runs within 80m of HP gas main or cable route for more than a length of 80m. High Voltage Power line Orsted Cable cannot be re-routed to accommodate our proposals. However crossing the cable would require protection measures to be installed below the ground – for example reinforced concrete slab bridging over the cable trench. These works are expected to have a cost of upto £250-£300K per crossing point. Running parallel to the High Voltage Power line Orsted Cable would need to be adequately separated from the cable and positioned outside of the easement which is expected to be c12m each side of each cable noting there are at least four cables being installed (the hazard zone extents are likely to be wider than the easement the cable route land extents being purchased extend to about 55m each side, therefore any options running within 60m on each side of the cable route centreline may be considered to be at risk).
What is the quality of the supporting evidence?	4	Not modelled in 2014 though similar to previous options.
Key uncertainties	Planning and environmental concerns. Taverham Road highway bridge: current width insufficient to accommodate a compliant single / dual carriageway. Bridge widening or a new bridge will be required.	

Financial

Affordability	3	No current funding sources.
Capital Cost (£m)	£150-£250 million	
Overall cost risk	4	

Commercial

Flexibility of option	3	One of several route options.
Where is funding coming from?	Funding from several sources of local and central government expected.	
Any income generated?	Yes	Unknown

Early Assessment and Sifting Tool

Option name/no.	Option 71: Blue line (2018 public consultation), single carriageway	
Description	From the A1067, west of the junction with the A1270 at Deighton Hills, Option 71 heads south-west, crossing the River Wensum and Ringland Lane passing through Primrose Grove. The route then heads south crossing the northern Weston Road to the west of Ringland before crossing Honinham Lane passing through Poets Breck and Plantation to the southern Weston Road. Option 71 then heads west to cross Taverham Road before routing south and running parallel to Taverham Road. Option 71 then crosses the River Tud to connect with the A47 to the west of Easton at the existing Taverham Road junction. Option 71 would be of single carriageway standard.	

Strategic

Scale of impact against specific objectives	4	
Fit with high-level objectives	4	Supports the creation of a stronger, cleaner and more productive economy by improving links to local economy and sources of employment across the network. Connects people and places, and will help to encourage investment into the west of Norwich including, for example, tourism. Will improve journey time reliability on the local road network, as well as the A47 and A1067, transferring trips from existing local roads to a new high-speed high-standard link designed to the latest safety standards. Provides strong regional economic links for the future. It can be assumed that the provision of a dualled version of this route will further improve resilience and reliability.
Degree of consensus	5	Public consultation has taken place with high degree of consensus that a new highway link would address the current network issues. Considerations that the council should take into account, according to respondents, included: reducing congestion, rat running, shortening journey times and providing better journey time reliability together with improved road safety.

Economic

Economic growth	4	Providing a direct link between A47 and NDR will significantly improve connectivity and access to potential new employment opportunities to the north. Improves south to north journey time and improves network resilience. Compliments delivery of housing in Easton area.
Socio-distributional impacts and the regions	3	No direct impact on accessibility of vulnerable social groups, but improvement in network reliability and resilience and will improve journey times for all user groups.
Local environment	2	<i>Separate, additional Environmental Appraisal undertaken</i>
Well being	4	Reduces severance on existing routes by attracting existing traffic, would be expected to attract rat running HGVs from local roads and reduce accident severity
Expected VfM category	3. Medium 1.5-2	

Managerial

Implementation timetable	Medium (3-8 Years)	Assumed construction start 2022. Assumed completion 2026.
Public acceptability	4	An initial round of public consultation in May-July 2018 based on high level key issues seeking to identify the need for the scheme and extent of public support for a potential solution in principle was undertaken. This did not include any specific scheme options or lines on a plan, however broad support was noted for a highways option as a solution to existing issues. There are established stakeholder groups actively engaged in the project – this includes a Member Working Group (Council Members) and a Local Liaison Group (Parish council reps). Engagement with Natural England, the Environment Agency and Highways England was also undertaken.
Practical feasibility	4	New crossing required, Town and Country Planning The EHV overhead power lines have a minor impact during construction. The design would be limited by fixed pylons locations; building bridges near them has further challenges. This option crosses the HP gas main and thus there will be a c£3m cost impact. Protection works or pipe upgrade will be needed if we are to cross the HP gas main and £1.2m stopple charges for stopping the main gas supply to East Anglia during the works. Furthermore there are likely to be further limitations where a route runs within 80m of HP gas main or cable route for more than a length of 80m. High Voltage Power line Orsted Cable cannot be re-routed to accommodate our proposals. However crossing the cable would require protection measures to be installed below the ground – for example reinforced concrete slab bridging over the cable trench. These works are expected to have a cost of upto £250-£300K per crossing point. Running parallel to the High Voltage Power line Orsted Cable would need to be adequately separated from the cable and positioned outside of the easement which is expected to be c12m each side of each cable noting there are at least four cables being installed (the hazard zone extents are likely to be wider than the easement the cable route land extents being purchased extend to about 55m each side, therefore any options running within 60m on each side of the cable route centreline may be considered to be at risk).
What is the quality of the supporting evidence?	4	Not modelled in 2014 though similar to previous options.
Key uncertainties	Planning and environmental concerns.	

Financial

Affordability	3	No current funding sources.
Capital Cost (£m)	£150-£250 million	
Overall cost risk	5	

Commercial

Flexibility of option	3	One of several route options.
Where is funding coming from?	Funding from several sources of local and central government expected.	
Any income generated?	Yes	Unknown

Early Assessment and Sifting Tool

Option name/no.	Option 72: Blue line (2018 public consultation), dual carriageway	
Description	From the A1067, west of the junction with the A1270 at Deighton Hills, Option 72 heads south-west, crossing the River Wensum and Ringland Lane passing through Primrose Grove. The route then heads south crossing the northern Weston Road to the west of Ringland before crossing Honinham Lane passing through Poets Breck and Plantation to the southern Weston Road. Option 72 then heads west to cross Taverham Road before routing south and running parallel to Taverham Road. Option 72 then crosses the River Tud to connect with the A47 to the west of Easton at the existing Taverham Road junction. Option 72 would be of dual carriageway standard. Upgrades to the A1067 to dual carriageway standard may also be required.	

Strategic

Scale of impact against specific objectives	4	
Fit with high-level objectives	4	Supports the creation of a stronger, cleaner and more productive economy by improving links to local economy and sources of employment across the network. Connects people and places, and will help to encourage investment into the west of Norwich including, for example, tourism. Will improve journey time reliability on the local road network, as well as the A47 and A1067, transferring trips from existing local roads to a new high-speed high-standard link designed to the latest safety standards. Provides strong regional economic links for the future.
Degree of consensus	5	Public consultation has taken place with high degree of consensus that a new highway link would address the current network issues. Considerations that the council should take into account, according to respondents, included: reducing congestion, rat running, shortening journey times and providing better journey time reliability together with improved road safety.

Economic

Economic growth	4	Providing a direct link between A47 and NDR will significantly improve connectivity and access to potential new employment opportunities to the north. Improves south to north journey time and improves network resilience. Compliments delivery of housing in Easton area.
Socio-distributional impacts and the regions	3	No direct impact on accessibility of vulnerable social groups, but improvement in network reliability and resilience and will improve journey times for all user groups.
Local environment	2	<i>Separate, additional Environmental Appraisal undertaken</i>
Well being	4	Reduces severance on existing routes by attracting existing traffic, would be expected to attract rat running HGVs from local roads and reduce accident severity
Expected VfM category	3. Medium 1.5-2	

Managerial

Implementation timetable	Medium (3-8 Years)	Assumed construction start 2022. Assumed completion 2026.
Public acceptability	4	An initial round of public consultation in May-July 2018 based on high level key issues seeking to identify the need for the scheme and extent of public support for a potential solution in principle was undertaken. This did not include any specific scheme options or lines on a plan, however broad support was noted for a highways option as a solution to existing issues. There are established stakeholder groups actively engaged in the project – this includes a Member Working Group (Council Members) and a Local Liaison Group (Parish council reps). Engagement with Natural England, the Environment Agency and Highways England was also undertaken.
Practical feasibility	4	New crossing required, Town and Country Planning The EHV overhead power lines have a minor impact during construction. The design would be limited by fixed pylons locations; building bridges near them has further challenges. This option crosses the HP gas main and thus there will be a c£3m cost impact. Protection works or pipe upgrade will be needed if we are to cross the HP gas main and £1.2m stopple charges for stopping the main gas supply to East Anglia during the works. Furthermore there are likely to be further limitations where a route runs within 80m of HP gas main or cable route for more than a length of 80m. High Voltage Power line Orsted Cable cannot be re-routed to accommodate our proposals. However crossing the cable would require protection measures to be installed below the ground – for example reinforced concrete slab bridging over the cable trench. These works are expected to have a cost of upto £250-£300K per crossing point. Running parallel to the High Voltage Power line Orsted Cable would need to be adequately separated from the cable and positioned outside of the easement which is expected to be c12m each side of each cable noting there are at least four cables being installed (the hazard zone extents are likely to be wider than the easement the cable route land extents being purchased extend to about 55m each side, therefore any options running within 60m on each side of the cable route centreline may be considered to be at risk).
What is the quality of the supporting evidence?	4	Not modelled in 2014 though similar to previous options.
Key uncertainties	Planning and environmental concerns.	

Financial

Affordability	3	No current funding sources.
Capital Cost (£m)	£100-£150 million	
Overall cost risk	4	

Commercial

Flexibility of option	3	One of several route options.
Where is funding coming from?	Funding from several sources of local and central government expected.	
Any income generated?	Yes	Unknown

Early Assessment and Sifting Tool

Option name/no.	Option 73: Relay Fakenham to Norwich rail line	
Description	This option considers the relaying and reopening of the Fakenham to Norwich Railway Line to provide services to Norwich City Centre from the outer districts, encouraging modal shift. The route heads north-west out of Norwich City Centre, crossing the River Wensum on three occasions to Drayton. The route then crosses the A1270 and follow the alignment of Reepham Road diverting away west, passing north of Attleridge and Lenwade toward Reepham. The route to Fakenham then uses the existing cycle network to Foulsham (Kerdiston Road / Reepham Road), Bintree (Claypit Road / Gunn Street / Bintree Road), Great Ryburgh (Mill Road / B1110 Bridge Road) to Fakeham (Fakenham Road / B1146 Dereham Road).	

Strategic

Scale of impact against specific objectives	3	
Fit with high-level objectives	3	Supports the creation of a stronger, cleaner and more productive economy by improving links to local economy and sources of employment across the network. Connects people and places, and will help to encourage investment into the west of Norwich including, for example, tourism. Will improve journey time reliability on the local road network, as well as the A47 and A1067, transferring trips from private vehicle to a more sustainable mode.
Degree of consensus	3	During public consultation improving public transport gained the 4th highest level of support.

Economic

Economic growth	3	Potential to improve connectivity between towns to the west and Norwich. Improved reliability both on rail line and road network. May increase potential for improved agglomeration and improved access to labour. However does not directly encourage delivery of housing but would encourage local tourism.
Socio-distributional impacts and the regions	3	Improves accessibility for vulnerable social groups such as the disabled, low income groups and the elderly. May help to encourage tourism, raising the profile of the River Wensum Valley. Does not encourage housing and has limited impact on existing economic contributors such as the Longwater Industrial Estate and the proposed Food Enterprise Zone.
Local environment	3	<i>Separate, additional Environmental Appraisal undertaken</i>
Well being	3	Would have little impact on severance but would potentially encourage increased activity through increased use of public transport. Some improvement in terms of access to goods and services over a wider area.
Expected VfM category	5. Poor <1	

Managerial

Implementation timetable	Long Term (8+ Years)	Long term project requiring long term planning while Transport and Works Act 1992 process would be required.
Public acceptability	3	An initial round of public consultation in May-July 2018 based on high level key issues seeking to identify the need for the scheme and extent of public support for a potential solution in principle was undertaken. During public consultation, public transport options, while scoring less than a highways option, did score relatively well. High costs associated with new heavy rail may dampen public support as the scheme does not address all issues.
Practical feasibility	2	Dependent on buy in from multiple operators and stakeholders and land holders. The infrastructure would be developed at least partially by NCC, maintained by Network Rail and operated by private operator issues. Potential issues with project governance. Existing path of line does still exist which will reduce risks associated with land take, though large sections currently used by walkers and cyclists.
What is the quality of the supporting evidence?	2	No modelling undertaken at this stage, but multiple existing projects provide a theoretical evidential base.
Key uncertainties	Significant cost implications associated with new infrastructure. Project management would reduce potential for cost over-runs but would not be able to reduce costs. Necessary demand for the option to be feasible. Ensuring that the most beneficial and feasible route is targeted. Public and political acceptance. Marriotts Way (A Frame Bridge over River Wensum): originally a railway bridge built in 1893 that has since been converted to a footbridge.	

Financial

Affordability	2	No current funding sources.
Capital Cost (£m)	£100-£150 million	
Overall cost risk	1	

Commercial

Flexibility of option	1. Static	Use of existing line.
Where is funding coming from?	Funding from several sources of local and central government expected.	
Any income generated?	Yes	Unknown

Early Assessment and Sifting Tool

Option name/no.	Option 74: New bus route connecting Dereham, Hellesdon and Norwich Airport	
Description	Provision of a new bus route connecting Dereham, Hellesdon and Norwich International Airport (with the potential to connect in to development to the north of Norwich). The service would use smaller, more manoeuvrable vehicles running every 15 minutes. From Dereham the bus route would largely use the A47 toward Norwich, passing Hockering, Honingham and Easton. The bus route would then use the A1074 Dereham Road through Longwater and New Costessey before heading north on Marl Pit Lane / Hellesdon Road, crossing the River Wensum, to serve Hellesdon. The route would continue along Low Road, onto Hospital Lane, then Middletons Lane before joining the A140 Holt Road and connecting to Norwich International Airport.	

Strategic

Scale of impact against specific objectives	4	
Fit with high-level objectives	3	Supports the creation of a stronger, cleaner and more productive economy by improving links to local economy and sources of employment across the network. Connects people and places, and will help to encourage investment into the west of Norwich including, for example, tourism. Would attract people to public transport options by creating a more robust service. Little impact on future growth in terms of movement of goods and services.
Degree of consensus	3	During public consultation improving public transport gained the 4th highest level of support. Better access to the airport was a consideration which respondents felt the council should take into account when considering options.

Economic

Economic growth	4	Will improve connectivity between key locations encouraging growth. Does not directly help in the delivery of housing but may encourage it through improved connectivity. Would potentially link into existing P&R sites.
Socio-distributional impacts and the regions	3	Improvement in accessibility for vulnerable social groups adjacent to the proposed service.
Local environment	5	<i>Separate, additional Environmental Appraisal undertaken</i>
Well being	3	Would increase access to goods and service and may have a moderate impact in terms of reducing severance through modal shift and reduced private vehicle trips. Would increase physical activity through increased use of public transport.
Expected VfM category	3. Medium 1.5-2	

Managerial

Implementation timetable	Short (1-2 Years)	This would be dependent on the operator.
Public acceptability	3	Would gather support from locals adjacent to the route only.
Practical feasibility	3	Would be dependent on local operators and may require subsidy.
What is the quality of the supporting evidence?	3	Will require analysis of trip Origin-Destinations
Key uncertainties	Would require significant subsidy. Necessary demand for the option to be feasible. Need to ensure that the most beneficial and feasible route is targeted. Public and political acceptance.	

Financial

Affordability	3	No current funding sources.
Capital Cost (£m)	£0-£5 million	
Overall cost risk	3	

Commercial

Flexibility of option	4	Option be scaled up or down depending on operators understanding of patronage. Option requires little additional infrastructure so can be stopped at any point and routing could be changed if required to facilitate future development.
Where is funding coming from?	Funding from several sources of local and central government expected.	
Any income generated? (£m)	Yes	Unknown

Early Assessment and Sifting Tool

Option name/no.	Option 75: Black line (2018 public consultation), existing route, single carriageway	
Description	Upgrading the existing road network between the A1067 at Lenwade (Porter's Lane junction) to the A47 east of Hockering. From the A1067 Porter's Lane junction at Lenwade, Option 75 upgrades the B1535 to the junction with Rectory Road. The B1535 heads west for a short distance before routing south-east to the junction with Wood Lane. The existing B1535 exhibits a series of sharp bends at junctions with Collin Green Lane and Sandy Lane. The route then connects with the A47 to the north-west of Honingham at Wood Lane / Berrys Lane junction. Option 75 would be of single carriageway standard.	

Strategic

Scale of impact against specific objectives	3	
Fit with high-level objectives	3	Supports the creation of a stronger, cleaner and more productive economy by improving links to local economy and sources of employment across the network. Connects people and places, and will help to encourage investment into the west of Norwich including, for example, tourism. Will improve journey time reliability on the local road network, as well as the A47 and A1067, transferring trips from existing local roads to a new high-speed high-standard link designed to the latest safety standards. Provides strong regional economic links for the future. It can be assumed that the provision of a dualled version of this route will further improve resilience and reliability.
Degree of consensus	4	During public consultation improving existing routes received the 2nd highest level of support as a solution to existing issues. Considerations that the council should take into account, according to respondents, included; reducing congestion, rat running, shortening journey times, providing better journey time reliability together with improved road safety.

Economic

Economic growth	3	Will improve connectivity between the A47 and A1067 to the east of the study area improving access to existing employment and housing in this area however does not directly encourage new housing. Would likely attract trips from other routes increasing JTs for existing and new traffic. Would have a limited impact in terms of resilience.
Socio-distributional impacts and the regions	3	Will improve connectivity for vulnerable local groups with access to private vehicles, but will have limited impact in terms of public transport. Will help to improve access to local business and employment locally. Would help to encourage local tourism to the River Wensum Valley.
Local environment	3	<i>Separate, additional Environmental Appraisal undertaken</i>
Well being	3	Would help to reduce severance on the local road network but may increase severance on the route itself through increased traffic demand. Would potentially encourage PT and active travel options on other competing routes due to reduction of traffic on those routes.
Expected VfM category	3. Medium 1.5-2	

Managerial

Implementation timetable	Medium (3-8 Years)	Would require additional study, design and construction.
Public acceptability	4	An initial round of public consultation in May-July 2018 based on high level key issues seeking to identify the need for the scheme and extent of public support for a potential solution in principle was undertaken. This did not include any specific scheme options or lines on a plan, however broad support was noted improvements to existing routes as a solution to existing issues. There are established stakeholder groups actively engaged in the project – this includes a Member Working Group (Council Members) and a Local Liaison Group (Parish council reps). Engagement with Natural England, the Environment Agency and Highways England was also undertaken.
Practical feasibility	4	Option has not been tested using a model. Mitigation of environmental concerns would not be expected to be show stoppers. Environmental concerns and planning process will determine legal feasibility of the option? NCC would undertake maintain and operate widened sections.
What is the quality of the supporting evidence?	3	No modelling of this option has been undertaken to date.
Key uncertainties	Significant cost implications associated with new infrastructure. Project management would reduce potential for cost over-runs but would not be able to reduce costs. Low public support and low patronage (dependent on placement of stops).	

Financial

Affordability	3	Budgetary options are still being investigated.
Capital Cost (£m)	£10-£25 million	
Overall cost risk	3	

Commercial

Flexibility of option	4	Very inflexible option in terms of design and closure.
Where is funding coming from?	None specifically set aside. Funding sources to be considered.	
Any income generated?	No	N/A

Early Assessment and Sifting Tool

Option name/no.	Option 76: Black line (2018 public consultation), existing route, dual carriageway	
Description	Upgrading the existing road network between the A1067 at Lenwade (Porter's Lane junction) to the A47 east of Hockering. From the A1067 Porter's Lane junction at Lenwade, Option 76 upgrades the B1535 to the junction with Rectory Road. The B1535 heads west for a short distance before routing south-east to the junction with Wood Lane. The existing B1535 exhibits a series of sharp bends at junctions with Collin Green Lane and Sandy Lane. The route then connects with the A47 to the north-west of Honingham at Wood Lane / Berrys Lane junction. Option 76 would be of dual carriageway standard. Upgrades to the A1067 to dual carriageway standard may also be required.	

Strategic

Scale of impact against specific objectives	4	
Fit with high-level objectives	3	Supports the creation of a stronger, cleaner and more productive economy by improving links to local economy and sources of employment across the network. Connects people and places, and will help to encourage investment into the west of Norwich including, for example, tourism. Will improve journey time reliability on the local road network, as well as the A47 and A1067, transferring trips from existing local roads to a new high-speed high-standard link designed to the latest safety standards. Provides strong regional economic links for the future.
Degree of consensus	4	During public consultation improving existing routes received the 2nd highest level of support as a solution to existing issues. Considerations that the council should take into account, according to respondents, included; reducing congestion, rat running, shortening journey times, providing better journey time reliability together with improved road safety.

Economic

Economic growth	4	Will improve connectivity between the A47 and A1067 to the east of the study area improving access to existing employment and housing in this area however does not directly encourage new housing. Would likely attract trips from other routes increasing JTs for existing and new traffic. Would have a limited impact in terms of resilience.
Socio-distributional impacts and the regions	3	Will improve connectivity for vulnerable local groups with access to private vehicles, but will have limited impact in terms of public transport. Will help to improve access to local business and employment locally. Would help to encourage local tourism to the River Wensum Valley.
Local environment	3	<i>Separate, additional Environmental Appraisal undertaken</i>
Well being	3	Would help to reduce severance on the local road network but may increase severance on the route itself through increased traffic demand. Would potentially encourage PT and active travel options on other competing routes due to reduction of traffic on those routes.
Expected VfM category	3. Medium 1.5-2	

Managerial

Implementation timetable	Medium (3-8 Years)	Would require additional study, design and construction.
Public acceptability	4	An initial round of public consultation in May-July 2018 based on high level key issues seeking to identify the need for the scheme and extent of public support for a potential solution in principle was undertaken. This did not include any specific scheme options or lines on a plan, however broad support was noted improvements to existing routes as a solution to existing issues. There are established stakeholder groups actively engaged in the project – this includes a Member Working Group (Council Members) and a Local Liaison Group (Parish council reps). Engagement with Natural England, the Environment Agency and Highways England was also undertaken.
Practical feasibility	4	Option has not been tested using a model. Mitigation of environmental concerns would not be expected to be show stoppers. Environmental concerns and planning process will determine legal feasibility of the option? NCC would undertake maintain and operate widened sections.
What is the quality of the supporting evidence?	3	No modelling of this option has been undertaken to date.
Key uncertainties	Significant cost implications associated with new infrastructure. Project management would reduce potential for cost over-runs but would not be able to reduce costs. Low public support and low patronage (dependent on placement of stops).	

Financial

Affordability	3	Budgetary options are still being investigated.
Capital Cost (£m)	£10-£25 million	
Overall cost risk	3	

Commercial

Flexibility of option	4	Very inflexible option in terms of design and closure.
Where is funding coming from?	None specifically set aside. Funding sources to be considered.	
Any income generated?	No	N/A

Early Assessment and Sifting Tool

Option name/no.	Option 77: Outer ring road widening	
Description	Widening of the existing outer ring road (A47 / A146 / A140 / A1042) to improve capacity, connectivity journey time and reliability, while improving access to Norwich from the western quadrant.	

Strategic

Scale of impact against specific objectives	3	
Fit with high-level objectives	3	Supports the creation of a stronger, cleaner and more productive economy by improving links to local economy and sources of employment across the network. Connects people and places, and will help to encourage investment into the west of Norwich including, for example, tourism. Will improve journey time reliability on the local road network. Would be expected to significantly encourage local development.
Degree of consensus	4	During public consultation improving existing routes received the 2nd highest level of support as a solution to existing issues. Considerations that the council should take into account, according to respondents, included; reducing congestion, rat running, shortening journey times, providing better journey time reliability together with improved road safety.

Economic

Economic growth	4	Would improve journey times on the outer ring road increasing accessibility to employment and attracting potential new employment. Would not directly help in the delivery of housing.
Socio-distributional impacts and the regions	2	Would deliver significant benefits in terms of improving access to local industry. However, would do little to improve access of vulnerable groups to transport.
Local environment	3	<i>Separate, additional Environmental Appraisal undertaken</i>
Well being	3	Would increase severance on the ring road but reduce severance on local road network within the study area. Would improve access to goods and services and may have a limited impact on physical activity by drawing trips away from local roads.
Expected VfM category	4. Low 1-1.5	

Managerial

Implementation timetable	Medium (3-8 Years)	Would require additional study, design and construction.
Public acceptability	4	An initial round of public consultation in May-July 2018 based on high level key issues seeking to identify the need for the scheme and extent of public support for a potential solution in principle was undertaken. This did not include any specific scheme options or lines on a plan, however broad support was noted improvements to existing routes as a solution to existing issues. There are established stakeholder groups actively engaged in the project – this includes a Member Working Group (Council Members) and a Local Liaison Group (Parish council reps). Engagement with Natural England, the Environment Agency and Highways England was also undertaken.
Practical feasibility	3	Option has not been tested using a model. Mitigation of environmental concerns would not be expected to be show stoppers. Environmental concerns and planning process will determine legal feasibility of the option? NCC would undertake maintain and operate widened sections.
What is the quality of the supporting evidence?	3	No modelling of this option has been undertaken to date.
Key uncertainties	Significant cost implications associated with new infrastructure. Project management would reduce potential for cost over-runs but would not be able to reduce costs. Low public support and low patronage (dependent on placement of stops). Carrow Road (Carrow Road River Bridge): structure in fair condition with minor cracking to concrete and some localised corrosion to steel members, structure contains a bespoke steel rolling bascule span for which widening to support a compliant single / dual carriageway will not be possible. A new bridge will be required at the following locations: Sweet Briar Road and Martineau Lane.	

Financial

Affordability	2	Budgetary options are still being investigated.
Capital Cost (£m)	£10-£25 million	
Overall cost risk	2	

Commercial

Flexibility of option	2	Very inflexible option in terms of design and closure.
Where is funding coming from?	None specifically set aside. Funding sources to be considered.	
Any income generated?	No	N/A

Early Assessment and Sifting Tool

Option name/no.	Option 78: Do nothing	
Description	No change	

Strategic

Scale of impact against specific objectives	1	
Fit with high-level objectives	2	As the "Do nothing" option requires no change, it fails to support transport and government objectives.
Degree of consensus	1	During public consultation there was overwhelming consensus that issues existed and solutions should be found.

Economic

Economic growth	2	Would neither encourage modal shift or improve routing options therefore would see further pressure on network with predicted future growth resulting in increased delay, reduced access and additional constraints in terms of delivery of housing.
Socio-distributional impacts and the regions	1	No improvement to connectivity or accessibility for vulnerable social groups.
Local environment	4	N/A
Well being	2	Severance would be increased in term of increased traffic on existing roads. Severity of injury would reduce but overall number of accidents would increase. Little encouragement in relation to physical activity.
Expected VfM category	3. Medium 1.5-2	

Managerial

Implementation timetable	Short (1-2 Years)	N/A
Public acceptability	2	Public consultation showed a large consensus in relation to the requirement for solutions to be adopted to tackle existing issues.
Practical feasibility	2	Without some form of action, conditions are likely to worsen. Long term economic costs would be significant.
What is the quality of the supporting evidence?	4	Baseline option
Key uncertainties	No action would result in further network congestion and discouragement of investment locally.	

Financial

Affordability	3	Budgetary options are still being investigated.
Capital Cost (£m)	N/A	
Overall cost risk	4	

Commercial

Flexibility of option	5. Dynamic	N/A
Where is funding coming from?	No funding required.	
Any income generated?	No	N/A

Early Assessment and Sifting Tool

Option name/no.	Option 79: Pink line (2018), single carriageway	
Description	From the A1067, west of the junction with the A1270 at Deighton Hills, Option 79 heads west, crossing the River Wensum, before routing south-west crossing a number of local roads (Ringland Lane, Weston Road). The route then passes east of Weston Green, before, crossing Breck Road and The Broadway to connect with the A47 to the north-west of Honingham at the existing Wood Lane / Berry's Lane junction. Option 79 would be of single carriageway standard.	

Strategic

Scale of impact against specific objectives	3	
Fit with high-level objectives	3	Supports the creation of a stronger, cleaner and more productive economy by improving links to local economy and sources of employment across the network. Connects people and places, and will help to encourage investment into the west of Norwich including, for example, tourism. Will improve journey time reliability on the local road network, as well as the A47 and A1067, transferring trips from existing local roads to a new high-speed high-standard link designed to the latest safety standards. Provides strong regional economic links for the future. It can be assumed that the provision of a dualled version of this route will further improve resilience and reliability.
Degree of consensus	5	Public consultation has taken place with high degree of consensus that a new highway link would address the current network issues. Considerations that the council should take into account, according to respondents, included: reducing congestion, rat running, shortening journey times and providing better journey time reliability together with improved road safety.

Economic

Economic growth	4	Provides increased accessibility, reliability and resilience similar to the purple line. Limited access to housing or proposed housing development. Potential to link into the proposed realigned dualled A47 junction at the intersection of the A47 and Wood Lane. Will help to encourage Tourism locally through improved transport links and reduced congestion.
Socio-distributional impacts and the regions	3	Improved accessibility for groups with access to a car. Severance currently related to rat running would be reduced giving minor improvements to conditions for Non-Motorised Users in the Weston Longville and Ringland areas.
Local environment	3	<i>Separate, additional Environmental Appraisal undertaken</i>
Well being	3	May reduce severance with reassignment of traffic from rat run routes and improve access to goods and services for non motorised users encouraging physical activity in locations previously suffering from severance. Expected to improve access to goods and services for private vehicle owners in terms of improved JT on network. New road would have a lower accident rate associated with improved design and conditions.
Expected VfM category	3. Medium 1.5-2	

Managerial

Implementation timetable	Medium (3-8 Years)	Assumed construction start 2022. Assumed completion 2026.
Public acceptability	4	An initial round of public consultation in May-July 2018 based on high level key issues seeking to identify the need for the scheme and extent of public support for a potential solution in principle was undertaken. This did not include any specific scheme options or lines on a plan, however broad support was noted for a highways option as a solution to existing issues. There are established stakeholder groups actively engaged in the project – this includes a Member Working Group (Council Members) and a Local Liaison Group (Parish council reps). Engagement with Natural England, the Environment Agency and Highways England was also undertaken.
Practical feasibility	4	Significant costs and some environmental concerns. The EHV overhead power lines have a minor impact during construction. The design would be limited by fixed pylons locations; building bridges near them has further challenges. This option crosses the HP gas main and thus there will be a c£3m cost impact. Protection works or pipe upgrade will be needed if we are to cross the HP gas main and £1.2m stopple charges for stopping the main gas supply to East Anglia during the works. Furthermore there are likely to be further limitations where a route runs within 80m of HP gas main or cable route for more than a length of 80m. High Voltage Power line Orsted Cable cannot be re-routed to accommodate our proposals. However crossing the cable would require protection measures to be installed below the ground – for example reinforced concrete slab bridging over the cable trench. These works are expected to have a cost of upto £250-£300K per crossing point.
What is the quality of the supporting evidence?	4	Not modelled in 2014 though similar to previous options.
Key uncertainties	Public acceptability, land take requirements and environmental constraints.	

Financial

Affordability	3	Budgetary options are still being investigated.
Capital Cost (£m)	£50-£100 million	
Overall cost risk	3	

Commercial

Flexibility of option	3	Little opportunity to change alignment later in design phase, however at this stage option can be scaled up or down. When in operation option can not be changed or closed without significant financial penalties.
Where is funding coming from?	None specifically set aside. Funding sources to be considered.	
Any income generated?	No	N/A

Early Assessment and Sifting Tool

Option name/no.	Option 80: Pink line (2018), dual carriageway	
Description	From the A1067, west of the junction with the A1270 at Deighton Hills, Option 80 heads west, crossing the River Wensum, before routing south-west crossing a number of local roads (Ringland Lane, Weston Road). The route then passes east of Weston Green, before, crossing Breck Road and The Broadway to connect with the A47 to the north-west of Honingham at the existing Wood Lane / Berry's Lane junction. Option 80 would be of dual carriageway standard. Upgrades to the A1067 to dual carriageway standard may also be required.	

Strategic

Scale of impact against specific objectives	4	
Fit with high-level objectives	4	Supports the creation of a stronger, cleaner and more productive economy by improving links to local economy and sources of employment across the network. Connects people and places, and will help to encourage investment into the west of Norwich including, for example, tourism. Will improve journey time reliability on the local road network, as well as the A47 and A1067, transferring trips from existing local roads to a new high-speed high-standard link designed to the latest safety standards. Provides strong regional economic links for the future.
Degree of consensus	5	Public consultation has taken place with high degree of consensus that a new highway link would address the current network issues. Considerations that the council should take into account, according to respondents, included: reducing congestion, rat running, shortening journey times and providing better journey time reliability together with improved road safety.

Economic

Economic growth	4	Provides increased accessibility, reliability and resilience similar to the purple line. Limited access to housing or proposed housing development. Potential to link into the proposed realigned dualled A47 junction at the intersection of the A47 and Wood Lane. Will help to encourage Tourism locally through improved transport links and reduced congestion.
Socio-distributional impacts and the regions	3	Improved accessibility for groups with access to a car. Severance currently related to rat running would be reduced giving minor improvements to conditions for Non-Motorised Users in the Weston Longville and Ringland areas.
Local environment	3	<i>Separate, additional Environmental Appraisal undertaken</i>
Well being	4	May reduce severance with reassignment of traffic from rat run routes and improve access to goods and services for non motorised users encouraging physical activity in specific locations. Expected to improve access to goods and services for private vehicle owners in terms of improved JT on network. New road would have a lower accident rate associated with improved design and conditions.
Expected VfM category	3. Medium 1.5-2	

Managerial

Implementation timetable	Medium (3-8 Years)	Assumed construction start 2022. Assumed completion 2026.
Public acceptability	4	An initial round of public consultation in May-July 2018 based on high level key issues seeking to identify the need for the scheme and extent of public support for a potential solution in principle was undertaken. This did not include any specific scheme options or lines on a plan, however broad support was noted for a highways option as a solution to existing issues. There are established stakeholder groups actively engaged in the project – this includes a Member Working Group (Council Members) and a Local Liaison Group (Parish council reps). Engagement with Natural England, the Environment Agency and Highways England was also undertaken.
Practical feasibility	4	Significant costs and some environmental concerns. The EHV overhead power lines have a minor impact during construction. The design would be limited by fixed pylons locations; building bridges near them has further challenges. This option crosses the HP gas main and thus there will be a c£3m cost impact. Protection works or pipe upgrade will be needed if we are to cross the HP gas main and £1.2m stopple charges for stopping the main gas supply to East Anglia during the works. Furthermore there are likely to be further limitations where a route runs within 80m of HP gas main or cable route for more than a length of 80m. High Voltage Power line Orsted Cable cannot be re-routed to accommodate our proposals. However crossing the cable would require protection measures to be installed below the ground – for example reinforced concrete slab bridging over the cable trench. These works are expected to have a cost of upto £250-£300K per crossing point.
What is the quality of the supporting evidence?	4	Not modelled in 2014 though similar to previous options.
Key uncertainties	Public acceptability, land take requirements and environmental constraints.	

Financial

Affordability	3	Budgetary options are still being investigated.
Capital Cost (£m)	£100-£150 million	
Overall cost risk	3	

Commercial

Flexibility of option	3	Little opportunity to change alignment later in design phase, however at this stage option can be scaled up or down. When in operation option can not be changed or closed without significant financial penalties.
Where is funding coming from?	None specifically set aside. Funding sources to be considered.	
Any income generated?	No	N/A

Early Assessment and Sifting Tool

Option name/no.	Option 81: Yellow line (2018), single carriageway	
Description	From the A1067, west of the junction with the A1270 at Deighton Hills, Option 81 heads west, crossing the River Wensum and Ringland Lane, before routeing south-east crossing Weston Road and skirting to the east of Blackbreck Plantation and Poets Breck. The route then heads south-west crossing Weston Road for a second time, before passing west of Hill Farm. Option 81 then crosses the River Tud to connect with the A47 to the west of Easton at the existing Taverham Road junction. Option 81 would be of single carriageway standard.	

Strategic

Scale of impact against specific objectives	4	
Fit with high-level objectives	4	Supports the creation of a stronger, cleaner and more productive economy by improving links to local economy and sources of employment across the network. Connects people and places, and will help to encourage investment into the west of Norwich including, for example, tourism. Will improve journey time reliability on the local road network, as well as the A47 and A1067, transferring trips from existing local roads to a new high-speed high-standard link designed to the latest safety standards. Provides strong regional economic links for the future. It can be assumed that the provision of a dualled version of this route will further improve resilience and reliability.
Degree of consensus	4	Public consultation has taken place with high degree of consensus that a new highway link would address the current network issues. Considerations that the council should take into account, according to respondents, included: reducing congestion, rat running, shortening journey times and providing better journey time reliability together with improved road safety.

Economic

Economic growth	4	Provides connectivity directly between the A47 and A1067. Improves south to north journey time and improves network resilience. Compliments delivery of housing in the Easton area. Provides new access to employment opportunities to the north.
Socio-distributional impacts and the regions	3	No direct impact on accessibility of vulnerable social groups, but improvement in network reliability and resilience and will improve journey times for all user groups.
Local environment	2	<i>Separate, additional Environmental Appraisal undertaken</i>
Well being	3	Reduces severance on existing routes by attracting existing traffic, would be expected to attract rat running HGVs from local roads
Expected VfM category	3. Medium 1.5-2	

Managerial

Implementation timetable	Medium (3-8 Years)	Assumed construction start 2022. Assumed completion 2026.
Public acceptability	4	An initial round of public consultation in May-July 2018 based on high level key issues seeking to identify the need for the scheme and extent of public support for a potential solution in principle was undertaken. This did not include any specific scheme options or lines on a plan, however broad support was noted for a highways option as a solution to existing issues. There are established stakeholder groups actively engaged in the project – this includes a Member Working Group (Council Members) and a Local Liaison Group (Parish council reps). Engagement with Natural England, the Environment Agency and Highways England was also undertaken.
Practical feasibility	2	High costs and potential environmental concerns. The option runs parallel to Wood Ln during its route and would require diversion/shuttle running increasing delays/construction time. Furthermore a new crossing would be required. The EHV overhead power lines have a minor impact during construction. The design would be limited by fixed pylons locations; building bridges near them has further challenges. This option crosses the HP gas main and thus there will be a c£3m cost impact. Protection works or pipe upgrade will be needed if we are to cross the HP gas main and £1.2m stopple charges for stopping the main gas supply to East Anglia during the works. Furthermore there are likely to be further limitations where a route runs within 80m of HP gas main or cable route for more than a length of 80m. High Voltage Power line Orsted Cable cannot be re-routed to accommodate our proposals. However crossing the cable would require protection measures to be installed below the ground – for example reinforced concrete slab bridging over the cable trench. These works are expected to have a cost of upto £250-£300K per crossing point. Running parallel to the High Voltage Power line Orsted Cable would need to be adequately separated from the cable and positioned outside of the easement which is expected to be c12m each side of each cable noting there are at least four cables being installed (the hazard zone extents are likely to be wider than the easement the cable route land extents being purchased extend to about 55m each side, therefore any options running within 60m on each side of the cable route centreline may be considered to be at risk).
What is the quality of the supporting evidence?	4	Not modelled in 2014 though similar to previous options.
Key uncertainties	Public acceptability, land take requirements and environmental constraints.	

Financial

Affordability	3	Budgetary options are still being investigated.
Capital Cost (£m)	£50-£100 million	
Overall cost risk	3	

Commercial

Flexibility of option	3	Little opportunity to change alignment later in design phase, however at this stage option can be scaled up or down. When in operation option can not be changed or closed without significant financial penalties.
Where is funding coming from?	None specifically set aside. Funding sources to be considered.	
Any income generated?	No	N/A

Early Assessment and Sifting Tool

Option name/no.	Option 82: Yellow line (2018), dual carriageway	
Description	From the A1067, west of the junction with the A1270 at Deighton Hills, Option 82 heads west, crossing the River Wensum and Ringland Lane, before routing south-east crossing Weston Road and skirting to the east of Blackbreck Plantation and Poets Breck. The route then heads south-west crossing Weston Road for a second time, before passing west of Hill Farm. Option 82 then crosses the River Tud to connect with the A47 to the west of Easton at the existing Taverham Road junction. Option 82 would be of dual carriageway standard. Upgrades to the A1067 to dual carriageway standard may also be required.	

Strategic

Scale of impact against specific objectives	4	
Fit with high-level objectives	4	Supports the creation of a stronger, cleaner and more productive economy by improving links to local economy and sources of employment across the network. Connects people and places, and will help to encourage investment into the west of Norwich including, for example, tourism. Will improve journey time reliability on the local road network, as well as the A47 and A1067, transferring trips from existing local roads to a new high-speed high-standard link designed to the latest safety standards. Provides strong regional economic links for the future.
Degree of consensus	5	Public consultation has taken place with high degree of consensus that a new highway link would address the current network issues. Considerations that the council should take into account, according to respondents, included: reducing congestion, rat running, shortening journey times and providing better journey time reliability together with improved road safety.

Economic

Economic growth	4	Provides connectivity directly between the A47 and A1067. Improves south to north journey time and improves network resilience. Compliments delivery of housing in the Easton area. Provides new access to employment opportunities to the north.
Socio-distributional impacts and the regions	3	No direct impact on accessibility of vulnerable social groups, but improvement in network reliability and resilience and will improve journey times for all user groups.
Local environment	2	<i>Separate, additional Environmental Appraisal undertaken</i>
Well being	4	Reduces severance on existing routes by attracting existing traffic, would be expected to attract rat running HGVs from local roads
Expected VfM category	3. Medium 1.5-2	

Managerial

Implementation timetable	Medium (3-8 Years)	Assumed construction start 2022. Assumed completion 2026.
Public acceptability	4	An initial round of public consultation in May-July 2018 based on high level key issues seeking to identify the need for the scheme and extent of public support for a potential solution in principle was undertaken. This did not include any specific scheme options or lines on a plan, however broad support was noted for a highways option as a solution to existing issues. There are established stakeholder groups actively engaged in the project – this includes a Member Working Group (Council Members) and a Local Liaison Group (Parish council reps). Engagement with Natural England, the Environment Agency and Highways England was also undertaken.
Practical feasibility	2	High costs and potential environmental concerns. The option runs parallel to Wood Ln during its route and would require diversion/shuttle running increasing delays/construction time. Furthermore a new crossing would be required. The EHV overhead power lines have a minor impact during construction. The design would be limited by fixed pylons locations; building bridges near them has further challenges. This option crosses the HP gas main and thus there will be a c£3m cost impact. Protection works or pipe upgrade will be needed if we are to cross the HP gas main and £1.2m stopple charges for stopping the main gas supply to East Anglia during the works. Furthermore there are likely to be further limitations where a route runs within 80m of HP gas main or cable route for more than a length of 80m. High Voltage Power line Orsted Cable cannot be re-routed to accommodate our proposals. However crossing the cable would require protection measures to be installed below the ground – for example reinforced concrete slab bridging over the cable trench. These works are expected to have a cost of upto £250-£300K per crossing point. Running parallel to the High Voltage Power line Orsted Cable would need to be adequately separated from the cable and positioned outside of the easement which is expected to be c12m each side of each cable noting there are at least four cables being installed (the hazard zone extents are likely to be wider than the easement the cable route land extents being purchased extend to about 55m each side, therefore any options running within 60m on each side of the cable route centreline may be considered to be at risk).
What is the quality of the supporting evidence?	4	Not modelled in 2014 though similar to previous options.
Key uncertainties	Public acceptability, land take requirements and environmental constraints.	

Financial

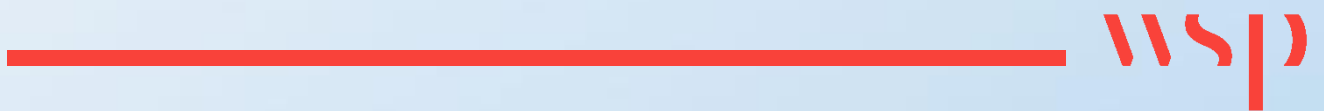
Affordability	3	Budgetary options are still being investigated.
Capital Cost (£m)	£100-£150 million	
Overall cost risk	3	

Commercial

Flexibility of option	3	Little opportunity to change alignment later in design phase, however at this stage option can be scaled up or down. When in operation option can not be changed or closed without significant financial penalties.
Where is funding coming from?	None specifically set aside. Funding sources to be considered.	
Any income generated?	No	N/A

Appendix F

ENVIRONMENTAL APPRAISAL



Environmental Appraisal

Option name/no.	Option 1: A1067 Attlebridge to A47 west of Honingham; 2014 Purple (1A), single carriageway
Description	From the A1067 at Attlebridge, Option 1 runs parallel to Marl Hill Road, before crossing Ringland Lane to pass east of Weston Longville. Option 1 then routes south along an alignment approximately following the pylons, and crosses Weston Road. The route then passes east of Weston Green, before routing south-west, crossing Breck Road and The Broadway to connect with the A47 to the north-west of Honingham at the existing Wood Lane / Berry's Lane junction. Option 1 would be of single carriageway standard.

Topic

Noise	2 (Moderate Adverse)	Route passes closely to Weston Longville and isolated settlements and therefore will introduce a new noise source to a rural location. The number of properties affected is likely to be fewer than other new route options, due to it running through only small isolated dwelling areas, and the A47 and the A1067 are sources of traffic noise already at either end. No distinction with Option 2.
Air quality	3 (Slight Adverse)	The route passes closely to Weston Longville and isolated settlements, but these are unlikely to presently experience road traffic pollutants at concentrations near to the objective levels. The introduction of a new road, whilst close to houses, is not adjacent to housing and hence is therefore unlikely to lead to a new breach of the objective levels. The option at this stage is not thought likely to affect the concentrations of NO2 in the City Centre AQMA to the degree that will significantly affect its designation. No distinction with Option 2.
Greenhouse gases	3 (Slight Adverse)	The route will amend the flow of traffic around Norwich and at this early stage without traffic modelling, it is unknown whether this will lead to a significant growth in traffic and a change in average speeds. However, as the option does not include any new development any additional traffic is unlikely to be significant and therefore the change in greenhouse gases is likely to be limited. No distinction with Option 2.
Landscape	2 (Moderate Adverse)	The introduction of the new road will contribute to a significant loss of agricultural land, field boundary hedgerows and partial loss of woodland at Scotchwood Hills, Weston Foxburrow Plantation and along The Broadway resulting in a conflict with the character of the landscape due to diminishing the sense of place and tranquility of the area. The route passes close to Weston Longville and isolated settlements and cuts across the PROW Honingham RB1 introducing a new feature to these viewpoints. Mitigation in the form of screening vegetation and landscape bunds along the route could potentially reduce these visual effects but considering the lack of intervening vegetation the route is unlikely to be completely concealed. Not distinctly different to Option 2.
Townscape	N/A	N/A
Historic environment	2 (Moderate Adverse)	There are no designated (protected) archaeological or built heritage assets within the route, though there are ten listed buildings within a 500m buffer of the route, including one Grade I and one Grade II* listed building. The setting of these assets may be adversely impacted by the proposed development, though the overall heritage significance of these assets is unlikely to be affected. The route does not lie within or adjacent to an LPA conservation area or LPA archaeological priority area. The natural sand and gravel geology, which underlies much of the route, combined with the proximity to the River Wensum and River Tud, would have made it attractive to early settlement and archaeological survival across the site is likely to be high, except in areas of former quarry pits, and at a shallow depth below ground. The presence and nature of any buried archaeological remains is uncertain at this stage but the new road would truncate or completely remove any such remains present within its footprint. Similar impact to Option 3 and 4.
Biodiversity	2 (Moderate Adverse)	The route will cross over the River Wensum SAC/SSSI, no significant negative impacts assumed due to design and mitigation. The route will cause habitat loss of Foxburrow Plantation CWS. There will be loss and severance of broadleaved woodland, grassland, arable fields and hedgerows.
Water environment	2 (Moderate Adverse)	As no additional infrastructure is proposed over or near a watercourse, the effects upon the water environment will be limited to those associated with increased highway runoff from the new carriageway. Assuming that the scheme can be constructed to the EA's requirements with regard to there being no net increase in flooding, impacts upon the water environment are likely to be no greater than slight adverse.

Environmental Appraisal

Option name/no.	Option 2: A1067 Attlebridge to A47 west of Honingham; 2014 Purple (1A), dual carriageway
Description	From the A1067 at Attlebridge, Option 2 runs parallel to Marl Hill Road, before crossing Ringland Lane to pass east of Weston Longville. Option 2 then routes south along an alignment approximately following the pylons, and crosses Weston Road. The route then passes east of Weston Green, before routing south-west, crossing Breck Road and The Broadway to connect with the A47 to the north-west of Honingham at the existing Wood Lane / Berry's Lane junction. Option 2 would be of dual carriageway standard. Upgrades to the A1067 to dual carriageway standard may also be required.

Topic	
Noise	2 (Moderate Adverse) Route passes closely to Weston Longville and isolated settlements and therefore will introduce a new noise source to a rural location. The number of properties affected is likely to be fewer than other new route options, due to it running through only small isolated dwelling areas, and the A47 and the A1067 are sources of traffic noise already at either end. No distinction with Option 2.
Air quality	3 (Slight Adverse) The route passes closely to Weston Longville and isolated settlements, but these are unlikely to presently experience road traffic pollutants at concentrations near to the objective levels. The introduction of a new road, whilst close to houses, is not adjacent to housing and hence is therefore unlikely to lead to a new breach of the objective levels. The option at this stage is not thought likely to affect the concentrations of NO2 in the City Centre AQMA to the degree that will significantly affect its designation. No distinction with Option 2.
Greenhouse gases	3 (Slight Adverse) The route will amend the flow of traffic around Norwich and at this early stage without traffic modelling, it is unknown whether this will lead to a significant growth in traffic and a change in average speeds. However, as the option does not include any new development any additional traffic is unlikely to be significant and therefore the change in greenhouse gases is likely to be limited. No distinction with Option 2.
Landscape	2 (Moderate Adverse) The introduction of the new road will contribute to a significant loss of agricultural land, field boundary hedgerows and partial loss of woodland at Scotchwood Hills, Weston Foxburrow Plantation and along The Broadway resulting in a conflict with the character of the landscape due to diminishing the sense of place and tranquility of the area. The route passes close to Weston Longville and isolated settlements and cuts across the PROW Honingham RB1 introducing a new feature to these viewpoints. Mitigation in the form of screening vegetation and landscape bunds along the route could potentially reduce these visual effects but considering the lack of intervening vegetation the route is unlikely to be completely concealed. Not distinctly different to Option 2.
Townscape	N/A N/A
Historic environment	2 (Moderate Adverse) There are no designated (protected) archaeological or built heritage assets within the route, though there are ten listed buildings within a 500m buffer of the route, including one Grade I and one Grade II* listed building. The setting of these assets may be adversely impacted by the proposed development, though the overall heritage significance of these assets is unlikely to be affected. The route does not lie within or adjacent to an LPA conservation area or LPA archaeological priority area. The natural sand and gravel geology, which underlies much of the route, combined with the proximity to the River Wensum and River Tud, would have made it attractive to early settlement and archaeological survival across the site is likely to be high, except in areas of former quarry pits, and at a shallow depth below ground. The presence and nature of any buried archaeological remains is uncertain at this stage but the new road would truncate or completely remove any such remains present within its footprint. Similar impact to Option 3 and 4.
Biodiversity	2 (Moderate Adverse) The route will cross over the River Wensum SAC/SSSI, no significant negative impacts assumed due to design and mitigation. The route will cause habitat loss of Foxburrow Plantation CWS. There will be loss and severance of broadleaved woodland, grassland, arable fields and hedgerows.
Water environment	2 (Moderate Adverse) As no additional infrastructure is proposed over or near a watercourse, the effects upon the water environment will be limited to those associated with increased highway runoff from the new carriageway. Assuming that the scheme can be constructed to the EA's requirements with regard to there being no net increase in flooding, impacts upon the water environment are likely to be no greater than slight adverse.

Environmental Appraisal

Option name/no.	Option 3: A1067 Attlebridge to A47 west of Honingham; 2014 Purple (2A), single carriageway
Description	From the A1067 at Attlebridge, Option 3 runs parallel to Marl Hill Road, before crossing Ringland Lane to pass east of Weston Longville. Option 3 then routes south along an alignment approximately following the pylons, and crosses Weston Road. The route then passes east of Weston Green, continuing south to cross The Broadway. Option 3 passes east of Hall Farm, and crosses the River Tud, before joining into the A47 and Norwich Road. Option 3 would be of single carriageway standard.

Topic

Noise	2 (Moderate Adverse)	Route passes closely to Weston Longville and isolated settlements and therefore will introduce a new noise source to a rural location. The number of properties affected is likely to be fewer than other new route options, due to it running through only small isolated dwelling areas, and the A47 and the A1067 are sources of traffic noise already at either end. No distinction with Option 1.
Air quality	3 (Slight Adverse)	The route passes closely to Weston Longville and isolated settlements, but these are unlikely to presently experience road traffic pollutants at concentrations near to the objective levels. The introduction of a new road, whilst close to houses, is not adjacent to housing and hence is therefore unlikely to lead to a new breach of the objective levels. The option at this stage is not thought likely to affect the concentrations of NO2 in the City Centre AQMA to the degree that will significantly affect its designation. No distinction with Option 1.
Greenhouse gases	3 (Slight Adverse)	The route will amend the flow of traffic around Norwich and at this early stage without traffic modelling, it is unknown whether this will lead to a significant growth in traffic and a change in average speeds. However, as the option does not include any new development any additional traffic is unlikely to be significant and therefore the change in greenhouse gases is likely to be limited. No distinction with Option 1.
Landscape	2 (Moderate Adverse)	The introduction of the new road will contribute to significant loss of agricultural land, field boundary hedgerows and partial loss of woodland at Scotchwood Hills, Weston Foxburrow Plantation and along The Broadway. The new route also cuts across the River Tud and associated woodland resulting to a conflict with the character of the landscape due to diminishing the sense of place and tranquility of the area. The route passes closely to Weston Longville and isolated settlements introducing a new feature into their views. Mitigation in the form of screening vegetation and landscape bunds along the route could potentially reduce the visual effects but considering the lack of intervening vegetation the route is unlikely to be completely concealed. Not distinctly different to Option 1.
Townscape	N/A	N/A
Historic environment	2 (Moderate Adverse)	There are no designated (protected) archaeological or built heritage assets within the route, though there are eleven listed buildings within a 500m buffer of the route, including one Grade I and two Grade II* listed building. The setting of these assets may be adversely impacted by the proposed development, though the overall heritage significance of these assets is unlikely to be affected. The route does not lie within or adjacent to an LPA conservation area or LPA archaeological priority area. The natural sand and gravel geology, which underlies much of the route, combined with the proximity to the River Wensum and River Tud, would have made it attractive to early settlement and archaeological survival across the site is likely to be high, except in areas of former quarry pits, and at a shallow depth below ground. The presence and nature of any buried archaeological remains is uncertain at this stage but the new road would truncate or completely remove any such remains present within its footprint. Similar impact to Option 1 and 2.
Biodiversity	2 (Moderate Adverse)	The route will include a new crossing over the River Wensum SAC/SSSI, no significant negative impacts assumed due to design and mitigation. The route will cause habitat loss of Chuch Meadow, Alder Carr, Three Corner Thicket and Nursery Plantation CWS and River Tud at Easton and Honingham. There will be loss and severance of broadleaved woodland, grassland, arable fields and hedgerows.
Water environment	2 (Moderate Adverse)	As no additional infrastructure is proposed over or near a watercourse, the effects upon the water environment will be limited to those associated with increased highway runoff from the new carriageway. Assuming that the scheme can be constructed to the EA's requirements with regard to there being no net increase in flooding, impacts upon the water environment are likely to be no greater than slight adverse.

Environmental Appraisal

Option name/no.	Option 4: A1067 Attlebridge to A47 west of Honingham; 2014 Purple (2A), dual carriageway
Description	From the A1067 at Attlebridge, Option 4 runs parallel to Marl Hill Road, before crossing Ringland Lane to pass east of Weston Longville. Option 4 then routes south along an alignment approximately following the pylons, and crosses Weston Road. The route then passes east of Weston Green, continuing south to cross The Broadway. Option 4 passes east of Hall Farm, and crosses the River Tud, before joining into the A47 and Norwich Road. Option 4 would be of dual carriageway standard. Upgrades to the A1067 to dual carriageway standard may also be required.

Topic

Noise	2 (Moderate Adverse)	Route passes closely to Weston Longville and isolated settlements and therefore will introduce a new noise source to a rural location. The number of properties affected is likely to be fewer than other new route options, due to it running through only small isolated dwelling areas, and the A47 and the A1067 are sources of traffic noise already at either end. No distinction with Option 1.
Air quality	3 (Slight Adverse)	The route passes closely to Weston Longville and isolated settlements, but these are unlikely to presently experience road traffic pollutants at concentrations near to the objective levels. The introduction of a new road, whilst close to houses, is not adjacent to housing and hence is therefore unlikely to lead to a new breach of the objective levels. The option at this stage is not thought likely to affect the concentrations of NO2 in the City Centre AQMA to the degree that will significantly affect its designation. No distinction with Option 1.
Greenhouse gases	3 (Slight Adverse)	The route will amend the flow of traffic around Norwich and at this early stage without traffic modelling, it is unknown whether this will lead to a significant growth in traffic and a change in average speeds. However, as the option does not include any new development any additional traffic is unlikely to be significant and therefore the change in greenhouse gases is likely to be limited. No distinction with Option 1.
Landscape	2 (Moderate Adverse)	The introduction of the new road will contribute to significant loss of agricultural land, field boundary hedgerows and partial loss of woodland at Scotchwood Hills, Weston Foxburrow Plantation and along The Broadway. The new route also cuts across the River Tud and associated woodland resulting to a conflict with the character of the landscape due to diminishing the sense of place and tranquility of the area. The route passes closely to Weston Longville and isolated settlements introducing a new feature into their views. Mitigation in the form of screening vegetation and landscape bunds along the route could potentially reduce the visual effects but considering the lack of intervening vegetation the route is unlikely to be completely concealed. Not distinctly different to Option 1.
Townscape	N/A	N/A
Historic environment	2 (Moderate Adverse)	There are no designated (protected) archaeological or built heritage assets within the route, though there are eleven listed buildings within a 500m buffer of the route, including one Grade I and two Grade II* listed building. The setting of these assets may be adversely impacted by the proposed development, though the overall heritage significance of these assets is unlikely to be affected. The route does not lie within or adjacent to an LPA conservation area or LPA archaeological priority area. The natural sand and gravel geology, which underlies much of the route, combined with the proximity to the River Wensum and River Tud, would have made it attractive to early settlement and archaeological survival across the site is likely to be high, except in areas of former quarry pits, and at a shallow depth below ground. The presence and nature of any buried archaeological remains is uncertain at this stage but the new road would truncate or completely remove any such remains present within its footprint. Similar impact to Option 1 and 2.
Biodiversity	2 (Moderate Adverse)	The route will include a new crossing over the River Wensum SAC/SSSI, no significant negative impacts assumed due to design and mitigation. The route will cause habitat loss of Chuch Meadow, Alder Carr, Three Corner Thicket and Nursery Plantation CWS and River Tud at Easton and Honingham. There will be loss and severance of broadleaved woodland, grassland, arable fields and hedgerows.
Water environment	2 (Moderate Adverse)	This option will not require a new crossing of the Wensum River, but will require a crossing over the River Tud. This additional infrastructure over the river could affect geomorphology of the river and will provide a pathway for road run-off to enter the water course, which could potentially result in adverse impacts on the quality of the river. A slight adverse impact is provided given the single river crossing that is necessary.

Environmental Appraisal

Option name/no.	Option 5: A1067 Attlebridge to A47 west of Easton; 2014 Brown, single carriageway
Description	From the A1067 at Attlebridge, Option 5 runs parallel to Marl Hill Road, before crossing Ringland Lane to pass east of Weston Longville. Option 5 then routes south along an alignment approximately following the pylons, and crosses Weston Road. The route then passes east of Weston Green, crossing The Broadway, before routing south-east, passing through Hall Hill before crossing Taverham Road. Option 5 crosses the River Tud, to connect with the A47 via Taverham Road to the west of Easton on the single carriageway section, close to the existing lay-by. Option 5 would be of single carriageway standard.

Topic

Noise	2 (Moderate Adverse)	Route passes closely to Weston Longville and isolated settlements and therefore will introduce a new noise source to a rural location. The number of properties affected is likely to be fewer than other new route options, due to it running through only small isolated dwelling areas, and the A47 and the A1067 are sources of traffic noise already at either end. No distinction with Option 1 and 2.
Air quality	3 (Slight Adverse)	The route passes closely to Weston Longville and isolated settlements, but these are unlikely to presently experience road traffic pollutants at concentrations near to the objective levels. The introduction of a new road, whilst close to houses, is not adjacent to housing and hence is therefore unlikely to lead to a new breach of the objective levels. The option at this stage is not thought likely to affect the concentrations of NO2 in the City Centre AQMA to the degree that will significantly affect its designation. No distinction with Option 1 or 2.
Greenhouse gases	3 (Slight Adverse)	The route will amend the flow of traffic around Norwich and at this early stage without traffic modelling, it is unknown whether this will lead to a significant growth in traffic and a change in average speeds. However, as the option does not include any new development any additional traffic is unlikely to be significant and therefore the change in greenhouse gases is likely to be limited. No distinction with Option 1 or 2.
Landscape	2 (Moderate Adverse)	The route will contribute to significant loss of agricultural land, field boundary hedgerows and partial loss of woodland at Scotchwood Hills and Hall Hills. The new route also cuts across the River Tud resulting to a contrast with the character of the landscape due to diminishing the sense of place and tranquility of the area. The route passes close to Weston Longville and isolated settlements introducing a new feature into their views. Mitigation in the form of screening vegetation and landscape bunds along the route could potentially reduce the visual effects but considering the lack of intervening vegetation the route is unlikely to be completely concealed. Not distinctly different to Options 1 and 2.
Townscape	N/A	N/A
Historic environment	2 (Moderate Adverse)	There are no designated (protected) archaeological or built heritage assets within the route, though there are eleven listed buildings within a 500m buffer of the route, including one Grade I and one Grade II* listed building. The setting of these assets may be adversely impacted by the proposed development, though the overall heritage significance of these assets is unlikely to be affected. The route does not lie within or adjacent to an LPA conservation area or LPA archaeological priority area. The natural sand and gravel geology, which underlies much of the route, combined with the proximity to the River Wensum and River Tud, would have made it attractive to early settlement and archaeological survival across the site is likely to be high, except in areas of former quarry pits, and at a shallow depth below ground. The presence and nature of any buried archaeological remains is uncertain at this stage but the new road would truncate or completely remove any such remains present within its footprint. Similar impact to Option 1 and 2.
Biodiversity	2 (Moderate Adverse)	The route will include a new crossing over the River Wensum, no significant negative impacts assumed due to design and mitigation. The route will cause habitat loss of Halls Hill/Ringland Covert CWS and is adjacent to River Tud at Easton and Honingham CWS. There will be loss and severance of broadleaved woodland, grassland, arable fields and hedgerows.
Water environment	2 (Moderate Adverse)	This option will not require a new crossing of the Wensum River, but will require a crossing over the River Tud. This additional infrastructure over the river could affect geomorphology of the river and will provide a pathway for road run-off to enter the water course, which could potentially result in adverse impacts on the quality of the river. A slight adverse impact is provided given the single river crossing that is necessary.

Environmental Appraisal

Option name/no.	Option 6: A1067 Attlebridge to A47 west of Easton; 2014 Brown, dual carriageway
Description	From the A1067 at Attlebridge, Option 6 runs parallel to Marl Hill Road, before crossing Ringland Lane to pass east of Weston Longville. Option 6 then routes south along an alignment approximately following the pylons, and crosses Weston Road. The route then passes east of Weston Green, crossing The Broadway, before routing south-east, passing through Hall Hill before crossing Taverham Road. Option 6 crosses the River Tud, to connect with the A47 to the west of Easton on the single carriageway section, close to the existing lay-by via Taverham Road. Option 6 would be of dual carriageway standard. Upgrades to the A1067 to dual carriageway standard may also be required.

Topic

Noise	2 (Moderate Adverse)	Route passes closely to Weston Longville and isolated settlements and therefore will introduce a new noise source to a rural location. The number of properties affected is likely to be fewer than other new route options, due to it running through only small isolated dwelling areas, and the A47 and the A1067 are sources of traffic noise already at either end. No distinction with Option 1 and 2.
Air quality	3 (Slight Adverse)	The route passes closely to Weston Longville and isolated settlements, but these are unlikely to presently experience road traffic pollutants at concentrations near to the objective levels. The introduction of a new road, whilst close to houses, is not adjacent to housing and hence is therefore unlikely to lead to a new breach of the objective levels. The option at this stage is not thought likely to affect the concentrations of NO2 in the City Centre AQMA to the degree that will significantly affect its designation. No distinction with Option 1 or 2.
Greenhouse gases	3 (Slight Adverse)	The route will amend the flow of traffic around Norwich and at this early stage without traffic modelling, it is unknown whether this will lead to a significant growth in traffic and a change in average speeds. However, as the option does not include any new development any additional traffic is unlikely to be significant and therefore the change in greenhouse gases is likely to be limited. No distinction with Option 1 or 2.
Landscape	2 (Moderate Adverse)	The route will contribute to significant loss of agricultural land, field boundary hedgerows and partial loss of woodland at Scotchwood Hills and Hall Hills. The new route also cuts across the River Tud resulting to a contrast with the character of the landscape due to diminishing the sense of place and tranquility of the area. The route passes close to Weston Longville and isolated settlements introducing a new feature into their views. Mitigation in the form of screening vegetation and landscape bunds along the route could potentially reduce the visual effects but considering the lack of intervening vegetation the route is unlikely to be completely concealed. Not distinctly different to Options 1 and 2.
Townscape	N/A	N/A
Historic environment	2 (Moderate Adverse)	There are no designated (protected) archaeological or built heritage assets within the route, though there are eleven listed buildings within a 500m buffer of the route, including one Grade I and one Grade II* listed building. The setting of these assets may be adversely impacted by the proposed development, though the overall heritage significance of these assets is unlikely to be affected. The route does not lie within or adjacent to an LPA conservation area or LPA archaeological priority area. The natural sand and gravel geology, which underlies much of the route, combined with the proximity to the River Wensum and River Tud, would have made it attractive to early settlement and archaeological survival across the site is likely to be high, except in areas of former quarry pits, and at a shallow depth below ground. The presence and nature of any buried archaeological remains is uncertain at this stage but the new road would truncate or completely remove any such remains present within its footprint. Similar impact to Option 1 and 2.
Biodiversity	2 (Moderate Adverse)	The route will include a new crossing over the River Wensum, no significant negative impacts assumed due to design and mitigation. The route will cause habitat loss of Halls Hill/Ringland Covert CWS and is adjacent to River Tud at Easton and Honingham CWS. There will be loss and severance of broadleaved woodland, grassland, arable fields and hedgerows.
Water environment	2 (Moderate Adverse)	This option will not require a new crossing of the Wensum River, but will require a crossing over the River Tud. This additional infrastructure over the river could affect geomorphology of the river and will provide a pathway for road run-off to enter the water course, which could potentially result in adverse impacts on the quality of the river. A slight adverse impact is provided given the single river crossing that is necessary.

Environmental Appraisal

Option name/no.	Option 7: A1067 (west of A1067 / A1270 junction) to A47 west of Easton; 2014 Red, single carriageway
Description	From the A1067, west of the junction with the A1270 at Deighton Hills, Option 7 heads south-west, crossing the River Wensum, before passing west of Ringland, crossing a number of local roads (Ringland Lane, Weston Road and Honingham Lane). The route then heads south crossing Weston Road for a second time, before passing west of Hill Farm. Option 7 then crosses the River Tud to connect with the A47 to the west of Easton at the existing Taverham Road junction. Option 7 would be of single carriageway standard.

Topic

Noise	2 (Moderate Adverse)	The route passes very closely to Ringland and isolated settlements located east of Ringland. Therefore it will introduce a new noise source to a rural location. The number of properties affected is likely to be fewer than other new route options and the A47 and the A1067 are sources of traffic noise already at either end.
Air quality	3 (Slight Adverse)	The route passes very closely to Ringland and isolated settlements located east of Ringland. These are unlikely to experience road traffic pollutants at concentrations near to the objective levels. The option at this stage is not thought likely to affect the concentrations of NO2 in the City Centre AQMA to the degree that will significantly affect its designation. Some isolated and rurally position dwellings may experience an increase in air pollution as the proposed route is introducing a main road to a fairly rural location.
Greenhouse gases	3 (Slight Adverse)	The route will amend the flow of traffic around Norwich and at this early stage without traffic modelling, it is unknown whether this will lead to a significant growth in traffic and a change in average speeds. However, as the option does not include any new development any additional traffic is unlikely to be significant and therefore the change in greenhouse gases is likely to be limited. No distinction with Option 1,2 or 3.
Landscape	2 (Moderate Adverse)	The route has a significant effect on a number of landscape elements. The new route will contribute to a significant loss of agricultural land, field boundary hedgerows and partial loss of woodland at Ringland Hills. The new route also cuts across the River Wensum and a narrow part of River Tud both a moderate sensitivity landscape due to its recreational value and scenic quality leading to a detracton from the character of the landscape. The route passes close to a group of residential properties north of the A47 at Taverham Road introducing a new feature into their views. Mitigation in the form of screening vegetation and landscape bunds along the route could potentially reduce the visual effects but considering the proximity to the properties and the lack of existing intervening vegetation the new route is unlikely to be completely screened. The route also passes close to Ringland and the Merryhill Country Park that are both highly concealed and therefore are not visually affected. Not distinctly different to Option 1 and 2 and 3.
Townscape	N/A	N/A
Historic environment	3 (Slight Adverse)	There are no designated (protected) archaeological or built heritage assets within the route, and three Grade II listed buildings within a 500m buffer of the route, though there is a further Grade I listed building just over 500m from the route. The setting of these assets may be adversely impacted by the proposed development, though the overall heritage significance of these assets is unlikely to be affected. The route does not lie within or adjacent to an LPA conservation area or LPA archaeological priority area. The natural sand and gravel geology, which underlies much of the route, combined with the proximity to the River Wensum and River Tud, would have made it attractive to early settlement and archaeological survival across the site is likely to be high, except in areas of former quarry pits, and at a shallow depth below ground. The presence and nature of any buried archaeological remains is uncertain at this stage but the new road would truncate or completely remove any such remains present within its footprint.
Biodiversity	2 (Moderate Adverse)	The route will require a new crossing over the River Wensum SAC/SSSI, no negative impacts assumed due to design and mitigation. The route will cause habitat loss of Wensum Pastures at Morton Hall CWS, Roadside Nature Reserve No.59 and Primrose Grove Ancient Woodland. The route will cause habitat loss for two further CWSs proposed in 2018 and is adjacent to land meeting criteria as designation of a CWS. There will be loss and severance of broadleaved woodland, grassland, arable fields and hedgerows.
Water environment	2 (Moderate Adverse)	The route will include a new crossing over the River Wensum, River Tud, a tributary of the River Wensum and a flood zone 3 area. This additional infrastructure over the river could affect geomorphology of the river and will provide a pathway for road run-off to enter the water courses, which could potentially result in significant adverse impacts on the quality of the river.

Environmental Appraisal

Option name/no.	Option 8: A1067 (west of A1067 / A1270 junction) to A47 west of Easton; 2014 Red, dual carriageway
Description	From the A1067, west of the junction with the A1270 at Deighton Hills, Option 8 heads south-west, crossing the River Wensum, before passing west of Ringland, crossing a number of local roads (Ringland Lane, Weston Road and Honingham Lane). The route then heads south crossing Weston Road for a second time, before passing west of Hill Farm. Option 8 then crosses the River Tud to connect with the A47 to the west of Easton at the existing Taverham Road junction. Option 8 would be of dual carriageway standard. Upgrades to the A1067 to dual carriageway standard may also be required.

Topic

Noise	2 (Moderate Adverse)	The route passes very closely to Ringland and isolated settlements located east of Ringland. Therefore it will introduce a new noise source to a rural location. The number of properties affected is likely to be fewer than other new route options and the A47 and the A1067 are sources of traffic noise already at either end.
Air quality	3 (Slight Adverse)	The route passes very closely to Ringland and isolated settlements located east of Ringland. These are unlikely to experience road traffic pollutants at concentrations near to the objective levels. The option at this stage is not thought likely to affect the concentrations of NO ₂ in the City Centre AQMA to the degree that will significantly affect its designation. Some isolated and rurally position dwellings may experience an increase in air pollution as the proposed route is introducing a main road to a fairly rural location.
Greenhouse gases	3 (Slight Adverse)	The route will amend the flow of traffic around Norwich and at this early stage without traffic modelling, it is unknown whether this will lead to a significant growth in traffic and a change in average speeds. However, as the option does not include any new development any additional traffic is unlikely to be significant and therefore the change in greenhouse gases is likely to be limited. No distinction with Option 1,2 or 3.
Landscape	2 (Moderate Adverse)	The route has a significant effect on a number of landscape elements. The new route will contribute to a significant loss of agricultural land, field boundary hedgerows and partial loss of woodland at Ringland Hills. The new route also cuts across the River Wensum and a narrow part of River Tud both a moderate sensitivity landscape due to its recreational value and scenic quality leading to a detracton from the character of the landscape. The route passes close to a group of residential properties north of the A47 at Taverham Road introducing a new feature into their views. Mitigation in the form of screening vegetation and landscape bunds along the route could potentially reduce the visual effects but considering the proximity to the properties and the lack of existing intervening vegetation the new route is unlikely to be completely screened. The route also passes close to Ringland and the Merryhill Country Park that are both highly concealed and therefore are not visually affected. Not distinctly different to Option 1 and 2 and 3.
Townscape	N/A	N/A
Historic environment	3 (Slight Adverse)	There are no designated (protected) archaeological or built heritage assets within the route, and three Grade II listed buildings within a 500m buffer of the route, though there is a further Grade I listed building just over 500m from the route. The setting of these assets may be adversely impacted by the proposed development, though the overall heritage significance of these assets is unlikely to be affected. The route does not lie within or adjacent to an LPA conservation area or LPA archaeological priority area. The natural sand and gravel geology, which underlies much of the route, combined with the proximity to the River Wensum and River Tud, would have made it attractive to early settlement and archaeological survival across the site is likely to be high, except in areas of former quarry pits, and at a shallow depth below ground. The presence and nature of any buried archaeological remains is uncertain at this stage but the new road would truncate or completely remove any such remains present within its footprint.
Biodiversity	2 (Moderate Adverse)	The route will require a new crossing over the River Wensum SAC/SSSI, no negative impacts assumed due to design and mitigation. The route will cause habitat loss of Wensum Pastures at Morton Hall CWS, Roadside Nature Reserve No.59 and Primrose Grove Ancient Woodland. The route will cause habitat loss for two further CWSs proposed in 2018 and is adjacent to land meeting criteria as designation of a CWS. There will be loss and severance of broadleaved woodland, grassland, arable fields and hedgerows.
Water environment	2 (Moderate Adverse)	The route will include a new crossing over the River Wensum, River Tud, a tributary of the River Wensum and a flood zone 3 area. This additional infrastructure over the river could affect geomorphology of the river and will provide a pathway for road run-off to enter the water courses, which could potentially result in significant adverse impacts on the quality of the river.

Environmental Appraisal

Option name/no.	Option 9: A1067 (east of A1067 / A1270 junction) to A47 west of Easton; 2014 Blue (1), single carriageway
Description	From the A1067, east of the junction with the A1270 at Deighton Hills, Option 9 skirts the north-west edge of Taverham before crossing Ringland Road. The route then turns south-west and crosses the River Wensum and Costessey Lane to the south of Ringland. Option 9 continues in a south-western direction through Ringland Hills, crossing Weston Road, before heading south, passing west of Hill Farm. The route crosses the River Tud to connect with the A47 to the west of Easton at the existing Taverham Road junction. Option 9 would be of single carriageway standard.

Topic

Noise	2 (Moderate Adverse)	The route passes quite closely to Ringland and settlements located east of Taverham. Therefore this option will introduce a new noise source to a rural location. The number of properties affected is likely to be slightly greater than other new route options, as it passes close to Taverham town, and the A47 and the A1067 are sources of traffic noise already at either end.
Air quality	3 (Slight Adverse)	The route passes quite closely to Ringland and settlements located east of Taverham. These are unlikely to experience road traffic pollutants at concentrations near to the objective levels. The introduction of a new road, whilst close to houses, is not adjacent to housing and hence is therefore unlikely to lead to a new breach of the objective levels. The option at this stage is not thought likely to affect the concentrations of NO2 in the City Centre AQMA to the degree that will significantly affect its designation.
Greenhouse gases	3 (Slight Adverse)	The route will amend the flow of traffic around Norwich and at this early stage without traffic modelling, it is unknown whether this will lead to a significant growth in traffic and a change in average speeds. However, as the option does not include any new development any additional traffic is unlikely to be significant and therefore the change in greenhouse gases is likely to be limited. No distinction with Option 1,2, 3 and 4.
Landscape	2 (Moderate Adverse)	This option leads to significant loss of agricultural and recreational land, field boundary hedgerows and minor loss of woodland at Ringland Hills. It may also have an impact on the ponds west of Ringland Hills. The new route also cuts across the Rivers Wensum and Tud both of which have great local recreational value resulting to a contrast with the national character of the landscape due to diminishing the sense of place and tranquility of the area. The route passes close to Taverham and Ringland settlements as well as a group of properties north of the A47 at Taverham Road and cuts across the Wensum Valley Hotel Golf and Country Club introducing a new feature into their views. Mitigation in the form of screening vegetation and landscape bunds along the route could potentially reduce the visual effects but considering the lack of intervening vegetation the route is likely to remain visible from some viewpoints.
Townscape	N/A	N/A
Historic environment	3 (Slight Adverse)	There are no designated (protected) archaeological or built heritage assets within the route, and just three Grade II listed buildings within a 500m buffer of the route. The setting of these assets may be adversely impacted by the proposed development, though the overall heritage significance of these assets is unlikely to be affected. The route does not lie within or adjacent to an LPA conservation area or LPA archaeological priority area. The natural sand and gravel geology, which underlies much of the route, combined with the proximity to the River Wensum and River Tud, would have made it attractive to early settlement and archaeological survival across the site is likely to be high, except in areas of former quarry pits and possibly within the area occupied by the golf course, and at a shallow depth below ground. The presence and nature of any buried archaeological remains is uncertain at this stage but the new road would truncate or completely remove any such remains present within its footprint. No distinction with Option 7 and 8.
Biodiversity	2 (Moderate Adverse)	The route will require a new crossing over the River Wensum SAC/SSSI, no negative impacts assumed due to design and mitigation. The route could habitat loss of Walsingham Plantation CWS (north of A1067), Land Adjacent River Tud CWS and River Tud at Easton and Honingham CWS. The route is adjacent to Ringland Pits CWS and Blyth's Wood Ancient Woodland. The route dissects land that is considered meeting the criteria of a designation as a CWS. There will be loss and severance of broadleaved woodland, grassland, arable fields and hedgerows.
Water environment	2 (Moderate Adverse)	The route will include a new crossing over the River Wensum, River Tud, a tributary of the River Wensum and a flood zone 3 area. This additional infrastructure over the river could affect geomorphology of the river and will provide a pathway for road run-off to enter the water courses, which could potentially result in significant adverse impacts on the quality of the river.

Environmental Appraisal

Option name/no.	Option 10: A1067 (east of A1067 / A1270 junction) to A47 west of Easton; 2014 Blue (1), dual carriageway
Description	From the A1067, east of the junction with the A1270 at Deighton Hills, Option 10 skirts the north-west edge of Taverham before crossing Ringland Road. The route then turns south-west and crosses the River Wensum and Costessey Lane to the south of Ringland. Option 10 continues in a south-western direction through Ringland Hills, crossing Weston Road, before heading south, passing west of Hill Farm. The route crosses the River Tud to connect with the A47 to the west of Easton at the existing Taverham Road junction. Option 10 would be of dual carriageway standard. Upgrades to the A1067 to dual carriageway standard may also be required.

Topic

Noise	2 (Moderate Adverse)	The route passes quite closely to Ringland and settlements located east of Taverham. Therefore this option will introduce a new noise source to a rural location. The number of properties affected is likely to be slightly greater than other new route options, as it passes close to Taverham town, and the A47 and the A1067 are sources of traffic noise already at either end.
Air quality	3 (Slight Adverse)	The route passes quite closely to Ringland and settlements located east of Taverham. These are unlikely to experience road traffic pollutants at concentrations near to the objective levels. The introduction of a new road, whilst close to houses, is not adjacent to housing and hence is therefore unlikely to lead to a new breach of the objective levels. The option at this stage is not thought likely to affect the concentrations of NO2 in the City Centre AQMA to the degree that will significantly affect its designation.
Greenhouse gases	3 (Slight Adverse)	The route will amend the flow of traffic around Norwich and at this early stage without traffic modelling, it is unknown whether this will lead to a significant growth in traffic and a change in average speeds. However, as the option does not include any new development any additional traffic is unlikely to be significant and therefore the change in greenhouse gases is likely to be limited. No distinction with Option 1,2, 3 and 4.
Landscape	2 (Moderate Adverse)	This option leads to significant loss of agricultural and recreational land, field boundary hedgerows and minor loss of woodland at Ringland Hills. It may also have an impact on the ponds west of Ringland Hills. The new route also cuts across the Rivers Wensum and Tud both of which have great local recreational value resulting to a contrast with the national character of the landscape due to diminishing the sense of place and tranquility of the area. The route passes close to Taverham and Ringland settlements as well as a group of properties north of the A47 at Taverham Road and cuts across the Wensum Valley Hotel Golf and Country Club introducing a new feature into their views. Mitigation in the form of screening vegetation and landscape bunds along the route could potentially reduce the visual effects but considering the lack of intervening vegetation the route is likely to remain visible from some viewpoints.
Townscape	N/A	N/A
Historic environment	3 (Slight Adverse)	There are no designated (protected) archaeological or built heritage assets within the route, and just three Grade II listed buildings within a 500m buffer of the route. The setting of these assets may be adversely impacted by the proposed development, though the overall heritage significance of these assets is unlikely to be affected. The route does not lie within or adjacent to an LPA conservation area or LPA archaeological priority area. The natural sand and gravel geology, which underlies much of the route, combined with the proximity to the River Wensum and River Tud, would have made it attractive to early settlement and archaeological survival across the site is likely to be high, except in areas of former quarry pits and possibly within the area occupied by the golf course, and at a shallow depth below ground. The presence and nature of any buried archaeological remains is uncertain at this stage but the new road would truncate or completely remove any such remains present within its footprint. No distinction with Option 7 and 8.
Biodiversity	2 (Moderate Adverse)	The route will require a new crossing over the River Wensum SAC/SSSI, no negative impacts assumed due to design and mitigation. The route could habitat loss of Walsingham Plantation CWS (north of A1067), Land Adjacent River Tud CWS and River Tud at Easton and Honingham CWS. The route is adjacent to Ringland Pits CWS and Blyth's Wood Ancient Woodland. The route dissects land that is considered meeting the criteria of a designation as a CWS. There will be loss and severance of broadleaved woodland, grassland, arable fields and hedgerows.
Water environment	2 (Moderate Adverse)	The route will include a new crossing over the River Wensum, River Tud, a tributary of the River Wensum and a flood zone 3 area. This additional infrastructure over the river could affect geomorphology of the river and will provide a pathway for road run-off to enter the water courses, which could potentially result in significant adverse impacts on the quality of the river.

Environmental Appraisal

Option name/no.	Option 11: A1067 / A1270 junction to A47 west of Easton; 2014 Blue (2), single carriageway
Description	From the A1067 junction with the A1270 at Deighton Hills, Option 11 heads south, crossing Ringland Road, to the west of Taverham. The route then turns south-west and crosses the River Wensum and Costessey Lane to the south of Ringland. Option 11 continues in a south-western direction through Ringland Hills, crossing Weston Road, before heading south, passing west of Hill Farm. The route crosses the River Tud to connect with the A47 to the west of Easton at the existing Taverham Road junction. Option 11 would be of single carriageway standard.

Topic	
Noise	2 (Moderate Adverse) The route passes quite closely to Ringland and settlements located east of Taverham. Therefore this option will introduce a new noise source to a rural location. The number of properties affected is likely to be slightly less than other new route options, as it passes through only small isolated dwellings, than other new route options and the A47 and the A1067 are sources of traffic noise already at either end.
Air quality	3 (Slight Adverse) The route passes quite closely to Ringland and settlements located east of Taverham. These are unlikely to experience road traffic pollutants at concentrations near to the objective levels. The introduction of a new road, whilst close to houses, is not adjacent to housing and hence is therefore unlikely to lead to a new breach of the objective levels. The option at this stage is not thought likely to affect the concentrations of NO2 in the City Centre AQMA to the degree that will significantly affect its designation. No distinction between option 5.
Greenhouse gases	3 (Slight Adverse) The route will amend the flow of traffic around Norwich and at this early stage without traffic modelling, it is unknown whether this will lead to a significant growth in traffic and a change in average speeds. However, as the option does not include any new development any additional traffic is unlikely to be significant and therefore the change in greenhouse gases is likely to be limited. No distinction with Option 5.
Landscape	2 (Moderate Adverse) This option leads to significant loss of agricultural and recreational land, field boundary hedgerows and minor loss of woodland at Ringland Hills. It may also have an impact on the ponds west of Ringland Hills. The new route also cuts across the Rivers Wensum and Tud both of which have great local recreational value and therefore detracting from the landscape character due to diminishing the sense of place and tranquility of the area. The route passes close to Taverham and Ringland as well as a group of properties north of the A47 at Taverham Road and cuts across the Wensum Valley Hotel Golf and Country Club introducing a new feature into their views. Mitigation in the form of screening vegetation and landscape bunds along the route could potentially reduce the visual effects but considering the lack of intervening vegetation the route is likely to remain visible from some viewpoints. In terms of visual effects, this Option is preferable than Option 5 as route passes further away from Taverham allowing larger area to be used for buffer vegetation. However, even though this option is slightly preferable it is not sufficient to amend the magnitude of the effect.
Townscape	N/A
Historic environment	3 (Slight Adverse) There are no designated (protected) archaeological or built heritage assets within the route, and just three Grade II listed buildings within a 500m buffer of the route. The setting of these assets may be adversely impacted by the proposed development, though the overall heritage significance of these assets is unlikely to be affected. The route does not lie within or adjacent to an LPA conservation area or LPA archaeological priority area. The natural sand and gravel geology, which underlies much of the route, combined with the proximity to the River Wensum and River Tud, would have made it attractive to early settlement and archaeological survival across the site is likely to be high, except in areas of former quarry pits and possibly within the area occupied by the golf course, and at a shallow depth below ground. The presence and nature of any buried archaeological remains is uncertain at this stage but the new road would truncate or completely remove any such remains present within its footprint. No distinction with Option 9 and 10
Biodiversity	2 (Moderate Adverse) The route will require a new crossing over the River Wensum SAC/SSSI, no negative impacts assumed due to design and mitigation. The route could habitat loss of Walsingham Plantation CWS (north of A1067). The route is adjacent to Ringland Pits CWS and Blyth's Wood Ancient Woodland. The route dissects land that is considered meeting the criteria of a designation as a CWS. There will be loss and severance of broadleaved woodland, grassland, arable fields and hedgerows.
Water environment	2 (Moderate Adverse) The route will include a new crossing over the River Wensum, River Tud, a tributary of the River Wensum and a flood zone 3 area. This additional infrastructure over the river could affect geomorphology of the river and will provide a pathway for road run-off to enter the water courses, which could potentially result in significant adverse impacts on the quality of the river.

Environmental Appraisal

Option name/no.	Option 12: A1067 / A1270 junction to A47 west of Easton; 2014 Blue (2), dual carriageway
Description	From the A1067 junction with the A1270 at Deighton Hills, Option 12 heads south, crossing Ringland Road, to the west of Taverham. The route then turns south-west and crosses the River Wensum and Costessey Lane to the south of Ringland. Option 12 continues in a south-western direction through Ringland Hills, crossing Weston Road, before heading south, passing west of Hill Farm. The route crosses the River Tud to connect with the A47 to the west of Easton at the existing Taverham Road junction. Option 12 would be of dual carriageway standard.

Topic

Noise	2 (Moderate Adverse)	The route passes quite closely to Ringland and settlements located east of Taverham. Therefore this option will introduce a new noise source to a rural location. The number of properties affected is likely to be slightly less than other new route options, as it passes through only small isolated dwellings, than other new route options and the A47 and the A1067 are sources of traffic noise already at either end.
Air quality	3 (Slight Adverse)	The route passes quite closely to Ringland and settlements located east of Taverham. These are unlikely to experience road traffic pollutants at concentrations near to the objective levels. The introduction of a new road, whilst close to houses, is not adjacent to housing and hence is therefore unlikely to lead to a new breach of the objective levels. The option at this stage is not thought likely to affect the concentrations of NO2 in the City Centre AQMA to the degree that will significantly affect its designation. No distinction between option 5.
Greenhouse gases	3 (Slight Adverse)	The route will amend the flow of traffic around Norwich and at this early stage without traffic modelling, it is unknown whether this will lead to a significant growth in traffic and a change in average speeds. However, as the option does not include any new development any additional traffic is unlikely to be significant and therefore the change in greenhouse gases is likely to be limited. No distinction with Option 5.
Landscape	2 (Moderate Adverse)	This option leads to significant loss of agricultural and recreational land, field boundary hedgerows and minor loss of woodland at Ringland Hills. It may also have an impact on the ponds west of Ringland Hills. The new route also cuts across the Rivers Wensum and Tud both of which have great local recreational value and therefore detracting from the landscape character due to diminishing the sense of place and tranquility of the area. The route passes close to Taverham and Ringland as well as a group of properties north of the A47 at Taverham Road and cuts across the Wensum Valley Hotel Golf and Country Club introducing a new feature into their views. Mitigation in the form of screening vegetation and landscape bunds along the route could potentially reduce the visual effects but considering the lack of intervening vegetation the route is likely to remain visible from some viewpoints. In terms of visual effects, this Option is preferable than Option 5 as route passes further away from Taverham allowing larger area to be used for buffer vegetation. However, even though this option is slightly preferable it is not sufficient to amend the magnitude of the effect.
Townscape	N/A	N/A
Historic environment	3 (Slight Adverse)	There are no designated (protected) archaeological or built heritage assets within the route, and just three Grade II listed buildings within a 500m buffer of the route. The setting of these assets may be adversely impacted by the proposed development, though the overall heritage significance of these assets is unlikely to be affected. The route does not lie within or adjacent to an LPA conservation area or LPA archaeological priority area. The natural sand and gravel geology, which underlies much of the route, combined with the proximity to the River Wensum and River Tud, would have made it attractive to early settlement and archaeological survival across the site is likely to be high, except in areas of former quarry pits and possibly within the area occupied by the golf course, and at a shallow depth below ground. The presence and nature of any buried archaeological remains is uncertain at this stage but the new road would truncate or completely remove any such remains present within its footprint. No distinction with Option 9 and 10
Biodiversity	2 (Moderate Adverse)	The route will require a new crossing over the River Wensum SAC/SSSI, no negative impacts assumed due to design and mitigation. The route could habitat loss of Walsingham Plantation CWS (north of A1067). The route is adjacent to Ringland Pits CWS and Blyth's Wood Ancient Woodland. The route dissects land that is considered meeting the criteria of a designation as a CWS. There will be loss and severance of broadleaved woodland, grassland, arable fields and hedgerows.
Water environment	2 (Moderate Adverse)	The route will include a new crossing over the River Wensum, River Tud, a tributary of the River Wensum and a flood zone 3 area. This additional infrastructure over the river could affect geomorphology of the river and will provide a pathway for road run-off to enter the water courses, which could potentially result in significant adverse impacts on the quality of the river.

Environmental Appraisal

Option name/no.	Option 13: A1067 (east of A1067 / A1270 junction) to A47 / A1074 Longwater interchange; 2014 Orange (1), single carriageway
Description	From the A1067, east of the junction with the A1270 at Deighton Hills, Option 13 skirts the north-west edge of Taverham before crossing Ringland Road. The route then turns south and crosses the River Wensum and Costessey Lane to the south-east of Ringland. Option 13 continues south through Ringland Hills to the west of Queen's Hill before crossing the River Tud. The route passes through the Longwater employment area to connect with the A47 / A1074 Longwater Interchange. Option 13 would be of single carriageway standard.

Topic

Noise	2 (Moderate Adverse)	The route passes quite closely to the settlements located east of Taverham, small settlements south of the River Wensum, Longwater Retail Park and isolated dwellings. Therefore this option will introduce a new noise source to a relatively rural location. The number of properties affected is likely to be greater than other new route options, as it passes through small settlements and close to Taverham and Longwater Retail Park, and the A47 and the A1067 are sources of traffic noise already at either end.
Air quality	3 (Slight Adverse)	The route passes quite closely to the settlements located east of Taverham, small settlements south of the River Wensum, Longwater Retail Park and isolated dwellings. These are unlikely to experience road traffic pollutants at concentrations near to the objective levels. The introduction of a new road, whilst close to houses, is not adjacent to housing and hence is therefore unlikely to lead to a new breach of the objective levels. The option at this stage is not thought likely to affect the concentrations of NO2 in the City Centre AQMA to the degree that will significantly affect its designation.
Greenhouse gases	3 (Slight Adverse)	The route will amend the flow of traffic around Norwich and at this early stage without traffic modelling, it is unknown whether this will lead to a significant growth in traffic and a change in average speeds. However, as the option does not include any new development any additional traffic is unlikely to be significant and therefore the change in greenhouse gases is likely to be limited.
Landscape	2 (Moderate Adverse)	This option leads to significant loss of agricultural and recreational land, field boundary hedgerows and significant loss of woodland north and south of Rivers Wensum and Tud. The new route also cuts across the Rivers Wensum and Tud both of which have great local recreational value and therefore diminishing the sense of place and tranquility and detracting from the landscape character. The route passes closely to Taverham, Ringland and Queens Hills settlements however due to topography and intervening vegetation the route is likely to be screened from these receptors.
Townscape	N/A	N/A
Historic environment	3 (Slight Adverse)	There are no designated (protected) archaeological or built heritage assets within the route. There are four listed buildings within a 500m buffer of the route, one of which is Grade II*. The setting of these assets may be adversely impacted by the proposed development, though the overall heritage significance of these assets is unlikely to be affected. The route does not lie within or adjacent to an LPA conservation area or LPA archaeological priority area. The natural sand and gravel geology, which underlies much of the route, combined with the proximity to the River Wensum and River Tud, would have made it attractive to early settlement and archaeological survival across the site is likely to be high, except in areas of former quarry pits and possibly within the area occupied by the golf course, and at a shallow depth below ground. The presence and nature of any buried archaeological remains is uncertain at this stage but the new road would truncate or completely remove any such remains present within its footprint. No distinction with Option 11 and 12
Biodiversity	2 (Moderate Adverse)	The route will require a new crossing over the River Wensum SAC/SSSI, no negative impacts assumed due to design and mitigation. The route will cause habitat loss of Land South of Blyth's Wood CWS, Lord's Hill and Easton Reeds and Blackhill Woods CWS and Long Dell and Westlodge Hills CWS and River Tud at Easton and Honingham CWS. The route would include habitat loss of Blyth's Wood Ancient Woodland, Lords Hill Ancient Woodland and Blackhill Wood Ancient Woodland. The route is adjacent to Ringland Pits CWS. There will be loss and severance of broadleaved woodland, grassland, arable fields and hedgerows.
Water environment	2 (Moderate Adverse)	The route will include a new crossing over the River Wensum, River Tud, a tributary of the River Wensum and a flood zone 3 area. This additional infrastructure over the river could affect geomorphology of the river and will provide a pathway for road run-off to enter the water courses, which could potentially result in significant adverse impacts on the quality of the river.

Environmental Appraisal

Option name/no.	Option 14: A1067 (east of A1067 / A1270 junction) to A47 / A1074 Longwater interchange; 2014 Orange (1), dual carriageway
Description	From the A1067, east of the junction with the A1270 at Deighton Hills, Option 14 skirts the north-west edge of Taverham before crossing Ringland Road. The route then turns south and crosses the River Wensum and Costessey Lane to the south-east of Ringland. Option 14 continues south through Ringland Hills to the west of Queen's Hill before crossing the River Tud. The route passes through the Longwater employment area to connect with the A47 / A1074 Longwater Interchange. Option 14 would be of dual carriageway standard. Upgrades to the A1067 to dual carriageway standard may also be required.

Topic

Noise	2 (Moderate Adverse)	The route passes quite closely to the settlements located east of Taverham, small settlements south of the River Wensum, Longwater Retail Park and isolated dwellings. Therefore this option will introduce a new noise source to a relatively rural location. The number of properties affected is likely to be greater than other new route options, as it passes through small settlements and close to Taverham and Longwater Retail Park, and the A47 and the A1067 are sources of traffic noise already at either end.
Air quality	3 (Slight Adverse)	The route passes quite closely to the settlements located east of Taverham, small settlements south of the River Wensum, Longwater Retail Park and isolated dwellings. These are unlikely to experience road traffic pollutants at concentrations near to the objective levels. The introduction of a new road, whilst close to houses, is not adjacent to housing and hence is therefore unlikely to lead to a new breach of the objective levels. The option at this stage is not thought likely to affect the concentrations of NO2 in the City Centre AQMA to the degree that will significantly affect its designation.
Greenhouse gases	3 (Slight Adverse)	The route will amend the flow of traffic around Norwich and at this early stage without traffic modelling, it is unknown whether this will lead to a significant growth in traffic and a change in average speeds. However, as the option does not include any new development any additional traffic is unlikely to be significant and therefore the change in greenhouse gases is likely to be limited.
Landscape	2 (Moderate Adverse)	This option leads to significant loss of agricultural and recreational land, field boundary hedgerows and significant loss of woodland north and south of Rivers Wensum and Tud. The new route also cuts across the Rivers Wensum and Tud both of which have great local recreational value and therefore diminishing the sense of place and tranquility and detracting from the landscape character. The route passes closely to Taverham, Ringland and Queens Hills settlements however due to topography and intervening vegetation the route is likely to be screened from these receptors.
Townscape	N/A	N/A
Historic environment	3 (Slight Adverse)	There are no designated (protected) archaeological or built heritage assets within the route. There are four listed buildings within a 500m buffer of the route, one of which is Grade II*. The setting of these assets may be adversely impacted by the proposed development, though the overall heritage significance of these assets is unlikely to be affected. The route does not lie within or adjacent to an LPA conservation area or LPA archaeological priority area. The natural sand and gravel geology, which underlies much of the route, combined with the proximity to the River Wensum and River Tud, would have made it attractive to early settlement and archaeological survival across the site is likely to be high, except in areas of former quarry pits and possibly within the area occupied by the golf course, and at a shallow depth below ground. The presence and nature of any buried archaeological remains is uncertain at this stage but the new road would truncate or completely remove any such remains present within its footprint. No distinction with Option 11 and 12
Biodiversity	2 (Moderate Adverse)	The route will require a new crossing over the River Wensum SAC/SSSI, no negative impacts assumed due to design and mitigation. The route will cause habitat loss of Land South of Blyth's Wood CWS, Lord's Hill and Easton Reeds and Blackhill Woods CWS and Long Dell and Westlodge Hills CWS and River Tud at Easton and Honingham CWS. The route would include habitat loss of Blyth's Wood Ancient Woodland, Lords Hill Ancient Woodland and Blackhill Wood Ancient Woodland. The route is adjacent to Ringland Pits CWS. There will be loss and severance of broadleaved woodland, grassland, arable fields and hedgerows.
Water environment	2 (Moderate Adverse)	The route will include a new crossing over the River Wensum, River Tud, a tributary of the River Wensum and a flood zone 3 area. This additional infrastructure over the river could affect geomorphology of the river and will provide a pathway for road run-off to enter the water courses, which could potentially result in significant adverse impacts on the quality of the river.

Environmental Appraisal

Option name/no.	Option 15: A1067 / A1270 junction to A47 / A1074 Longwater interchange; 2014 Orange (2), single carriageway
Description	From the A1067 junction with the A1270 at Deighton Hills, Option 15 heads south, crossing Ringland Road, to the west of Taverham. The route continues south and crosses the River Wensum and Costessey Lane to the south-east of Ringland. Option 15 passes through Ringland Hills to the west of Queen's Hill before crossing the River Tud. The route passes through the Longwater employment area to connect with the A47 / A1074 Longwater Interchange. Option 15 would be of single carriageway standard.

Topic

Noise	2 (Moderate Adverse)	The route passes quite closely to settlements in Queens Hills south of the River Wensum, Longwater Retail Park and isolated dwellings. Therefore this option will introduce a new noise source to a relatively rural location. The number of properties affected is likely to be slightly greater than other new route options, as it passes near Longwater Retail Park, and the A47 and the A1067 are sources of traffic noise already at either end. No distinction with Option 6.
Air quality	3 (Slight Adverse)	The route passes quite closely to settlements in Queens Hills south of the River Wensum, Longwater Retail Park and isolated dwellings. These are unlikely to experience road traffic pollutants at concentrations near to the objective levels. The introduction of a new road, whilst close to houses, is not adjacent to housing and hence is therefore unlikely to lead to a new breach of the objective levels. The option at this stage is not thought likely to affect the concentrations of NO2 in the City Centre AQMA to the degree that will significantly affect its designation. Not distinctly different to Option 6 (Orange route 1) in terms of air quality.
Greenhouse gases	3 (Slight Adverse)	The route will amend the flow of traffic around Norwich and at this early stage without traffic modelling, it is unknown whether this will lead to a significant growth in traffic and a change in average speeds. However, as the option does not include any new development any additional traffic is unlikely to be significant and therefore the change in greenhouse gases is likely to be limited. No distinction with Option 6.
Landscape	2 (Moderate Adverse)	This option leads to significant loss of agricultural and recreational land, field boundary hedgerows and significant loss of woodland north and south of Rivers Wensum and Tud. The new route also cuts across the Rivers Wensum and Tud both of which have great local recreational value and therefore diminishing the sense of place and tranquility and detracting from the landscape character. The route passes closely to Ringand and Queens Hills settlements however due to topography and intervening vegetation the route is likely to be screened from these receptors. There is no distinction with Option 7.
Townscape	N/A	N/A
Historic environment	3 (Slight Adverse)	There are no designated (protected) archaeological or built heritage assets within the route. There are four listed buildings within a 500m buffer of the route, one of which is Grade II*. The setting of these assets may be adversely impacted by the proposed development, though the overall heritage significance of these assets is unlikely to be affected. The route does not lie within or adjacent to an LPA conservation area or LPA archaeological priority area. The natural sand and gravel geology, which underlies much of the route, combined with the proximity to the River Wensum and River Tud, would have made it attractive to early settlement and archaeological survival across the site is likely to be high, except in areas of former quarry pits and possibly within the area occupied by the golf course, and at a shallow depth below ground. The presence and nature of any buried archaeological remains is uncertain at this stage but the new road would truncate or completely remove any such remains present within its footprint. No distinction with Option 13 and 14.
Biodiversity	2 (Moderate Adverse)	The route will require a new crossing over the River Wensum SAC/SSSI, no negative impacts assumed due to design and mitigation. The route will cause habitat loss of Land South of Blyth's Wood CWS, Lord's Hill and Easton Reeds and Blackhill Woods CWS and Long Dell and Westlodge Hills CWS and River Tud at Easton and Honingham CWS. The route would include habitat loss of Blyth's Wood Ancient Woodland, Lords Hill Ancient Woodland and Blackhill Wood Ancient Woodland. The route is adjacent to Ringland Pits CWS. There will be loss and severance of broadleaved woodland, grassland, arable fields and hedgerows.
Water environment	2 (Moderate Adverse)	The route will include a new crossing over the River Wensum, River Tud, a tributary of the River Wensum and a flood zone 3 area. This additional infrastructure over the river could affect geomorphology of the river and will provide a pathway for road run-off to enter the water courses, which could potentially result in significant adverse impacts on the quality of the river.

Environmental Appraisal

Option name/no.	Option 16: A1067 / A1270 junction to A47 / A1074 Longwater interchange; 2014 Orange (2), dual carriageway
Description	From the A1067 junction with the A1270 at Deighton Hills, Option 16 heads south, crossing Ringland Road, to the west of Taverham. The route continues south and crosses the River Wensum and Costessey Lane to the south-east of Ringland. Option 16 passes through Ringland Hills to the west of Queen's Hill before crossing the River Tud. The route passes through the Longwater employment area to connect with the A47 / A1074 Longwater Interchange. Option 16 would be of dual carriageway standard.

Topic

Noise	2 (Moderate Adverse)	The route passes quite closely to settlements in Queens Hills south of the River Wensum, Longwater Retail Park and isolated dwellings. Therefore this option will introduce a new noise source to a relatively rural location. The number of properties affected is likely to be slightly greater than other new route options, as it passes near Longwater Retail Park, and the A47 and the A1067 are sources of traffic noise already at either end. No distinction with Option 6.
Air quality	3 (Slight Adverse)	The route passes quite closely to settlements in Queens Hills south of the River Wensum, Longwater Retail Park and isolated dwellings. These are unlikely to experience road traffic pollutants at concentrations near to the objective levels. The introduction of a new road, whilst close to houses, is not adjacent to housing and hence is therefore unlikely to lead to a new breach of the objective levels. The option at this stage is not thought likely to affect the concentrations of NO2 in the City Centre AQMA to the degree that will significantly affect its designation. Not distinctly different to Option 6 (Orange route 1) in terms of air quality.
Greenhouse gases	3 (Slight Adverse)	The route will amend the flow of traffic around Norwich and at this early stage without traffic modelling, it is unknown whether this will lead to a significant growth in traffic and a change in average speeds. However, as the option does not include any new development any additional traffic is unlikely to be significant and therefore the change in greenhouse gases is likely to be limited. No distinction with Option 6.
Landscape	2 (Moderate Adverse)	This option leads to significant loss of agricultural and recreational land, field boundary hedgerows and significant loss of woodland north and south of Rivers Wensum and Tud. The new route also cuts across the Rivers Wensum and Tud both of which have great local recreational value and therefore diminishing the sense of place and tranquility and detracting from the landscape character. The route passes closely to Ringland and Queens Hills settlements however due to topography and intervening vegetation the route is likely to be screened from these receptors. There is no distinction with Option 7.
Townscape	N/A	N/A
Historic environment	3 (Slight Adverse)	There are no designated (protected) archaeological or built heritage assets within the route. There are four listed buildings within a 500m buffer of the route, one of which is Grade II*. The setting of these assets may be adversely impacted by the proposed development, though the overall heritage significance of these assets is unlikely to be affected. The route does not lie within or adjacent to an LPA conservation area or LPA archaeological priority area. The natural sand and gravel geology, which underlies much of the route, combined with the proximity to the River Wensum and River Tud, would have made it attractive to early settlement and archaeological survival across the site is likely to be high, except in areas of former quarry pits and possibly within the area occupied by the golf course, and at a shallow depth below ground. The presence and nature of any buried archaeological remains is uncertain at this stage but the new road would truncate or completely remove any such remains present within its footprint. No distinction with Option 13 and 14.
Biodiversity	2 (Moderate Adverse)	The route will require a new crossing over the River Wensum SAC/SSSI, no negative impacts assumed due to design and mitigation. The route will cause habitat loss of Land South of Blyth's Wood CWS, Lord's Hill and Easton Reeds and Blackhill Woods CWS and Long Dell and Westlodge Hills CWS and River Tud at Easton and Honingham CWS. The route would include habitat loss of Blyth's Wood Ancient Woodland, Lords Hill Ancient Woodland and Blackhill Wood Ancient Woodland. The route is adjacent to Ringland Pits CWS. There will be loss and severance of broadleaved woodland, grassland, arable fields and hedgerows.
Water environment	2 (Moderate Adverse)	The route will include a new crossing over the River Wensum, River Tud, a tributary of the River Wensum and a flood zone 3 area. This additional infrastructure over the river could affect geomorphology of the river and will provide a pathway for road run-off to enter the water courses, which could potentially result in significant adverse impacts on the quality of the river.

Environmental Appraisal

Option name/no.	Option 17: A1067 (east of A1067 / A1270 junction) to A47 / A1074 Longwater interchange; 2014 Orange (3), single carriageway
Description	From the A1067, east of the junction with the A1270 at Deighton Hills, Option 17 skirts the north-west edge of Taverham before crossing Ringland Road. The route turns south-east and crosses the River Wensum and Costessey Lane to the south of Taverham. Option 17 then passes between Queen's Hill and Costessey, before crossing the River Tud. The route passes through the Longwater employment area to connect with the A47 / A1074 Longwater Interchange. Option 17 would be of single carriageway standard.

Topic

Noise	2 (Moderate Adverse)	The route passes quite closely to the settlements located east of Taverham, settlements in Queens Hills south of the River Wensum, Longwater Retail Park and isolated dwellings. Therefore this option will introduce a new noise source to a relatively rural location. The number of properties affected is likely to be greater than other new route options, due to the close route through a number of settlements and isolated dwellings, and the A47 and the A1067 are sources of traffic noise already at either end. No distinction with Option 6 and 7.
Air quality	3 (Slight Adverse)	The route passes quite closely to the settlements located east of Taverham, settlements in Queens Hills south of the River Wensum, Longwater Retail Park and isolated dwellings. These are unlikely to experience road traffic pollutants at concentrations near to the objective levels. The introduction of a new road, whilst close to houses, is not adjacent to housing and hence is therefore unlikely to lead to a new breach of the objective levels. The option at this stage is not thought likely to affect the concentrations of NO2 in the City Centre AQMA to the degree that will significantly affect its designation. Not distinctly different to Options 6 and 7 (Orange route 1 and 2) in terms of air quality.
Greenhouse gases	3 (Slight Adverse)	The route will amend the flow of traffic around Norwich and at this early stage without traffic modelling, it is unknown whether this will lead to a significant growth in traffic and a change in average speeds. However, as the option does not include any new development any additional traffic is unlikely to be significant and therefore the change in greenhouse gases is likely to be limited. No distinction with Option 6 or 7.
Landscape	2 (Moderate Adverse)	This option leads to significant loss of agricultural land, field boundary hedgerows and minor loss of woodland east of Queens Hills. The new route also cuts across the Rivers Wensum and Tud both of which have great local recreational value therefore diminishing the sense of place and tranquility and detracting from the character of the landscape. The route passes adjacent to Taverham and Queens Hills settlements introducing a new feature into their views. Mitigation in the form of screening vegetation and landscape bunds along the route could potentially reduce the visual effects but considering the lack of intervening vegetation and lack of space for buffer vegetation the route is likely to be visible or partially visible from settlements. This option is better than Option 7 & 8 in terms of landscape character impacts but worse than 7 and 8 in terms of visual impact.
Townscape	N/A	N/A
Historic environment	2 (Moderate Adverse)	There are no designated (protected) archaeological or built heritage assets within the route. There are seven Grade II listed buildings within a 500m buffer of the route. The setting of these assets may be adversely impacted by the proposed development, though the overall heritage significance of these assets is unlikely to be affected. The route does not lie within or adjacent to an LPA conservation area or LPA archaeological priority area. The natural sand and gravel geology, which underlies much of the route, combined with the proximity to the River Wensum and River Tud, would have made it attractive to early settlement and archaeological survival across the site is likely to be high, except in areas of former quarry pits and possibly within the area occupied by the golf course, and at a shallow depth below ground. The presence and nature of any buried archaeological remains is uncertain at this stage but the new road would truncate or completely remove any such remains present within its footprint.
Biodiversity	2 (Moderate Adverse)	The route will require a new crossing over the River Wensum SAC/SSSI, no negative impacts assumed due to design and mitigation. The route will cause habitat loss of Long Dale CWS and Snakes Hill CWS. The route would be adjacent to Brickfield Farm CWS, Blackhill Wood Ancient Woodland and Blyth's Wood CWS/Ancient Woodland. There will be loss and severance of broadleaved woodland, grassland, arable fields and hedgerows.
Water environment	2 (Moderate Adverse)	The route will include a new crossing over the River Wensum and the River Tud, a tributary of the River Wensum. This additional infrastructure over the river could affect geomorphology of the river and will provide a pathway for road runoff to enter the water courses, which could potentially result in significant adverse impacts on the quality of the river.

Environmental Appraisal

Option name/no.	Option 18: A1067 (east of A1067 / A1270 junction) to A47 / A1074 Longwater interchange; 2014 Orange (3), dual carriageway
Description	From the A1067, east of the junction with the A1270 at Deighton Hills, Option 18 skirts the north-west edge of Taverham before crossing Ringland Road. The route turns south-east and crosses the River Wensum and Costessey Lane to the south of Taverham. Option 18 then passes between Queen's Hill and Costessey, before crossing the River Tud. The route passes through the Longwater employment area to connect with the A47 / A1074 Longwater Interchange. Option 18 would be of dual carriageway standard. Upgrades to the A1067 to dual carriageway standard may also be required.

Topic

Noise	2 (Moderate Adverse)	The route passes quite closely to the settlements located east of Taverham, settlements in Queens Hills south of the River Wensum, Longwater Retail Park and isolated dwellings. Therefore this option will introduce a new noise source to a relatively rural location. The number of properties affected is likely to be greater than other new route options, due to the close route through a number of settlements and isolated dwellings, and the A47 and the A1067 are sources of traffic noise already at either end. No distinction with Option 6 and 7.
Air quality	3 (Slight Adverse)	The route passes quite closely to the settlements located east of Taverham, settlements in Queens Hills south of the River Wensum, Longwater Retail Park and isolated dwellings. These are unlikely to experience road traffic pollutants at concentrations near to the objective levels. The introduction of a new road, whilst close to houses, is not adjacent to housing and hence is therefore unlikely to lead to a new breach of the objective levels. The option at this stage is not thought likely to affect the concentrations of NO2 in the City Centre AQMA to the degree that will significantly affect its designation. Not distinctly different to Options 6 and 7 (Orange route 1 and 2) in terms of air quality.
Greenhouse gases	3 (Slight Adverse)	The route will amend the flow of traffic around Norwich and at this early stage without traffic modelling, it is unknown whether this will lead to a significant growth in traffic and a change in average speeds. However, as the option does not include any new development any additional traffic is unlikely to be significant and therefore the change in greenhouse gases is likely to be limited. No distinction with Option 6 or 7.
Landscape	2 (Moderate Adverse)	This option leads to significant loss of agricultural land, field boundary hedgerows and minor loss of woodland east of Queens Hills. The new route also cuts across the Rivers Wensum and Tud both of which have great local recreational value therefore diminishing the sense of place and tranquility and detracting from the character of the landscape. The route passes adjacent to Taverham and Queens Hills settlements introducing a new feature into their views. Mitigation in the form of screening vegetation and landscape bunds along the route could potentially reduce the visual effects but considering the lack of intervening vegetation and lack of space for buffer vegetation the route is likely to be visible or partially visible from settlements. This option is better than Option 7 & 8 in terms of landscape character impacts but worse than 7 and 8 in terms of visual impact.
Townscape	N/A	N/A
Historic environment	2 (Moderate Adverse)	There are no designated (protected) archaeological or built heritage assets within the route. There are seven Grade II listed buildings within a 500m buffer of the route. The setting of these assets may be adversely impacted by the proposed development, though the overall heritage significance of these assets is unlikely to be affected. The route does not lie within or adjacent to an LPA conservation area or LPA archaeological priority area. The natural sand and gravel geology, which underlies much of the route, combined with the proximity to the River Wensum and River Tud, would have made it attractive to early settlement and archaeological survival across the site is likely to be high, except in areas of former quarry pits and possibly within the area occupied by the golf course, and at a shallow depth below ground. The presence and nature of any buried archaeological remains is uncertain at this stage but the new road would truncate or completely remove any such remains present within its footprint.
Biodiversity	2 (Moderate Adverse)	The route will require a new crossing over the River Wensum SAC/SSSI, no negative impacts assumed due to design and mitigation. The route will cause habitat loss of Long Dale CWS and Snakes Hill CWS. The route would be adjacent to Brickfield Farm CWS, Blackhill Wood Ancient Woodland and Blyth's Wood CWS/Ancient Woodland. There will be loss and severance of broadleaved woodland, grassland, arable fields and hedgerows.
Water environment	2 (Moderate Adverse)	The route will include a new crossing over the River Wensum and the River Tud, a tributary of the River Wensum. This additional infrastructure over the river could affect geomorphology of the river and will provide a pathway for road run-off to enter the water courses, which could potentially result in significant adverse impacts on the quality of the river.

Environmental Appraisal

Option name/no.	Option 19: A1067 / A1270 junction to A47 / A1074 Longwater interchange; 2014 Orange (4), single carriageway
Description	From the A1067 junction with the A1270 at Deighton Hills, Option 19 heads south, crossing Ringland Road, to the west of Taverham. The route turns south-east and crosses the River Wensum and Costessey Lane to the south of Taverham. Option 19 then passes between Queen's Hill and Costessey, before crossing the River Tud. The route passes through the Longwater employment area to connect with the A47 / A1074 Longwater Interchange. Option 19 would be of single carriageway standard.

Topic

Noise	2 (Moderate Adverse)	The route passes quite closely to the settlements in Queens Hills south of the River Wensum, Longwater Retail Park and isolated dwellings. Therefore this option will introduce a new noise source to a relatively rural location. The number of properties affected is likely to be fewer than other new route options and the A47 and the A1067 are sources of traffic noise already at either end. No distinction with Option 6, 7 and 8.
Air quality	3 (Slight Adverse)	The route passes quite closely to the settlements in Queens Hills south of the River Wensum, Longwater Retail Park and isolated dwellings. These are unlikely to experience road traffic pollutants at concentrations near to the objective levels. The introduction of a new road, whilst close to houses, is not adjacent to housing and hence is therefore unlikely to lead to a new breach of the objective levels. The option at this stage is not thought likely to affect the concentrations of NO2 in the City Centre AQMA to the degree that will significantly affect its designation. Not distinctly different to Options 6, 7 and 8 (Orange route 1, 2 and 3) in terms of air quality.
Greenhouse gases	3 (Slight Adverse)	The route will amend the flow of traffic around Norwich and at this early stage without traffic modelling, it is unknown whether this will lead to a significant growth in traffic and a change in average speeds. However, as the option does not include any new development any additional traffic is unlikely to be significant and therefore the change in greenhouse gases is likely to be limited. No distinction with Option 6, 7 or 8.
Landscape	3 (Slight Adverse)	This option leads to significant loss of agricultural land, field boundary hedgerows and minor loss of woodland east of Queens Hills. The new route also cuts across the Rivers Wensum and Tud both of which have great local recreational value therefore diminishing the sense of place and tranquility and detracting from the character of the landscape. The route passes close to Queens Hills and Costessey settlements introducing a new feature into their views. Mitigation in the form of screening vegetation and landscape bunds along the route could potentially reduce the visual effects but considering limited intervening vegetation and restricted space for additional buffer vegetation dwellings on the edge of Queens Hills and Costessey are likely to have open or partial / filtered views. This option is likely to have less significant effects than Options 7, 8, 9, 11 & 12.
Townscape	N/A	N/A
Historic environment	2 (Moderate Adverse)	There are no designated (protected) archaeological or built heritage assets within the route. There are seven Grade II listed buildings within a 500m buffer of the route. The setting of these assets may be adversely impacted by the proposed development, though the overall heritage significance of these assets is unlikely to be affected. The route does not lie within or adjacent to an LPA conservation area or LPA archaeological priority area. The natural sand and gravel geology, which underlies much of the route, combined with the proximity to the River Wensum and River Tud, would have made it attractive to early settlement and archaeological survival across the site is likely to be high, except in areas of former quarry pits and possibly within the area occupied by the golf courses, and at a shallow depth below ground. The presence and nature of any buried archaeological remains is uncertain at this stage but the new road would truncate or completely remove any such remains present within its footprint. No distinction with option 17 and 18.
Biodiversity	2 (Moderate Adverse)	The route will require a new crossing over the River Wensum SAC/SSSI, no negative impacts assumed due to design and mitigation. The route will cause habitat loss of Long Dale CWS and Snakes Hill CWS. The route would be adjacent to Brickfield Farm CWS, Blackhill Wood Ancient Woodland and Blyth's Wood CWS/Ancient Woodland. There will be loss and severance of broadleaved woodland, grassland, arable fields and hedgerows.
Water environment	2 (Moderate Adverse)	The route will include a new crossing over the River Wensum, the River Tud, a tributary of the River Wensum and a flood zone 3 area. This additional infrastructure over the river could affect geomorphology of the river and will provide a pathway for road run-off to enter the water courses, which could potentially result in significant adverse impacts on the quality of the river.

Environmental Appraisal

Option name/no.	Option 20: A1067 / A1270 junction to A47 / A1074 Longwater interchange; 2014 Orange (4), dual carriageway
Description	From the A1067 junction with the A1270 at Deighton Hills, Option 20 heads south, crossing Ringland Road, to the west of Taverham. The route turns south-east and crosses the River Wensum and Costessey Lane to the south of Taverham. Option 20 then passes between Queen's Hill and Costessey, before crossing the River Tud. The route passes through the Longwater employment area to connect with the A47 / A1074 Longwater Interchange. Option 20 would be of dual carriageway standard.

Topic

Noise	2 (Moderate Adverse)	The route passes quite closely to the settlements in Queens Hills south of the River Wensum, Longwater Retail Park and isolated dwellings. Therefore this option will introduce a new noise source to a relatively rural location. The number of properties affected is likely to be fewer than other new route options and the A47 and the A1067 are sources of traffic noise already at either end. No distinction with Option 6, 7 and 8.
Air quality	3 (Slight Adverse)	The route passes quite closely to the settlements in Queens Hills south of the River Wensum, Longwater Retail Park and isolated dwellings. These are unlikely to experience road traffic pollutants at concentrations near to the objective levels. The introduction of a new road, whilst close to houses, is not adjacent to housing and hence is therefore unlikely to lead to a new breach of the objective levels. The option at this stage is not thought likely to affect the concentrations of NO2 in the City Centre AQMA to the degree that will significantly affect its designation. Not distinctly different to Options 6, 7 and 8 (Orange route 1, 2 and 3) in terms of air quality.
Greenhouse gases	3 (Slight Adverse)	The route will amend the flow of traffic around Norwich and at this early stage without traffic modelling, it is unknown whether this will lead to a significant growth in traffic and a change in average speeds. However, as the option does not include any new development any additional traffic is unlikely to be significant and therefore the change in greenhouse gases is likely to be limited. No distinction with Option 6, 7 or 8.
Landscape	3 (Slight Adverse)	This option leads to significant loss of agricultural land, field boundary hedgerows and minor loss of woodland east of Queens Hills. The new route also cuts across the Rivers Wensum and Tud both of which have great local recreational value therefore diminishing the sense of place and tranquility and detracting from the character of the landscape. The route passes close to Queens Hills and Costessey settlements introducing a new feature into their views. Mitigation in the form of screening vegetation and landscape bunds along the route could potentially reduce the visual effects but considering limited intervening vegetation and restricted space for additional buffer vegetation dwellings on the edge of Queens Hills and Costessey are likely to have open or partial / filtered views. This option is likely to have less significant effects than Options 7, 8, 9, 11 & 12.
Townscape	N/A	N/A
Historic environment	2 (Moderate Adverse)	There are no designated (protected) archaeological or built heritage assets within the route. There are seven Grade II listed buildings within a 500m buffer of the route. The setting of these assets may be adversely impacted by the proposed development, though the overall heritage significance of these assets is unlikely to be affected. The route does not lie within or adjacent to an LPA conservation area or LPA archaeological priority area. The natural sand and gravel geology, which underlies much of the route, combined with the proximity to the River Wensum and River Tud, would have made it attractive to early settlement and archaeological survival across the site is likely to be high, except in areas of former quarry pits and possibly within the area occupied by the golf courses, and at a shallow depth below ground. The presence and nature of any buried archaeological remains is uncertain at this stage but the new road would truncate or completely remove any such remains present within its footprint. No distinction with option 17 and 18.
Biodiversity	2 (Moderate Adverse)	The route will require a new crossing over the River Wensum SAC/SSSI, no negative impacts assumed due to design and mitigation. The route will cause habitat loss of Long Dale CWS and Snakes Hill CWS. The route would be adjacent to Brickfield Farm CWS, Blackhill Wood Ancient Woodland and Blyth's Wood CWS/Ancient Woodland. There will be loss and severance of broadleaved woodland, grassland, arable fields and hedgerows.
Water environment	2 (Moderate Adverse)	The route will include a new crossing over the River Wensum, the River Tud, a tributary of the River Wensum and a flood zone 3 area. This additional infrastructure over the river could affect geomorphology of the river and will provide a pathway for road run-off to enter the water courses, which could potentially result in significant adverse impacts on the quality of the river.

Environmental Appraisal

Option name/no.	Option 21: A1067 (east of A1067 / A1270 junction) to A1074 east of Longwater; 2014 Orange (5), single carriageway
Description	From the A1067, east of the junction with the A1270 at Deighton Hills, Option 21 skirts the north-west edge of Taverham before crossing Ringland Road. The route turns south-east and crosses the River Wensum and Costessey Lane to the south of Taverham. Option 21 then passes between Queen's Hill and Costessey, before crossing the River Tud. The route passes to the east of the Longwater employment area to connect with the A1074 between Longwater and New Costessey. Option 21 would be of single carriageway standard.

Topic

Noise	2 (Moderate Adverse)	The route passes quite closely to the settlements located east of Taverham, settlements in Queens Hills south of the River Wensum, Longwater Retail Park and isolated dwellings. Therefore this option will introduce a new noise source to a relatively rural location. The number of properties affected is likely to be fewer than other new route options and the A47 and the A1067 are sources of traffic noise already at either end. No distinction with Option 6, 7, 8 and 10.
Air quality	3 (Slight Adverse)	The route passes quite closely to the settlements located east of Taverham, settlements in Queens Hills south of the River Wensum, Longwater Retail Park and isolated dwellings. These are unlikely to experience road traffic pollutants at concentrations near to the objective levels. The introduction of a new road, whilst close to houses, is not adjacent to housing and hence is therefore unlikely to lead to a new breach of the objective levels. The option at this stage is not thought likely to affect the concentrations of NO2 in the City Centre AQMA to the degree that will significantly affect its designation. Not distinctly different to Options 6, 7, 8 and 10 (Orange route 1, 2, 3 and 4) in terms of air quality.
Greenhouse gases	3 (Slight Adverse)	The route will amend the flow of traffic around Norwich and at this early stage without traffic modelling, it is unknown whether this will lead to a significant growth in traffic and a change in average speeds. However, as the option does not include any new development any additional traffic is unlikely to be significant and therefore the change in greenhouse gases is likely to be limited. No distinction with Option 6, 7, 8 and 10.
Landscape	2 (Moderate Adverse)	This option leads to significant loss of agricultural land, field boundary hedgerows and minor loss of woodland east of Queens Hills. The new route also cuts across the Rivers Wensum and Tud both of which have great local recreational value therefore diminishing the sense of place and tranquility and detracting from the character of the landscape. The route passes adjacent to Taverham and Queens Hills settlements introducing a new feature into their views. Mitigation in the form of screening vegetation and landscape bunds along the route could potentially reduce the visual effects but considering limited intervening vegetation and lack of space for buffer vegetation a number of dwellings to the edge of Taverham and Queens Hills is likely to have open and partial views. Not distinctly different to Options 7, 8, and 9.
Townscape	N/A	N/A
Historic environment	2 (Moderate Adverse)	There are no designated (protected) archaeological or built heritage assets within the route. There are eleven Grade II listed buildings within a 500m buffer of the route. The setting of these assets may be adversely impacted by the proposed development, though the overall heritage significance of these assets is unlikely to be affected. The route does not lie within or adjacent to an LPA conservation area or LPA archaeological priority area. The natural sand and gravel geology, which underlies much of the route, combined with the proximity to the River Wensum and River Tud, would have made it attractive to early settlement and archaeological survival across the site is likely to be high, except in areas of former quarry pits and possibly within the area occupied by the golf courses, and at a shallow depth below ground. The presence and nature of any buried archaeological remains is uncertain at this stage but the new road would truncate or completely remove any such remains present within its footprint. No distinction with option 17 and 18.
Biodiversity	2 (Moderate Adverse)	The route will require a new crossing over the River Wensum SAC/SSSI, no negative impacts assumed due to design and mitigation. The route will cause habitat loss of Snakes Hill CWS and Blackhill Wood Ancient Woodland. The route is adjacent to Blyth's Wood CWS and Ancient Woodland and Brickfield Farm CWS. There will be loss and severance of broadleaved woodland, grassland, arable fields and hedgerows.
Water environment	2 (Moderate Adverse)	The route will include a new crossing over the River Wensum and the River Tud, a tributary of the River Wensum and a flood zone 3 area. This additional infrastructure over the river could affect geomorphology of the river and will provide a pathway for road run-off to enter the water courses, which could potentially result in significant adverse impacts on the quality of the river.

Environmental Appraisal

Option name/no.	Option 22: A1067 (east of A1067 / A1270 junction) to A1074 east of Longwater; 2014 Orange (5), dual carriageway
Description	From the A1067, east of the junction with the A1270 at Deighton Hills, Option 22 skirts the north-west edge of Taverham before crossing Ringland Road. The route turns south-east and crosses the River Wensum and Costessey Lane to the south of Taverham. Option 22 then passes between Queen's Hill and Costessey, before crossing the River Tud. The route passes to the east of the Longwater employment area to connect with the A1074 between Longwater and New Costessey. Option 22 would be of dual carriageway standard. Upgrades to the A1067 and A1074 to dual carriageway standard may also be required.

Topic	
Noise	2 (Moderate Adverse) The route passes quite closely to the settlements located east of Taverham, settlements in Queens Hills south of the River Wensum, Longwater Retail Park and isolated dwellings. Therefore this option will introduce a new noise source to a relatively rural location. The number of properties affected is likely to be fewer than other new route options and the A47 and the A1067 are sources of traffic noise already at either end. No distinction with Option 6, 7, 8 and 10.
Air quality	3 (Slight Adverse) The route passes quite closely to the settlements located east of Taverham, settlements in Queens Hills south of the River Wensum, Longwater Retail Park and isolated dwellings. These are unlikely to experience road traffic pollutants at concentrations near to the objective levels. The introduction of a new road, whilst close to houses, is not adjacent to housing and hence is therefore unlikely to lead to a new breach of the objective levels. The option at this stage is not thought likely to affect the concentrations of NO2 in the City Centre AQMA to the degree that will significantly affect its designation. Not distinctly different to Options 6, 7, 8 and 10 (Orange route 1, 2, 3 and 4) in terms of air quality.
Greenhouse gases	3 (Slight Adverse) The route will amend the flow of traffic around Norwich and at this early stage without traffic modelling, it is unknown whether this will lead to a significant growth in traffic and a change in average speeds. However, as the option does not include any new development any additional traffic is unlikely to be significant and therefore the change in greenhouse gases is likely to be limited. No distinction with Option 6, 7, 8 and 10.
Landscape	2 (Moderate Adverse) This option leads to significant loss of agricultural land, field boundary hedgerows and minor loss of woodland east of Queens Hills. The new route also cuts across the Rivers Wensum and Tud both of which have great local recreational value therefore diminishing the sense of place and tranquility and detracting from the character of the landscape. The route passes adjacent to Taverham and Queens Hills settlements introducing a new feature into their views. Mitigation in the form of screening vegetation and landscape bunds along the route could potentially reduce the visual effects but considering limited intervening vegetation and lack of space for buffer vegetation a number of dwellings to the edge of Taverham and Queens Hills is likely to have open and partial views. Not distinctly different to Options 7, 8, and 9.
Townscape	N/A N/A
Historic environment	2 (Moderate Adverse) There are no designated (protected) archaeological or built heritage assets within the route. There are eleven Grade II listed buildings within a 500m buffer of the route. The setting of these assets may be adversely impacted by the proposed development, though the overall heritage significance of these assets is unlikely to be affected. The route does not lie within or adjacent to an LPA conservation area or LPA archaeological priority area. The natural sand and gravel geology, which underlies much of the route, combined with the proximity to the River Wensum and River Tud, would have made it attractive to early settlement and archaeological survival across the site is likely to be high, except in areas of former quarry pits and possibly within the area occupied by the golf courses, and at a shallow depth below ground. The presence and nature of any buried archaeological remains is uncertain at this stage but the new road would truncate or completely remove any such remains present within its footprint. No distinction with option 17 and 18.
Biodiversity	2 (Moderate Adverse) The route will require a new crossing over the River Wensum SAC/SSSI, no negative impacts assumed due to design and mitigation. The route will cause habitat loss of Snakes Hill CWS and Blackhill Wood Ancient Woodland. The route is adjacent to Blyth's Wood CWS and Ancient Woodland and Brickfield Farm CWS. There will be loss and severance of broadleaved woodland, grassland, arable fields and hedgerows.
Water environment	2 (Moderate Adverse) The route will include a new crossing over the River Wensum and the River Tud, a tributary of the River Wensum and a flood zone 3 area. This additional infrastructure over the river could affect geomorphology of the river and will provide a pathway for road run-off to enter the water courses, which could potentially result in significant adverse impacts on the quality of the river.

Environmental Appraisal

Option name/no.	Option 23: A1067 / A1270 junction to A1074 east of Longwater; 2014 Orange (6), single carriageway
Description	From the A1067 junction with the A1270 at Deighton Hills, Option 23 heads south, crossing Ringland Road, to the west of Taverham. The route turns south-east and crosses the River Wensum and Costessey Lane to the south of Taverham. Option 23 then passes between Queen's Hill and Costessey, before crossing the River Tud. The route passes to the east of the Longwater employment area to connect with the A1074 between Longwater and New Costessey. Option 23 would be of single carriageway standard.

Topic	
Noise	2 (Moderate Adverse) The route passes quite closely to the settlements in Queens Hills south of the River Wensum, Longwater Retail Park and isolated dwellings. Therefore this option will introduce a new noise source to a relatively rural location. The number of properties affected is likely to be greater than other new route options, due to the close route through a number of settlements, Longwater Retail Park, and isolated dwellings, and the A47 and the A1067 are sources of traffic noise already at either end. No distinction with Option 6, 7, 8, 10 and 11.
Air quality	3 (Slight Adverse) The route passes quite closely to the settlements in Queens Hills south of the River Wensum, Longwater Retail Park and isolated dwellings. These are unlikely to experience road traffic pollutants at concentrations near to the objective levels. The introduction of a new road, whilst close to houses, is not adjacent to housing and hence is therefore unlikely to lead to a new breach of the objective levels. The option at this stage is not thought likely to affect the concentrations of NO2 in the City Centre AQMA to the degree that will significantly affect its designation. Not distinctly different to Options 6, 7, 8, 10 and 11 (Orange route 1, 2,3,4 and 5) in terms of air quality.
Greenhouse gases	3 (Slight Adverse) The route will amend the flow of traffic around Norwich and at this early stage without traffic modelling, it is unknown whether this will lead to a significant growth in traffic and a change in average speeds. However, as the option does not include any new development any additional traffic is unlikely to be significant and therefore the change in greenhouse gases is likely to be limited. No distinction with Option 6, 7,8, 10 and 11).
Landscape	2 (Moderate Adverse) This option leads to significant loss of agricultural land, field boundary hedgerows and minor loss of woodland east and south east of Queens Hills. The new route also cuts across the Rivers Wensum and Tud both of which have great local recreational value therefore diminishing the sense of place and tranquility and detracting from the character of the landscape. The route passes close to Queens Hills, Costessey and New Costessey settlements along the Longwater Lane introducing a new feature into their views. Mitigation in the form of screening vegetation and landscape bunds along the route could potentially reduce the visual effects but considering limited intervening vegetation and restricted space for additional buffer vegetation, dwellings on the edge of Queens Hills and Costessey are likely to have open or partial / filtered views. Slightly more adverse visual effects compared to Option 10 as more receptors will be affected.
Townscape	N/A N/A
Historic environment	2 (Moderate Adverse) There are no designated (protected) archaeological or built heritage assets within the route. There are eleven Grade II listed buildings within a 500m buffer of the route. The setting of these assets may be adversely impacted by the proposed development, though the overall heritage significance of these assets is unlikely to be affected. The route does not lie within or adjacent to an LPA conservation area or LPA archaeological priority area. The natural sand and gravel geology, which underlies much of the route, combined with the proximity to the River Wensum and River Tud, would have made it attractive to early settlement and archaeological survival across the site is likely to be high, except in areas of former quarry pits and possibly within the area occupied by the golf courses, and at a shallow depth below ground. The presence and nature of any buried archaeological remains is uncertain at this stage but the new road would truncate or completely remove any such remains present within its footprint. No distinction with option 17 and 18.
Biodiversity	2 (Moderate Adverse) The route will require a new crossing over the River Wensum SAC/SSSI, no negative impacts assumed due to design and mitigation. The route will cause habitat loss of Blyth's Wood Ancient Woodland, Blackhill Wood Ancient Woodland, Snakes Hill CWS. There will be loss and severance of broadleaved woodland, grassland, arable fields and hedgerows.
Water environment	2 (Moderate Adverse) The route will include a new crossing over the River Wensum and the River Tud, a tributary of the River Wensum and a flood zone 3 area. This additional infrastructure over the river could affect geomorphology of the river and will provide a pathway for road run-off to enter the water courses, which could potentially result in significant adverse impacts on the quality of the river.

Environmental Appraisal

Option name/no.	Option 24: A1067 / A1270 junction to A1074 east of Longwater; 2014 Orange (6), dual carriageway
Description	From the A1067 junction with the A1270 at Deighton Hills, Option 24 heads south, crossing Ringland Road, to the west of Taverham. The route turns south-east and crosses the River Wensum and Costessey Lane to the south of Taverham. Option 24 then passes between Queen's Hill and Costessey, before crossing the River Tud. The route passes to the east of the Longwater employment area to connect with the A1074 between Longwater and New Costessey. Option 24 would be of dual carriageway standard. Upgrades to the A1074 to dual carriageway standard may also be required.

Topic	
Noise	2 (Moderate Adverse) The route passes quite closely to the settlements in Queens Hills south of the River Wensum, Longwater Retail Park and isolated dwellings. Therefore this option will introduce a new noise source to a relatively rural location. The number of properties affected is likely to be greater than other new route options, due to the close route through a number of settlements, Longwater Retail Park, and isolated dwellings, and the A47 and the A1067 are sources of traffic noise already at either end. No distinction with Option 6, 7, 8, 10 and 11.
Air quality	3 (Slight Adverse) The route passes quite closely to the settlements in Queens Hills south of the River Wensum, Longwater Retail Park and isolated dwellings. These are unlikely to experience road traffic pollutants at concentrations near to the objective levels. The introduction of a new road, whilst close to houses, is not adjacent to housing and hence is therefore unlikely to lead to a new breach of the objective levels. The option at this stage is not thought likely to affect the concentrations of NO2 in the City Centre AQMA to the degree that will significantly affect its designation. Not distinctly different to Options 6, 7, 8, 10 and 11 (Orange route 1, 2,3,4 and 5) in terms of air quality.
Greenhouse gases	3 (Slight Adverse) The route will amend the flow of traffic around Norwich and at this early stage without traffic modelling, it is unknown whether this will lead to a significant growth in traffic and a change in average speeds. However, as the option does not include any new development any additional traffic is unlikely to be significant and therefore the change in greenhouse gases is likely to be limited. No distinction with Option 6, 7,8, 10 and 11).
Landscape	2 (Moderate Adverse) This option leads to significant loss of agricultural land, field boundary hedgerows and minor loss of woodland east and south east of Queens Hills. The new route also cuts across the Rivers Wensum and Tud both of which have great local recreational value therefore diminishing the sense of place and tranquility and detracting from the character of the landscape. The route passes close to Queens Hills, Costessey and New Costessey settlements along the Longwater Lane introducing a new feature into their views. Mitigation in the form of screening vegetation and landscape bunds along the route could potentially reduce the visual effects but considering limited intervening vegetation and restricted space for additional buffer vegetation, dwellings on the edge of Queens Hills and Costessey are likely to have open or partial / filtered views. Slightly more adverse visual effects compared to Option 10 as more receptors will be affected.
Townscape	N/A N/A
Historic environment	2 (Moderate Adverse) There are no designated (protected) archaeological or built heritage assets within the route. There are eleven Grade II listed buildings within a 500m buffer of the route. The setting of these assets may be adversely impacted by the proposed development, though the overall heritage significance of these assets is unlikely to be affected. The route does not lie within or adjacent to an LPA conservation area or LPA archaeological priority area. The natural sand and gravel geology, which underlies much of the route, combined with the proximity to the River Wensum and River Tud, would have made it attractive to early settlement and archaeological survival across the site is likely to be high, except in areas of former quarry pits and possibly within the area occupied by the golf courses, and at a shallow depth below ground. The presence and nature of any buried archaeological remains is uncertain at this stage but the new road would truncate or completely remove any such remains present within its footprint. No distinction with option 17 and 18.
Biodiversity	2 (Moderate Adverse) The route will require a new crossing over the River Wensum SAC/SSSI, no negative impacts assumed due to design and mitigation. The route will cause habitat loss of Blyth's Wood Ancient Woodland, Blackhill Wood Ancient Woodland, Snakes Hill CWS. There will be loss and severance of broadleaved woodland, grassland, arable fields and hedgerows.
Water environment	2 (Moderate Adverse) The route will include a new crossing over the River Wensum and the River Tud, a tributary of the River Wensum and a flood zone 3 area. This additional infrastructure over the river could affect geomorphology of the river and will provide a pathway for road run-off to enter the water courses, which could potentially result in significant adverse impacts on the quality of the river.

Environmental Appraisal

Option name/no.	Option 25: A140 / A1270 junction to A1074 east of Longwater; 2014 Green, single carriageway
Description	From the A140 junction with the A1270, Option 25 heads south-west, passing Hellesdon to the north-west crossing Reepham Road. The route continues in a south-western direction crossing the A1067, Low Road and the River Wensum. Option 25 then routes west, crossing Town House Road, passing to the south of Costessey, crossing Longwater Lane and the River Tud, before connecting to the A1074 between Longwater and New Costessey. Option 25 would be of single carriageway standard.

Topic	
Noise	2 (Moderate Adverse) The route passes quite closely to the settlements at Costessey and isolated dwellings. Therefore this option will introduce a new noise source to a relatively rural location. The number of properties affected is likely to be greater than other new route options, due to the route passing through Costessey, near Hellesdon and near New Costessey, and the A47 and the A1067 are sources of traffic noise already at either end.
Air quality	3 (Slight Adverse) The route passes quite closely to the settlements at Costessey and isolated dwellings. These are unlikely to experience road traffic pollutants at concentrations near to the objective levels. The introduction of a new road, whilst close to houses, is not adjacent to housing and hence is therefore unlikely to lead to a new breach of the objective levels. The option at this stage is not thought likely to affect the concentrations of NO2 in the City Centre AQMA to the degree that will significantly affect its designation.
Greenhouse gases	3 (Slight Adverse) The route will amend the flow of traffic around Norwich and at this early stage without traffic modelling, it is unknown whether this will lead to a significant growth in traffic and a change in average speeds. However, as the option does not include any new development any additional traffic is unlikely to be significant and therefore the change in greenhouse gases is likely to be limited.
Landscape	2 (Moderate Adverse) This route will lead to significant loss of agricultural land, hedgerows and partial loss of recreational grounds around the Rivers Wensum and Tud as well as the loss of the Manor Park Cricket Grounds. The route will cut across the River Wensum and Tud, both of which are valuable components of the landscape character. The route passes close to village and urban fringes such as Hellesdon, Costessey and New Costessey and cuts across the long distance PROW Marriots Way all of which are high sensitivity receptors with minimum intervening vegetation to block/ filter views. After application of reasonable mitigation measures residual visual and landscape character effects are likely to be significant and have a large adverse impact.
Townscape	N/A N/A
Historic environment	2 (Moderate Adverse) There are no designated (protected) archaeological or built heritage assets within the route. There are thirteen Grade II listed buildings within a 500m buffer of the route. The setting of these assets may be adversely impacted by the proposed development, though the overall heritage significance of these assets is unlikely to be affected. The route does not lie within or adjacent to an LPA conservation area or LPA archaeological priority area. The natural sand and gravel geology, which underlies much of the route, combined with the proximity to the River Wensum and River Tud, would have made it attractive to early settlement and archaeological survival across the site is likely to be high, except in areas of former quarry pits, and at a shallow depth below ground. The presence and nature of any buried archaeological remains is uncertain at this stage but the new road would truncate or completely remove any such remains present within its footprint.
Biodiversity	1 (Large Adverse) The route will require a new crossing over the River Wensum SAC/SSSI, no negative impacts assumed due to design and mitigation. The route will cross the Tud twice; once across completely and once at the top of a meander just catching the top of it. The route will cause habitat loss of Drayton Wood CWS, Marriot's Way CWS and Wensum Mount Farm CWS. There will be loss and severance of broadleaved woodland, grassland, arable fields and hedgerows.
Water environment	1 (Large Adverse) The route will include a new crossing over the River Wensum and the River Tud, a tributary of the River Wensum and a flood zone 3 area. This additional infrastructure over the river could affect geomorphology of the river and will provide a pathway for road run-off to enter the water courses, which could potentially result in significant adverse impacts on the quality of the river.

Environmental Appraisal

Option name/no.	Option 26: A140 / A1270 junction to A1074 east of Longwater; 2014 Green, dual carriageway
Description	From the A140 junction with the A1270, Option 26 heads south-west, passing Hellesdon to the north-west crossing Reepham Road. The route continues in a south-western direction crossing the A1067, Low Road and the River Wensum. Option 26 then routes west, crossing Town House Road, passing to the south of Costessey, crossing Longwater Lane and the River Tud, before connecting to the A1074 between Longwater and New Costessey. Option 26 would be of dual carriageway standard. Upgrades to the A1074 to dual carriageway standard may also be required.

Topic

Noise	2 (Moderate Adverse)	The route passes quite closely to the settlements at Costessey and isolated dwellings. Therefore this option will introduce a new noise source to a relatively rural location. The number of properties affected is likely to be greater than other new route options, due to the route passing through Costessey, near Hellesdon and near New Costessey, and the A47 and the A1067 are sources of traffic noise already at either end.
Air quality	3 (Slight Adverse)	The route passes quite closely to the settlements at Costessey and isolated dwellings. These are unlikely to experience road traffic pollutants at concentrations near to the objective levels. The introduction of a new road, whilst close to houses, is not adjacent to housing and hence is therefore unlikely to lead to a new breach of the objective levels. The option at this stage is not thought likely to affect the concentrations of NO2 in the City Centre AQMA to the degree that will significantly affect its designation.
Greenhouse gases	3 (Slight Adverse)	The route will amend the flow of traffic around Norwich and at this early stage without traffic modelling, it is unknown whether this will lead to a significant growth in traffic and a change in average speeds. However, as the option does not include any new development any additional traffic is unlikely to be significant and therefore the change in greenhouse gases is likely to be limited.
Landscape	2 (Moderate Adverse)	This route will lead to significant loss of agricultural land, hedgerows and partial loss of recreational grounds around the Rivers Wensum and Tud as well as the loss of the Manor Park Cricket Grounds. The route will cut across the River Wensum and Tud, both of which are valuable components of the landscape character. The route passes close to village and urban fringes such as Hellesdon, Costessey and New Costessey and cuts across the long distance PROW Marriots Way all of which are high sensitivity receptors with minimum intervening vegetation to block/ filter views. After application of reasonable mitigation measures residual visual and landscape character effects are likely to be significant and have a large adverse impact.
Townscape	N/A	N/A
Historic environment	2 (Moderate Adverse)	There are no designated (protected) archaeological or built heritage assets within the route. There are thirteen Grade II listed buildings within a 500m buffer of the route. The setting of these assets may be adversely impacted by the proposed development, though the overall heritage significance of these assets is unlikely to be affected. The route does not lie within or adjacent to an LPA conservation area or LPA archaeological priority area. The natural sand and gravel geology, which underlies much of the route, combined with the proximity to the River Wensum and River Tud, would have made it attractive to early settlement and archaeological survival across the site is likely to be high, except in areas of former quarry pits, and at a shallow depth below ground. The presence and nature of any buried archaeological remains is uncertain at this stage but the new road would truncate or completely remove any such remains present within its footprint.
Biodiversity	1 (Large Adverse)	The route will require a new crossing over the River Wensum SAC/SSSI, no negative impacts assumed due to design and mitigation. The route will cross the Tud twice; once across completely and once at the top of a meander just catching the top of it. The route will cause habitat loss of Drayton Wood CWS, Marriot's Way CWS and Wensum Mount Farm CWS. There will be loss and severance of broadleaved woodland, grassland, arable fields and hedgerows.
Water environment	1 (Large Adverse)	The route will include a new crossing over the River Wensum and the River Tud, a tributary of the River Wensum and a flood zone 3 area. This additional infrastructure over the river could affect geomorphology of the river and will provide a pathway for road run-off to enter the water courses, which could potentially result in significant adverse impacts on the quality of the river.

Environmental Appraisal

Option name/no.	Option 27: North Tuddenham via Attlebridge; 2018 Road Alignment (1), single carriageway
Description	From the A1067, west of Attlebridge, Option 27 heads west crossing Marl Hill Road and Morton Lane and the B1535 toward Collin Green Farm. The route then heads south-west passing between Collin Green Farm (north of alignment) and the solar farm (south of the alignment), before crossing Blind Lane. Option 27 routes south running parallel to Lyng Road. It crosses Stone Road passing west of Hockering Wood to connect with the A47 east of North Tuddenham. Option 27 would be of single carriageway standard.

Topic

Noise	2 (Moderate Adverse)	The route passes through predominately rural agricultural areas following the Heath Road for a short while. It will pass quite closely to some isolated dwellings. Therefore this option will introduce a new noise source to a rural location. The number of properties affected is likely to be fewer than other new route options, due to the rural nature of the route, and the A47 and the A1067 are sources of traffic noise already at either end.
Air quality	3 (Slight Adverse)	The route passes through predominately rural agricultural areas following the Heath Road for a short while. It will pass quite closely to some isolated dwellings. These are unlikely to experience road traffic pollutants at concentrations near to the objective levels. The road will introduce a new road pollution source to the rural areas where there are currently no main roads which may decrease the air quality in the surrounding area. However, as mentioned above there are relatively few sensitive receptors to air quality changes and therefore the impact is not likely to be substantial. The option at this stage is not thought likely to affect the concentrations of NO2 in the City Centre AQMA to the degree that will significantly affect its designation.
Greenhouse gases	3 (Slight Adverse)	The route will amend the flow of traffic around Norwich and at this early stage without traffic modelling, it is unknown whether this will lead to a significant growth in traffic and a change in average speeds. However, as the option does not include any new development any additional traffic is unlikely to be significant and therefore the change in greenhouse gases is likely to be limited.
Landscape	3 (Slight Adverse)	This option will result to noticeable loss of agricultural land and boundary hedgerows both elements that contribute to sense of place and perception of historic and cultural associations. This is a moderately sensitive landscape that would be able to accommodate the new development following application of reasonable mitigation measures such as planting and screening bunds. In terms of visual effects the number of properties affected is less than on other options and therefore reducing the significance of visual effects.
Townscape	N/A	N/A
Historic environment	2 (Moderate Adverse)	There are no designated (protected) archaeological or built heritage assets within the route. There are six listed buildings within a 500m buffer of the route, one of which is Grade II*. The setting of these assets may be adversely impacted by the proposed development, though the overall heritage significance of these assets is unlikely to be affected. The route does not lie within or adjacent to an LPA conservation area or LPA archaeological priority area. The natural sand and gravel geology, which underlies much of the route, combined with the proximity to the River Wensum and River Tud, would have made it attractive to early settlement and archaeological survival across the site is likely to be high, except in areas of former quarry pits, and at a shallow depth below ground. The presence and nature of any buried archaeological remains is uncertain at this stage but the new road would truncate or completely remove any such remains present within its footprint.
Biodiversity	3 (Slight Adverse)	The route will utilise an existing crossing over the River Wensum SAC/SSSI, no negative impacts assumed due to design and mitigation. There will be loss and severance of broadleaved woodland, grassland, arable fields and hedgerows.
Water environment	3 (Slight Adverse)	The introduction of a new road, whilst close to the River Wensum, does not cross over the river. This option would have no tangible benefit or adverse effect upon the water environment because no information is available on the change in traffic flows.

Environmental Appraisal

Option name/no.	Option 28: North Tuddenham via Attlebridge; 2018 Road Alignment (1), dual carriageway
Description	From the A1067, west of Attlebridge, Option 28 heads west crossing Marl Hill Road and Morton Lane and the B1535 toward Collin Green Farm. The route then heads south-west passing between Collin Green Farm (north of alignment) and the solar farm (south of the alignment), before crossing Blind Lane. Option 28 routes south running parallel to Lyng Road. It crosses Stone Road passing west of Hockering Wood to connect with the A47 east of North Tuddenham. Option 28 would be of dual carriageway standard. Upgrades to the A1067 to dual carriageway standard may also be required.

Topic

Noise	2 (Moderate Adverse)	The route passes through predominately rural agricultural areas following the Heath Road for a short while. It will pass quite closely to some isolated dwellings. Therefore this option will introduce a new noise source to a rural location. The number of properties affected is likely to be fewer than other new route options, due to the rural nature of the route, and the A47 and the A1067 are sources of traffic noise already at either end.
Air quality	3 (Slight Adverse)	The route passes through predominately rural agricultural areas following the Heath Road for a short while. It will pass quite closely to some isolated dwellings. These are unlikely to experience road traffic pollutants at concentrations near to the objective levels. The road will introduce a new road pollution source to the rural areas where there are currently no main roads which may decrease the air quality in the surrounding area. However, as mentioned above there are relatively few sensitive receptors to air quality changes and therefore the impact is not likely to be substantial. The option at this stage is not thought likely to affect the concentrations of NO2 in the City Centre AQMA to the degree that will significantly affect its designation.
Greenhouse gases	3 (Slight Adverse)	The route will amend the flow of traffic around Norwich and at this early stage without traffic modelling, it is unknown whether this will lead to a significant growth in traffic and a change in average speeds. However, as the option does not include any new development any additional traffic is unlikely to be significant and therefore the change in greenhouse gases is likely to be limited.
Landscape	3 (Slight Adverse)	This option will result to noticeable loss of agricultural land and boundary hedgerows both elements that contribute to sense of place and perception of historic and cultural associations. This is a moderately sensitive landscape that would be able to accommodate the new development following application of reasonable mitigation measures such as planting and screening bunds. In terms of visual effects the number of properties affected is less than on other options and therefore reducing the significance of visual effects.
Townscape	N/A	N/A
Historic environment	2 (Moderate Adverse)	There are no designated (protected) archaeological or built heritage assets within the route. There are six listed buildings within a 500m buffer of the route, one of which is Grade II*. The setting of these assets may be adversely impacted by the proposed development, though the overall heritage significance of these assets is unlikely to be affected. The route does not lie within or adjacent to an LPA conservation area or LPA archaeological priority area. The natural sand and gravel geology, which underlies much of the route, combined with the proximity to the River Wensum and River Tud, would have made it attractive to early settlement and archaeological survival across the site is likely to be high, except in areas of former quarry pits, and at a shallow depth below ground. The presence and nature of any buried archaeological remains is uncertain at this stage but the new road would truncate or completely remove any such remains present within its footprint.
Biodiversity	3 (Slight Adverse)	The route will utilise an existing crossing over the River Wensum SAC/SSSI, no negative impacts assumed due to design and mitigation. There will be loss and severance of broadleaved woodland, grassland, arable fields and hedgerows.
Water environment	3 (Slight Adverse)	The introduction of a new road, whilst close to the River Wensum, does not cross over the river. This option would have no tangible benefit or adverse effect upon the water environment because no information is available on the change in traffic flows.

Environmental Appraisal

Option name/no.	Option 29: A47 Honingham to Attlebridge (1); 2018 Road Alignment (2), single carriageway
Description	From the A1067 west of Attlebridge, Option 29 runs parallel to Marl Hill Road, before crossing Ringland Lane to pass east of Weston Longville. Option 29 then routes south along an alignment approximately following the pylons, and crosses Weston Road. The route then passes east of Weston Green, before routing south-west, crossing Breck Road and The Broadway. The route runs parallel to Wood Lane to connect with the A47 to the north-west of Honingham at the existing Wood Lane / Berrys Lane junction. Option 29 would be of single carriageway standard.

Topic

Noise	2 (Moderate Adverse)	The route passes quite closely to the settlements at West Longville and isolated dwellings. The new road follows Wood Lane for a small section of this option. Therefore this option will introduce a new noise source to a rural location. The number of properties affected is likely to be slightly greater than some new route options, as it passes through a few small settlements, and the A47 and the A1067 are sources of traffic noise already at either end.
Air quality	3 (Slight Adverse)	The route passes quite closely to the settlements at West Longville and isolated dwellings. The new road follows Wood Lane for a small section of this option. These are unlikely to experience road traffic pollutants at concentrations near to the objective levels. The introduction of a new road, whilst close to houses, is not adjacent to housing and hence is therefore unlikely to lead to a new breach of the objective levels. The option at this stage is not thought likely to affect the concentrations of NO2 in the City Centre AQMA to the degree that will significantly affect its designation.
Greenhouse gases	3 (Slight Adverse)	The route will amend the flow of traffic around Norwich and at this early stage without traffic modelling, it is unknown whether this will lead to a significant growth in traffic and a change in average speeds. However, as the option does not include any new development any additional traffic is unlikely to be significant and therefore the change in greenhouse gases is likely to be limited.
Landscape	2 (Moderate Adverse)	The introduction of the new road will contribute to significant loss of agricultural land, field boundary hedgerows and minor loss of woodland resulting to a conflict with the character of the landscape due to diminishing the sense of place and tranquility of the area. The route passes closely to Weston Longville and isolated settlements and cuts across the PROW Honingham RB1 introducing a new feature into their views. Proposed screening vegetation and bunds along the route would decrease the visual effects but due to lack of intervening vegetation the route is unlikely to be completely concealed.
Townscape	N/A	N/A
Historic environment	2 (Moderate Adverse)	There are no designated (protected) archaeological or built heritage assets within the route. There are eight listed buildings within a 500m buffer of the route, one of which is Grade I and another is Grade II*. The setting of these assets may be adversely impacted by the proposed development, though the overall heritage significance of these assets is unlikely to be affected. The route does not lie within or adjacent to an LPA conservation area or LPA archaeological priority area. The natural sand and gravel geology, which underlies much of the route, combined with the proximity to the River Wensum and River Tud, would have made it attractive to early settlement and archaeological survival across the site is likely to be high, except in areas of former quarry pits, and at a shallow depth below ground. The presence and nature of any buried archaeological remains is uncertain at this stage but the new road would truncate or completely remove any such remains present within its footprint.
Biodiversity	2 (Moderate Adverse)	The route will utilise an existing crossing over the River Wensum SAC/SSSI, no negative impacts assumed due to design and mitigation. The route would be adjacent to Old Covert/Wood Lane CWS and Land adjoining Foxburrow Plantation CWS. There will be loss and severance of broadleaved woodland, grassland, arable fields and hedgerows.
Water environment	2 (Moderate Adverse)	The introduction of a new road, does not cross over the River Wensum, however does cross a minor watercourse near Wood Farm in Weston Green. However vehicular traffic crossing over the minor watercourse is unlikely to lead to significant changes in road surface run-off.

Environmental Appraisal

Option name/no.	Option 30: A47 Honingham to Attlebridge (1); 2018 Road Alignment (2), dual carriageway
Description	From the A1067 west of Attlebridge, Option 30 runs parallel to Marl Hill Road, before crossing Ringland Lane to pass east of Weston Longville. Option 30 then routes south along an alignment approximately following the pylons, and crosses Weston Road. The route then passes east of Weston Green, before routing south-west, crossing Breck Road and The Broadway. The route runs parallel to Wood Lane to connect with the A47 to the north-west of Honingham at the existing Wood Lane / Berrys Lane junction. Option 30 would be of dual carriageway standard. Upgrades to the A1067 to dual carriageway standard may also be required.

Topic

Noise	2 (Moderate Adverse)	The route passes quite closely to the settlements at West Longville and isolated dwellings. The new road follows Wood Lane for a small section of this option. Therefore this option will introduce a new noise source to a rural location. The number of properties affected is likely to be slightly greater than some new route options, as it passes through a few small settlements, and the A47 and the A1067 are sources of traffic noise already at either end.
Air quality	3 (Slight Adverse)	The route passes quite closely to the settlements at West Longville and isolated dwellings. The new road follows Wood Lane for a small section of this option. These are unlikely to experience road traffic pollutants at concentrations near to the objective levels. The introduction of a new road, whilst close to houses, is not adjacent to housing and hence is therefore unlikely to lead to a new breach of the objective levels. The option at this stage is not thought likely to affect the concentrations of NO2 in the City Centre AQMA to the degree that will significantly affect its designation.
Greenhouse gases	3 (Slight Adverse)	The route will amend the flow of traffic around Norwich and at this early stage without traffic modelling, it is unknown whether this will lead to a significant growth in traffic and a change in average speeds. However, as the option does not include any new development any additional traffic is unlikely to be significant and therefore the change in greenhouse gases is likely to be limited.
Landscape	2 (Moderate Adverse)	The introduction of the new road will contribute to significant loss of agricultural land, field boundary hedgerows and minor loss of woodland resulting to a conflict with the character of the landscape due to diminishing the sense of place and tranquility of the area. The route passes closely to Weston Longville and isolated settlements and cuts across the PROW Honingham RB1 introducing a new feature into their views. Proposed screening vegetation and bunds along the route would decrease the visual effects but due to lack of intervening vegetation the route is unlikely to be completely concealed.
Townscape	N/A	N/A
Historic environment	2 (Moderate Adverse)	There are no designated (protected) archaeological or built heritage assets within the route. There are eight listed buildings within a 500m buffer of the route, one of which is Grade I and another is Grade II*. The setting of these assets may be adversely impacted by the proposed development, though the overall heritage significance of these assets is unlikely to be affected. The route does not lie within or adjacent to an LPA conservation area or LPA archaeological priority area. The natural sand and gravel geology, which underlies much of the route, combined with the proximity to the River Wensum and River Tud, would have made it attractive to early settlement and archaeological survival across the site is likely to be high, except in areas of former quarry pits, and at a shallow depth below ground. The presence and nature of any buried archaeological remains is uncertain at this stage but the new road would truncate or completely remove any such remains present within its footprint.
Biodiversity	2 (Moderate Adverse)	The route will utilise an existing crossing over the River Wensum SAC/SSSI, no negative impacts assumed due to design and mitigation. The route would be adjacent to Old Covert/Wood Lane CWS and Land adjoining Foxburrow Plantation CWS. There will be loss and severance of broadleaved woodland, grassland, arable fields and hedgerows.
Water environment	2 (Moderate Adverse)	The introduction of a new road, does not cross over the River Wensum, however does cross a minor watercourse near Wood Farm in Weston Green. However vehicular traffic crossing over the minor watercourse is unlikely to lead to significant changes in road surface run-off.

Environmental Appraisal

Option name/no.	Option 31: A47 to Attlebridge (2), 2018 Road Alignment (3), single carriageway
Description	From the A1067 west of Attlebridge, Option 31 runs parallel to Marl Hill Road, before crossing Ringland Lane to pass east of Weston Longville. Option 31 then routes south along an alignment approximately following the pylons, and crosses Weston Road. The route continues south passing east of Weston Green and crossing Breck Road and The Broadway. Option 31 then heads south-west just north of Hall Hills to connect with the A47 to the north-west of Honingham at the existing Wood Lane / Berrys Lane junction. Option 31 would be of single carriageway standard.

Topic

Noise	2 (Moderate Adverse)	The route passes quite closely to the settlements at West Longville and Merryhill Country Park. The new road follows Wood Lane for a small section of this option. Therefore this option will introduce a new noise source to a rural location. The number of properties affected is likely to be slightly greater than some new route options, as it passes through a few small settlements, and the A47 and the A1067 are sources of traffic noise already at either end.
Air quality	3 (Slight Adverse)	The route passes quite closely to the settlements at West Longville and Merryhill Country Park. The new road follows Wood Lane for a small section of this option. These are unlikely to experience road traffic pollutants at concentrations near to the objective levels. The introduction of a new road, whilst close to houses, is not adjacent to housing and hence is therefore unlikely to lead to a new breach of the objective levels. The option at this stage is not thought likely to affect the concentrations of NO ₂ in the City Centre AQMA to the degree that will significantly affect its designation. No significant distinction with Option 15.
Greenhouse gases	3 (Slight Adverse)	The route will amend the flow of traffic around Norwich and at this early stage without traffic modelling, it is unknown whether this will lead to a significant growth in traffic and a change in average speeds. However, as the option does not include any new development any additional traffic is unlikely to be significant and therefore the change in greenhouse gases is likely to be limited. No distinction with Option 15.
Landscape	2 (Moderate Adverse)	The introduction of the new road will contribute to significant loss of agricultural land, field boundary hedgerows and minor loss of woodland at Foxburrow Plantation and The Broadway resulting to a conflict with the character of the landscape due to diminishing the sense of place and tranquility of the area. The route passes closely to Weston Longville and isolated settlements and cuts across the PROW Honingham RB1 introducing a new feature into their views. Proposed screening vegetation and bunds along the route would decrease the visual effects but due to lack of intervening vegetation the route is unlikely to be completely concealed.
Townscape	N/A	N/A
Historic environment	2 (Moderate Adverse)	There are no designated (protected) archaeological or built heritage assets within the route. There are nine listed buildings within a 500m buffer of the route, one of which is Grade I and another is Grade II*. The setting of these assets may be adversely impacted by the proposed development, though the overall heritage significance of these assets is unlikely to be affected. The route does not lie within or adjacent to an LPA conservation area or LPA archaeological priority area. The natural sand and gravel geology, which underlies much of the route, combined with the proximity to the River Wensum and River Tud, would have made it attractive to early settlement and archaeological survival across the site is likely to be high, except in areas of former quarry pits, and at a shallow depth below ground. The presence and nature of any buried archaeological remains is uncertain at this stage but the new road would truncate or completely remove any such remains present within its footprint.
Biodiversity	2 (Moderate Adverse)	The route will cause the loss of land adjoining Foxburrow Plantation CWS. There will be loss and severance of broadleaved woodland, grassland, arable fields and hedgerows.
Water environment	2 (Moderate Adverse)	The introduction of a new road, does not cross over the River Wensum, however does cross a minor watercourse near Wood Farm in Weston Green. However vehicular traffic crossing over the minor watercourse is unlikely to lead to significant changes in road surface run-off.

Environmental Appraisal

Option name/no.	Option 32: A47 to Attlebridge (2), 2018 Road Alignment (3), dual carriageway
Description	From the A1067 west of Attlebridge, Option 32 runs parallel to Marl Hill Road, before crossing Ringland Lane to pass east of Weston Longville. Option 32 then routes south along an alignment approximately following the pylons, and crosses Weston Road. The route continues south passing east of Weston Green and crossing Breck Road and The Broadway. Option 32 then heads south-west just north of Hall Hills to connect with the A47 to the north-west of Honingham at the existing Wood Lane / Berrys Lane junction. Option 32 would be of dual carriageway standard. Upgrades to the A1067 to dual carriageway standard may also be required.

Topic

Noise	2 (Moderate Adverse)	The route passes quite closely to the settlements at West Longville and Merryhill Country Park. The new road follows Wood Lane for a small section of this option. Therefore this option will introduce a new noise source to a rural location. The number of properties affected is likely to be slightly greater than some new route options, as it passes through a few small settlements, and the A47 and the A1067 are sources of traffic noise already at either end.
Air quality	3 (Slight Adverse)	The route passes quite closely to the settlements at West Longville and Merryhill Country Park. The new road follows Wood Lane for a small section of this option. These are unlikely to experience road traffic pollutants at concentrations near to the objective levels. The introduction of a new road, whilst close to houses, is not adjacent to housing and hence is therefore unlikely to lead to a new breach of the objective levels. The option at this stage is not thought likely to affect the concentrations of NO2 in the City Centre AQMA to the degree that will significantly affect its designation. No significant distinction with Option 15.
Greenhouse gases	3 (Slight Adverse)	The route will amend the flow of traffic around Norwich and at this early stage without traffic modelling, it is unknown whether this will lead to a significant growth in traffic and a change in average speeds. However, as the option does not include any new development any additional traffic is unlikely to be significant and therefore the change in greenhouse gases is likely to be limited. No distinction with Option 15.
Landscape	2 (Moderate Adverse)	The introduction of the new road will contribute to significant loss of agricultural land, field boundary hedgerows and minor loss of woodland at Foxburrow Plantation and The Broadway resulting to a conflict with the character of the landscape due to diminishing the sense of place and tranquility of the area. The route passes closely to Weston Longville and isolated settlements and cuts across the PROW Honingham RB1 introducing a new feature into their views. Proposed screening vegetation and bunds along the route would decrease the visual effects but due to lack of intervening vegetation the route is unlikely to be completely concealed.
Townscape	N/A	N/A
Historic environment	2 (Moderate Adverse)	There are no designated (protected) archaeological or built heritage assets within the route. There are nine listed buildings within a 500m buffer of the route, one of which is Grade I and another is Grade II*. The setting of these assets may be adversely impacted by the proposed development, though the overall heritage significance of these assets is unlikely to be affected. The route does not lie within or adjacent to an LPA conservation area or LPA archaeological priority area. The natural sand and gravel geology, which underlies much of the route, combined with the proximity to the River Wensum and River Tud, would have made it attractive to early settlement and archaeological survival across the site is likely to be high, except in areas of former quarry pits, and at a shallow depth below ground. The presence and nature of any buried archaeological remains is uncertain at this stage but the new road would truncate or completely remove any such remains present within its footprint.
Biodiversity	2 (Moderate Adverse)	The route will cause the loss of land adjoining Foxburrow Plantation CWS. There will be loss and severance of broadleaved woodland, grassland, arable fields and hedgerows.
Water environment	2 (Moderate Adverse)	The introduction of a new road, does not cross over the River Wensum, however does cross a minor watercourse near Wood Farm in Weston Green. However vehicular traffic crossing over the minor watercourse is unlikely to lead to significant changes in road surface run-off.

Environmental Appraisal

Option name/no.	Option 33: A47 Easton to A1067 / A1270 junction; 2018 Road Alignment (4), single carriageway
Description	From the A1067 junction with the A1270 at Deighton Hills, Option 33 heads south-west, crossing the River Wensum. The route continues, crossing Ringland Lane, Weston Road and Honingham Lane. The route then heads south crossing Weston Road and the River Tud to connect with the A47 at the existing Taverham Road junction. Option 33 would be of single carriageway standard.

Topic

Noise	2 (Moderate Adverse)	Route does not pass that closely to any settlements, but they will potentially pass quite closely to isolated dwellings. Therefore this option will introduce a new noise source to a rural location. The number of properties affected is likely to be slightly greater than some new route options, as it passes through a few small settlements, and the A47 and the A1067 are sources of traffic noise already at either end.
Air quality	3 (Slight Adverse)	Routes does not pass that closely to any settlements, but they will potentially pass quite closely to isolated dwellings. Therefore the introduction of a new road, whilst close to houses, is not adjacent to housing and hence is therefore unlikely to lead to a new breach of the objective levels. The option at this stage is not thought likely to affect the concentrations of NO2 in the City Centre AQMA to the degree that will significantly affect its designation.
Greenhouse gases	3 (Slight Adverse)	Routes will amend the flow of traffic around Norwich and at this early stage without traffic modelling, it is unknown whether this will lead to a significant growth in traffic and a change in average speeds. However, as the option does not include any new development any additional traffic is unlikely to be significant and therefore the change in greenhouse gases is likely to be limited.
Landscape	2 (Moderate Adverse)	The new route will contribute to a significant loss of agricultural land and field boundary hedgerows and partial loss of woodland at Church Hill Plantation and Poetsbreck Plantation. The new route also cuts across the River Wensum and River Tud a moderate sensitivity landscape due to its recreational value and scenic quality leading to a detracting from the character of the landscape. Proposed mitigation planting and landscape bunds along the route would reduce the potential visual and landscape effects. However, the route passes closely to Ringland and considering the lack of intervening vegetation and space availability for screening the route is unlikely to be completely concealed from this settlement.
Townscape	N/A	N/A
Historic environment	3 (Slight Adverse)	There are no designated (protected) archaeological or built heritage assets within the route. There are four listed buildings within a 500m buffer of the route, one of which is Grade I. The setting of these assets may be adversely impacted by the proposed development, though the overall heritage significance of these assets is unlikely to be affected. The route does not lie within or adjacent to an LPA conservation area or LPA archaeological priority area. The natural sand and gravel geology, which underlies much of the route, combined with the proximity to the River Wensum and River Tud, would have made it attractive to early settlement and archaeological survival across the site is likely to be high, except in areas of former quarry pits, and at a shallow depth below ground. The presence and nature of any buried archaeological remains is uncertain at this stage but the new road would truncate or completely remove any such remains present within its footprint.
Biodiversity	2 (Moderate Adverse)	The route will require a new crossing over the River Wensum SAC/SSSI, no negative impacts assumed due to design and mitigation. The route will cause habitat loss of Land Adjoining River Tud CWS, Roadside Nature Reserve 65 and Primrose Grove Ancient Woodland. The route would also dissect two areas being considered for CWS status in 2018 and land considered worthy of CWS status. There will be loss and severance of broadleaved woodland, grassland, arable fields and hedgerows.
Water environment	2 (Moderate Adverse)	The route will include a new crossing over the River Wensum and the River Tud, a tributary of the River Wensum and a flood zone 3 area. This additional infrastructure over the river could affect geomorphology of the river and will provide a pathway for road run-off to enter the watercourses, which could potentially result in significant adverse impacts on the quality of the river.

Environmental Appraisal

Option name/no.	Option 34: A47 Easton to A1067 / A1270 junction; 2018 Road Alignment (4), dual carriageway
Description	From the A1067 junction with the A1270 at Deighton Hills, Option 34 heads south-west, crossing the River Wensum. The route continues, crossing Ringland Lane, Weston Road and Honingham Lane. The route then heads south crossing Weston Road and the River Tud to connect with the A47 at the existing Taverham Road junction. Option 34 would be of dual carriageway standard.

Topic

Noise	2 (Moderate Adverse)	Route does not pass that closely to any settlements, but they will potentially pass quite closely to isolated dwellings. Therefore this option will introduce a new noise source to a rural location. The number of properties affected is likely to be slightly greater than some new route options, as it passes through a few small settlements, and the A47 and the A1067 are sources of traffic noise already at either end.
Air quality	3 (Slight Adverse)	Routes does not pass that closely to any settlements, but they will potentially pass quite closely to isolated dwellings. Therefore the introduction of a new road, whilst close to houses, is not adjacent to housing and hence is therefore unlikely to lead to a new breach of the objective levels. The option at this stage is not thought likely to affect the concentrations of NO2 in the City Centre AQMA to the degree that will significantly affect its designation.
Greenhouse gases	3 (Slight Adverse)	Routes will amend the flow of traffic around Norwich and at this early stage without traffic modelling, it is unknown whether this will lead to a significant growth in traffic and a change in average speeds. However, as the option does not include any new development any additional traffic is unlikely to be significant and therefore the change in greenhouse gases is likely to be limited.
Landscape	2 (Moderate Adverse)	The new route will contribute to a significant loss of agricultural land and field boundary hedgerows and partial loss of woodland at Church Hill Plantation and Poetsbreck Plantation. The new route also cuts across the River Wensum and River Tud a moderate sensitivity landscape due to its recreational value and scenic quality leading to a detraction from the character of the landscape. Proposed mitigation planting and landscape bunds along the route would reduce the potential visual and landscape effects. However, the route passes closely to Ringland and considering the lack of intervening vegetation and space availability for screening the route is unlikely to be completely concealed from this settlement.
Townscape	N/A	N/A
Historic environment	3 (Slight Adverse)	There are no designated (protected) archaeological or built heritage assets within the route. There are four listed buildings within a 500m buffer of the route, one of which is Grade I. The setting of these assets may be adversely impacted by the proposed development, though the overall heritage significance of these assets is unlikely to be affected. The route does not lie within or adjacent to an LPA conservation area or LPA archaeological priority area. The natural sand and gravel geology, which underlies much of the route, combined with the proximity to the River Wensum and River Tud, would have made it attractive to early settlement and archaeological survival across the site is likely to be high, except in areas of former quarry pits, and at a shallow depth below ground. The presence and nature of any buried archaeological remains is uncertain at this stage but the new road would truncate or completely remove any such remains present within its footprint.
Biodiversity	2 (Moderate Adverse)	The route will require a new crossing over the River Wensum SAC/SSSI, no negative impacts assumed due to design and mitigation. The route will cause habitat loss of Land Adjoining River Tud CWS, Roadside Nature Reserve 65 and Primrose Grove Ancient Woodland. The route would also dissect two areas being considered for CWS status in 2018 and land considered worthy of CWS status. There will be loss and severance of broadleaved woodland, grassland, arable fields and hedgerows.
Water environment	2 (Moderate Adverse)	The route will include a new crossing over the River Wensum and the River Tud, a tributary of the River Wensum and a flood zone 3 area. This additional infrastructure over the river could affect geomorphology of the river and will provide a pathway for road run-off to enter the watercourses, which could potentially result in significant adverse impacts on the quality of the river.

Environmental Appraisal

Option name/no.	Option 35: A47 Easton to A1067 / A1270 junction; 2018 Road Alignment (5), single carriageway
Description	From the A1067 junction with the A1270 at Deighton Hills, Option 35 heads south, crossing Ringland Road to the west of Taverham. The route then turns south-west and crosses the River Wensum and connects to the Costessey Lane / Ringland Lane junction to the south of Ringland. Option 35 continues in a south-western direction following Ringland Road through Ringland Hills, before passing north of Hill Farm. The route crosses the River Tud to connect with the A47 to the west of Easton at the existing Taverham Road junction. Option 35 would be of single carriageway standard.

Topic	
Noise	2 (Moderate Adverse) The route passes quite closely to the settlements east of Taverham and potentially isolated dwellings. Therefore this option will introduce a new noise source to a rural location. The number of properties affected is likely to be slightly less than other new route options, due to the relatively rural nature of the route, and the A47 and the A1067 are sources of traffic noise already at either end.
Air quality	3 (Slight Adverse) The route passes quite closely to the settlements east of Taverham and potentially isolated dwellings. These are unlikely to experience road traffic pollutants at concentrations near to the objective levels. The introduction of a new road, whilst close to houses, is not adjacent to housing and hence is therefore unlikely to lead to a new breach of the objective levels. The option at this stage is not thought likely to affect the concentrations of NO2 in the City Centre AQMA to the degree that will significantly affect its designation.
Greenhouse gases	3 (Slight Adverse) Routes alignment 5 will amend the flow of traffic around Norwich and at this early stage without traffic modelling, it is unknown whether this will lead to a significant growth in traffic and a change in average speeds. However, as the option does not include any new development any additional traffic is unlikely to be significant and therefore the change in greenhouse gases is likely to be limited.
Landscape	2 (Moderate Adverse) This option leads to significant loss of agricultural and recreational land, field boundary hedgerows and minor loss of woodland at Ringland Hills. The new route cuts across the Rivers Wensum and Tud both of which have great local recreational value resulting to a contrast with the national character of the landscape due to diminishing tranquility and sense of place. The route passes closely to Taverham and Ringland settlements and cuts across the Wensum Valley Hotel Golf and Country Club introducing a new feature into their views. Proposed screening vegetation and bunds along the route would decrease the visual effects but due to lack of substantial intervening vegetation the route is likely to be visible from some settlements.
Townscape	N/A N/A
Historic environment	3 (Slight Adverse) There are no designated (protected) archaeological or built heritage assets within the route. There are three Grade II listed buildings within a 500m buffer of the route. The setting of these assets may be adversely impacted by the proposed development, though the overall heritage significance of these assets is unlikely to be affected. The route does not lie within or adjacent to an LPA conservation area or LPA archaeological priority area. The natural sand and gravel geology, which underlies much of the route, combined with the proximity to the River Wensum and River Tud, would have made it attractive to early settlement and archaeological survival across the site is likely to be high, except in areas of former quarry pits, and at a shallow depth below ground. The presence and nature of any buried archaeological remains is uncertain at this stage but the new road would truncate or completely remove any such remains present within its footprint.
Biodiversity	2 (Moderate Adverse) The route will require a new crossing over the River Wensum SAC/SSSI, no negative impacts assumed due to design and mitigation. The route will cause habitat loss of Blyth's Wood Ancient Woodland, Roadside Nature Reserve 59, Ringland Pits CWS and land considered worthy of CWS status. The route will be adjacent to Ringland Hills CWS and Westlodge Hills CWS. There will be loss and severance of broadleaved woodland, grassland, arable fields and hedgerows.
Water environment	2 (Moderate Adverse) The route will include a new crossing over the River Wensum and the River Tud, a tributary of the River Wensum and a flood zone 3 area. The northern extent of the route also runs in close proximity to the River Wensum. This additional infrastructure over the river could affect geomorphology of the river and will provide a pathway for road run-off to enter the watercourses, which could potentially result in significant adverse impacts on the quality of the river.

Environmental Appraisal

Option name/no.	Option 36: A47 Easton to A1067 / A1270 junction; 2018 Road Alignment (5), dual carriageway
Description	From the A1067 junction with the A1270 at Deighton Hills, Option 36 heads south, crossing Ringland Road to the west of Taverham. The route then turns south-west and crosses the River Wensum and connects to the Costessey Lane / Ringland Lane junction to the south of Ringland. Option 36 continues in a south-western direction following Ringland Road through Ringland Hills, before passing north of Hill Farm. The route crosses the River Tud to connect with the A47 to the west of Easton at the existing Taverham Road junction. Option 36 would be of dual carriageway standard.

Topic		
Noise	2 (Moderate Adverse)	The route passes quite closely to the settlements east of Taverham and potentially isolated dwellings. Therefore this option will introduce a new noise source to a rural location. The number of properties affected is likely to be slightly less than other new route options, due to the relatively rural nature of the route, and the A47 and the A1067 are sources of traffic noise already at either end.
Air quality	3 (Slight Adverse)	The route passes quite closely to the settlements east of Taverham and potentially isolated dwellings. These are unlikely to experience road traffic pollutants at concentrations near to the objective levels. The introduction of a new road, whilst close to houses, is not adjacent to housing and hence is therefore unlikely to lead to a new breach of the objective levels. The option at this stage is not thought likely to affect the concentrations of NO2 in the City Centre AQMA to the degree that will significantly affect its designation.
Greenhouse gases	3 (Slight Adverse)	Routes alignment 5 will amend the flow of traffic around Norwich and at this early stage without traffic modelling, it is unknown whether this will lead to a significant growth in traffic and a change in average speeds. However, as the option does not include any new development any additional traffic is unlikely to be significant and therefore the change in greenhouse gases is likely to be limited.
Landscape	2 (Moderate Adverse)	This option leads to significant loss of agricultural and recreational land, field boundary hedgerows and minor loss of woodland at Ringland Hills. The new route cuts across the Rivers Wensum and Tud both of which have great local recreational value resulting to a contrast with the national character of the landscape due to diminishing tranquility and sense of place. The route passes closely to Taverham and Ringand settlements and cuts across the Wensum Valley Hotel Golf and Country Club introducing a new feature into their views. Proposed screening vegetation and bunds along the route would decrease the visual effects but due to lack of substantial intervening vegetation the route is likely to be visible from some settlements.
Townscape	N/A	N/A
Historic environment	3 (Slight Adverse)	There are no designated (protected) archaeological or built heritage assets within the route. There are three Grade II listed buildings within a 500m buffer of the route. The setting of these assets may be adversely impacted by the proposed development, though the overall heritage significance of these assets is unlikely to be affected. The route does not lie within or adjacent to an LPA conservation area or LPA archaeological priority area. The natural sand and gravel geology, which underlies much of the route, combined with the proximity to the River Wensum and River Tud, would have made it attractive to early settlement and archaeological survival across the site is likely to be high, except in areas of former quarry pits, and at a shallow depth below ground. The presence and nature of any buried archaeological remains is uncertain at this stage but the new road would truncate or completely remove any such remains present within its footprint.
Biodiversity	2 (Moderate Adverse)	The route will require a new crossing over the River Wensum SAC/SSSI, no negative impacts assumed due to design and mitigation. The route will cause habitat loss of Blyth's Wood Ancient Woodland, Roadside Nature Reserve 59, Ringland Pits CWS and land considered worthy of CWS status. The route will be adjacent to Ringland Hills CWS and Westlodge Hills CWS. There will be loss and severance of broadleaved woodland, grassland, arable fields and hedgerows.
Water environment	2 (Moderate Adverse)	The route will include a new crossing over the River Wensum and the River Tud, a tributary of the River Wensum and a flood zone 3 area. The northern extent of the route also runs in close proximity to the River Wensum. This additional infrastructure over the river could affect geomorphology of the river and will provide a pathway for road run-off to enter the watercourses, which could potentially result in significant adverse impacts on the quality of the river.

Environmental Appraisal

Option name/no.	Option 37: Tolled routes / bridges
Description	Tolled routes / bridges to reduce traffic flow on routes used as alternatives to avoid delays and congestion (“rat-runs”). Currently no locations have been developed as these would be dependent on a number of factors.

Topic

Noise	3 (Slight Adverse)	Changes to a tolled route could lead to increased use of the road and therefore more congestion. It will also potentially increase more stopping and starting due to having to stop at tolls, queue and move on again. However, without traffic data to show traffic flow it is likely that the changes to toll roads could lead to a slight adverse impact in terms of traffic noise.
Air quality	3 (Slight Adverse)	Changes to a tolled route could lead to increased use of the road and therefore more congestion. It will also potentially increase more stopping and starting due to having to stop at tolls, queue and move on again. Without further detail on the toll option and without any air quality assessment it isn't clear what the impacts are likely to be, however changing to a toll road has the potential to slightly increase air pollutants that affect local air quality.
Greenhouse gases	3 (Slight Adverse)	Changes to a tolled route could lead to increased use of the road and therefore more congestion. It will also potentially increase more stopping and starting due to having to stop at tolls, queue and move on again. Without further detail on the toll option and without any air quality assessment it isn't clear what the impacts are likely to be, however changing to a toll road has the potential to slightly increase air pollutants that affect local air quality. It not clear how this will affect greenhouse gases without updated traffic modelling.
Landscape	3 (Slight Adverse)	Introducing tolled routes and bridges could potentially increase the scale of new infrastructure and increase levels of congestion. There is the potential for a slight adverse impact with currently known location of tolled routes.
Townscape	N/A	N/A
Historic environment	3 (Slight Adverse)	The locations of the proposed toll routes/bridges is not known. The construction of tollbooths would not impact on archaeological remains. The setting of any nearby listed buildings could be affected by the construction of tollbooths.
Biodiversity	4 (Neutral)	The addition or removal of tolled bridges could result in additional infrastructure although this is unlikely to result in adverse effects upon biodiversity assets
Water environment	4 (Neutral)	This option would have no tangible benefit or adverse effect upon the water environment because no information is available on the change in traffic flows.

Environmental Appraisal

Option name/no.	Option 38: Improvements to existing routes
Description	Improvements to the existing A1074 route to increase capacity and improve traffic flow. This could include localised widening, upgrading the A1074 from the A140 Sweet Briar Road / Guardian Road junction to the A47 Norwich Southern Bypass to dual carriageway standard. This, in turn, would align with the Highways England A47 Road Investment Strategy scheme.

Topic

Noise	3 (Slight Adverse)	Widening the route will lead to the road passing closer to adjacent settlements on either side of the existing A1074. The widening of the route could also lead to reduced congestion, however, without traffic data to show traffic flow it is likely that the changes to toll roads could lead to a slight adverse impact in terms of traffic noise.
Air quality	3 (Slight Adverse)	Widening the route will lead to the road passing closer to adjacent settlements on either side of the existing A1074. However, this will also reduce congestion which could reduce localised air pollution along this route. More cars will pass through per time period and therefore the likely impacts on air quality are slight adverse.
Greenhouse gases	3 (Slight Adverse)	Widening the route could lead to reduced congestion which could reduce localised air pollution along this route. More cars will pass through per time period and therefore the likely impacts on air quality are slight adverse. However, as the option does not include any new development any additional traffic is unlikely to be significant and therefore the change in greenhouse gases is likely to be limited.
Landscape	3 (Slight Adverse)	Widening the route will lead to the road passing closer to adjacent settlements on either side of the existing A1074 and to short term open or filtered views due to vegetation clearance along the verge. The widening of the route is likely to have a negligible adverse effect on the landscape character as the interventions are within the existing road network. However, opportunities for mitigation planting along the route will result long term to negligible impact on landscape character and views
Townscape	N/A	N/A
Historic environment	3 (Slight Adverse)	There are no designated (protected) archaeological or built heritage assets within the route. There are two Grade II listed buildings within a 500m buffer of the route. The setting of these assets may be adversely impacted by the proposed road widening, though the overall heritage significance of these assets is unlikely to be affected. The route does not lie within or adjacent to an LPA conservation area or LPA archaeological priority area. The natural sand and gravel geology, which underlies much of the route, combined with the proximity to the River Wensum and River Tud, would have made it attractive to early settlement. Archaeological survival will vary across the route. Much of the route is in area of urban development and survival would be expected to be lower in this area. Survival is likely to be higher in areas that have not been developed. The presence and nature of any buried archaeological remains is uncertain at this stage but the widened road would truncate or completely remove any such remains present within its footprint.
Biodiversity	3 (Slight Adverse)	The widening of these sections of A1074 are not adjacent to any designated sites. The route is mostly urban, which would have limited ecological value. There would be some broadleaved woodland habitat loss to the west.
Water environment	3 (Slight Adverse)	This option would have no tangible benefit or adverse effect upon the water environment because no information is available on the change in traffic flows and it is assumed that suitable highway drainage infrastructure is already in place.

Environmental Appraisal

Option name/no.	Option 39: Improvements to existing junctions
Description	Improvements to existing junctions to maximise capacity, improve traffic flow and address safety issues. The potential locations for junction improvements include: A1074 Dereham Road / Marl Pit Lane / Larkman Lane, A140 Sweet Briar Road / A1074 Dereham Road / A140 Guardian Road, A140 Boundary Road / A1067 Drayton Road / A140 Sweet Briar Road / A1067 Drayton High Road, A1067 Drayton High Road / Middletons Lane / Hospital Lane

Topic

Noise	3 (Slight Adverse)	Without further information on whether the improvements will include increased lanes or more light signals it is not certain how this option will affect noise. However due to the close proximity to some of the proposed junctions, it is likely that any potential widening of the junctions will encroach slightly closer to settlements. therefore the likely effect of this option is slight adverse.
Air quality	3 (Slight Adverse)	Without further information on whether the improvements will include increased lanes or more light signals it is not certain how this option will affect air quality. However due to the close proximity to some of the proposed junctions, it is likely that any potential widening of the junctions will encroach slightly closer to settlements. improved junctions could lead to potential reductions in air quality due to reduced congestion, but there could be more lanes. Without further information and absence of traffic data, this option will be slight adverse potential impacts.
Greenhouse gases	3 (Slight Adverse)	Without further information on whether the improvements will include increased lanes or more light signals it is not certain how this option will affect greenhouse gases. Improved junctions could lead to potential reductions in air quality due to reduced congestion, but there could be more lanes. However, as the option does not include any new development any additional traffic is unlikely to be significant and therefore the change in greenhouse gases is likely to be limited.
Landscape	N/A	N/A
Townscape	3 (Slight Adverse)	The sensitivity of the townscape at these junctions is low comprising of low quality dilapidated streetscape with general competition between pedestrians and cars. Increased carriageway width will result in adverse impacts however, opportunities for mitigation planting and use of high quality materials could provide a slight beneficial effect for townscape character. Any potential widening of the junctions will encroach slightly closer to settlements therefore the likely visual effect of this option is slight adverse.
Historic environment	1 (Large Adverse)	There is a Scheduled Monument (Wayside Cross) at the Boundary Road/Drayton Road junction. There are no designated (protected) archaeological or built heritage assets at any of the other three junctions. None of the junctions is in a LPA conservation area or LPA archaeological priority area. The natural sand and gravel geology, which underlies the four junctions, combined with the proximity to the River Wensum, would have made it attractive to early settlement. The junctions are in area of urban development and survival would expected to be lower in this area. The presence and nature of any buried archaeological remains is uncertain at this stage but any below ground works would truncate or completely remove any such remains present within their footprint. Any works affecting the Scheduled Monument would require Scheduled Monument Consent.
Biodiversity	4 (Neutral)	The four junction options are not adjacent to any designated sites. The locations are largely urban, with little habitat take assumed.
Water environment	4 (Neutral)	This option would have no tangible benefit or adverse effect upon the water environment because no information is available on the change in traffic flows and it is assumed that suitable highway drainage infrastructure is already in place.

Environmental Appraisal

Option name/no.	Option 40: Signing and lining improvements
Description	Improvements to existing signing and road markings to improve route choice and deter rat-running and unnecessary Heavy Good Vehicle (HGV) movements. This includes the potential for the introduction of Variable Message Signs (VMS) to warn drivers of congestion, accidents, roadwork zones, speed limits and car park availability.

Topic

Noise	4 (Neutral)	Improvements to signing and lining and potential for VMS is unlikely to lead to significant changes to noise.
Air quality	4 (Neutral)	Improvements to signing and lining and potential for VMS is unlikely to lead to significant changes to air quality.
Greenhouse gases	4 (Neutral)	Improvements to signing and potential for VMS is exist unlikely to lead to significant changes to greenhouse gas changes.
Landscape	4 (Neutral)	Improvements to signing and lining and potential for VMS is unlikely to lead to significant changes to landscape character or lead to deterioration of the existing view.
Townscape	N/A	N/A
Historic environment	4 (Neutral)	There are no anticipated impacts on cultural heritage due to improvements in signing lining. Therefore the likely impact of this option will be neutral.
Biodiversity	4 (Neutral)	There are no anticipated changes to biodiversity by changing signing and lining. This is due to no habitat loss being anticipated.
Water environment	4 (Neutral)	This option would have no tangible benefit or adverse effect upon the water environment because no information is available on the change in traffic flows.

Environmental Appraisal

Option name/no.	Option 41: Signal improvements
Description	Improvements to signalised junctions to improve the connectivity and reliability of the network by improving junction efficiency and capacity. Improvements could potentially include bus priority signals and greater and coordination on junctions.

Topic

Noise	4 (Neutral)	Improvements to signalised junction is unlikely to lead to significant changes to noise. (Unless there is a new bus lane, which would lead to widening and potentially increased traffic levels and therefore increased noise levels).
Air quality	4 (Neutral)	Improvements to signalised junction is unlikely to lead to significant changes to air quality. (Unless there is a new bus lane, which would lead to widening and potentially increased traffic levels).
Greenhouse gases	4 (Neutral)	Improvements to signalised junction is unlikely to lead to significant changes to greenhouse gases. (Unless there is a new bus lane, which would lead to widening and potentially increased traffic levels).
Landscape	4 (Neutral)	Improvements to signalised junction is unlikely to lead to significant landscape and visual effects. (Unless there is a new bus lane, which would lead to widening of road and potential land take and removal of vegetation).
Townscape	N/A	N/A
Historic environment	4 (Neutral)	There are no anticipated impacts on cultural heritage due to signal improvements. Therefore the likely impact of this option will be neutral.
Biodiversity	4 (Neutral)	There are no anticipated changes to biodiversity by improving signals. This is due to no habitat loss being anticipated.
Water environment	4 (Neutral)	This option would have no tangible benefit or adverse effect upon the water environment because no information is available on the change in traffic flows.

Environmental Appraisal

Option name/no.	Option 42: Speed limit changes
Description	Changes to speed limits, to improve traffic flow, routing decisions and safety. Potential areas for speed limit changes include: Dereham Road (connecting to the A47, passing through Easton), Norwich Road / Town House Road (from the A1074 in New Costessey towards Costessey), Sandy Lane / Taverham Lane (A1067 to Costessey), Ringland (Costessey Lane / Field Road / The Street), Weston Longville (Marl Hill / Church Street / Honingham Road / Field Road, Hockering (The Street / Heath Road), North Tuddenham (Norwich Road / Low Road), Lyng (Lyng Road / The Street / The Common / Rectory Road)

Topic

Noise	3 (Slight Adverse)	Changes in speed lead to an increase in flow upon some routes and a decrease in flow upon others as traffic re-routes to alternative quicker options. In the absence of detailed traffic data it is not possible to identify whether the change in flow and speed will adversely or beneficially affect sensitive receptors because lower speeds will have greater emissions, but could correspond to a reduction in traffic flow. A combination of the two is likely and a slight adverse impact has been identified given that the decrease in speed is unlikely to affect a considerable number of vehicle journeys.
Air quality	3 (Slight Adverse)	Changes in speed lead to an increase in flow upon some routes and a decrease in flow upon others as traffic re-routes to alternative quicker options. In the absence of detailed traffic data it is not possible to identify whether the change in flow and speed will adversely or beneficially affect sensitive receptors because lower speeds will have greater emissions, but could correspond to a reduction in traffic flow. A combination of the two is likely and a slight adverse impact has been identified given that the decrease in speed is unlikely to affect a considerable number of vehicle journeys.
Greenhouse gases	3 (Slight Adverse)	Changes in speed lead to an increase in flow upon some routes and a decrease in flow upon others as traffic re-routes to alternative quicker options. In the absence of detailed traffic data it is not possible to identify whether the change in flow and speed will adversely or beneficially affect sensitive receptors because lower speeds will have greater emissions, but could correspond to a reduction in traffic flow. A combination of the two is likely and a slight adverse impact on greenhouse gases has been identified given that the decrease in speed is unlikely to affect a considerable number of vehicle journeys.
Landscape	4 (Neutral)	Improvements to signing and lining and potential for VMS is unlikely to lead to significant changes to landscape or lead to deterioration of the existing view.
Townscape	N/A	N/A
Historic environment	4 (Neutral)	There are no anticipated impacts on cultural heritage due to speed limit changes. Therefore the likely impact of this option will be neutral.
Biodiversity	4 (Neutral)	There are no anticipated changes to biodiversity by changing speed limits. This is due to no habitat loss being anticipated.
Water environment	4 (Neutral)	This option would have no tangible benefit or adverse effect upon the water environment because no information is available on the change in traffic flows.

Environmental Appraisal

Option name/no.	Option 43: Directional traffic management schemes
Description	Directional management schemes which focus on locations where rat-running occurs. Schemes could include changing two-way sections of road altered to one-way only sections. Potential locations include: Dereham Road (connecting to the A47, passing through Easton), Norwich Road / Town House Road (from the A1074 in New Costessey towards Costessey), Sandy Lane / Taverham Lane (A1067 to Costessey), Ringland (Costessey Lane / Field Road / The Street), Weston Longville (Marl Hill / Church Street / Honingham Road / Field Road, Hockering (The Street / Heath Road), North Tuddenham (Norwich Road / Low Road), Lyng (Lyng Road / The Street / The Common / Rectory Road)

Topic		
Noise	3 (Slight Adverse)	Changes to directional traffic management is unlikely to cause any significant effects to noise levels. However, in the absence of traffic modelling data and therefore information on traffic flow the likely significance of this option is slight adverse.
Air quality	3 (Slight Adverse)	Changes to directional traffic management could lead to a decrease in local emissions if traffic moves more continuously without congestion build up. However it could increase capacity of traffic if 2 way traffic changes to a one way system. Without detailed traffic data is not possible to identify whether changing direction of traffic in specific management areas will adversely or beneficially affect sensitive receptors. A combination of increase capacity and some reduced congestion could lead to only a slight adverse effect in a worse case scenario.
Greenhouse gases	3 (Slight Adverse)	Changes to directional traffic management could lead to a decrease in local emissions if traffic moves more continuously without congestion build up. However it could increase capacity of traffic if 2 way traffic changes to a one way system. Without detailed traffic data is not possible to identify whether changing direction of traffic in specific management areas will adversely or beneficially affect sensitive receptors. A combination of increase capacity and some reduced congestion could lead to only a slight adverse effect in a worse case scenario.
Landscape	4 (Neutral)	Changes to directional traffic management is unlikely to result to any significant landscape and visual effects.
Townscape	N/A	N/A
Historic environment	4 (Neutral)	There are no anticipated impacts on cultural heritage due to directional traffic management. Therefore the likely impact of this option will be neutral.
Biodiversity	4 (Neutral)	There are no anticipated changes to biodiversity by implementing directional traffic management schemes. This is due to no habitat loss being anticipated.
Water environment	4 (Neutral)	This option would have no tangible benefit or adverse effect upon the water environment because no information is available on the change in traffic flows.

Environmental Appraisal

Option name/no.	Option 44: New / improved crossing points
Description	New / improved crossing points to improve safety and accessibility for all users. Crossing could include controlled and uncontrolled crossings, for example pelican / puffin crossings and refuge islands.

Topic

Noise	4 (Neutral)	Adding in crossing points to improve pedestrian safety is likely to have a negligible effect on noise levels.
Air quality	4 (Neutral)	Adding in crossing points to improve pedestrian safety is likely to have a negligible effect on air quality as this shouldn't lead to any noticeable increase or decrease in air quality.
Greenhouse gases	4 (Neutral)	Adding in crossing points to improve pedestrian safety is likely to have a negligible effect on air quality as this shouldn't lead to any noticeable increase or decrease in air quality. This option will not cause any changes to greenhouse gases.
Landscape	3 (Slight Adverse)	The scale of interventions is small and localised and therefore is likely to have a negligible impact to the existing character and views. (Unless the new improved crossing points are close to high sensitivity receptors with restricted, enclosed views which may lead to slight or moderate visual effects.
Townscape	N/A	N/A
Historic environment	3 (Slight Adverse)	The locations of new or improved crossings is not known. Any below ground works could impact on archaeological remains. The setting of any nearby listed buildings could be affected by the construction of crossing infrastructure.
Biodiversity	4 (Neutral)	There are no anticipated changes to biodiversity by improving crossing points. This is due to no habitat loss being anticipated.
Water environment	4 (Neutral)	This option would have no tangible benefit or adverse effect upon the water environment.

Environmental Appraisal

Option name/no.	Option 45: New wider footpath
Description	New wider footpath to improve accessibility and promote modal shift away from cars towards alternative modes of transport. A new wider footpath would provide better care for pedestrians including those with disabilities.

Topic

Noise	4 (Neutral)	Widening pedestrian footpaths is likely to have a negligible impact on noise.
Air quality	4 (Neutral)	Widening pedestrian footpaths is likely to have a negligible impact on air quality as long as this does not alter the layout of the road or traffic capacity e.g. numbers of lanes to be able to achieve this.
Greenhouse gases	4 (Neutral)	Widening pedestrian footpaths is likely to have a negligible impact on air quality as long as this does not alter the layout of the road or traffic capacity e.g. numbers of lanes to be able to achieve this. This option will not cause any changes to greenhouse gases.
Landscape	4 (Neutral)	The scale of intervention is small and localised and therefore is likely to have a negligible impact to the existing character and views.
Townscape	N/A	N/A
Historic environment	3 (Slight Adverse)	The locations of the widened footpaths is not known. Any below ground works could impact on archaeological remains, although they would be relatively shallow. The setting of any nearby listed buildings would be unlikely to be affected.
Biodiversity	4 (Neutral)	There are limited anticipated changes to biodiversity by widening footpaths. This is due to limited habitat loss anticipated and the unknown current geographical location of the footpaths to be widened.
Water environment	4 (Neutral)	This option would have no tangible benefit or adverse effect upon the water environment.

Environmental Appraisal

Option name/no.	Option 46: New cycling links to key facilities and services
Description	New cycling links to key facilities and services, for example schools and employment areas. There is potential to include both on-line and off-line cycle routes. Tying in with existing cycle links would be advantageous. The cycle network could include the following: Thorpe Marriot to Drayton (linking to the A1270), Norwich to Easton (along the A1074), Taverham to Norwich (along the A1067), Taverham to New Costessey (via Costessey)

Topic

Noise	4 (Neutral)	Adding in new cycling links will have a negligible impact on noise as long as this does not alter the layout of the road or traffic capacity i.e. increase noise levels.
Air quality	4 (Neutral)	Adding in new cycling links will have a negligible impact on air quality as long as this does not alter the layout of the road or traffic capacity e.g. numbers of lanes to be able to achieve this. If the traffic modelling shows a decrease in traffic due to a potential increase in cycling then there may be a slight beneficial effect, however in the absence of any traffic data the likely effect is neutral.
Greenhouse gases	4 (Neutral)	Adding in new cycling links will have a negligible impact on air quality as long as this does not alter the layout of the road or traffic capacity e.g. numbers of lanes to be able to achieve this. If the traffic modelling shows a decrease in traffic due to a potential increase in cycling then there may be a slight beneficial effect, however in the absence of any traffic data the likely effect is neutral. This option will not cause any changes to greenhouse gases.
Landscape	3 (Slight Adverse)	Addition of new cycling links to the existing road network will result to the removal of hedgerows and trees along the route and therefore will have a minor impact on the landscape character. The removal of vegetation will open up or filter views from some receptors. However, opportunities for mitigation planting along the route will result in an imperceptible change of view. Overall, the likely impact is slight adverse due to the uncertainty of the opportunities for mitigation planting.
Townscape	N/A	N/A
Historic environment	3 (Slight Adverse)	The routes of the new cycle links are not confirmed. Any below ground works could impact on archaeological remains. However, such works would be expected to be relatively shallow. The setting of any nearby listed buildings could be affected by the new facilities.
Biodiversity	2 (Moderate Adverse)	There are CWSs adjacent to the proposed cycling routes. Habitat loss is therefore assumed to provide space for the new cycling route links.
Water environment	2 (Moderate Adverse)	This option would have no tangible benefit or adverse effect upon the water environment because cycling infrastructure does not pose a risk from the perspective of highway runoff

Environmental Appraisal

Option name/no.	Option 47: Cycle parking facilities
Description	New improved cycle parking provision at key facilities and services, for example schools and employment areas. Improved cycle parking would improve accessibility and safety, as well as encouraging cycling as a viable alternative mode of transport.

Topic

Noise	4 (Neutral)	Adding in new improved cycle parking facilities will have a negligible impact on noise levels and therefore will lead to a neutral significant effect.
Air quality	4 (Neutral)	Adding in new improved cycle parking facilities will have a negligible impact on air quality as long as this does not alter the layout of the road or traffic capacity e.g. numbers of lanes to be able to achieve this. If the traffic modelling shows a decrease in traffic due to a potential increase in cycling as a viable mode of transport, then there may be a slight beneficial effect, however in the absence of any traffic data the likely effect is neutral.
Greenhouse gases	4 (Neutral)	Adding in new improved cycle parking facilities will have a negligible impact on air quality as long as this does not alter the layout of the road or traffic capacity e.g. numbers of lanes to be able to achieve this. If the traffic modelling shows a decrease in traffic due to a potential increase in cycling as a viable mode of transport, then there may be a slight beneficial effect, however in the absence of any traffic data the likely effect is neutral. This option will not cause any changes to greenhouse gases.
Landscape	4 (Neutral)	Addition of new improved cycle parking facilities will have a negligible impact on landscape character and views.
Townscape	N/A	N/A
Historic environment	3 (Slight Adverse)	The locations of proposed cycle parking facilities are not known. Any below ground works could impact on archaeological remains. However, such works would be expected to be relatively shallow. The setting of any nearby listed buildings could be affected by the new facilities.
Biodiversity	4 (Neutral)	There are no anticipated changes to biodiversity by providing cycle parking. This is due to no habitat loss being anticipated.
Water environment	4 (Neutral)	This option would have no tangible benefit or adverse effect upon the water environment.

Environmental Appraisal

Option name/no.	Option 48: New orbital bus route
Description	A new orbital bus route connecting towns in the western quadrant and proposed business parks. A route has not yet been identified.

Topic

Noise	4 (Neutral)	A new orbital bus route will not lead to additional traffic flows that exceed the threshold for assessment (a >10% HGV flow change) and therefore effects upon noise can be considered to be neutral.
Air quality	4 (Neutral)	A new orbital bus route has the potential to have a slight beneficial impact on local air quality if it reduces the traffic flow and capacity of traffic in the area. However, without more detail of the numbers of buses that will be operating and the absence of traffic modelling indicating how this option will affect traffic, the likely overall effect is neutral.
Greenhouse gases	4 (Neutral)	A new orbital bus route has the potential to have a slight beneficial impact on local air quality if it reduces the traffic flow and capacity of traffic in the area. However, without more detail of the numbers of buses that will be operating and the absence of traffic modelling indicating how this option will affect traffic, the likely overall effect is neutral. This option is unlikely to cause any changes to greenhouse gases.
Landscape	3 (Slight Adverse)	A new orbital bus route on the existing road network is likely to have a negligible impact on the landscape character and views if widening of road is not required. If widening of road is required to accommodate a new bus lane the impact might be slightly larger assuming need for some tree and hedgerow removal along the verge. However, opportunities for screening planting would result in an imperceptible change of view and therefore will lead to a slight adverse effect.
Townscape	N/A	N/A
Historic environment	4 (Neutral)	There are no anticipated impacts on cultural heritage due to the new orbital bus route. This assumes no cultural heritage loss, due to lack of geographical location of the new orbital bus route. Therefore the likely impact of this option will be neutral.
Biodiversity	4 (Neutral)	There are no anticipated changes to biodiversity by a new orbital bus route. This assumes no or limited habitat loss due to lack of geographical location of the new orbital bus route.
Water environment	4 (Neutral)	This option would have no tangible benefit or adverse effect upon the water environment because no information is available on the change in traffic flows.

Environmental Appraisal

Option name/no.	Option 49: Improvements to existing bus services (28, 29 and X29)
Description	Improvements to the existing 28, 29 and X29 bus services, including increased frequencies during the evening and weekend. Improving bus services will increase accessibility and connectivity of public transport that is more reliable, potentially contributing to modal shift away from car use.

Topic

Noise	4 (Neutral)	Improving and increasing the frequencies of the existing bus services will not lead to additional traffic flows that exceed the threshold for assessment (a >10% HGV flow change) and therefore effects upon noise can be considered to be neutral.
Air quality	4 (Neutral)	Improving and increasing the frequencies of the existing bus services may encourage more users which may decrease traffic congestion at certain times when the buses were not in operation before. The threshold for assessment is a change of + or - 100 HGVs a day which is very unlikely and therefore the overall effect is likely to be neutral.
Greenhouse gases	3 (Slight Adverse)	Improving and increasing the frequencies of the existing bus services may encourage more users which may decrease traffic congestion at certain times when the buses were not in operation before. However, without more detail on the extent of the increased frequency of the bus service and any traffic modelling on any changes this may cause traffic movements the overall effect is likely to be slightly adverse due to an increase in transport (bus service frequency) and no further information on the traffic capacity or changes.
Landscape	4 (Neutral)	Improving and increasing the frequency of the existing bus services on the already existing road network is likely to have a negligible impact on the landscape character and views from residential receptors at Tavernham and isolated settlements.
Townscape	N/A	N/A
Historic environment	4 (Neutral)	There are no anticipated impacts on cultural heritage due to increasing the frequencies of the existing bus services. Therefore the likely impact of this option will be neutral.
Biodiversity	4 (Neutral)	There are no anticipated changes to biodiversity by improving bus services. This is due to no habitat loss being anticipated.
Water environment	4 (Neutral)	This option would have no tangible benefit or adverse effect upon the water environment because the degree of HGV vehicle change as a result of improved bus services would not lead to a measurable change in highway runoff.

Environmental Appraisal

Option name/no.	Option 50: Improvements to existing bus services (23, 23A, 24 and 24A)
Description	Improvements to the existing 23, 23A, 24 and 24A bus services, including increased frequencies during the evening and weekend. Improving bus services will increase accessibility and connectivity of public transport that is more reliable, potentially contributing to modal shift away from car use.

Topic

Noise	4 (Neutral)	Improving and increasing the frequencies of the existing bus services will not lead to additional traffic flows that exceed the threshold for assessment (a >10% HGV flow change) and therefore effects upon noise can be considered to be neutral.
Air quality	3 (Slight Adverse)	Improving and increasing the frequencies of the existing bus services to may encourage more users which may decrease traffic congestion at certain times when the buses were not in operation before. However, without more detail on the extent of the increased frequency of the bus service and any traffic modelling on any changes this may cause to traffic movements, the overall effect is likely to be slightly adverse due to an increase in transport (bus service frequency) and no further information on the traffic capacity or changes.
Greenhouse gases	3 (Slight Adverse)	Improving and increasing the frequencies of the existing bus services to may encourage more users which may decrease traffic congestion at certain times when the buses were not in operation before. However, without more detail on the extent of the increased frequency of the bus service and any traffic modelling on any changes this may cause traffic movements the overall effect is likely to be slightly adverse due to an increase in transport (bus service frequency) and no further information on the traffic capacity or changes.
Landscape	4 (Neutral)	Improving and increasing the frequencies of the existing bus services on the already existing road network is likely to have a negligible impact on the landscape character and result to minor deterioration of the existing views from residential receptors at Costessey and New Costessey.
Townscape	N/A	N/A
Historic environment	4 (Neutral)	There are no anticipated impacts on cultural heritage due to increasing the frequencies of the existing bus services. Therefore the likely impact of this option will be neutral.
Biodiversity	4 (Neutral)	There are no anticipated changes to biodiversity by improving bus services. This is due to no habitat loss being anticipated.
Water environment	4 (Neutral)	This option would have no tangible benefit or adverse effect upon the water environment because the degree of HGV vehicle change as a result of improved bus services would not lead to a measurable change in highway runoff.

Environmental Appraisal

Option name/no.	Option 51: Improved public transport information: real-time app
Description	Improved public transport information in the form of improved online real-time apps to encourage modal shift. Real-time apps will increase accessibility and connectivity of public transport that is more reliable, potentially contributing to modal shift away from car use. The use of real-time apps is dependent on the option and current technological roll out – there are currently multiple projects within the UK and EU.

Topic

Noise	4 (Neutral)	Improving public transport information will have negligible effect on noise levels.
Air quality	4 (Neutral)	This option would have no tangible benefit or adverse effect upon air quality because no information is available on the change in traffic flows.
Greenhouse gases	4 (Neutral)	This option would have no tangible benefit or adverse effect upon greenhouse gases because no information is available on the change in traffic flows
Landscape	4 (Neutral)	Improving public transport information would have no tangible benefit or adverse effect on landscape character and views.
Townscape	N/A	N/A
Historic environment	4 (Neutral)	There are no anticipated impacts on cultural heritage due to improvements in public transport information. Therefore the likely impact of this option will be neutral.
Biodiversity	4 (Neutral)	There are no anticipated changes to biodiversity by improving public transport information. This is due to no habitat loss being anticipated.
Water environment	4 (Neutral)	This option would have no tangible benefit or adverse effect upon the water environment because no information is available on the change in traffic flows.

Environmental Appraisal

Option name/no.	Option 52: Improved public transport information: real-time information at stops
Description	Improved public transport information in the form of real-time information at bus stops to encourage the use of bus services and subsequently modal shift. Real-time information at bus stops will increase accessibility and connectivity of public transport that is more reliable.

Topic

Noise	4 (Neutral)	Improving public transport information will have negligible effect on noise levels.
Air quality	4 (Neutral)	Improving public transport information will have negligible effect on air quality because there is no information available on the changes in traffic flows.
Greenhouse gases	4 (Neutral)	Improving public transport information will have negligible effect on greenhouse gases because there is no information available on the changes in traffic flows.
Landscape	4 (Neutral)	Improving public transport information would have no tangible benefit or adverse effect on landscape character and views.
Townscape	N/A	N/A
Historic environment	4 (Neutral)	There are no anticipated impacts on cultural heritage due to improvements in public transport information. Therefore the likely impact of this option will be neutral.
Biodiversity	4 (Neutral)	There are no anticipated changes to biodiversity by improving public transport information. This is due to no habitat loss being anticipated.
Water environment	4 (Neutral)	This option would have no tangible benefit or adverse effect upon the water environment because no information is available on the change in traffic flows.

Environmental Appraisal

Option name/no.	Option 53: Update the digital road map
Description	Update the digital road map to provide better navigation information, improving routing, connectivity and journey reliability.

Topic

Noise	4 (Neutral)	Updating the digital road map will have negligible effect on noise levels.
Air quality	4 (Neutral)	Updating the digital road map will have negligible effect on air quality.
Greenhouse gases	4 (Neutral)	Update the digital road map will have negligible effect on greenhouse gases because there is no information available on the changes in traffic flows.
Landscape	4 (Neutral)	Improving public transport information would have no tangible benefit or adverse effect on landscape character and views.
Townscape	N/A	N/A
Historic environment	4 (Neutral)	There are no anticipated impacts on cultural heritage due to updates in the digital road map. Therefore the likely impact of this option will be neutral.
Biodiversity	4 (Neutral)	There are no anticipated changes to biodiversity by updating the digital road map. This is due to no habitat loss being anticipated.
Water environment	4 (Neutral)	This option would have no tangible benefit or adverse effect upon the water environment.

Environmental Appraisal

Option name/no.	Option 54: Develop local cycling and walking infrastructure plan
Description	Develop a Local Cycling and Walking Infrastructure Plan (LCWIP). This is a strategic approach to identifying cycling and walking improvements required at the local level. An LCWIP would enable a long-term approach to developing local cycling and walking networks (ideally over a 10-year period), in order to encourage modal shift – increasing the number of trips made of foot or by cycle, and reduce vehicular trips and associated congestion and rat-running. The LCWIP would form the planning element of a package containing walking and cycling options.

Topic

Noise	4 (Neutral)	Developing local cycling and walking infrastructure will have negligible effects on noise levels, without any traffic modelling data on changes to traffic flow the overall effect of this option is likely to be neutral.
Air quality	4 (Neutral)	Developing local cycling and walking infrastructure may lead to a beneficial impact on air quality. However, without any traffic modelling data on changes to traffic flow the overall effect of this option is likely to be neutral.
Greenhouse gases	4 (Neutral)	Developing local cycling and walking infrastructure may lead to a beneficial impact on air quality. However, without any traffic modelling data on changes to traffic flow the overall effect is likely to be neutral. This option will not cause any changes to greenhouse gases.
Landscape	3 (Slight Adverse)	Developing local cycling and walking infrastructure may lead to partial loss of verge vegetation resulting in adverse effects on landscape character and views. However, with appropriate mitigation planting and given the scale and nature of intervention and use of high quality materials, the proposed infrastructure could comfortably fit in the landscape resulting in an imperceptible change of landscape character and views
Townscape	N/A	N/A
Historic environment	4 (Neutral)	There are no anticipated impacts on cultural heritage due to the development of a local cycling and walking infrastructure plan. Therefore the likely impact of this option will be neutral.
Biodiversity	4 (Neutral)	There are no anticipated changes to biodiversity by developing local cycling and walking infrastructure. This is due to no habitat loss being anticipated.
Water environment	4 (Neutral)	This option would have no tangible benefit or adverse effect upon the water environment because cycling and walking infrastructure does not generate significant volumes of runoff

Environmental Appraisal

Option name/no.	Option 55: Promote cycling schemes
Description	Promote cycling schemes (for example Cyclescheme www.cyclescheme.co.uk) to increase the uptake of cycling in the area and encourage modal shift subsequently reducing the number of vehicular trips. The promotion of cycling schemes would generally be an element of a package of cycling schemes.

Topic

Noise	4 (Neutral)	Promoting cycling schemes will have negligible effects on noise levels.
Air quality	4 (Neutral)	Promoting cycling schemes may lead to a beneficial impact on air quality. However, without any traffic modelling data on changes to traffic flow the overall effect of this option is likely to be neutral.
Greenhouse gases	4 (Neutral)	Promoting cycling schemes may lead to a beneficial impact on greenhouse gases. However, without any traffic modelling data on changes to traffic flow the overall effect is likely to be neutral.
Landscape	4 (Neutral)	Promoting cycling schemes would have no tangible benefit or adverse effect on landscape character and views.
Townscape	N/A	N/A
Historic environment	4 (Neutral)	There are no anticipated impacts on cultural heritage due to promoting of a cycle scheme. Therefore the likely impact of this option will be neutral.
Biodiversity	4 (Neutral)	There are no anticipated changes to biodiversity by promoting cycling. This is due to no habitat loss being anticipated.
Water environment	4 (Neutral)	This option would have no tangible benefit or adverse effect upon the water environment because no information is available on the change in traffic flows.

Environmental Appraisal

Option name/no.	Option 56: Develop green lung schemes
Description	A Green Lung is an designated area of natural parkland (usually within an urban region) which replenishes the air with oxygen and provides improved air quality. Implementation of green lung schemes, particularly adjacent to proposed development, would improve access to green space and encourage modal shift towards walking and cycling.

Topic

Noise	4 (Neutral)	Developing a scheme to encourage walking and cycling will have negligible effects on noise levels.
Air quality	4 (Neutral)	Developing a scheme to encourage walking and cycling may lead to a beneficial impact on air quality. However, without any traffic modelling data on changes to traffic flow the overall effect of this option is likely to be neutral.
Greenhouse gases	4 (Neutral)	Developing a scheme to encourage walking and cycling may lead to a beneficial impact on greenhouse gases. However, without any traffic modelling data on changes to traffic flow the overall effect of this option is likely to be neutral.
Landscape	3 (Slight Adverse)	Develop a Green Lung Scheme to encourage walking and cycling will lead to a beneficial impact on landscape character and views as it would introduce green areas that will complement the landscape quality and value. This option is also likely to improve views from high sensitivity receptors (residential properties and PROWs) due to added planting that is likely to conceal views.
Townscape	N/A	N/A
Historic environment	4 (Neutral)	There are no anticipated impacts on cultural heritage due to the development of the Green Lung Scheme which will encourage walking and cycling. Therefore the likely impact of this option will be neutral.
Biodiversity	4 (Neutral)	There are no anticipated changes to biodiversity by developing a green lung scheme. This is due to no habitat loss being anticipated.
Water environment	4 (Neutral)	This option would have no tangible benefit or adverse effect upon the water environment because no information is available on the change in traffic flows.

Environmental Appraisal

Option name/no.	Option 57: Bike-on-bus schemes
Description	Implement bike-on-bus schemes to encourage modal shift and active travel by combining both cycling and public transport use. Bike-on-bus scheme would make public transport more accessible and improve connectivity, with the potential for improved journey times.

Topic

Noise	4 (Neutral)	Implementing a bike on bus scheme will have negligible effects on noise levels.
Air quality	4 (Neutral)	Implementing a 'Bike on Bus' Scheme may lead to a beneficial impact on air quality. However, without any traffic modelling data on changes to traffic flow the overall effect of this option is likely to be neutral.
Greenhouse gases	4 (Neutral)	Implementing a Bike on bus may lead to a beneficial impact on greenhouse gases. However, without any traffic modelling data on changes to traffic flow the overall effect of this option is likely to be neutral.
Landscape	4 (Neutral)	Assuming existing stops are used, implementing a Bike on Bus Scheme is an option that does not require introduction of new features to the landscape or require significant alterations to the existing highway infrastructure. Therefore, the landscape character and views would remain largely unchanged.
Townscape	N/A	N/A
Historic environment	4 (Neutral)	There are no anticipated impacts on cultural heritage due to implementing the 'Bike of Bus' scheme to encourage cycling and public transport use. Therefore the likely impact of this option will be neutral.
Biodiversity	4 (Neutral)	There are no anticipated changes to biodiversity by implementing bike on bus schemes. This is due to no habitat loss being anticipated.
Water environment	4 (Neutral)	This option would have no tangible benefit or adverse effect upon the water environment because no information is available on the change in traffic flows.

Environmental Appraisal

Option name/no.	Option 58: Mobility as a service scheme
Description	Mobility as a Service schemes combines public and private transportation methods into a unified platform as services, where trips can be managed. Implementing Mobility as a Service schemes improves access for all groups and to all areas, leading to modal shift away from privately owned modes of transport, and reduced journey times.

Topic

Noise	4 (Neutral)	Implement mobility as a service scheme will have a negligible effect upon noise levels.
Air quality	4 (Neutral)	Implement mobility as a service scheme will have a negligible effect upon air quality because no information is available on the change in traffic flows.
Greenhouse gases	4 (Neutral)	Implement mobility as a service scheme will have a negligible effect upon greenhouse gases because no information is available on the change in traffic flows.
Landscape	4 (Neutral)	Implementing mobility as a service scheme will have a negligible effect on landscape character and views.
Townscape	N/A	N/A
Historic environment	4 (Neutral)	There are no anticipated impacts on cultural heritage due to the implementation of mobility as a service scheme. Therefore the likely impact of this option will be neutral.
Biodiversity	4 (Neutral)	There are no anticipated changes to biodiversity by implementing mobility as a service scheme. This is due to no habitat loss being anticipated.
Water environment	4 (Neutral)	This option would have no tangible benefit or adverse effect upon the water environment because no information is available on the change in traffic flows.

Environmental Appraisal

Option name/no.	Option 59: Light rail
Description	A light rail service connecting all locations from the A147 St Crispins Road / A147 Barn Road / Barker Street roundabout to Fir Covert Road, following the alignment of the Marriott's Way (disused railway path). The route leaves Norwich City Centre heading north-west crossing the River Wensum, before turning west, skirting between Heigham Grove and Sweet Briar Industrial Estate. The light rail alignment would cross the River Wensum for a second time before heading north-west, passing west of Hellesdon. The route continues through the River Wensum Valley up to Drayton (crossing the River Wensum for a third time), before crossing the A1067 passing through Thorpe Marriot (north of Taverham) and connecting with Fir Covert Road.

Topic

Noise	2 (Moderate Adverse)	The Light Rail Service option is likely to lead to newly generated noises from the new service. Therefore, as this is a new noise source in the area, the potential impact is likely to be moderate adverse.
Air quality	5 (Slight Beneficial)	The Light Rail Service option may lead to an beneficial impact on air quality due to the potential for reducing traffic emissions and capacity. Therefore, the overall impact is likely to be slight beneficial due to the offset of traffic.
Greenhouse gases	5 (Slight Beneficial)	The Light Rail Service option may lead to an beneficial impact on greenhouse gases due to the potential for reducing traffic emissions and capacity. Therefore, the likely overall effect is slight beneficial.
Landscape	2 (Moderate Adverse)	The Light Rail Service option along an existing disused rail line which is currently well concealed may lead to adverse effects on the landscape character and views due to clearance of screening vegetation and disuse of Marriotts Way (a PROW and part of the National Cycleway Route). However application of mitigation planting along the route is likely to result to negligible change to landscape character and views from high sensitivity receptors.
Townscape	N/A	N/A
Historic environment	2 (Moderate Adverse)	There are no designated (protected) archaeological or built heritage assets on the route. There are four Scheduled Monuments within a 500m buffer of the route. There are 92 listed buildings within the buffer, of which six are Grade I and five are Grade II*. The route is not within a LPA conservation area. The eastern terminus is adjacent to the Norwich City Centre Conservation Area. A small southern section of the route is in the Norwich Area of Main Archaeological Interest. The majority of the route would follow a disused railway line apart from a small section in Drayton. The western part of the route is through an area of geology comprising sands and gravels close the River Wensum which would have been an attractive area for early settlement. Any below ground works could impact on archaeological remains. However, such works would be expected to be relatively shallow. The setting of any nearby listed buildings could be affected by the new facilities associated with the rail scheme.
Biodiversity	2 (Moderate Adverse)	The route will require a new crossing over the River Wensum SAC/SSSI, no negative impacts assumed due to design and mitigation. The route will cause habitat loss of Marriot's Way CWS and associated habitats.
Water environment	2 (Moderate Adverse)	This new rail service will cross the River Wensum and flood zone 3 area at two different locations. This additional infrastructure over the river could affect geomorphology of the river and could provide a pathway for run-off to enter the water course, which could potentially result in adverse impacts on the quality of the river. Although is unlikely to be as significant as highway run-off.

Environmental Appraisal

Option name/no.	Option 60: Very light rail
Description	A very light rail service connecting Longwater, Queen's Hill and Costessey to Norwich City Centre. The route follows the existing A1074 from Norwich City Centre westward, passing Clover Hill, New Costessey, and Longwater. where it meets the A47 Norwich Southern Bypass. The very light rail would then head north through the Longwater Industrial Estate following Sir Alfred Munnings Road to serve Queen's Hill. The service would then join West End at the junction with Ringland Lane and Taverham Lane following this to Costessey, before connecting back to the A1074 via Town House Road and Norwich Road.

Topic	
Noise	2 (Moderate Adverse) The Very Light Rail Service option is likely to lead to newly generated noises from the new service. Therefore, as this is a new noise source in the area, the potential impact is likely to be moderate adverse.
Air quality	5 (Slight Beneficial) The Very Light Rail Service option may lead to an beneficial impact on air quality due to the potential for reducing traffic emissions and capacity. Therefore, the overall impact is likely to be slight beneficial due to the offset of traffic.
Greenhouse gases	5 (Slight Beneficial) The Very Light Rail Service option may lead to an beneficial impact on greenhouse gases due to the potential for reducing traffic emissions and capacity. Therefore, the likely overall effect is slight beneficial.
Landscape	2 (Moderate Adverse) The Very Light Rail Service option will generally follow existing highway alignment however the intensification of associated infrastructure will result in adverse effects on landscape character and views especially within residential areas.
Townscape	N/A N/A
Historic environment	2 (Moderate Adverse) There are no designated (protected) archaeological or built heritage assets on the route. There are eleven Scheduled Monuments within a 100m buffer of the route. There are 149 listed buildings within the 100m buffer, of which nine are Grade I and nine are Grade II*. The eastern part of the route is in the Norwich Area of Main Archaeological Interest. The route passes through two LPA conservation areas (Norwich City Centre and Old Costessey West End). The majority of the route would follow existing roads apart from the western section by Queen's Hills. The western part of the route is through an area of geology comprising sands and gravels close the River Wensum And River Tud which would have been an attractive area for early settlement. The eastern part runs through the historic core of Norwich. Any below ground works could impact on archaeological remains. However, such works would be expected to be relatively shallow. The setting of any nearby listed buildings could be affected by the new facilities associated with the rail scheme.
Biodiversity	3 (Slight Adverse) The route will require a crossing over the River Tud, no negative impact assumed due to design and mitigation. The route suggests widening of existing roads, with loss of adjacent habitat including broadleaved woodland.
Water environment	3 (Slight Adverse) This new rail service will pass adjacent to the River Wensum and flood zone 3 area at two different locations. This additional infrastructure over the river could affect geomorphology of the river and could provide a pathway for run-off to enter the water course, which could potentially result in adverse impacts on the quality of the river. Although is unlikely to be as significant as highway run-off.

Environmental Appraisal

Option name/no.	Option 61: Offline busway
Description	Provision of offline busways (including partial and full options). These would be installed alongside key highway corridors with localised widening. There are several route options available, including: A1074 corridor: between Norwich Road and A1074 / Breckland Road / Wendene / Barnard Road Roundabout, A1074 corridor: between Longwater Lane and Easton, crossing the A47 and utilising Dereham Road, A1067 corridor: between the A1067 / A1402 junction Drayton Wood Road.

Topic		
Noise	2 (Moderate Adverse)	Provision of an offline Busway may lead to a shift in noise levels from the original busway to new busway offline. Therefore, the new busway will generate new noise levels which are expected to meet the noise limit threshold for assesment. The likely impact is moderate adverse.
Air quality	4 (Neutral)	Provision of an offline Busway may lead to a shift in air quality from the original busway to new busway offline. The threshold for assessment is a change of + or - 100 HGVs a day which is unlikely and therefore the overall effect is likely to be neutral.
Greenhouse gases	4 (Neutral)	Provision of an offline Busway may lead to a shift in air quality from the original busway to new busway offline. The addition of the new bus service would not be significant within the context of greenhouse gas emissions from transport in Norfolk. As no information is available on whether the bus service would remove passenger car vehicles, a neutral score is appropriate.
Landscape	2 (Moderate Adverse)	Provision of an offline Busway will lead to new infrastructure resulting in land take and significant loss of vegetation buffers. In addition, the offline busway passes close to residential properties in New Costessey and Hellesdon resulting in adverse visual effects to some receptors.
Townscape	N/A	N/A
Historic environment	1 (Large Adverse)	There are no designated (protected) archaeological or built heritage assets on the route. There is one Scheduled Monument adjoining the route: a Wayside Cross at the Boundary Road/Drayton Road junction. The route is not in an LPA archaeological priority area. The route passes through one LPA conservation area. There are 39 listed buildings within a 500m buffer of the route, one of which is Grade I and a further two are Grade II*. The route is through an area of geology comprising sands and gravels close the River Wensum And River Tud which would have been an attractive area for early settlement. The presence and nature of any buried archaeological remains is uncertain at this stage. Any below ground works could impact on archaeological remains. However, such works would be expected to be relatively shallow. Any works affecting the Scheduled Monument would require Scheduled Monument Consent.
Biodiversity	2 (Moderate Adverse)	The Busway will require road widening in sections of the A1067, A1074 and A47. The busway is largely through urban areas, with potential to cause habitat loss of Drayton Wood CWS and Long Dell and Westlodge Hills CWS.
Water environment	2 (Moderate Adverse)	This option would introduce a new highway and associated highway runoff alongside existing carriageway. This would have an additional contribution to surface water runoff, but as the only traffic would be buses, the degree of any pollution is unlikely to be significant and therefore this option has a lesser impact upon the water environment than new offline road options.

Environmental Appraisal

Option name/no.	Option 62: New orbital rail line
Description	The orbital rail line would follow the alignment of the Marriott's Way (disused railway path) from Norwich City Centre out north-west to Fir Covert Road, north of Taverham – crossing the River Wensum on three occasions. The rail line would then extend to cross the A1270 and Reepham Road before routing east, passing south of Felthorpe, and Horsford following the A1270 alignment. The route then crosses the A140, passing north of Norwich International Airport connecting with the proposed development south of Horsham St Faith. The route then passes south of Spixworth, before crossing the B1150. It passes north of Rackheath crossing Wroxham Road connecting with the existing railway line north of Salhouse Station to the north-east of Norwich.

Topic	
Noise	2 (Moderate Adverse) Development of an orbital line may lead to a shift in noise levels from the original busway to new busway offline. However, this option will not lead to additional traffic flows that exceed the threshold for assessment (a >10% HGV flow change) and therefore effects upon noise can be considered to be slight adverse.
Air quality	5 (Slight Beneficial) Development of an orbital line may lead to a shift in air quality from the roads to the new orbital line. Therefore, the overall impact is likely to be slight beneficial due to the offset of traffic.
Greenhouse gases	5 (Slight Beneficial) Development of an orbital line may lead to a shift in air quality from the roads to the new orbital line. Therefore, this option may lead to a slight beneficial impact on greenhouse gases due to the potential for reducing traffic emissions.
Landscape	2 (Moderate Adverse) Part of the proposed orbital rail line from Norwich up to the A1270 follows the existing disused rail line which is currently well concealed and therefore only minor adverse effects on the landscape character and views are expected on this part of the route. The rest of the route from the A1270 to Rackheath will lead to loss of pasture and agricultural land and loss of trees and boundary hedgerows therefore effects on the landscape character and views from Horsham St Faith, Spixworth and Rackheath settlements is considered to be moderate adverse.
Townscape	N/A N/A
Historic environment	2 (Moderate Adverse) There are no designated (protected) archaeological or built heritage assets within the route. A small southern section of the route is in the Norwich Area of Main Archaeological Interest. There is one Scheduled Monument within a 100m buffer and two Registered Parks/Gardens. There are four Grade II listed buildings within a 100m buffer. The setting of these assets may be adversely impacted by the proposed development, though the overall heritage significance of these assets is unlikely to be affected. The first part of the route, from Norwich north to Taverham, would be along a disused railway. From Taverham the line would continue north-west to just south of Felthorpe. The geology in this area is sands and gravels close to the River Wensum which would have been attractive to early settlement. The route then runs east to Salhouse Station. The geology comprises glacial sands and gravels which could contain prehistoric remains. Archaeological survival across the rural sections of the route is likely to be high and at a shallow depth below ground. The presence and nature of any buried archaeological remains is uncertain at this stage but the new rail line would truncate or remove any such remains present within its footprint.
Biodiversity	2 (Moderate Adverse) The route will require a new crossing over the River Wensum SAC/SSSI, no negative impacts assumed due to design and mitigation. The orbital line largely follows Marriot's Way CWS, which will lead to habitat loss. Other protected sites may be affected to the north of the route.
Water environment	2 (Moderate Adverse) The proposed orbital line will cross the River Wensum and flood zone 3 area at two different locations. This additional infrastructure over the river could affect geomorphology of the river and could provide a pathway for run-off to enter the water course, which could potentially result in adverse impacts on the quality of the river although this will be less adverse than a new highway.

Environmental Appraisal

Option name/no.	Option 63: Inner ring road widening
Description	Widening of the existing inner ring road (A147) to improve capacity, connectivity journey time and reliability, while improving access to Norwich from the western quadrant.

Topic

Noise	3 (Slight Adverse)	Widening of the roads may lead to a greater capacity of traffic. However, without traffic modelling data it is not known what the impacts on traffic flow will be and therefore, currently, the likely effect is slightly adverse.
Air quality	1 (Large Adverse)	Widening of the roads may lead to a reduction in congestion and therefore a slight increase in air quality; or it may lead to a slight decrease in air quality due to a greater capacity of traffic. The inner ring road is within the Norwich AQMA area and therefore this option is likely to lead to large adverse impacts on air quality because road widening would result in greater traffic and hence greater road traffic emissions in an area presently failing to meet the air quality objective levels.
Greenhouse gases	3 (Slight Adverse)	Widening of the roads may lead to a reduction in congestion and therefore a slight increase in greenhouse gases quality; or it may lead to a slight decrease in greenhouse gases due to a greater capacity of traffic. Without traffic modelling data it is not known what the impacts of traffic flow on greenhouse gases will be and therefore, currently, the likely effect is slightly adverse.
Landscape	N/A	N/A
Townscape	2 (Moderate Adverse)	Widening of the roads will have a significant adverse effect on the townscape character and views from properties along the road boundary due to loss of plants, footway narrowing and intensification of the highway infrastructure including additional signage, lighting and further hard surfaces. High quality materials and public realm strategy along with mitigation planting to replace any losses of existing soft landscaping should be considered although opportunities for the above mitigation measures could be limited by the need to minimise land-take from privately owned land.
Historic environment	1 (Large Adverse)	There is one Scheduled Monument crossing and adjoining the route: The City Walls and Tower. The route is in the Norwich Area of Main Archaeological Interest. The route passes through three LPA conservation areas. There are 109 listed buildings within a 100m buffer of the route, six of which are Grade I and a further six are Grade II*. The route is in the historic core of Norwich. The presence and nature of any buried archaeological remains is uncertain at this stage. Any below ground works could impact on archaeological remains. However, such works would be expected to be relatively shallow. Any works affecting the Scheduled Monument would require Scheduled Monument Consent.
Biodiversity	4 (Neutral)	The route will not affect any designated sites. Due to the urban location, little effect on biodiversity is anticipated.
Water environment	4 (Neutral)	Widening the existing inner ring road will increase the volume of vehicles using the road. The inner ring road currently crosses the River Wensum at two different locations and a flood zone 2 area in one location. An increase in traffic flow is likely to increase highway run-off into the watercourse, which could potentially result in adverse impacts on the quality of the river although it is assumed that existing drainage is present to manage this runoff and the score is attributable to the increase in traffic.

Environmental Appraisal

Option name/no.	Option 64: Provision of sprint services: A47 / A1074
Description	Provision of a new sprint bus service (distinctly branded Sprint vehicles) on the A47 / A1074 corridor connecting Norwich City Centre with western quadrant locations, possibly as far as Dereham. The sprint service would have high reliability and competitive journey time targets. Where possible high-quality bus shelters, bus lanes / busways and bus priority measures would be provided to make it an attractive method of travel.

Topic

Noise	4 (Neutral)	This option of a new sprint bus service may lead to a shift in noise levels from the original busway to new busway offline. However, this option will not lead to additional traffic flows that exceed the threshold for assessment (a >10% HGV flow change) and therefore effects upon noise can be considered to be neutral.
Air quality	4 (Neutral)	This option of a new sprint bus service may lead to a shift in air quality from the roads to the new bus line. However, there is the potential for an increase in pollution from transport as there will be a new transport link. The threshold for assessment is a change of + or - 100 HGVs a day which is unlikely and therefore the overall effect is likely to be neutral.
Greenhouse gases	4 (Neutral)	This option on a new sprint bus service may lead to a shift in air quality from the roads to the new bus line. The addition of the new bus service would not be significant within the context of greenhouse gas emissions from transport in Norfolk. As no information is available on whether the bus service would remove passenger car vehicles, a neutral score is appropriate.
Landscape	3 (Slight Adverse)	Provision of a new sprint bus service using the existing road network will lead to no significant change to landscape character and views from receptors however assumed localised road widening requiring land take and removal of vegetation would result in more adverse effects.
Townscape	N/A	N/A
Historic environment	3 (Slight Adverse)	There are no designated (protected) archaeological or built heritage assets within the route. The route is not in an LPA archaeological priority area or an LPA conservation area. There is one Scheduled Monument within a 100m buffer and one Registered Park/Garden. There are eight listed buildings within a 100m buffer, one is Grade I and one is Grade II*. Much of the route would be along the existing A47, but new bus shelters, bus lanes and busways may be constructed. Any below ground works could impact on archaeological remains. However, such works would be expected to be relatively shallow. Any works would be unlikely to affect the setting of nearby listed buildings.
Biodiversity	4 (Neutral)	There are no anticipated changes to biodiversity by provision of a new sprint bus service.
Water environment	4 (Neutral)	This option would have no tangible benefit or adverse effect upon the water environment because no information is available on the change in traffic flows although it is unlikely that additional buses will be a significant contributor to highway runoff pollution.

Environmental Appraisal

Option name/no.	Option 65: Provision of sprint services: A1067 corridor
Description	Provision of a new sprint bus service (distinctly branded Sprint vehicles) on the A1067 corridor connecting Norwich City Centre with western quadrant locations, possibly as far as Bawdeswell. The sprint service would have high reliability and competitive journey time targets. Where possible high-quality bus shelters, bus lanes / busways and bus priority measures would be provided to make it an attractive method of travel.

Topic

Noise	4 (Neutral)	This option of a new sprint bus service may lead to a shift in noise levels from the original busway to new busway offline. However, this option will not lead to additional traffic flows that exceed the threshold for assessment (a >10% HGV flow change) and therefore effects upon noise can be considered to be neutral.
Air quality	4 (Neutral)	This option on a new sprint bus service may lead to a shift in air quality from the roads to the new bus line. However, there is the potential for an increase in pollution from transport as there will be a new transport link. The threshold for assessment is a change of + or - 100 HGVs a day which is unlikely and therefore the overall effect is likely to be neutral.
Greenhouse gases	4 (Neutral)	This option on a new sprint bus service may lead to a shift in air quality from the roads to the new bus line. The addition of the new bus service would not be significant within the context of greenhouse gas emissions from transport in Norfolk. As no information is available on whether the bus service would remove passenger car vehicles, a neutral score is appropriate.
Landscape	3 (Slight Adverse)	Provision of a new sprint bus service using the existing road network will lead to no significant change to landscape character and views from receptors however assumed localised road widening requiring land take and removal of vegetation would result in more adverse effects.
Townscape	N/A	N/A
Historic environment	3 (Slight Adverse)	There are no designated (protected) archaeological or built heritage assets within the route. The route is not in an LPA archaeological priority area or an LPA conservation area. There are five Scheduled Monuments within a 100m buffer and one Registered Park/Garden. There are 43 listed buildings within a 100m buffer, one is Grade I and one is Grade II*. Much of the route would be along the existing A1067, but new bus shelters, bus lanes and busways may be constructed. Any below ground works could impact on archaeological remains. However, such works would be expected to be relatively shallow. Any works would be unlikely to affect the setting of nearby listed buildings.
Biodiversity	4 (Neutral)	There are no anticipated changes to biodiversity by provision of a new sprint bus service. This is due to no habitat loss being anticipated.
Water environment	4 (Neutral)	This option would have no tangible benefit or adverse effect upon the water environment because no information is available on the change in traffic flows although it is unlikely that additional buses will be a significant contributor to highway runoff pollution.

Environmental Appraisal

Option name/no.	Option 66: Provision of a sustainable urban distribution centre
Description	Provision of a sustainable urban distribution centre on the outskirts of the city. All local deliveries are made to the distribution centre and are thereafter delivered in more carbon efficient vehicles and routing patterns.

Topic

Noise	4 (Neutral)	Provision of a Sustainable Urban Distribution Centre option will have a negligible effect upon noise levels.
Air quality	4 (Neutral)	This option may lead to a slight beneficial impact on local air quality if local deliveries use a more efficient and effective route. However, without any traffic modelling data on changes to traffic flow the overall effect of this option is likely to be neutral.
Greenhouse gases	4 (Neutral)	This option may lead to a slight beneficial impact on local air quality if local deliveries use a more efficient and effective route. However, without any traffic modelling data on changes to traffic flow the overall effect on greenhouse gases is likely to be neutral.
Landscape	4 (Neutral)	Provision of a Sustainable Urban Distribution Centre option will lead to no change on landscape character and views
Townscape	N/A	N/A
Historic environment	2 (Moderate Adverse)	The location of the proposed SUDC is not known. Any below ground works could impact on archaeological remains. The setting of any nearby listed buildings could be affected by the new building.
Biodiversity	3 (Slight Adverse)	There are likely to be habitat losses from the footprint of a Sustainable Urban Distribution Centre, but no details are provided as to location.
Water environment	3 (Slight Adverse)	This option would have no tangible benefit or adverse effect upon the water environment because no information is available on the change in traffic flows although a slight adverse score is appropriate as the SUDC's location is unknown and it could therefore impact upon water courses.

Environmental Appraisal

Option name/no.	Option 67: Provision of improved freight route intelligence
Description	Provision of improved freight route intelligence to improve route choice and deter rat-running and unnecessary Heavy Good Vehicle (HGV) movements.

Topic

Noise	4 (Neutral)	Improved freight route option will have a negligible effect upon noise levels.
Air quality	4 (Neutral)	This option may lead to a slight beneficial impact on local air quality if HGV will be limited. However, without any traffic modelling data on changes to traffic flow or more detail on the improvements the overall effect of this option on local air quality is likely to be neutral.
Greenhouse gases	4 (Neutral)	This option may lead to a slight beneficial impact on local air quality if HGV numbers are to be limited. However, without any traffic modelling data on changes to traffic flow or more detail on the improvements the overall effect of this option on greenhouse gases is likely to be neutral.
Landscape	4 (Neutral)	Improved freight route option is likely to reduce the movement of traffic along the routes applied and therefore contribute to the tranquility of the area and bring in line with the landscape character. Reduced movement of traffic will also lead to a slight beneficial effect on the views from settlements along these routes. However, without any traffic modelling data on changes to traffic flow or more detail on the improvements the overall effect of this option in landscape terms is likely to be neutral.
Townscape	N/A	N/A
Historic environment	4 (Neutral)	There are no anticipated impacts on cultural heritage due to improving freight route intelligence. Therefore the likely impact of this option will be neutral.
Biodiversity	4 (Neutral)	There are no anticipated changes to biodiversity by provision of improved freight route intelligence. This is due to no habitat loss being anticipated.
Water environment	4 (Neutral)	This option would have no tangible benefit or adverse effect upon the water environment because no information is available on the change in traffic flows.

Environmental Appraisal

Option name/no.	Option 68: Lorry management strategy
Description	Development of an overarching lorry management strategy for the Norwich area. The strategy could include: creation of a lorry route network, restriction of lorry movement, speed management and traffic calming, accessibility measures, route suitability assessments, managing lorry deliveries, lorry parking facilities, communication of information strategy, partnerships with key hauliers and associations (Road Haulage Association / Freight Transport Association)

Topic

Noise	4 (Neutral)	The development of an overarching lorry management strategy may lead to an increase of lorry traffic due to the creation of a lorry route network. However the overall outcome for the lorry management strategy is to control and improve lorry use, parking and speed on roads and associated lorry facilities. Therefore, it is unlikely that this option will lead to any greater levels of noise that exceed noise limit thresholds. Overall this option will lead to a neutral effect on noise.
Air quality	4 (Neutral)	The development of an overarching lorry management strategy will have a negligible effect upon air quality because no information is available on the change in traffic flows.
Greenhouse gases	4 (Neutral)	The development of an overarching lorry management strategy will have a negligible effect upon greenhouse gases because no information is available on the change in traffic flows.
Landscape	4 (Neutral)	The development of an overarching lorry management strategy will have a negligible effect upon the landscape character and views because no information is available on the change in traffic flows
Townscape	N/A	N/A
Historic environment	4 (Neutral)	There are no anticipated impacts on cultural heritage due to the development of an overarching lorry management strategy. Therefore the likely impact of this option will be neutral.
Biodiversity	4 (Neutral)	There are no anticipated changes to biodiversity by the development of an overarching lorry management strategy. This is due to no habitat loss being anticipated.
Water environment	4 (Neutral)	This option would have no tangible benefit or adverse effect upon the water environment because no information is available on the change in traffic flows.

Environmental Appraisal

Option name/no.	Option 69: Purple line (2018 public consultation), single carriageway
Description	From the A1067, west of the junction with the A1270 at Deighton Hills, Option 69 heads south-west, crossing the River Wensum and Ringland Lane. The route then heads south crossing Weston Road, near Breck Barn Cottages to the west of Ringland, passing through Blackbreck Plantation and crossing The Broadway. Option 69 continues south to tie-in with Taverham Road following the alignment for approximately 300 metres (over the River Tud) to connect with the A47 at the junction with Blind Lane. Option 69 would be of single carriageway standard.

Topic

Noise	2 (Moderate Adverse)	The route passes closely to isolated settlements and farms located west of Ringland. Therefore it will introduce a new noise source to a rural location. The number of properties affected is likely to be fewer than other new route options and the A47 and the A1067 are sources of traffic noise already at either end.
Air quality	3 (Slight Adverse)	The route passes closely to isolated settlements and farms located west of Ringland. These are unlikely to experience road traffic pollutants at concentrations near to the objective levels. The option at this stage is not thought likely to affect the concentrations of NO ₂ in the City Centre AQMA to the degree that will significantly affect its designation. Some isolated and rurally positioned dwellings may experience an increase in air pollution as the proposed route is introducing a main road to a fairly rural location.
Greenhouse gases	3 (Slight Adverse)	The route will amend the flow of traffic around Norwich and at this early stage without traffic modelling, it is unknown whether this will lead to a significant growth in traffic and a change in average speeds. However, as the option does not include any new development any additional traffic is unlikely to be significant and therefore the change in greenhouse gases is likely to be limited.
Landscape	2 (Moderate Adverse)	The route has a significant effect on a number of landscape elements. The new route will contribute to a significant loss of agricultural land, field boundary hedgerows and significant loss of woodland. The new route also cuts across the River Wensum and River Tud a moderately sensitive landscape due to its recreational value and scenic quality leading to a detraction from the current character of the landscape. The route passes close to Ringland and the Merryhill Country Park but due to intervening woodland the views are likely to be partially screened. Additional screening vegetation and bunds along the route would decrease further the visual effects.
Townscape	N/A	N/A
Historic environment	2 (Moderate Adverse)	There are no designated (protected) archaeological or built heritage assets within the route, though there are four listed buildings within a 500m buffer of the route, including one Grade II* listed building. The setting of these assets may be adversely impacted by the proposed development, though the overall heritage significance of these assets is unlikely to be affected. The route does not lie within or adjacent to an LPA conservation area or LPA archaeological priority area. The natural sand and gravel geology, which underlies much of the route, combined with the proximity to the River Wensum and River Tud, would have made it attractive to early settlement and archaeological survival across the site is likely to be high, except in areas of former quarry pits, and at a shallow depth below ground. The presence and nature of any buried archaeological remains is uncertain at this stage but the new road would truncate or completely remove any such remains present within its footprint.
Biodiversity	2 (Moderate Adverse)	The route will require a new crossing over the River Wensum SAC/SSSI, no negative impacts assumed due to design and mitigation. The route will cause habitat loss of a CWS proposed for 2018 and land worth of CWS status. The route would be adjacent to Primrose Grove Ancient Woodland. There will be loss and severance of broadleaved woodland, grassland, arable fields and hedgerows.
Water environment	2 (Moderate Adverse)	The route will include a new crossing over the River Wensum and the River Tud, a tributary of the River Wensum and flood zone 3 area. This additional infrastructure over the river could affect geomorphology of the river and will provide a pathway for road run-off to enter the water courses, which could potentially result in significant adverse impacts on the quality of the river.

Environmental Appraisal

Option name/no.	Option 70: Purple line (2018 public consultation), dual carriageway
Description	From the A1067, west of the junction with the A1270 at Deighton Hills, Option 70 heads south-west, crossing the River Wensum and Ringland Lane. The route then heads south crossing Weston Road, near Breck Barn Cottages to the west of Ringland, passing through Blackbreck Plantation and crossing The Broadway. Option 70 continues south to tie-in with Taverham Road following the alignment for approximately 300 metres (over the River Tud) to connect with the A47 at the junction with Blind Lane. Option 70 would be of dual carriageway standard. Upgrades to the A1067 to dual carriageway standard may also be required.

Topic

Noise	2 (Moderate Adverse)	The route passes closely to isolated settlements and farms located west of Ringland. Therefore it will introduce a new noise source to a rural location. The number of properties affected is likely to be fewer than other new route options and the A47 and the A1067 are sources of traffic noise already at either end.
Air quality	3 (Slight Adverse)	The route passes closely to isolated settlements and farms located west of Ringland. These are unlikely to experience road traffic pollutants at concentrations near to the objective levels. The option at this stage is not thought likely to affect the concentrations of NO2 in the City Centre AQMA to the degree that will significantly affect its designation. Some isolated and rurally positioned dwellings may experience an increase in air pollution as the proposed route is introducing a main road to a fairly rural location.
Greenhouse gases	3 (Slight Adverse)	The route will amend the flow of traffic around Norwich and at this early stage without traffic modelling, it is unknown whether this will lead to a significant growth in traffic and a change in average speeds. However, as the option does not include any new development any additional traffic is unlikely to be significant and therefore the change in greenhouse gases is likely to be limited.
Landscape	2 (Moderate Adverse)	The route has a significant effect on a number of landscape elements. The new route will contribute to a significant loss of agricultural land, field boundary hedgerows and significant loss of woodland. The new route also cuts across the River Wensum and River Tud a moderately sensitive landscape due to its recreational value and scenic quality leading to a detraction from the current character of the landscape. The route passes close to Ringland and the Merryhill Country Park but due to intervening woodland the views are likely to be partially screened. Additional screening vegetation and bunds along the route would decrease further the visual effects.
Townscape	N/A	N/A
Historic environment	2 (Moderate Adverse)	There are no designated (protected) archaeological or built heritage assets within the route, though there are four listed buildings within a 500m buffer of the route, including one Grade II* listed building. The setting of these assets may be adversely impacted by the proposed development, though the overall heritage significance of these assets is unlikely to be affected. The route does not lie within or adjacent to an LPA conservation area or LPA archaeological priority area. The natural sand and gravel geology, which underlies much of the route, combined with the proximity to the River Wensum and River Tud, would have made it attractive to early settlement and archaeological survival across the site is likely to be high, except in areas of former quarry pits, and at a shallow depth below ground. The presence and nature of any buried archaeological remains is uncertain at this stage but the new road would truncate or completely remove any such remains present within its footprint.
Biodiversity	2 (Moderate Adverse)	The route will require a new crossing over the River Wensum SAC/SSSI, no negative impacts assumed due to design and mitigation. The route will cause habitat loss of a CWS proposed for 2018 and land worth of CWS status. The route would be adjacent to Primrose Grove Ancient Woodland. There will be loss and severance of broadleaved woodland, grassland, arable fields and hedgerows.
Water environment	2 (Moderate Adverse)	The route will include a new crossing over the River Wensum and the River Tud, a tributary of the River Wensum and flood zone 3 area. This additional infrastructure over the river could affect geomorphology of the river and will provide a pathway for road run-off to enter the water courses, which could potentially result in significant adverse impacts on the quality of the river.

Environmental Appraisal

Option name/no.	Option 71: Blue line (2018 public consultation), single carriageway
Description	From the A1067, west of the junction with the A1270 at Deighton Hills, Option 71 heads south-west, crossing the River Wensum and Ringland Lane passing through Primrose Grove. The route then heads south crossing the northern Weston Road to the west of Ringland before crossing Honinham Lane passing through Poets Breck and Plantation to the southern Weston Road. Option 71 then heads west to cross Taverham Road before routing south and running parallel to Taverham Road. Option 71 then crosses the River Tud to connect with the A47 to the west of Easton at the existing Taverham Road junction. Option 71 would be of single carriageway standard.

Topic	
Noise	2 (Moderate Adverse) The route passes closely to isolated settlements and farms located west of Ringland. Therefore it will introduce a new noise source to a rural location. The number of properties affected is likely to be fewer than other new route options and the A47 and the A1067 are sources of traffic noise already at either end.
Air quality	3 (Slight Adverse) The route passes closely to isolated settlements and farms located west of Ringland. These are unlikely to experience road traffic pollutants at concentrations near to the objective levels. The option at this stage is not thought likely to affect the concentrations of NO ₂ in the City Centre AQMA to the degree that will significantly affect its designation. Some isolated and rurally positioned dwellings may experience an increase in air pollution as the proposed route is introducing a main road to a fairly rural location. Without traffic data it is not known how this option will affect air quality and therefore the likely effect is slight adverse.
Greenhouse gases	3 (Slight Adverse) The route will amend the flow of traffic around Norwich and at this early stage without traffic modelling, it is unknown whether this will lead to a significant growth in traffic and a change in average speeds. However, as the option does not include any new development any additional traffic is unlikely to be significant and therefore the change in greenhouse gases is likely to be limited.
Landscape	2 (Moderate Adverse) The route has a significant effect on a number of landscape elements. The new route will contribute to a significant loss of agricultural land, field boundary hedgerows and significant loss of woodland. The new route also cuts across the River Wensum and River Tud a moderate sensitivity landscape due to its recreational value and scenic quality leading to a detraction from the current character of the landscape. The route passes close to Ringland and the Merryhill Country Park but due to intervening woodland the views are likely to be partially screened. Additional screening vegetation and bunds along the route would decrease further the visual effects.
Townscape	N/A N/A
Historic environment	3 (Slight Adverse) There are no designated (protected) archaeological or built heritage assets within the route, though there are three Grade II listed buildings within a 500m buffer of the route. The setting of these assets may be adversely impacted by the proposed development, though the overall heritage significance of these assets is unlikely to be affected. The route does not lie within or adjacent to an LPA conservation area or LPA archaeological priority area. The natural sand and gravel geology, which underlies much of the route, combined with the proximity to the River Wensum and River Tud, would have made it attractive to early settlement and archaeological survival across the site is likely to be high, except in areas of former quarry pits, and at a shallow depth below ground. The presence and nature of any buried archaeological remains is uncertain at this stage but the new road would truncate or completely remove any such remains present within its footprint.
Biodiversity	2 (Moderate Adverse) The route will require a new crossing over the River Wensum SAC/SSSI, no negative impacts assumed due to design and mitigation. The route will cause habitat loss of 4 proposed 2018 CWSs and is adjacent to a further site. It will also cause habitat loss of a site worthy of CWS. There will be loss and severance of broadleaved woodland, grassland, arable fields and hedgerows.
Water environment	2 (Moderate Adverse) The route will include a new crossing over the River Wensum and the River Tud, a tributary of the River Wensum and flood zone 3 area. This additional infrastructure over the river could affect geomorphology over the river and will provide a pathway for road run-off to enter the water courses, which could potentially result in significant adverse impacts on the quality of the river.

Environmental Appraisal

Option name/no.	Option 72: Blue line (2018 public consultation), dual carriageway
Description	From the A1067, west of the junction with the A1270 at Deighton Hills, Option 72 heads south-west, crossing the River Wensum and Ringland Lane passing through Primrose Grove. The route then heads south crossing the northern Weston Road to the west of Ringland before crossing Honinham Lane passing through Poets Breck and Plantation to the southern Weston Road. Option 72 then heads west to cross Taverham Road before routing south and running parallel to Taverham Road. Option 72 then crosses the River Tud to connect with the A47 to the west of Easton at the existing Taverham Road junction. Option 72 would be of dual carriageway standard. Upgrades to the A1067 to dual carriageway standard may also be required.

Topic	
Noise	2 (Moderate Adverse) The route passes closely to isolated settlements and farms located west of Ringland. Therefore it will introduce a new noise source to a rural location. The number of properties affected is likely to be fewer than other new route options and the A47 and the A1067 are sources of traffic noise already at either end.
Air quality	3 (Slight Adverse) The route passes closely to isolated settlements and farms located west of Ringland. These are unlikely to experience road traffic pollutants at concentrations near to the objective levels. The option at this stage is not thought likely to affect the concentrations of NO2 in the City Centre AQMA to the degree that will significantly affect its designation. Some isolated and rurally positioned dwellings may experience an increase in air pollution as the proposed route is introducing a main road to a fairly rural location. Without traffic data it is not known how this option will affect air quality and therefore the likely effect is slight adverse.
Greenhouse gases	3 (Slight Adverse) The route will amend the flow of traffic around Norwich and at this early stage without traffic modelling, it is unknown whether this will lead to a significant growth in traffic and a change in average speeds. However, as the option does not include any new development any additional traffic is unlikely to be significant and therefore the change in greenhouse gases is likely to be limited.
Landscape	2 (Moderate Adverse) The route has a significant effect on a number of landscape elements. The new route will contribute to a significant loss of agricultural land, field boundary hedgerows and significant loss of woodland. The new route also cuts across the River Wensum and River Tud a moderate sensitivity landscape due to its recreational value and scenic quality leading to a detraction from the current character of the landscape. The route passes close to Ringland and the Merryhill Country Park but due to intervening woodland the views are likely to be partially screened. Additional screening vegetation and bunds along the route would decrease further the visual effects.
Townscape	N/A N/A
Historic environment	3 (Slight Adverse) There are no designated (protected) archaeological or built heritage assets within the route, though there are three Grade II listed buildings within a 500m buffer of the route. The setting of these assets may be adversely impacted by the proposed development, though the overall heritage significance of these assets is unlikely to be affected. The route does not lie within or adjacent to an LPA conservation area or LPA archaeological priority area. The natural sand and gravel geology, which underlies much of the route, combined with the proximity to the River Wensum and River Tud, would have made it attractive to early settlement and archaeological survival across the site is likely to be high, except in areas of former quarry pits, and at a shallow depth below ground. The presence and nature of any buried archaeological remains is uncertain at this stage but the new road would truncate or completely remove any such remains present within its footprint.
Biodiversity	2 (Moderate Adverse) The route will require a new crossing over the River Wensum SAC/SSSI, no negative impacts assumed due to design and mitigation. The route will cause habitat loss of 4 proposed 2018 CWSs and is adjacent to a further site. It will also cause habitat loss of a site worthy of CWS. There will be loss and severance of broadleaved woodland, grassland, arable fields and hedgerows.
Water environment	2 (Moderate Adverse) The route will include a new crossing over the River Wensum and the River Tud, a tributary of the River Wensum and flood zone 3 area. This additional infrastructure over the river could affect geomorphology over the river and will provide a pathway for road run-off to enter the water courses, which could potentially result in significant adverse impacts on the quality of the river.

Environmental Appraisal

Option name/no.	Option 73: Relay Fakenham to Norwich rail line
Description	This option considers the relaying and reopening of the Fakenham to Norwich Railway Line to provide services to Norwich City Centre from the outer districts, encouraging modal shift. The route heads north-west out of Norwich City Centre, crossing the River Wensum on three occasions to Drayton. The route then crosses the A1270 and follow the alignment of Reepham Road diverting away west, passing north of Attleridge and Lenwade toward Reepham. The route to Fakenham then uses the existing cycle network to Foulsham (Kerdiston Road / Reepham Road), Bintree (Claypit Road / Gunn Street / Bintree Road), Great Ryburgh (Mill Road / B1110 Bridge Road) to Fakeham (Fakenham Road / B1146 Dereham Road).

Topic	
Noise	2 (Moderate Adverse) The reopening of the rail line may lead to a slight increase in noise levels. The new noise generated from the train line and trains passing through is likely to have an impact on the surrounding receptors. Without further information as the numbers and frequency of trains the likely impact is moderate adverse.
Air quality	5 (Slight Beneficial) The reopening of the rail line may lead to a beneficial effect on air quality due to the shift from traffic transport to rail transport. Therefore, the overall impact is likely to be slight beneficial due to the offset of traffic.
Greenhouse gases	5 (Slight Beneficial) The reopening of the rail line may lead to an increase in air quality if this reduced traffic congestion and number on the roads. Therefore, this option may lead to a slight beneficial impact on greenhouse gases due to the potential for reducing traffic emissions.
Landscape	2 (Moderate Adverse) The relaying of the rail line option is likely to have adverse effects on landscape character and views as the route is currently well concealed with screening vegetation. Mitigation planting could screen open or filtered views from receptors created due to vegetation clearance at construction.
Townscape	N/A N/A
Historic environment	2 (Moderate Adverse) There are no designated (protected) archaeological or built heritage assets on the route. There are two Scheduled Monuments within a 100m buffer of the route. There are 27 listed buildings within the buffer, of which one is Grade I and three are Grade II*. There is one Registered Park/Garden within the buffer. A small southern section of the route is in the Norwich Area of Main Archaeological Interest. The route passes through one LPA conservation area (Foulsham) and borders another (Great Ryburgh). The eastern terminus would be adjacent to the Norwich City Centre Conservation Area. The route north-west from Norwich would follow a disused railway. From Drayton the route would continue north west in an area of geology comprising sands and gravels close the River Wensum which would have been an attractive area for early settlement. From Lenwade to Fakenham the route would use the existing cycle network. Any below ground works could impact on archaeological remains. Relaying of rail track on the route of disused rail lines or cycle tracks would not impact on any remains. Foundations of facilities, such as new stations, could remove any remains within their footprint. The setting of any nearby Scheduled Monuments or listed buildings could be affected by any new facilities constructed for the scheme.
Biodiversity	2 (Moderate Adverse) The rail line will require a new crossing over the River Wensum SAC/SSSI, no negative impacts assumed due to design and mitigation. The route is likely to pass through a range of protected sites. There will be loss and severance of broadleaved woodland, grassland, arable fields and hedgerows.
Water environment	2 (Moderate Adverse) The proposed orbital line will cross the River Wensum and flood zone 3 area This additional infrastructure over the river could affect geomorphology of the river and could provide a pathway for run-off to enter the water course, which could potentially result in adverse impacts on the quality of the river although this will be less adverse than a new highway.

Environmental Appraisal

Option name/no.	Option 74: New bus route connecting Dereham, Hellesdon and Norwich Airport
Description	Provision of a new bus route connecting Dereham, Hellesdon and Norwich International Airport (with the potential to connect in to development to the north of Norwich). The service would use smaller, more manoeuvrable vehicles running every 15 minutes. From Dereham the bus route would largely use the A47 toward Norwich, passing Hockering, Honingham and Easton. The bus route would then use the A1074 Dereham Road through Longwater and New Costessey before heading north on Marl Pit Lane / Hellesdon Road, crossing the River Wensum, to serve Hellesdon. The route would continue along Low Road, onto Hospital Lane, then Middletons Lane before joining the A140 Holt Road and connecting to Norwich International Airport.

Topic		
Noise	4 (Neutral)	An additional bus service on a 15 minute frequency will not lead to additional traffic flows that exceed the threshold for assessment (a >10% HGV flow change) and therefore effects upon noise can be considered to be neutral.
Air quality	4 (Neutral)	An additional bus service on a 15 minute frequency will not exceed the threshold for assessment (>100 HGVs per day) and therefore effects upon air quality can be considered to be neutral.
Greenhouse gases	4 (Neutral)	An additional bus service on a 15 minute frequency would not be significant within the context of greenhouse gas emissions from transport in Norfolk. As no information is available on whether the bus service would remove passenger car vehicles, a neutral score is appropriate.
Landscape	4 (Neutral)	As the new bus route will use the existing infrastructure the landscape character and visual effects are considered neutral.
Townscape	4 (Neutral)	N/A
Historic environment	4 (Neutral)	There are no anticipated impacts on cultural heritage due to the development of a new bus route connecting Dereham Hellesdon to the airport. Therefore the likely impact of this option will be neutral.
Biodiversity	4 (Neutral)	There are no anticipated changes to biodiversity by the provision of a new bus route.
Water environment	4 (Neutral)	As no additional infrastructure is proposed in or near a watercourse, and as the number of new bus journeys will not be on existing roads with existing drainage infrastructure, the effects upon the water environment will be neutral

Environmental Appraisal

Option name/no.	Option 75: Black line (2018 public consultation), existing route, single carriageway
Description	Upgrading the existing road network between the A1067 at Lenwade (Porter's Lane junction) to the A47 east of Hockering. From the A1067 Porter's Lane junction at Lenwade, Option 75 upgrades the B1535 to the junction with Rectory Road. The B1535 heads west for a short distance before routing south-east to the junction with Wood Lane. The existing B1535 exhibits a series of sharp bends at junctions with Collin Green Lane and Sandy Lane. The route then connects with the A47 to the north-west of Honingham at Wood Lane / Berrys Lane junction. Option 75 would be of single carriageway standard.

Topic	
Noise	2 (Moderate Adverse) An update of the existing road network goes offline through some areas that are currently not occupied by a road and which are relatively rural. Therefore this option will introduce a new noise source to a rural location. The number of properties affected is likely to be fewer than other new route options, due to the new road being shorter close to the existing road. Only slight changes are going to be made with this new route as it predominately an update of the existing route. However without traffic modelling the likely effect is moderate adverse
Air quality	3 (Slight Adverse) An update to the existing road network is not expected to significantly reduce air quality within the area as the new route is close to the existing road and therefore no new air quality emissions should be expected. Overall, the likely significance of effect is slight adverse.
Greenhouse gases	3 (Slight Adverse) Updating the existing road network will amend the flow of traffic around Norwich and, at this early stage without traffic modelling, it is unknown whether this will lead to a significant growth in traffic and a change in average speeds. However, as the option does not include any new development any additional traffic is unlikely to be significant and therefore the change in greenhouse gases is likely to be limited. Therefore, the likely impact on greenhouse gases is slightly adverse.
Landscape	2 (Moderate Adverse) This route will lead to significant loss of woodland to the north near the Dinosaur Park, loss of boundary hedgerows and specimen trees some of them quite mature therefore diminishing the sense of place and tranquility of the area. The route will pass close to a number of isolated settlements introducing a new feature into their views. Mitigation in the form of planting and landscape bunds along the route could potentially reduce the landscape character and visual effects but considering the lack of intervening vegetation the route is likely to remain visible from most of the viewpoints.
Townscape	N/A N/A
Historic environment	2 (Moderate Adverse) There are no designated (protected) archaeological or built heritage assets within the route, though there are 14 Grade II listed buildings within a 500m buffer of the route. The setting of these assets may be adversely impacted by the proposed route upgrade, though the overall heritage significance of these assets is unlikely to be affected. The route does not lie within or adjacent to an LPA conservation area or LPA archaeological priority area. The natural sand and gravel geology, which underlies much of the route, combined with the proximity to the River Wensum and River Tud, would have made it attractive to early settlement and archaeological survival across the site is likely to be high, except in areas of former quarry pits, and at a shallow depth below ground. The presence and nature of any buried archaeological remains is uncertain at this stage but the construction associated with the upgrade would truncate or completely remove any such remains present within the footprint of the works.
Biodiversity	3 (Slight Adverse) The route would cause habitat loss of Old Covert, Wood Lane CWS and Weston Meadow CWS. There is the potential for loss of broadleaved woodland, grassland, arable fields and hedgerows. Therefore the likely impact will be slight adverse.
Water environment	3 (Slight Adverse) The updated road will cross the River Wensum, however this section of road is unchanged and will use existing crossing. The likely intensification of traffic could have an adverse effect upon highway runoff.

Environmental Appraisal

Option name/no.	Option 76: Black line (2018 public consultation), existing route, dual carriageway
Description	Upgrading the existing road network between the A1067 at Lenwade (Porter's Lane junction) to the A47 east of Hockering. From the A1067 Porter's Lane junction at Lenwade, Option 76 upgrades the B1535 to the junction with Rectory Road. The B1535 heads west for a short distance before routing south-east to the junction with Wood Lane. The existing B1535 exhibits a series of sharp bends at junctions with Collin Green Lane and Sandy Lane. The route then connects with the A47 to the north-west of Honingham at Wood Lane / Berrys Lane junction. Option 76 would be of dual carriageway standard. Upgrades to the A1067 to dual carriageway standard may also be required.

Topic	
Noise	2 (Moderate Adverse) An update of the existing road network goes offline through some areas that are currently not occupied by a road and which are relatively rural. Therefore this option will introduce a new noise source to a rural location. The number of properties affected is likely to be fewer than other new route options, due to the new road being shorter close to the existing road. Only slight changes are going to be made with this new route as it predominately an update of the existing route. However without traffic modelling the likely effect is moderate adverse
Air quality	3 (Slight Adverse) An update to the existing road network is not expected to significantly reduce air quality within the area as the new route is close to the existing road and therefore no new air quality emissions should be expected. Overall, the likely significance of effect is slight adverse.
Greenhouse gases	3 (Slight Adverse) Updating the existing road network will amend the flow of traffic around Norwich and, at this early stage without traffic modelling, it is unknown whether this will lead to a significant growth in traffic and a change in average speeds. However, as the option does not include any new development any additional traffic is unlikely to be significant and therefore the change in greenhouse gases is likely to be limited. Therefore, the likely impact on greenhouse gases is slightly adverse.
Landscape	2 (Moderate Adverse) This route will lead to significant loss of woodland to the north near the Dinosaur Park, loss of boundary hedgerows and specimen trees some of them quite mature therefore diminishing the sense of place and tranquility of the area. The route will pass close to a number of isolated settlements introducing a new feature into their views. Mitigation in the form of planting and landscape bunds along the route could potentially reduce the landscape character and visual effects but considering the lack of intervening vegetation the route is likely to remain visible from most of the viewpoints.
Townscape	N/A N/A
Historic environment	2 (Moderate Adverse) There are no designated (protected) archaeological or built heritage assets within the route, though there are 14 Grade II listed buildings within a 500m buffer of the route. The setting of these assets may be adversely impacted by the proposed route upgrade, though the overall heritage significance of these assets is unlikely to be affected. The route does not lie within or adjacent to an LPA conservation area or LPA archaeological priority area. The natural sand and gravel geology, which underlies much of the route, combined with the proximity to the River Wensum and River Tud, would have made it attractive to early settlement and archaeological survival across the site is likely to be high, except in areas of former quarry pits, and at a shallow depth below ground. The presence and nature of any buried archaeological remains is uncertain at this stage but the construction associated with the upgrade would truncate or completely remove any such remains present within the footprint of the works.
Biodiversity	3 (Slight Adverse) The route would cause habitat loss of Old Covert, Wood Lane CWS and Weston Meadow CWS. There is the potential for loss of broadleaved woodland, grassland, arable fields and hedgerows. Therefore the likely impact will be slight adverse.
Water environment	3 (Slight Adverse) The updated road will cross the River Wensum, however this section of road is unchanged and will use existing crossing. The likely intensification of traffic could have an adverse effect upon highway runoff.

Environmental Appraisal

Option name/no.	Option 77: Outer ring road widening
Description	Widening of the existing outer ring road (A47 / A146 / A140 / A1042) to improve capacity, connectivity journey time and reliability, while improving access to Norwich from the western quadrant.

Topic

Noise	3 (Slight Adverse)	Widening of the outer ring roads may lead to a greater capacity of traffic. However, without traffic modelling data it is not known what the impacts on traffic flow will be and therefore, currently, the likely effect is slightly adverse.
Air quality	3 (Slight Adverse)	The widening of the outer ring road could cause a slight increase in traffic and therefore traffic emissions. Without traffic modelling it is not known to what extent this would be to. Therefore, the likely significance of effect is slight adverse.
Greenhouse gases	3 (Slight Adverse)	Widening the route could lead to reduced congestion which could reduce localised greenhouse gases along this route. However, more cars will pass through per time period and therefore the likely impacts on air quality are slight adverse. However, as the option does not include any new development any additional traffic is unlikely to be significant and therefore the change in greenhouse gases is likely to be limited.
Landscape	N/A	N/A
Townscape	2 (Moderate Adverse)	Widening the outer ring road will have a minor adverse effect on the townscape character due to loss of trees and verges, footway narrowing and intensification of highway infrastructure including additional signage, lighting and associated hard standings. This option will reduce the distance to residential properties and considering limited potential for mitigation planting in some locations, this option is likely to increase the effects on receptors.
Historic environment	1 (Large Adverse)	There are no designated (protected) archaeological or built heritage assets within the route, though there are 14 Grade II listed buildings within a 500m buffer of the route. The setting of these assets may be adversely impacted by the proposed route upgrade, though the overall heritage significance of these assets is unlikely to be affected. The route does not lie within or adjacent to an LPA conservation area or LPA archaeological priority area. The natural sand and gravel geology, which underlies much of the route, combined with the proximity to the River Wensum and River Tud, would have made it attractive to early settlement and archaeological survival across the site is likely to be high, except in areas of former quarry pits, and at a shallow depth below ground. The presence and nature of any buried archaeological remains is uncertain at this stage but the construction associated with the upgrade would truncate or completely remove any such remains present within the footprint of the works.
Biodiversity	3 (Slight Adverse)	There is little anticipated changes to biodiversity from widening the outer ring road. There is the potential for habitat loss at Mousehold Heath and adjacent to the River Wensum. Therefore the likely impact will be slight adverse.
Water environment	3 (Slight Adverse)	The widening of the outer ring road crosses over the River Wensum, therefore widening may lead to adverse impacts on the river and the flood zone surrounding it. Without further information the likely effect on the water environment is slight adverse.

Environmental Appraisal

Option name/no.	Option 78: Do nothing
Description	No change

Topic

Noise	4 (Neutral)	N/A
Air quality	4 (Neutral)	N/A
Greenhouse gases	4 (Neutral)	N/A
Landscape	4 (Neutral)	N/A
Townscape	N/A	N/A
Historic environment	4 (Neutral)	N/A
Biodiversity	4 (Neutral)	N/A
Water environment	4 (Neutral)	N/A

Environmental Appraisal

Option name/no.	Option 79: Pink line (2018), single carriageway
Description	From the A1067, west of the junction with the A1270 at Deighton Hills, Option 79 heads west, crossing the River Wensum, before routing south-west crossing a number of local roads (Ringland Lane, Weston Road). The route then passes east of Weston Green, before, crossing Breck Road and The Broadway to connect with the A47 to the north-west of Honingham at the existing Wood Lane / Berry's Lane junction. Option 79 would be of single carriageway standard.

Topic

Noise	2 (Moderate Adverse)	The route passes quite close to small settlements st Weston Green and various isolated dwellings. The new road does not follow any current roads and almost completely an offline option. Therefore it will introduce a new noise source to the rural location. The route is more rural than some of the other offline options and therefore the number of properties affected will be slightly less than other options. Therefore the overall significance of effect is likely to be moderate adverse.
Air quality	3 (Slight Adverse)	The route passes quite close to small settlements st Weston Green and various isolated dwellings. The new road does not follow any current roads and almost completely an offline option. The new road is relatively rural and is unlikely to affect a great number of properties in terms of air pollution. The dwellings that are relatively close are unlikely to experience road traffic pollutants at concentrations near to the objective levels. Furthermore the introduction of a new road, whilst close to houses, is not adjacent to housing and hence is therefore unlikely to lead to a new breach of the objective levels. The option at this stage is not thought likely to affect the concentrations of NO2 in the City Centre AQMA to the degree that will significantly affect its designation.
Greenhouse gases	3 (Slight Adverse)	The route will amend the flow of traffic around Norwich and at this early stage without traffic modelling, it is unknown whether this will lead to a significant growth in traffic and a change in average speeds. However, as the option does not include any new development any additional traffic is unlikely to be significant and therefore the change in greenhouse gases is likely to be limited.
Landscape	2 (Moderate Adverse)	The new route will contribute to a significant loss of agricultural land and woodland at Foxburrow Plantation, along The Broadway and the Long Plantation the last of which is an ancient woodland. The new route also cuts across the River Wensum a moderately sensitive landscape due to its recreational value and scenic quality leading to a detracton from the current character of the landscape. The route passes close to few isolated residential properties and east of Weston Green settlement where there is minimum intervening vegetation. Proposed screening vegetation and bunds along the route would decrease the landscape and visual effects but due to lack of substantial intervening vegetation and the proximity to the settlements is likely to be a significant deterioration of the existing views.
Townscape	N/A	N/A
Historic environment	3 (Slight Adverse)	There are no designated (protected) archaeological or built heritage assets within the route, though there are two Grade II listed buildings within a 500m buffer of the route. The setting of these assets may be adversely impacted by the proposed development, though the overall heritage significance of these assets is unlikely to be affected. The route does not lie within or adjacent to an LPA conservation area or LPA archaeological priority area. The natural sand and gravel geology, which underlies much of the route, combined with the proximity to the River Wensum and River Tud, would have made it attractive to early settlement and archaeological survival across the site is likely to be high, except in areas of former quarry pits, and at a shallow depth below ground. The presence and nature of any buried archaeological remains is uncertain at this stage but the new road would truncate or completely remove any such remains present within its footprint.
Biodiversity	2 (Moderate Adverse)	The route will include a new crossing over the River Wensum SAC/SSSI, no significant negative impacts assumed due to design and mitigation. The route will cause habitat loss of Wensum Pastures at Morton Hall CWS, Broom and Spring Hills CWS, Land adjoining Foxburrow Plantation CWS, Roadside Nature Reserve 59 and a proposed CWS adjacent to the River Wensum. The route is adjacent to Primrose Grove Ancient Woodland. There will be loss and severance of broadleaved woodland, grassland, arable fields and hedgerows.
Water environment	2 (Moderate Adverse)	The route will include a new crossing over the River Wensum, however it will not cross the River Tud. This additional infrastructure over the River Wensum could affect geomorphology of the river and will provide a pathway for road runoff to enter the water courses, which could potentially result in significant adverse impacts on the quality of the river. As it does not cross the River Tud, the overall impacts, compared to other options where the new road crosses both rivers, is likely to be slight adverse.

Environmental Appraisal

Option name/no.	Option 80: Pink line (2018), dual carriageway
Description	From the A1067, west of the junction with the A1270 at Deighton Hills, Option 80 heads west, crossing the River Wensum, before routing south-west crossing a number of local roads (Ringland Lane, Weston Road). The route then passes east of Weston Green, before, crossing Breck Road and The Broadway to connect with the A47 to the north-west of Honingham at the existing Wood Lane / Berry's Lane junction. Option 80 would be of dual carriageway standard. Upgrades to the A1067 to dual carriageway standard may also be required.

Topic

Noise	2 (Moderate Adverse)	The route passes quite close to small settlements st Weston Green and various isolated dwellings. The new road does not follow any current roads and almost completely an offline option. Therefore it will introduce a new noise source to the rural location. The route is more rural than some of the other offline options and therefore the number of properties affected will be slightly less than other options. Therefore the overall significance of effect is likely to be moderate adverse.
Air quality	3 (Slight Adverse)	The route passes quite close to small settlements st Weston Green and various isolated dwellings. The new road does not follow any current roads and almost completely an offline option. The new road is relatively rural and is unlikely to affect a great number of properties in terms of air pollution. The dwellings that are relatively close are unlikely to experience road traffic pollutants at concentrations near to the objective levels. Furthermore the introduction of a new road, whilst close to houses, is not adjacent to housing and hence is therefore unlikely to lead to a new breach of the objective levels. The option at this stage is not thought likely to affect the concentrations of NO2 in the City Centre AQMA to the degree that will significantly affect its designation.
Greenhouse gases	3 (Slight Adverse)	The route will amend the flow of traffic around Norwich and at this early stage without traffic modelling, it is unknown whether this will lead to a significant growth in traffic and a change in average speeds. However, as the option does not include any new development any additional traffic is unlikely to be significant and therefore the change in greenhouse gases is likely to be limited.
Landscape	2 (Moderate Adverse)	The new route will contribute to a significant loss of agricultural land and woodland at Foxburrow Plantation, along The Broadway and the Long Plantation the last of which is an ancient woodland. The new route also cuts across the River Wensum a moderately sensitive landscape due to its recreational value and scenic quality leading to a detracton from the current character of the landscape. The route passes close to few isolated residential properties and east of Weston Green settlement where there is minimum intervening vegetation. Proposed screening vegetation and bunds along the route would decrease the landscape and visual effects but due to lack of substantial intervening vegetation and the proximity to the settlements is likely to be a significant deterioration of the existing views.
Townscape	N/A	N/A
Historic environment	3 (Slight Adverse)	There are no designated (protected) archaeological or built heritage assets within the route, though there are two Grade II listed buildings within a 500m buffer of the route. The setting of these assets may be adversely impacted by the proposed development, though the overall heritage significance of these assets is unlikely to be affected. The route does not lie within or adjacent to an LPA conservation area or LPA archaeological priority area. The natural sand and gravel geology, which underlies much of the route, combined with the proximity to the River Wensum and River Tud, would have made it attractive to early settlement and archaeological survival across the site is likely to be high, except in areas of former quarry pits, and at a shallow depth below ground. The presence and nature of any buried archaeological remains is uncertain at this stage but the new road would truncate or completely remove any such remains present within its footprint.
Biodiversity	2 (Moderate Adverse)	The route will include a new crossing over the River Wensum SAC/SSSI, no significant negative impacts assumed due to design and mitigation. The route will cause habitat loss of Wensum Pastures at Morton Hall CWS, Broom and Spring Hills CWS, Land adjoining Foxburrow Plantation CWS, Roadside Nature Reserve 59 and a proposed CWS adjacent to the River Wensum. The route is adjacent to Primrose Grove Ancient Woodland. There will be loss and severance of broadleaved woodland, grassland, arable fields and hedgerows.
Water environment	2 (Moderate Adverse)	The route will include a new crossing over the River Wensum, however it will not cross the River Tud. This additional infrastructure over the River Wensum could affect geomorphology of the river and will provide a pathway for road runoff to enter the water courses, which could potentially result in significant adverse impacts on the quality of the river. As it does not cross the River Tud, the overall impacts, compared to other options where the new road crosses both rivers, is likely to be slight adverse.

Environmental Appraisal

Option name/no.	Option 81: Yellow line (2018), single carriageway
Description	From the A1067, west of the junction with the A1270 at Deighton Hills, Option 81 heads west, crossing the River Wensum and Ringland Lane, before routeing south-east crossing Weston Road and skirting to the east of Blackbreck Plantation and Poets Breck. The route then heads south-west crossing Weston Road for a second time, before passing west of Hill Farm. Option 81 then crosses the River Tud to connect with the A47 to the west of Easton at the existing Taverham Road junction. Option 81 would be of single carriageway standard.

Topic	
Noise	2 (Moderate Adverse) The route doesn't pass close to any large settlements, but it will pass quite close to some isolated dwellings. Therefore this option will introduce a new noise source to a rural location. The number of properties affected is likely to be less than other new route options, as it predominately passes through agricultural fields. It is likely to have an overall significance of moderate adverse due to the creation of a new noise source in a relatively rural environment.
Air quality	3 (Slight Adverse) The route doesn't pass close to any large settlements, but it will pass quite close to some isolated dwellings. Therefore the introduction of a new road, whilst close to isolated dwellings, is not adjacent to housing and hence is therefore unlikely to lead to a new breach of the objective levels. The option at this stage is not thought likely to affect the concentrations of NO2 in the City Centre AQMA to the degree that will significantly affect its designation.
Greenhouse gases	3 (Slight Adverse) The route will amend the flow of traffic around Norwich and at this early stage without traffic modelling, it is unknown whether this will lead to a significant growth in traffic and a change in average speeds. However, as the option does not include any new development any additional traffic is unlikely to be significant and therefore the change in greenhouse gases is likely to be limited.
Landscape	2 (Moderate Adverse) This option will result in a noticeable loss of agricultural land and hedgerows but minor loss of woodland at Long Plantation and Poetsbreck Plantation. The route crosses the River Wensum and River Tud, both of which are valuable components of the landscape character and any new structure would potentially detract from the character of the landscape. However, this option is in close proximity to only a few isolated residential properties east of Taverham Road and Weston Green Road and therefore in terms of visual effects the numbers of properties affected is less compared to other options. This option is likely to have an overall significance of moderate adverse effects due to a noticeable change of landscape character around both rivers but particularly around the River Wensum.
Townscape	N/A N/A
Historic environment	3 (Slight Adverse) There are no designated (protected) archaeological or built heritage assets within the route, though there are four listed buildings within a 500m buffer of the route, one of which is Grade II*. The setting of these assets may be adversely impacted by the proposed development, though the overall heritage significance of these assets is unlikely to be affected. The route does not lie within or adjacent to an LPA conservation area or LPA archaeological priority area. The natural sand and gravel geology, which underlies much of the route, combined with the proximity to the River Wensum and River Tud, would have made it attractive to early settlement and archaeological survival across the site is likely to be high, except in areas of former quarry pits, and at a shallow depth below ground. The presence and nature of any buried archaeological remains is uncertain at this stage but the new road would truncate or completely remove any such remains present within its footprint.
Biodiversity	2 (Moderate Adverse) The route will include a new crossing over the River Wensum SAC/SSSI, no significant negative impacts assumed due to design and mitigation. The route will cause habitat loss of 2 proposed CWSs, one adjacent to the River Wensum for 2018 and one site that is worthy of CWS status and Roadside Nature Reserve 59. The route is adjacent to Broom and Spring Hills CWS. There will be loss and severance of broadleaved woodland, grassland, arable fields and hedgerows.
Water environment	2 (Moderate Adverse) The route will include a new crossing over the River Wensum and the River Tud, a tributary of the River Wensum and a flood zone 3 area. This additional infrastructure over the river could affect geomorphology of the river and will provide a pathway for road run-off to enter the watercourses, which could potentially result in significant adverse impacts on the quality of the river.

Environmental Appraisal

Option name/no.	Option 82: Yellow line (2018), dual carriageway
Description	From the A1067, west of the junction with the A1270 at Deighton Hills, Option 82 heads west, crossing the River Wensum and Ringland Lane, before routeing south-east crossing Weston Road and skirting to the east of Blackbreck Plantation and Poets Breck. The route then heads south-west crossing Weston Road for a second time, before passing west of Hill Farm. Option 82 then crosses the River Tud to connect with the A47 to the west of Easton at the existing Taverham Road junction. Option 82 would be of dual carriageway standard. Upgrades to the A1067 to dual carriageway standard may also be required.

Topic	
Noise	2 (Moderate Adverse) The route doesn't pass close to any large settlements, but it will pass quite close to some isolated dwellings. Therefore this option will introduce a new noise source to a rural location. The number of properties affected is likely to be less than other new route options, as it predominately passes through agricultural fields. It is likely to have an overall significance of moderate adverse due to the creation of a new noise source in a relatively rural environment.
Air quality	3 (Slight Adverse) The route doesn't pass close to any large settlements, but it will pass quite close to some isolated dwellings. Therefore the introduction of a new road, whilst close to isolated dwellings, is not adjacent to housing and hence is therefore unlikely to lead to a new breach of the objective levels. The option at this stage is not thought likely to affect the concentrations of NO2 in the City Centre AQMA to the degree that will significantly affect its designation.
Greenhouse gases	3 (Slight Adverse) The route will amend the flow of traffic around Norwich and at this early stage without traffic modelling, it is unknown whether this will lead to a significant growth in traffic and a change in average speeds. However, as the option does not include any new development any additional traffic is unlikely to be significant and therefore the change in greenhouse gases is likely to be limited.
Landscape	2 (Moderate Adverse) This option will result in a noticeable loss of agricultural land and hedgerows but minor loss of woodland at Long Plantation and Poetsbreck Plantation. The route crosses the River Wensum and River Tud, both of which are valuable components of the landscape character and any new structure would potentially detract from the character of the landscape. However, this option is in close proximity to only a few isolated residential properties east of Taverham Road and Weston Green Road and therefore in terms of visual effects the numbers of properties affected is less compared to other options. This option is likely to have an overall significance of moderate adverse effects due to a noticeable change of landscape character around both rivers but particularly around the River Wensum.
Townscape	N/A N/A
Historic environment	3 (Slight Adverse) There are no designated (protected) archaeological or built heritage assets within the route, though there are four listed buildings within a 500m buffer of the route, one of which is Grade II*. The setting of these assets may be adversely impacted by the proposed development, though the overall heritage significance of these assets is unlikely to be affected. The route does not lie within or adjacent to an LPA conservation area or LPA archaeological priority area. The natural sand and gravel geology, which underlies much of the route, combined with the proximity to the River Wensum and River Tud, would have made it attractive to early settlement and archaeological survival across the site is likely to be high, except in areas of former quarry pits, and at a shallow depth below ground. The presence and nature of any buried archaeological remains is uncertain at this stage but the new road would truncate or completely remove any such remains present within its footprint.
Biodiversity	2 (Moderate Adverse) The route will include a new crossing over the River Wensum SAC/SSSI, no significant negative impacts assumed due to design and mitigation. The route will cause habitat loss of 2 proposed CWSs, one adjacent to the River Wensum for 2018 and one site that is worthy of CWS status and Roadside Nature Reserve 59. The route is adjacent to Broom and Spring Hills CWS. There will be loss and severance of broadleaved woodland, grassland, arable fields and hedgerows.
Water environment	2 (Moderate Adverse) The route will include a new crossing over the River Wensum and the River Tud, a tributary of the River Wensum and a flood zone 3 area. This additional infrastructure over the river could affect geomorphology of the river and will provide a pathway for road run-off to enter the watercourses, which could potentially result in significant adverse impacts on the quality of the river.

Appendix G

STRUCTURES APPRAISAL



Ref	Road name / reference at structure	OS grid reference (bridge ID)	Structure type / width (m)	Structural capacity	Option(s) relevant	Appraisal
Bridges crossing the River Wensum (upstream of Norwich, starting upstream)						
BR01	Mill Street Bridge	TG 05100 17840	Highway bridge	Unknown	N/A	Bridge carries single-lane carriageway, with a smaller bridge to the north crossing a separate drain. Construction of a compliant single or dual carriageway would likely require reconstruction.
BR02	Lyng Road, Pockthorpe	TG 07299 18006	Highway bridge / culvert - approximately 7m	Unknown	Option 42 Option 43	Bridge carries single carriageway with narrow grassed verges to both sides and no vehicle restraints / parapets. No impact on proposal
BR03	A1067 Norwich Road, Great Witchingham	TG 10217 18256	Highway bridge - 13m	Unknown; understood as 40 tonnes and 37.5HB	Option 49 Option 65	Carries single carriageway road with footways each side. Bridge is west of all road options.
BR04	Marriott's Way	TG 10341 18579	Former railway bridge	Unknown	Option 73	Disused railway bridge currently carries Marriott's Way foot / cycle path. Narrow structure not suitable for any road options. Existing foot / cycle path would need relocating off existing bridge for proposal.
BR05	Porter's Lane	TG 10732 18722	Highway bridge - 4.5m	Unknown	N/A	Two consecutive single lane structures over River Wensum
BR06	Marriott's Way	TG 12215 17776	Former railway bridge	Unknown	Option 73	Disused railway bridge currently carries Marriott's Way foot / cycle path. Narrow structure not suitable for any road options. Existing foot / cycle path would need relocating off existing bridge for proposal.

Ref	Road name / reference at structure	OS grid reference (bridge ID)	Structure type / width (m)	Structural capacity	Option(s) relevant	Appraisal
BR07	A1067 Fakenham Road Bridge 1, Attlebridge	TG 12824 16738	Highway bridge - 13m	Unknown; understood as 40 tonnes and 37.5HB	Option 1/2 Option 3/4 Option 5/6 Option 27/28 Option 29/30 Option 31/32 Option 49 Option 65 Option 75	Carries single carriageway road with wide verges. Can accommodate single carriageway options without minor modifications. Bridge width insufficient for dual carriageway; would require major widening works. No impact from improvements to bus services or provision of sprint services.
BR08A	Old Fakenham Road Bridge A, Attlebridge	TG 12821 16769	Disused highway bridge - 4.5m	Unknown	Option 2 Option 4 Option 6 Option 28 Option 30 Option 32 Option 49 Option 65	Carried Fakenham Road before construction of A1067, now carries foot/cycle traffic only; unlikely to be suitable for re-use as part of dualling of A1067.
BR08B	Old Fakenham Road Bridge B, Attlebridge	TG 12909 16793	Disused highway bridge - 4m	Unknown	As for BR08A	Carried Fakenham Road before construction of A1067, now carries foot/cycle traffic only; unlikely to be suitable for re-use as part of dualling of A1067.
BR09	A1067 Fakenham Road Bridge 2, Attlebridge	TG 12888 16713	Highway bridge - 13m	Unknown; understood as 40 tonnes and 37.5HB	As for BR07	Bridge is immediately east of BR06, with similar width. Similar appraisal as BR06.
BR10	Ringland Road Bridge	TG 14147 13707	Highway bridge - 5.5m	Posted 7.5t	Option 9/10 Option 11/12 Option 35/36 Option 42 Option 43	Currently carries single lane carriageway over River Wensum. Width inadequate for two-lane carriageway. Would require major widening and strengthening works or, given the age of the structure, demolition and reconstruction for reuse in a compliant road scheme. Should not be affected by speed limit changes or directional traffic management schemes.

Ref	Road name / reference at structure	OS grid reference (bridge ID)	Structure type / width (m)	Structural capacity	Option(s) relevant	Appraisal
BR11	Costessey Lane / Ringland Hills Bridge	TG 14233 12486	Unknown bridge	Unknown	Option 13/14 Option 15/16 Option 35/36	Currently carries track across River Wensum. Unlikely to be suitable for anything other than new / improved footpath / cycle path provisions.
BR12	Costessey Road (Taverham Bridge)	TG 15989 13711 (TG11400)	Highway bridge - 8m	Not currently available	Option 42 Option 43 Option 46	Currently narrow grass verges either side of carriageway - on line provision of a cycleway will reduce the existing carriageway width which is already substandard or bridge widening will be required if carriageway width is to remain unchanged. Existing parapet needs upgrading to provide appropriate height for cyclists. Bridge in good condition with minor to moderate cracking in deck and parapets needing repair ¹ .
BR13	Costessey Lane (near Costessey Mill weir)	TG 17676 12722	Highway bridge	Posted 7.5t	N/A	Narrow bridge over River Wensum upstream from weir. Unsuitable for any compliant carriageway option.
BR14	Marriott's Way (A-Frame bridge over River Wensum)	TG 17921 13256 (TG11402)	Footbridge - 5m	Full pedestrian Live loading	Option 59 Option 62 Option 73	Originally a railway bridge built in 1893 that has since been converted to a footbridge. Existing deck width and structural capacity may be sufficient to carry proposed rail options, depending on chosen design and subject to renovation and maintenance repainting. Vertical cracks in abutments suggest possible defects in substructure and foundations, which may require strengthening work ² . Alternatively, a new railway bridge may be required at this location. If rail option progressed, a new structure would be required to carry Marriott's Way pedestrians / cyclists.

¹ Principal Inspection Report, Taverham Bridge, Bridge No. TG 11400, Norfolk County Council, March 2010

² Principal Inspection Report, A Frame Bridge over River Wensum, Bridge No. TG 11402, Norfolk County Council, March 1998

Ref	Road name / reference at structure	OS grid reference (bridge ID)	Structure type / width (m)	Structural capacity	Option(s) relevant	Appraisal
BR15	Marriott's Way (bridge over The Street track)	TG 17991 13050	Unknown	Unknown	Option 59 Option 62 Option 73	Appraisal as per BR14.
Bridges crossing the River Tud (upstream of Norwich, starting upstream)						
BR16	A47 near Honingham	TG 10609 11830	Highway bridge - 13.5m	Unknown but presumed 40 tonnes and 37.5HB	Option 64 Option 74	Carries existing A47 single carriageway with hatched median and wide verges. May be improved or widened as part of future Highways England scheme. Should be suitable for currently proposed options.
BR17	Taverham Road (Church Farm Bridge)	TG 11810 11255 (TG11308)	Highway bridge - 5.5m	40 tonnes and 30HB	Option 69/70	Original concrete filler beam deck was replaced in 2010 with a reinforced concrete slab ³ . Current width insufficient to accommodate a compliant single / dual carriageway. Bridge widening or a new bridge will be required for proposed options.
BR18	Ringland Road (near Hill Farm)	TG 13351 11488	Highway bridge & separate footbridge	Unknown	Option 35/36	Structure type unknown but key-klamp parapets suggest old structure. Single lane carriageway unlikely to accommodate additional lanes without major widening works or reconstruction.
BR19	Lodge Farm Road Bridge	TG 14042 11623	Track bridge	Unknown	N/A	No information available but likely to be unsuitable for any road option.
BR20	Track bridge near Lord's Hills / Longdell Hills	TG 14498 11543	Track bridge	N/A	N/A	Not considered; likely to be unsuitable.

³ Approval in Principle, Church Farm Bridge, Bridge No. TG11308, Norfolk County Council, November 2009

Ref	Road name / reference at structure	OS grid reference (bridge ID)	Structure type / width (m)	Structural capacity	Option(s) relevant	Appraisal
BR21	Sir Alfred Munnings Road (Queens Hills Bridge)	TG 15323 11604 (TG11427)	Highway bridge - 13m	40 tonnes and 30HB	Option 46 Option 50 Option 60	Bridge constructed in 2005 and in good condition ⁴ . Currently 4m wide foot / cycle way provided to the east of the carriageway, so suitable for cycling links. Structure should be suitable for on-road bus services. Subject to the current bridge capacity, no structural modification may be necessary to carry a very light rail system up to 40 tonnes.
BR22	Longwater Lane (Longwater Lane Bridge)	TG 16958 11277 (TG11407)	Highway bridge - 12m	Carriageway 40 tonnes and 37.5HB; footway 7.5 tonnes	Option 25/26 Option 35/36 Option 50	Bridge constructed in 1968 and in good condition ⁵ . Strengthening will be required to accommodate a compliant single carriageway as verge areas have substandard capacity. Bridge strengthening and widening or reconstruction will be required to accommodate a compliant dual carriageway. Original bridge adjacent no longer used by vehicles. Adjacent Costessey Centre, school and playing fields.

⁴ Principal Inspection Report, Queens Hills Bridge, Bridge No. TG11427, February 2013

⁵ Principal Inspection Report, Longwater Lane Bridge, Bridge No. TG11407, June 2004

Ref	Road name / reference at structure	OS grid reference (bridge ID)	Structure type / width (m)	Structural capacity	Option(s) relevant	Appraisal
BR23	Norwich Road (Rogers Bridge)	TG 18477 11185 (TG11410)	Highway bridge - 6m	40 tonnes and 15HB	Option 42 Option 43 Option 46 Option 50 Option 60	Bridge carries single carriageway with no verge or footways. Bridge in good condition with minor cracks in brickwork ⁶ . On line provision of cycleway will reduce the existing carriageway width, which is already substandard. Bridge widening or new bridge will be required if carriageway width is to remain unchanged. The case is similar for a very light rail system except that the rail system may be able to share the existing carriageway width with other road vehicles without needing to widen the bridge, provided the bridge capacity is sufficient. No impact from speed limit changes and directional traffic management schemes. This may help facilitate cycling / light rail options due to limited deck width.
BR24	Red Bridge Lane	TG 19120 10939	Road bridge with separate footbridge	Unknown	N/A	Presumed to carry single track.
BR25	Marriott's Way (near Costessey)	TG 19532 10373	Disused railway bridge	Unknown	Option 59 Option 62 Option 73	Disused railway bridge currently carries Marriott's Way foot / cycle path. Narrow structure not suitable for any road options. Existing foot / cycle path would need relocating off existing bridge for proposal.
BR26	Hellesdon Mill Bridge	TG 19887 10453	Track bridge	Unknown	N/A	Four-barrel culvert bridge not publicly accessible.
Other bridges and bridges in Norwich City Centre						

⁶ Principal Inspection Report, Rogers Bridge, Bridge No. TG11410, Norfolk County Council, June 2004

Ref	Road name / reference at structure	OS grid reference (bridge ID)	Structure type / width (m)	Structural capacity	Option(s) relevant	Appraisal
BR27	A47 Fox Lane Bridge (North Tuddenham Exit over)	TG 05303 13724	Highway bridge (<i>Highways England structure</i>)	Not currently available	Option 27/28 Option 75	Bridge carries single carriageway with standard width verges over A47, forming part of junction. Would require widening or reconstruction to accommodate more lanes if a dual carriageway is proposed, or a new junction interchange bridge build. OK for single carriageway.
BR28	Dereham Road / A47 IC	TG 15561 10600 (TG11416)	Highway bridge - 13m (<i>Highways England structure</i>)	Not currently available	Option 13/14 Option 15/16 Option 17/18 Option 19/20 Option 38 Option 46 Option 50 Option 61 Option 64	The proposed options have no structural implication on existing bridge.
BR29	<i>Deleted</i>					
BR30	Dereham Road (Bowthorpe Pedestrian Subway)	TG 18016 09978 (TG10237)	Highway bridge - 14m	40 tonnes and 45HB	Option 38 Option 46 Option 50 Option 61 Option 61 Option 64 Option 74	Concrete box culvert constructed in 1976 and in fair condition ⁷ . Existing bridge carries a dual carriageway - no structural modification is necessary for the proposed options. May require widening to accommodate a fully offline busway or if very light rail is off-road. Alternatively, there may be sufficient space to rearrange the carriageway layout. Should be unaffected by other bus options. Existing parapet needs upgrading to provide appropriate height for cyclists.
BR31	Hellesdon Road Bridge (over River Wensum)	TG 19864 10075	Highway bridge - 4.5m	Posted 3t	Option 74	Steel girder bridge. Weak bridge carries single lane carriageway with footbridge alongside. Structure may require strengthening for bus route.

⁷ Principal Inspection Report, Bowthorpe Pedestrian Subway, Bridge No. TG10237, November 1994

Ref	Road name / reference at structure	OS grid reference (bridge ID)	Structure type / width (m)	Structural capacity	Option(s) relevant	Appraisal
BR32	Marriotts' Way (Hellesdon A Frame Bridge over River Wensum)	TG 19933 09987 (TG10229)	Footbridge - 5m	Full pedestrian live loading	Option 59 Option 62 Option 73	Originally a railway bridge built in 1882 that has since been converted to a footbridge. Existing deck width and structural capacity may be sufficient to carry proposed rail options, depending on chosen design and subject to renovation and maintenance repainting. The secondary deck elements (i.e. jack arches) near the abutments were previously reported as unsafe which, if not already addressed, requires repair ⁸ . Alternatively, a new railway bridge may be required at this location.
BR33	Sweet Briar Road (Sweet Briar Road Bridge)	TG 20619 09945 (TG20110)	Highway bridge - 13.5m	40 tonnes	Option 76 Option 59 Option 62 Option 73	Concrete filler beam and jack arch bridge built in 1930s, crosses over Marriott's Way (disused rail line now a foot/cycle path). Structure in good condition with minor concrete cracking and some defects in fascia brickwork ⁹ . A compliant single carriageway is already provided over the bridge. Bridge widening will be required to accommodate a dual carriageway. Rail options cross underneath bridge so should not affect it.
BR34	Sweet Briar Road (Sweet Briar Road over River Wensum)	TG 20628 09526 (TG20112)	Highway bridge - 15m	40 tonnes and 31HB	Option 76	A reinforce concrete beam and slab bridge built in 1930s with an arch fascia. Structure in good condition with minor concrete spalling and cracking ¹⁰ . A compliant single carriageway is already provided over the bridge. Bridge widening will be required to accommodate a dual carriageway. But to preserve the unique appearance of the edge fascia, widening the existing bridge is not thought to be desirable. A new bridge is most likely required.

⁸ Principal Inspection Report, Hellesdon A Frame Bridge, Bridge No. TG 10229, Norfolk County Council, March 2004

⁹ Principal Inspection Report, Sweet Briar Road Bridge, Bridge No. TG20110, Norfolk County Council, January 2010

¹⁰ Principal Inspection Report, Sweet Briar Road Over River Wensum, Bridge No. TG20112, Norfolk County Council, March 2008

Ref	Road name / reference at structure	OS grid reference (bridge ID)	Structure type / width (m)	Structural capacity	Option(s) relevant	Appraisal
BR35	Mile Cross Road A1024 (Mile Cross Road Bridge over Wensum)	TG 21735 09894 (TG20113)	Highway bridge - 12m	Carriageway 40 tonnes; footway sufficient for pedestrian live loading only	Option 46	Currently 1.7m wide footway / verge each side of the carriageway. If the carriageway width is to remain unchanged, bridge widening will be required to provide a compliant foot / cycleway. Bridge in fair condition with minor to moderate concrete defects needing repair ¹¹ .
BR36	Mile Cross Road A1024 (Mile Cross Road Bridge)	TG 21713 10029 (TG21300)	Highway bridge - 12m	Carriageway 40 tonnes; footway 7.5 tonnes	Option 46 Option 59 Option 62 Option 73	Bridge constructed in 1928 and in fair condition with minor concrete cracking ¹² crosses over Marriott's Way (disused rail line now a foot / cycle path). Currently 1.5m wide footway / verge each side of the carriageway. If the carriageway width is to remain unchanged, bridge widening will be required to provide a compliant foot / cycleway. Rail options cross underneath bridge so should not affect it.
BR37	Marriott's Way (Dragon Crossing Footbridge)	TG 22131 09912 (TG20184)	Footbridge Varying width - 3-4m	Full pedestrian live loading	Option 59 Option 62 Option 73	Steel footbridge constructed in 2000; currently in good condition with minor cracking to concrete abutment ¹³ . Existing deck width and structural capacity are not suitable to carry the proposed rail options and a new railway bridge would be required.
BR38	St Crispins Road (Bridge over River Wensum)		Highway bridge - 12m and 11m		Option 63	Twin structure carrying two eastbound lanes and two westbound lanes of St Crispins Road (Inner Ring Road). Westbound bridge cannot accommodate carriageway widening without widening structure itself. Parapets already protected by trief kerbs. Eastbound bridge has wide footway/cycleway with double kerb.

¹¹ Principal Inspection Report, Mile Cross Road Bridge over the River Wensum, Bridge No. TG20113, Norfolk County Council, October 2010

¹² Principal Inspection Report, Mile Cross Road Bridge, Bridge No. TG21300, Norfolk County Council, January 2013

¹³ Principal Inspection Report, Dragon Crossing Footbridge, Bridge No. TG20184, Norfolk County Council, January 2015

Ref	Road name / reference at structure	OS grid reference (bridge ID)	Structure type / width (m)	Structural capacity	Option(s) relevant	Appraisal
BR39	St Crispins Road (Magdalen Street Flyover)	TG 23077 09279 (TG20119)	Highway bridge - 18m	40 tonnes and 30HB	Option 63	Structure in good condition with localised concrete spalling and reinforcement corrosion ¹⁴ . Currently carrying a dual carriageway. Narrow raised verges mean increasing number of lanes further would require widening the structure. Further bridge widening is possible but may be constrained by the lower level highway and properties to the south.
BR40	Carrow Road (Carrow Road River Bridge)	TG 23908 07735 (TG20100)	Highway bridge - 11m	40 tonnes (assessment ongoing, subject to confirmation)	Option 63 Option 76	Carries two lane single carriageway forming both the Inner and Outer Ring Road. Structure in fair condition with minor cracking to concrete and some localised corrosion to steel members ¹⁵ . Structure contains a bespoke steel rolling bascule span for which widening to support a compliant single / dual carriageway will not be possible and a new bridge would therefore be required.
BR41	Carrow Road (Carrow Road Rail Bridge)	TG 24382 08033 (TG20130)	Highway bridge - 13.5m	40 tonnes and 45HB (footways 7.5 tonnes but protected from accidental vehicle loading)	Option 76	Carries two lane single carriageway forming part of Outer Ring Road. Prestressed concrete beam and slab bridge constructed in 1965, spanning over all railway lines into Norwich Station. Structure in good condition with some hairline cracks and minor spalling ¹⁶ . Bridge widening and strengthening would be required to accommodate any additional carriageway lanes.

Structures to the West (associated with Fakenham to Norwich Rail Line)

¹⁴ Principal Inspection Report, Magdalen Street Flyover, Bridge No. TG20119, Norfolk County Council, April 2018

¹⁵ Principal Inspection Report, Carrow Road River Bridge, Bridge No. TG20100, Norfolk County Council, October 2012

¹⁶ Principal Inspection Report, Carrow Road Rail Bridge, Bridge No. TG20130, Norfolk County Council, October 2008

Ref	Road name / reference at structure	OS grid reference (bridge ID)	Structure type / width (m)	Structural capacity	Option(s) relevant	Appraisal
BR42	Blackwater Lane (Ex-British Rail No. 270)	TG 09082 20093 (TG02419)	Highway bridge - 5m	7.5 tonnes	Option 73	Existing bridge spans over the proposed route alignment, which may restrict the achievable cross-section and headroom. Alternatively, a new highway bridge will be required to permit the desirable railway cross-section and headroom.
BR43	Marriott's Way (Whitwell Common Bridge)	TG 08956 20556 (TG02430)	Footbridge < 3m	Not currently available	Option 73	Most likely a railway bridge originally built in 1880s that has since been converted to a footbridge. Structure is in fair condition possibly with brickwork defects needing repair ¹⁷ . Existing deck width and structural capacity may be sufficient to carry proposed rail options, depending on chosen design and subject to renovation and maintenance repair. Alternatively, a new railway bridge may be required at this location.
BR44	Marriott's Way (Whitwell Bridge)	TG 09046 21179 (TG02426)	Footbridge - 4m	40 tonnes	Option 73	Originally a railway bridge built in 1880s that has since been converted to a footbridge. Existing deck width and structural capacity may be sufficient to carry proposed rail options, depending on chosen design and subject to renovation and maintenance repair. Alternatively, a new railway bridge may be required at this location.

¹⁷ Email 03/09/2018, Norfolk County Council

Ref	Road name / reference at structure	OS grid reference (bridge ID)	Structure type / width (m)	Structural capacity	Option(s) relevant	Appraisal
BR45	Marriott's Way (Pettywell Bridge)	TG 07790 23007 (TG02425)	Footbridge - 4m	40 tonnes and 43.9HB	Option 73	Originally a railway bridge built in 1880s that has since been converted to a footbridge. Structure in fair condition with some corrosion in structural steelwork and moderate concrete spalling to localised areas ¹⁸ . Existing deck width and structural capacity may be sufficient to carry proposed rail options, depending on chosen design and subject to renovation and maintenance repair. Alternatively, a new railway bridge may be required at this location.
BR46	Marriott's Way (Wood Farm Bridge)	TG 07227 23170 (TG02424)	Footbridge - 4m	40 tonnes	Option 73	Originally a railway bridge built in 1880s that has since been converted to a footbridge. Structure in fair condition with some surface corrosion to structural steelwork and localised spalling and cracking in brickwork ¹⁹ . Existing deck width and structural capacity may be sufficient to carry proposed rail options, depending on chosen design and subject to renovation and maintenance repair. Alternatively, a new railway bridge may be required at this location.
BR47	A1065 (Gogg's Mill Bridge)	TF 91291 29665 (TF92100)	Highway bridge - 13m	40 tonnes and 22.5HB; (footway protected from accidental vehicle loading)	Option 73	Structure in good condition with minor concrete cracking and delamination to localised areas ²⁰ . Existing deck width and capacity unlikely to be sufficient to accommodate highway and rail traffic at the same time. A new railway bridge may be required.

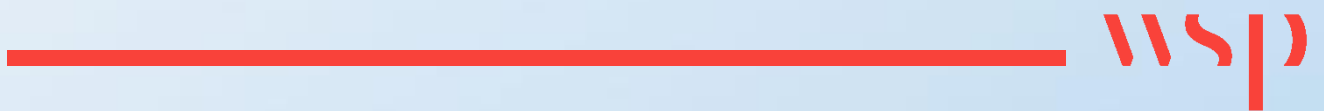
¹⁸ Principal Inspection Report, Pettywell Bridge, Bridge No. TG02425, Norfolk County Council, August 1997

¹⁹ Principal Inspection Report, Wood Farm Bridge, Bridge No. TG02424, Norfolk County Council, September 1997

²⁰ Principal Inspection Report, Gogg's Mill Bridge, Bridge No. TF92100, Norfolk County Council, January 2005

Appendix H

DISCOUNTED OPTIONS



Option and description	Reasoning
Option 1: A1067 Attlebridge to A47 west of Honingham; 2014 Purple (1A), single carriageway	Discounted based on the overall performance against the “Do Nothing” option, and therefore does not offer good value for money.
Option 3: A1067 Attlebridge to A47 west of Honingham; 2014 Purple (2A), single carriageway	Discounted on the basis that the dual carriageway variation will produce the most robust assessment in terms of potential land take, costing and environmental concerns. The single carriageway variation of shortlisted options may be reinstated during later appraisal stages, if necessary.
Option 4: A1067 Attlebridge to A47 west of Honingham; 2014 Purple (2A), dual carriageway	Discounted as it did not perform as well as the competing new highway link options. Compared with Option 2, Option 4 crosses the strategic gas main and intersects a County Wildlife Site on two separate occasions.
Option 5: A1067 Attlebridge to A47 west of Easton; 2014 Brown, single carriageway	Discounted on the basis that the dual carriageway variation will produce the most robust assessment in terms of potential land take, costing and environmental concerns. The single carriageway variation of shortlisted options may be reinstated during later appraisal stages, if necessary.
Option 6: A1067 Attlebridge to A47 west of Easton; 2014 Brown, dual carriageway	Discounted as it did not perform as well as the competing new highway link options. This related to the alignment running adjacent to the extra high voltage pylons for the longest distance, which would impact upon feasibility and scheme cost and add risk with construction in close proximity to such infrastructure. Option 6 also has the biggest impact on County Wildlife Sites, severing a large County Wildlife Site in two.
Option 7: A1067 (west of A1067 / A1270 junction) to A47 west of Easton; 2014 Red, single carriageway	Discounted on the basis that the dual carriageway variation will produce the most robust assessment in terms of potential land take, costing and environmental concerns. The single carriageway variation of shortlisted options may be reinstated during later appraisal stages, if necessary.
Option 9: A1067 (east of A1067 / A1270 junction) to A47 west of Easton; 2014 Blue (1), single carriageway	Discounted on the basis that the dual carriageway variation will produce the most robust assessment in terms of potential land take, costing and environmental concerns. The single carriageway variation of shortlisted options may be reinstated during later appraisal stages, if necessary.
Option 10: A1067 (east of A1067 / A1270 junction) to A47 west of Easton; 2014 Blue (1), dual carriageway	Discounted as it did not perform as well as the competing new highway link options. This was due to challenging levels resulting in high costs associated with the proposed River Wensum crossing. The alignment also runs adjacent to the River Wensum for a significant distance, increasing risk and the potential for pollution. Option 10 would also impact upon the Wensum Valley Hotel, Golf and Country Club resulting in a significant commercial impact.

Option and description	Reasoning
<p>Option 11: A1067 / A1270 junction to A47 west of Easton; 2014 Blue (2), single carriageway</p>	<p>Discounted on the basis that the dual carriageway variation will produce the most robust assessment in terms of potential land take, costing and environmental concerns. The single carriageway variation of shortlisted options may be reinstated during later appraisal stages, if necessary.</p>
<p>Option 12: A1067 / A1270 junction to A47 west of Easton; 2014 Blue (2), dual carriageway</p>	<p>Discounted as it did not perform as well as the competing new highway link options. This was due to challenging levels resulting in high costs associated with the proposed River Wensum crossing. The alignment also runs adjacent to the River Wensum for a significant distance, increasing risk and the potential for pollution. Option 12 would also impact upon the Wensum Valley Hotel, Golf and Country Club resulting in a significant commercial impact.</p>
<p>Option 13: A1067 (east of A1067 / A1270 junction) to A47 / A1074 Longwater interchange; 2014 Orange (1), single carriageway</p>	<p>Discounted based on the overall performance against the “Do Nothing” option, and therefore does not offer good value for money.</p>
<p>Option 14: A1067 (east of A1067 / A1270 junction) to A47 / A1074 Longwater interchange; 2014 Orange (1), dual carriageway</p>	<p>Discounted based on the overall performance against the “Do Nothing” option, and therefore does not offer good value for money.</p>
<p>Option 15: A1067 / A1270 junction to A47 / A1074 Longwater interchange; 2014 Orange (2), single carriageway</p>	<p>Discounted based on the overall performance against the “Do Nothing” option, and therefore does not offer good value for money.</p>
<p>Option 16: A1067 / A1270 junction to A47 / A1074 Longwater interchange; 2014 Orange (2), dual carriageway</p>	<p>Discounted as it did not perform as well as the competing new highway link options. This was due to concerns related to the alignment running adjacent to the River Wensum for a significant distance, increasing risk and the potential for pollution. Potential significant commercial impact is also associated with route running through the Wensum Valley Hotel, Golf and Country Club and the impact upon Ancient Woodland. Option 16 also connects to the A47 at the Longwater Interchange, which may exacerbate existing issues.</p>
<p>Option 17: A1067 (east of A1067 / A1270 junction) to A47 / A1074 Longwater interchange; 2014 Orange (3), single carriageway</p>	<p>Discounted based on the overall performance against the “Do Nothing” option, and therefore does not offer good value for money.</p>
<p>Option 18: A1067 (east of A1067 / A1270 junction) to A47 / A1074 Longwater interchange; 2014 Orange (3), dual carriageway</p>	<p>Discounted based on the overall performance against the “Do Nothing” option, and therefore does not offer good value for money.</p>
<p>Option 19: A1067 / A1270 junction to A47 / A1074 Longwater interchange; 2014 Orange (4), single carriageway</p>	<p>Discounted based on the overall performance against the “Do Nothing” option, and therefore does not offer good value for money.</p>

Option and description	Reasoning
<p>Option 20: A1067 / A1270 junction to A47 / A1074 Longwater interchange; 2014 Orange (4), dual carriageway</p>	<p>Discounted as it did not perform as well as the competing new highway link options. This was due to concerns related to the alignment running adjacent to the River Wensum for a significant distance, increasing risk and the potential for pollution. Potential significant commercial impact is also associated with route running through the Wensum Valley Hotel, Golf and Country Club. Option 20 also connects to the A47 at the Longwater Interchange, which may exacerbate existing issues.</p>
<p>Option 21: A1067 (east of A1067 / A1270 junction) to A1074 east of Longwater; 2014 Orange (5), single carriageway</p>	<p>Discounted based on the overall performance against the “Do Nothing” option, and therefore does not offer good value for money.</p>
<p>Option 22: A1067 (east of A1067 / A1270 junction) to A1074 east of Longwater; 2014 Orange (5), dual carriageway</p>	<p>Discounted based on the overall performance against the “Do Nothing” option, and therefore does not offer good value for money.</p>
<p>Option 23: A1067 / A1270 junction to A1074 east of Longwater; 2014 Orange (6), single carriageway</p>	<p>Discounted based on the overall performance against the “Do Nothing” option, and therefore does not offer good value for money.</p>
<p>Option 24: A1067 / A1270 junction to A1074 east of Longwater; 2014 Orange (6), dual carriageway</p>	<p>Discounted based on the overall performance against the “Do Nothing” option, and therefore does not offer good value for money.</p>
<p>Option 25: A140 / A1270 junction to A1074 east of Longwater; 2014 Green, single carriageway</p>	<p>Discounted based on the overall performance against the “Do Nothing” option, and therefore does not offer good value for money.</p>
<p>Option 26: A140 / A1270 junction to A1074 east of Longwater; 2014 Green, dual carriageway</p>	<p>Discounted based on the overall performance against the “Do Nothing” option, and therefore does not offer good value for money.</p>
<p>Option 27: North Tuddenham via Attlebridge; 2018 Road Alignment (1), single carriageway</p>	<p>Discounted based on the overall performance against the “Do Nothing” option, and therefore does not offer good value for money.</p>
<p>Option 28: North Tuddenham via Attlebridge; 2018 Road Alignment (1), dual carriageway</p>	<p>Discounted as it did not perform as well as the competing new highway link options. This was due to the alignment length and intersection with the A47 west of Hockering, which does not align with the Highways England A47 RIS scheme. Compared with option alignments further east it would attract fewer trips, therefore Option 28 would be less likely to support the scheme objective, gain public support and deliver an acceptable Benefit to Cost Ratio.</p>
<p>Option 29: A47 Honingham to Attlebridge (1); 2018 Road Alignment (2), single carriageway</p>	<p>Discounted based on the overall performance against the “Do Nothing” option, and therefore does not offer good value for money.</p>

Option and description	Reasoning
Option 30: A47 Honingham to Attlebridge (1); 2018 Road Alignment (2), dual carriageway	Discounted as it did not perform as well as the competing new highway link options. This was due to passing close to settlements and within proximity to many farm buildings, therefore affecting more properties. The alignment also runs directly underneath the extra high voltage pylons, which would impact upon feasibility and scheme cost and add risk with construction. The proximity to Wood Lane near the junction with The Broadway is also likely to result in severance of the road network and directly impact upon farms and the connectivity between dwellings and land.
Option 31: A47 to Attlebridge (2), 2018 Road Alignment (3), single carriageway	Discounted based on the overall performance against the “Do Nothing” option, and therefore does not offer good value for money.
Option 32: A47 to Attlebridge (2), 2018 Road Alignment (3), dual carriageway	Discounted as it did not perform as well as the competing new highway link options. Option 32 would also cross the strategic gas main at two separate locations significantly increasing risk and potential cost.
Option 33: A47 Easton to A1067 / A1270 junction; 2018 Road Alignment (4), single carriageway	Discounted based on the overall performance against the “Do Nothing” option, and therefore does not offer good value for money.
Option 34: A47 Easton to A1067 / A1270 junction; 2018 Road Alignment (4), dual carriageway	Discounted based on the overall performance against the “Do Nothing” option, and therefore does not offer good value for money.
Option 35: A47 Easton to A1067 / A1270 junction; 2018 Road Alignment (5), single carriageway	Discounted based on the overall performance against the “Do Nothing” option, and therefore does not offer good value for money.
Option 36: A47 Easton to A1067 / A1270 junction; 2018 Road Alignment (5), dual carriageway	Discounted based on the overall performance against the “Do Nothing” option, and therefore does not offer good value for money.
Option 37: Tolled routes / bridges	Discounted based on the overall performance against the “Do Nothing” option, and therefore does not offer good value for money.
Option 38: Improvements to existing routes	Discounted based on the overall performance against the “Do Nothing” option, and therefore does not offer good value for money.
Option 42: Speed limit changes	Discounted based on the overall performance against the “Do Nothing” option, and therefore does not offer good value for money.
Option 43: Directional traffic management schemes	Discounted based on the overall performance against the “Do Nothing” option, and therefore does not offer good value for money.
Option 45: New wider footpath	Discounted based on the overall performance against the “Do Nothing” option, and therefore does not offer good value for money.

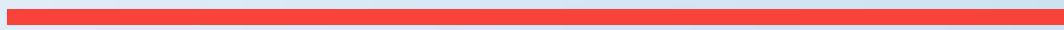
Option and description	Reasoning
Option 46: New cycling links to key facilities and services	Discounted based on the overall performance against the “Do Nothing” option, and therefore does not offer good value for money.
Option 47: Cycle parking facilities	Discounted based on the overall performance against the “Do Nothing” option, and therefore does not offer good value for money.
Option 48: New orbital bus route	Discounted based on the overall performance against the “Do Nothing” option, and therefore does not offer good value for money.
Option 51: Improved public transport information: real-time app	Discounted based on the overall performance against the “Do Nothing” option, and therefore does not offer good value for money.
Option 52: Improved public transport information: real-time information at stops	Discounted based on the overall performance against the “Do Nothing” option, and therefore does not offer good value for money.
Option 53: Update the digital road map	Discounted based on the overall performance against the “Do Nothing” option, and therefore does not offer good value for money.
Option 54: Develop local cycling and walking infrastructure plan	Discounted based on the overall performance against the “Do Nothing” option, and therefore does not offer good value for money.
Option 56: Develop green lung schemes	Discounted based on the overall performance against the “Do Nothing” option, and therefore does not offer good value for money.
Option 57: Bike-on-bus schemes	Discounted based on the overall performance against the “Do Nothing” option, and therefore does not offer good value for money.
Option 59: Light rail	Discounted based on the overall performance against the “Do Nothing” option, and therefore does not offer good value for money.
Option 60: Very light rail	Discounted based on the overall performance against the “Do Nothing” option, and therefore does not offer good value for money.
Option 61: Offline busway	Discounted based on the overall performance against the “Do Nothing” option, and therefore does not offer good value for money.
Option 62: New orbital rail line	Discounted based on the overall performance against the “Do Nothing” option, and therefore does not offer good value for money.
Option 63: Inner ring road widening	Discounted based on the overall performance against the “Do Nothing” option, and therefore does not offer good value for money.

Option and description	Reasoning
Option 64: Provision of sprint services: A47 / A1074	Discounted based on the overall performance against the “Do Nothing” option, and therefore does not offer good value for money.
Option 65: Provision of sprint services: A1067 corridor	Discounted based on the overall performance against the “Do Nothing” option, and therefore does not offer good value for money.
Option 66: Provision of a sustainable urban distribution centre	Discounted based on the overall performance against the “Do Nothing” option, and therefore does not offer good value for money.
Option 67: Provision of improved freight route intelligence	Discounted based on the overall performance against the “Do Nothing” option, and therefore does not offer good value for money.
Option 69: Purple line (2018 public consultation), single carriageway	Discounted on the basis that the dual carriageway variation will produce the most robust assessment in terms of potential land take, costing and environmental concerns. The single carriageway variation of shortlisted options may be reinstated during later appraisal stages, if necessary.
Option 70: Purple line (2018 public consultation), dual carriageway	Discounted as it did not perform as well as the competing new highway link options. Alignment crosses the strategic gas main and the Orsted Cable route at their intersection which would likely result in significant cost and risk. Option 70 is also reliant on an existing stretch of Taverham Road between residential properties and near listed buildings, which would have significant commercial implications.
Option 71: Blue line (2018 public consultation), single carriageway	Discounted on the basis that the dual carriageway variation will produce the most robust assessment in terms of potential land take, costing and environmental concerns. The single carriageway variation of shortlisted options may be reinstated during later appraisal stages, if necessary.
Option 72: Blue line (2018 public consultation), dual carriageway	Discounted as it did not perform as well as the competing new highway link options. Compared with Option 8, Option 72 is longer in length (by approximately 600m) and runs adjacent to the Orsted Cable route for a significant length, which would increase cost and risk. Option 72 also had a more significant topographical variation over its entire length which would again increase risk and cost.
Option 73: Relay Fakenham to Norwich rail line	Discounted based on the overall performance against the “Do Nothing” option, and therefore does not offer good value for money.
Option 76: Black line (2018 public consultation), existing route, dual carriageway	Discounted due to consideration of the consistency of the existing highway network.

Option and description	Reasoning
Option 77: Outer ring road widening	Discounted based on the overall performance against the “Do Nothing” option, and therefore does not offer good value for money.
Option 79: Pink line (2018), single carriageway	Discounted on the basis that the dual carriageway variation will produce the most robust assessment in terms of potential land take, costing and environmental concerns. The single carriageway variation of shortlisted options may be reinstated during later appraisal stages, if necessary.
Option 81: Yellow line (2018), single carriageway	Discounted based on the overall performance against the “Do Nothing” option, and therefore does not offer good value for money.
Option 82: Yellow line (2018), dual carriageway	Discounted based on the overall performance against the “Do Nothing” option, and therefore does not offer good value for money.

Appendix I

DELIVERY PROGRAMME



ID	Task Mode	Task Name	Duration	Start	Finish	Predecessors	Successors	Deadline	Total Slack	2018		2019		2020		2021		2022		2023		2024		2025									
										H1	H2	H1	H2	H1	H2	H1	H2	H1	H2	H1	H2	H1	H2	H1	H2								
1		Norwich Western Link	1785 days	Mon 05/02/18	Wed 22/01/25			NA	0 days																								
3		Option Development and Appraisal	165 days	Mon 05/02/18	Fri 28/09/18			NA	0 days																								
11		October 2018 EDT Committee	30 days	Mon 03/09/18	Fri 12/10/18			NA	1 day																								
16		November 2018 EDT Committee	30 days	Mon 01/10/18	Fri 09/11/18			NA	0 days																								
21		Shortlist Consultation	107 days	Mon 01/10/18	Fri 01/03/19			NA	0 days																								
27		March 2019 EDT Committee	30 days	Mon 28/01/19	Fri 08/03/19			NA	1 day																								
32		Strategic Outline Business Case (SOBC)	164 days	Thu 13/09/18	Wed 08/05/19			NA	0 days																								
41		Outline Business Case (OBC)	135 days	Tue 14/05/19	Wed 20/11/19			NA	0 days																								
49		Full Business Case (FBC)	375 days	Fri 19/02/21	Fri 29/07/22			NA	25 days																								
55		Public and Stakeholder Consultations	657 days	Wed 04/07/18	Thu 04/02/21			NA	0 days																								
62		Land Purchase	575 days	Tue 13/10/20	Tue 03/01/23			NA	70 days																								
77		Preliminary Design	760 days	Mon 05/02/18	Thu 04/02/21			NA	0 days																								
84		Planning Application (T&C)	575 days	Tue 14/05/19	Thu 12/08/21			NA	275 days																								
91		Two Stage D&B Contractor Appointment	1330 days	Thu 21/11/19	Wed 22/01/25			NA	0 days																								
92		Prequalification period	75 days	Thu 21/11/19	Mon 09/03/20			NA	0 days																								
99		Tender period	100 days	Tue 10/03/20	Fri 31/07/20			NA	0 days																								
104		D&B Stage 1 (Design Period)	570 days	Mon 03/08/20	Fri 14/10/22			NA	0 days																								
115		D&B Stage 2 (Construction Period)	615 days	Mon 05/09/22	Wed 22/01/25			NA	0 days																								
123		Project completion	0 days	Wed 22/01/25	Wed 22/01/25	121		NA	0 days																								

Project: 180823_NWL Prog 2-Stag
Date: Tue 25/09/18

Task		Project Summary		Inactive Milestone		Manual Summary Rollup		Deadline	
Split		External Tasks		Inactive Summary		Manual Summary		Critical	
Milestone		External Milestone		Manual Task		Start-only		Critical Split	
Summary		Inactive Task		Duration-only		Finish-only		Progress	

Appendix J

WSP
MODELLING TECHNICAL REPORT



NORWICH WESTERN LINK

TECHNICAL NOTE 1

Quality management		Project number	70041922	Report number		File reference	
Version	Date	Author	Signed	Checked	Signed	Authorised	Signed
First issue	27/02/19	C Drennan		D Murungi		C Drennan	

INTRODUCTION

This Technical Note (TN) is intended to provide further background and more detailed information than that contained within the Options Appraisal Report (OAR). This TN is intended for internal use and should only be circulated within the immediate project team.

FORECAST YEAR TRAFFIC MODELLING

The following forecast years have been identified:

- 2025: Opening year
- 2040: Design year
- 2050: Horizon year.

Development growth

The updated traffic forecast models include local development and infrastructure which is classified as 'Near Certain' or 'More than Likely'. This includes developments and schemes which have planning permission or are going through the planning process.

For each of the modelled peak hours the base year validated matrix was used as a starting point.

Background traffic growth for cars has been obtained from the Trip End Model Presentation Program version 7.2 (TEMPro), a software tool that provides projections of growth over time based on outputs from the National Trip End Model (NTEM). NTEM takes into account changes in population, employment, car ownership and trip rates to forecast the growth in trip origins and destinations. NTEM version 7.2 datasets were published on 1 March 2017 and are the latest available set of forecasts at the time the forecast models will be updated

Growth for LGVs and HGVs has been obtained from the National Road Traffic Forecasts (NRTF) published by the DfT (September 2018). These growth rates have been applied to each region depending on the NWL zone location.

At this stage a 'core' central growth scenario has been developed with District wide demographic growth constrained to the top totals within TEMPro version 7.2 and in the absence of an adopted Local Plan beyond 2026 as the new Local Plans applicable to the study area are still emerging. TEMPro and NRTF factors have been assigned to each base year model zone with the origin and destination totals for each base year zone increased appropriately. This is in accordance with WebTAG methodology where forecasting needs to consider time periods beyond adopted policy. Sensitivity testing will be carried out at the SOBC stage for a wider range of growth scenarios. However, at this stage a TEMPro-based approach is considered to be robust as the housing growth assumptions within TEMPro exceed those set out within the relevant Local Plans.



The forecast year origin and destination totals were then used to furnish the base year matrix to generate a matrix for the forecast year peak hour which represented background growth in traffic. Furnishing is a process by which the matrix is balanced in order to meet targets totals for origins and destinations. Since both trip ends are factored, the process is referred to as being doubly-constrained.

As land use developments are a source of uncertainty, the total growth predicted by the forecast model is to reflect the total growth predicted by TEMPro in order to be consistent with national and regional planning policy. Unadjusted TEMPro factors at district level, have been effectively used as a constraint on the forecast matrix.

Forecasting scenarios

Updated forecast year 2025, 2040 and 2050 networks have been produced with the core growth demand matrices. These are the 'Do Nothing' scenarios for 2025, 2040 and 2050, that is without NWL infrastructure. The 2025, 2040 and 2050 forecast year models have been produced for the following 'Do Nothing' network scenarios:

- Highways England A47 North Tuddenham to Easton scheme assumed to include at-grade junctions with the A47
- Highways England A47 North Tuddenham to Easton scheme assumed to include grade-separated junctions with the A47.

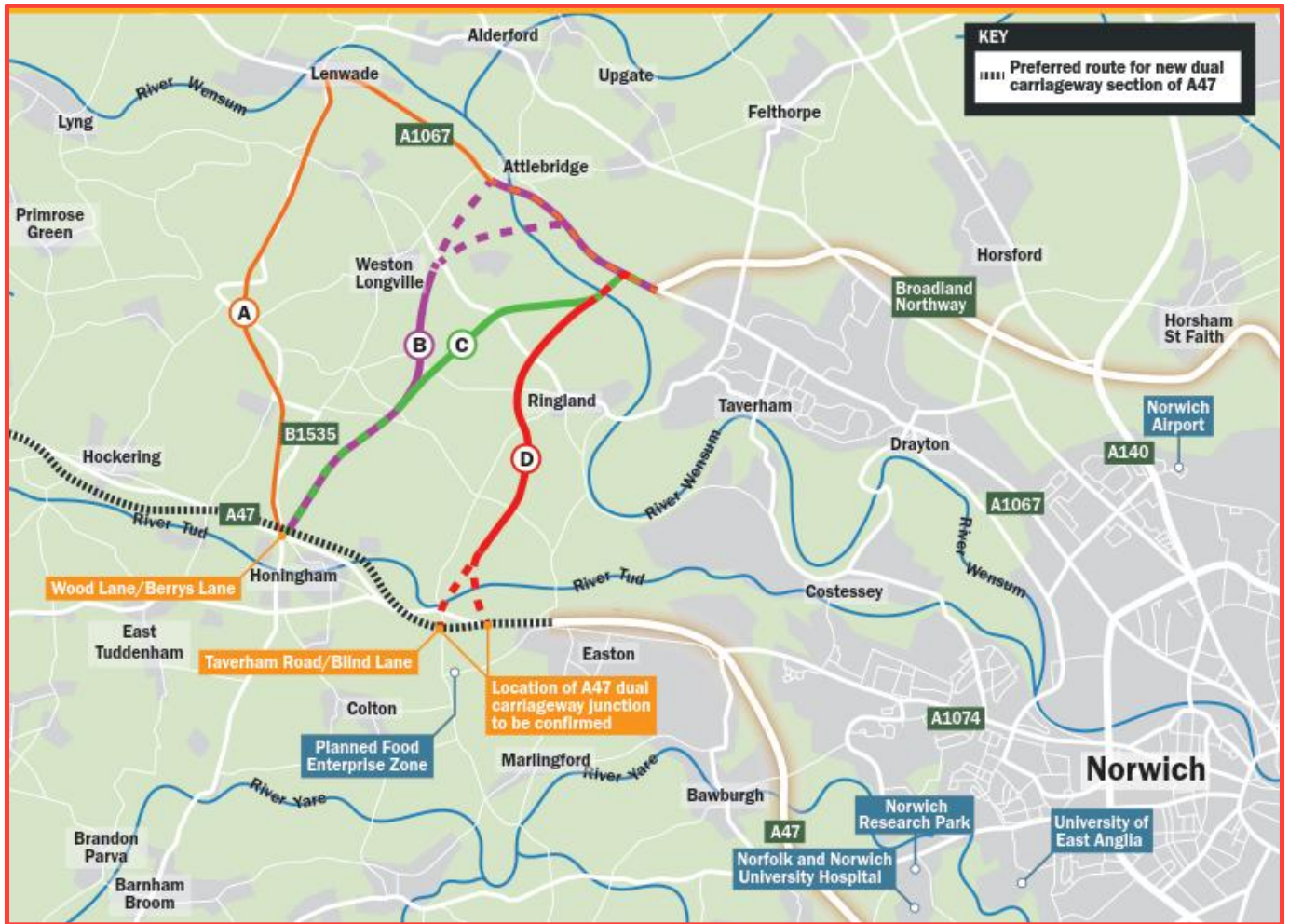
Scheme options

To undertake an assessment of the shortlisted options for NWL, the proposed schemes have been coded into the "Do nothing" network to create a "Do Something" network. This has been undertaken to understand the range of demand generated by the various options and to gauge the likely effects of an NWL. The options are:

- Option A
- Option B
- Option B Alt
- Option C
- Option D.

The five options have been based on having the Highways England A47 North Tuddenham to Easton scheme included within the Do nothing as 'at-grade junctions' and 'grade-separated' junctions with the A47. Option B Alt follows a similar alignment to Option B but uses the existing bridge at Attlebridge. Figure 1 shows the shortlisted highways options.

FIGURE 1: SHORTLISTED HIGHWAYS OPTIONS



The short-listed options are:

- **Option A:**
 - Single carriageway link from Wood Lane/Berry's Lane A47 proposed Highways England roundabout (extra arm added) which would replace the existing B1535 route
 - WS2 standard
 - No widening of A1067 to A1270
- **Option B:**
 - Dual carriageway link from Wood Lane/Berry's Lane A47 proposed Highways England roundabout (extra arm added)
 - D2AP standard
 - A1067 also dualled to A1270
 - On viaduct crossing River Wensum
- **Option B Alt:**
 - Dual carriageway link from Wood Lane/Berry's Lane A47 proposed Highways England roundabout (extra arm added) using the existing bridge at Attlebridge to join with the A1067

- D2AP standard
- A1067 also dualled to A1270
- **Option C:**
 - Dual carriageway link from Wood Lane/Berry's Lane A47 proposed Highways England roundabout (extra arm added)
 - D2AP standard
 - On viaduct crossing River Wensum short section of A1067 also dualled to A1270
- **Option D:**
 - Dual carriageway link from Taverham Road/Blind Lane A47 proposed Highways England roundabout (extra arm added)
 - D2AP standard
 - On viaduct crossing River Wensum and also bridges over the River Tud. Short section of A1067 also dualled to A1270.

ASSUMPTIONS

The proposed scheme options described above have been coded into the SATURN transport model with Figure 2 to Figure 5 showing the Norwich Western Link scheme option connections with the A47 at-grade roundabout.

FIGURE 2: OPTION A

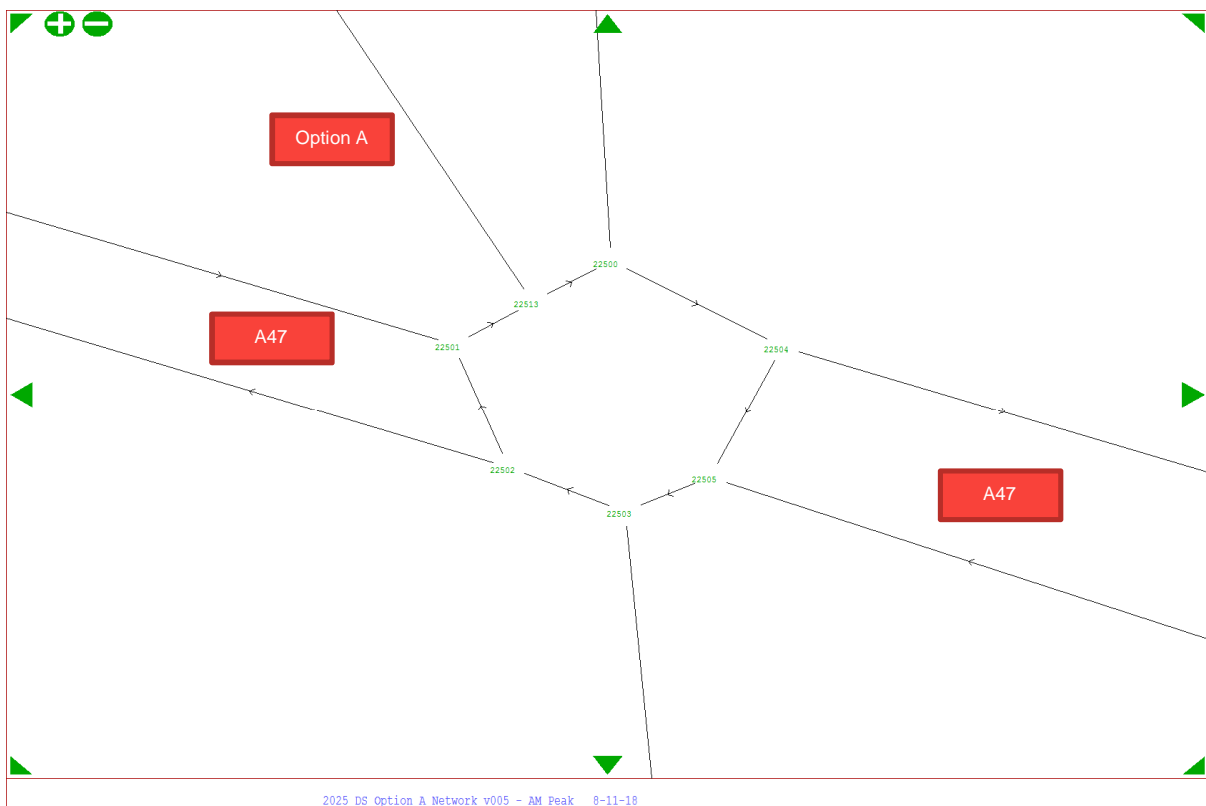


FIGURE 3: OPTION B

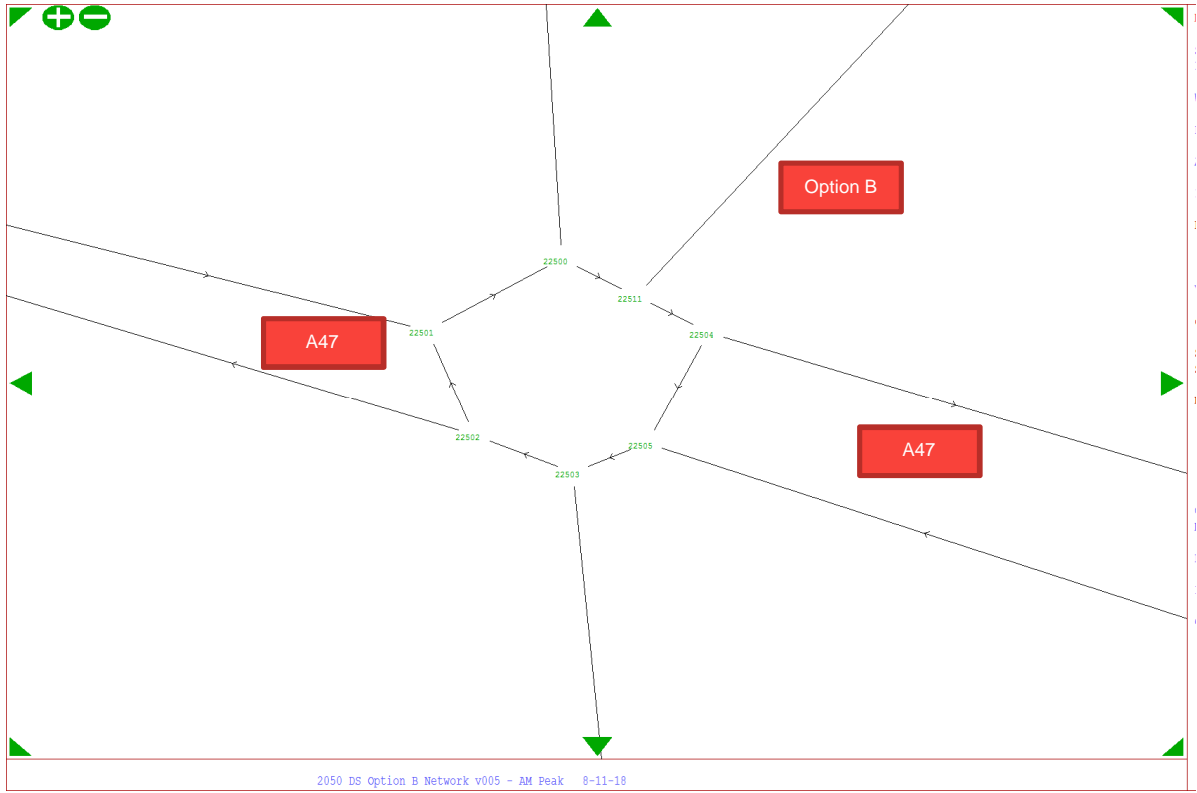


FIGURE 4: OPTION C

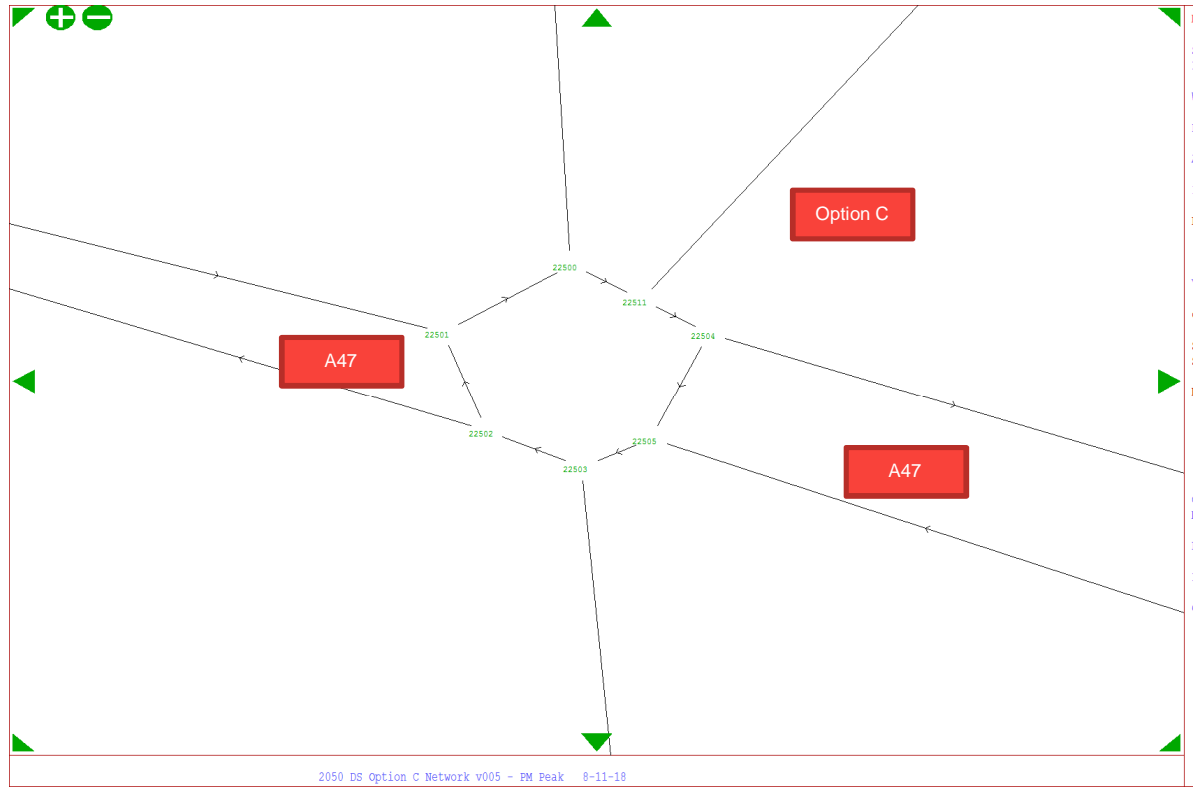


FIGURE 5: OPTION D

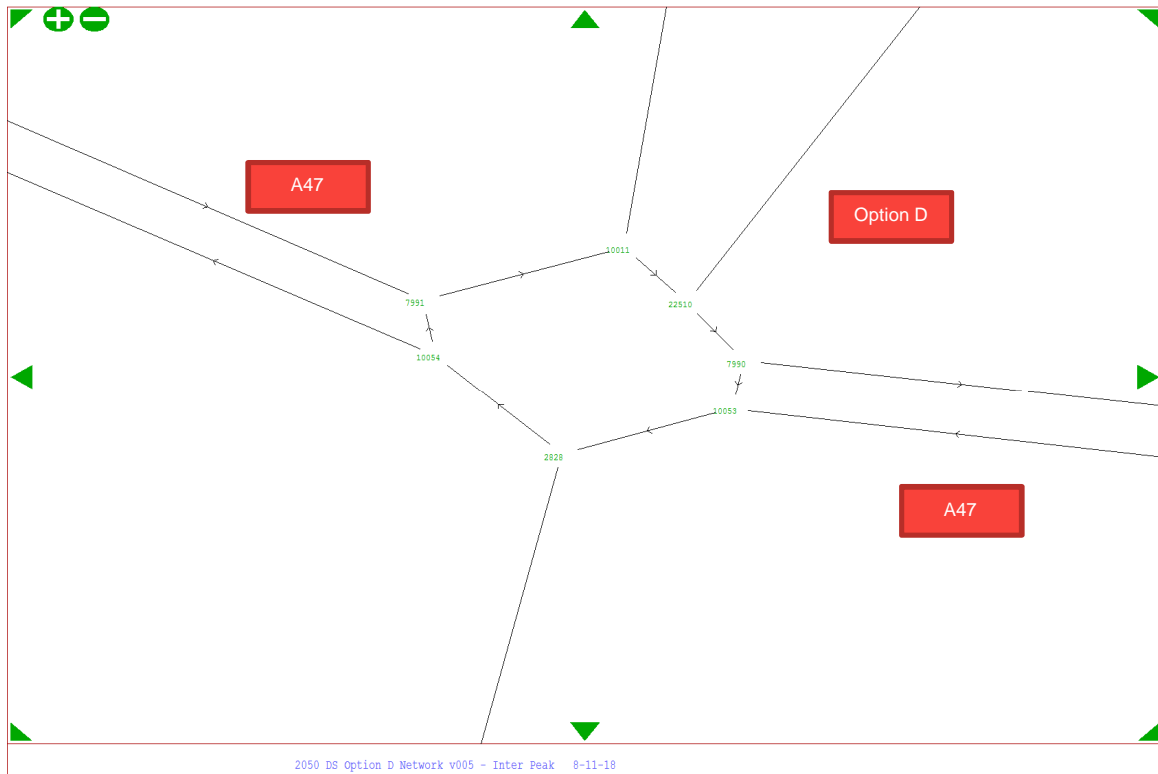


Figure 6 to Figure 9 showing the Norwich Western Link scheme option connections with the A47 Grade-separated roundabout.

FIGURE 6: OPTION A

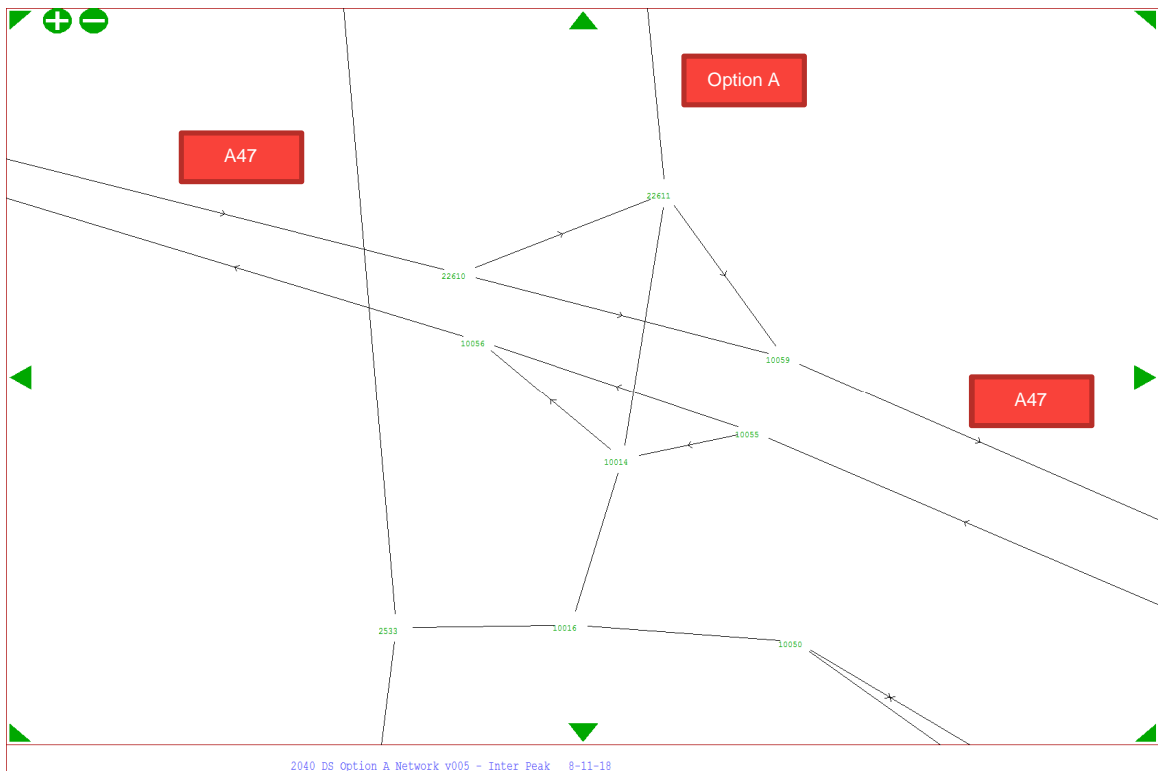


FIGURE 7: OPTION B

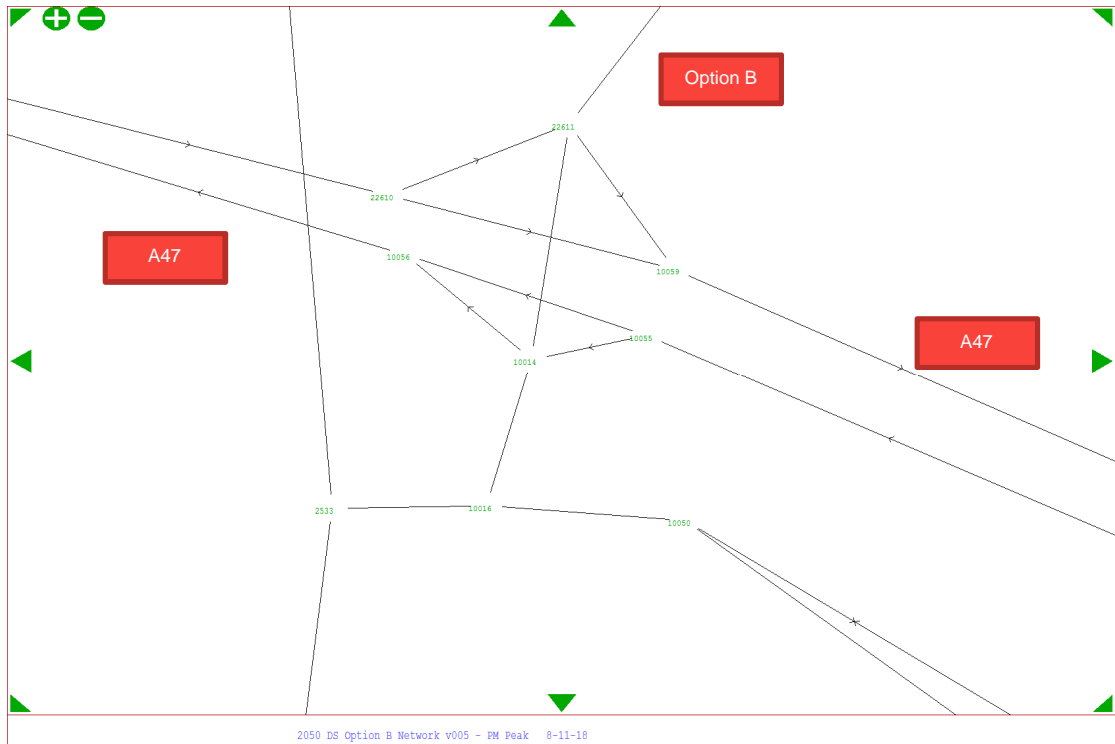


FIGURE 8: OPTION C

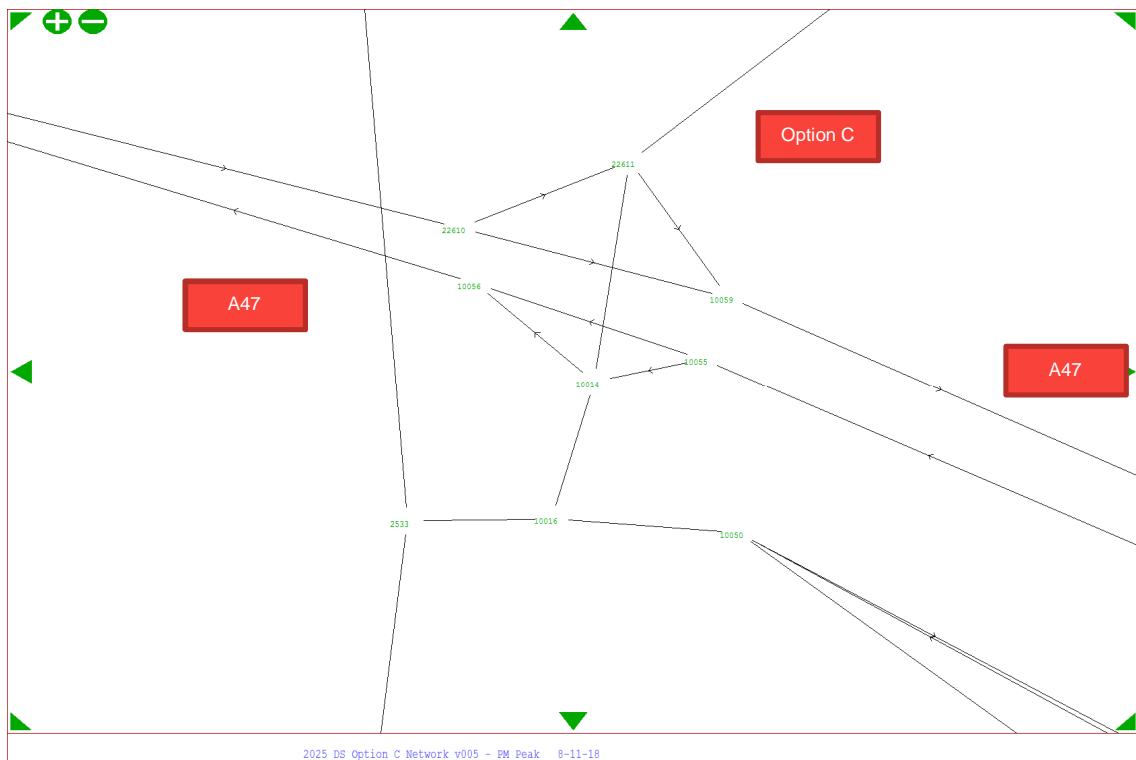


FIGURE 9: OPTION D

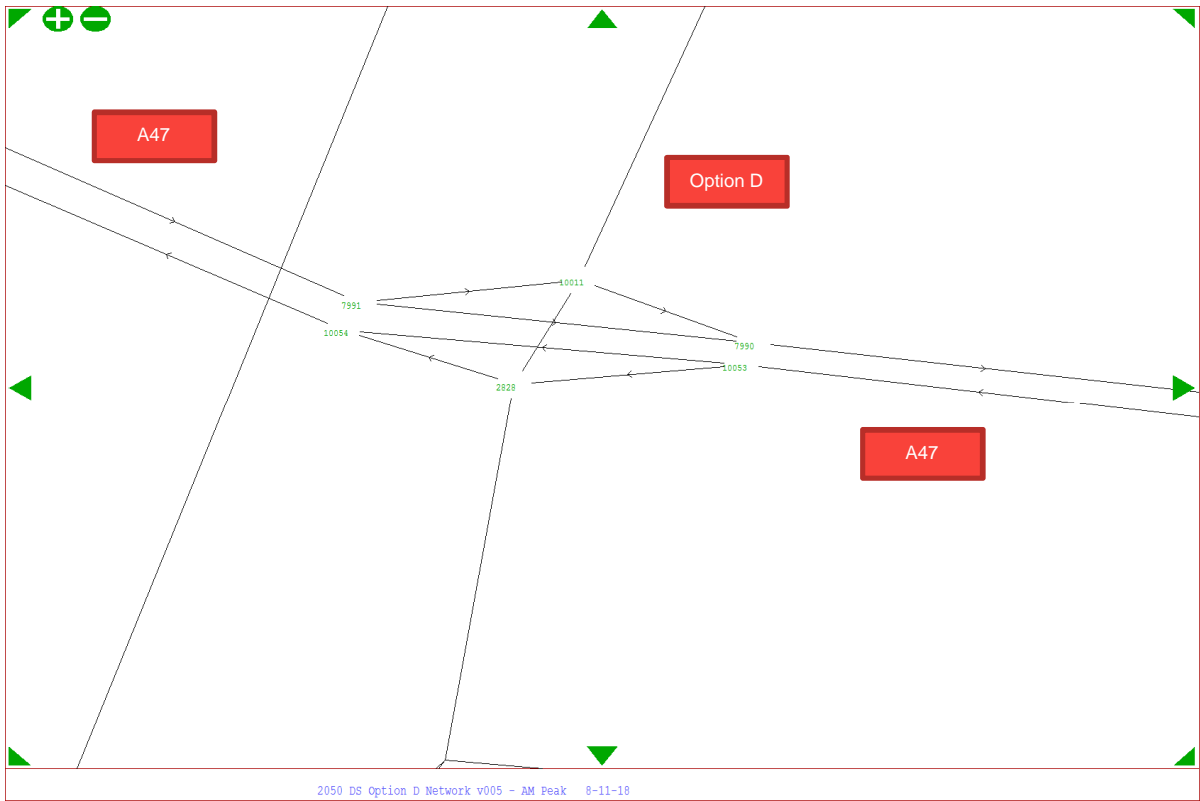


Figure 10 to Figure 13 showing the Norwich Western Link scheme option connections with the A1067.

FIGURE 10: OPTION A

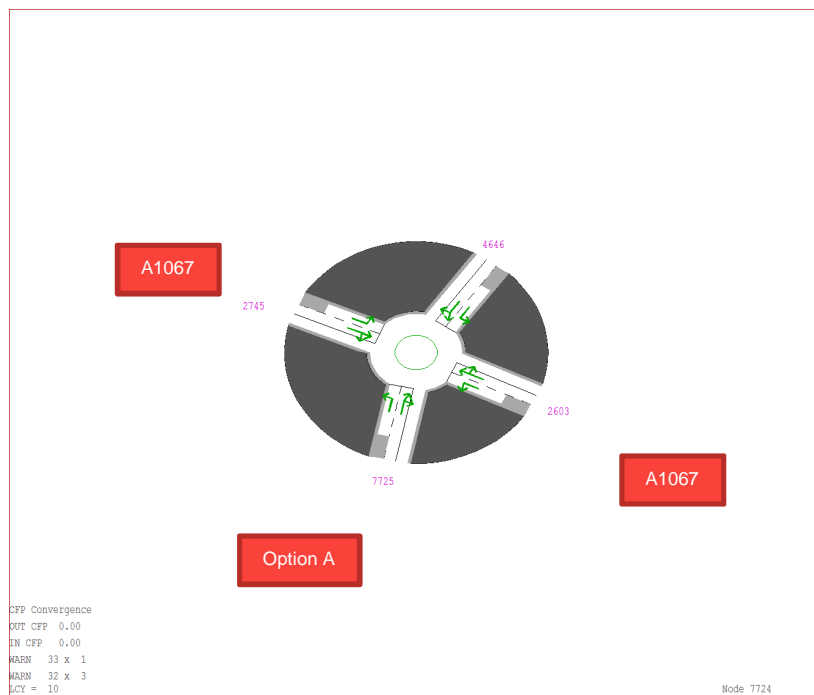


FIGURE 11: OPTION B

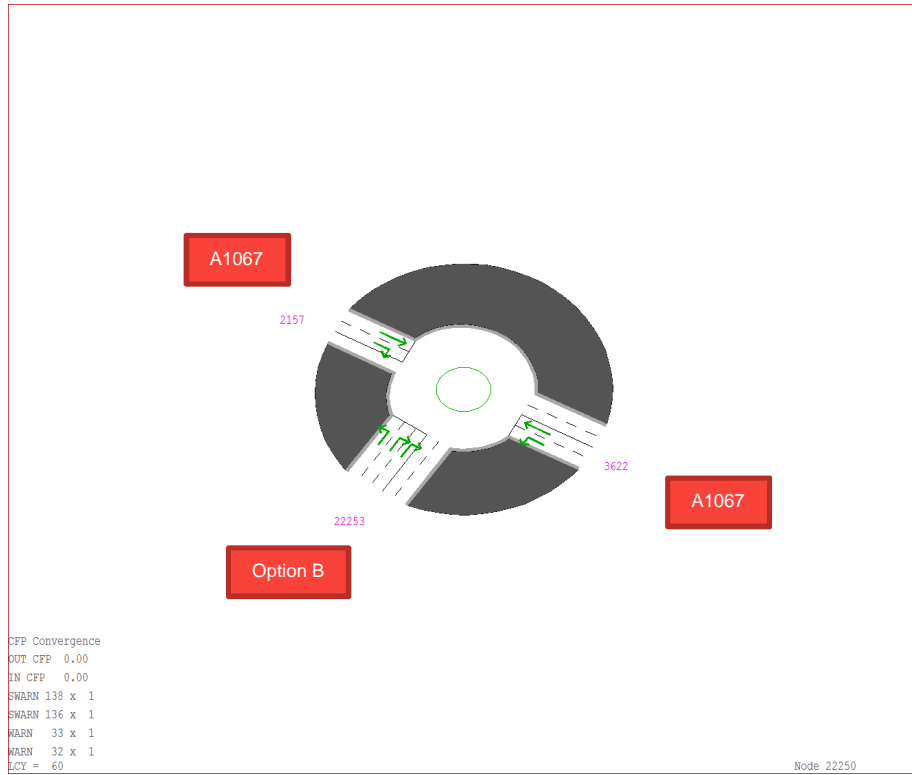


FIGURE 12: OPTION C

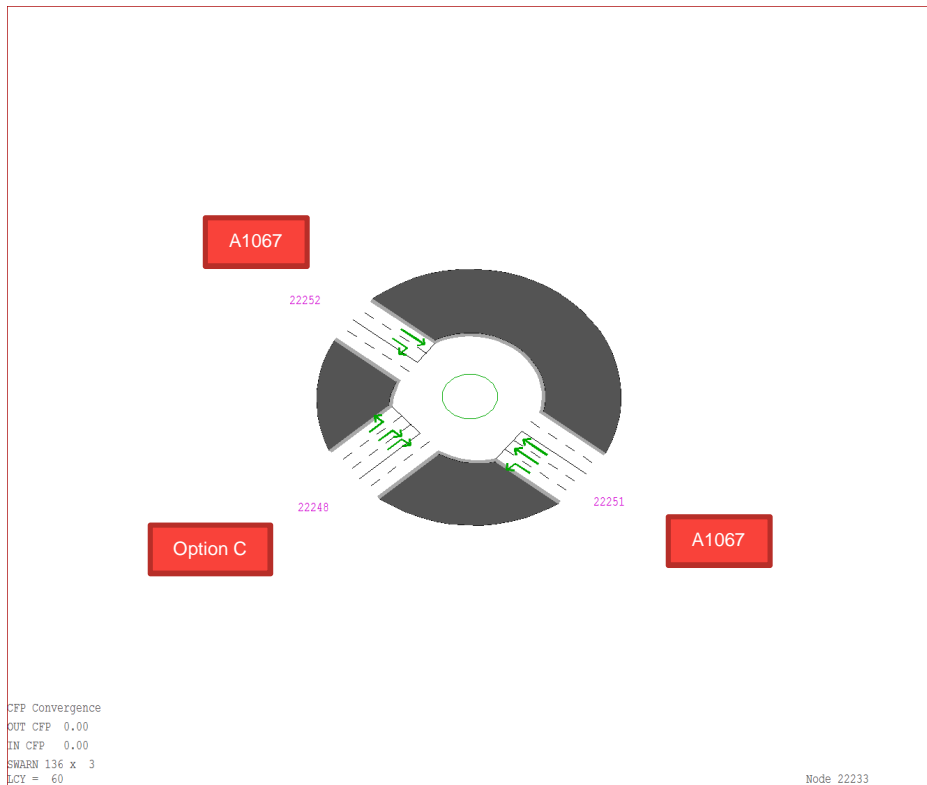
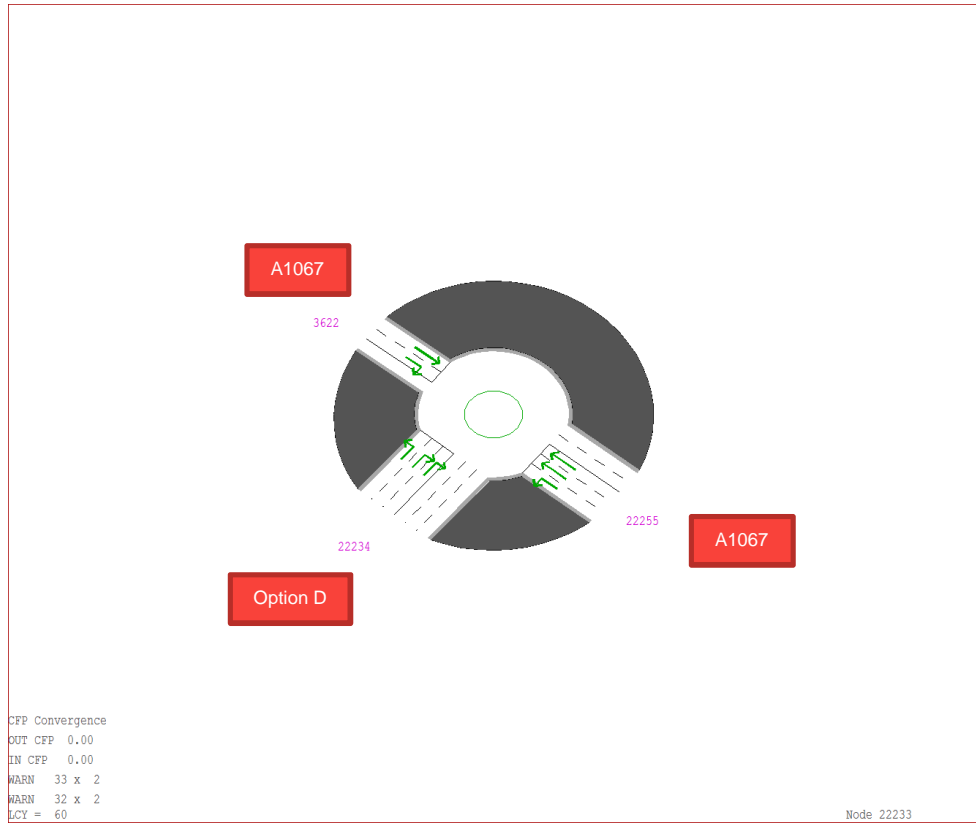


FIGURE 13: OPTION D



ANNUAL AVERAGE DAILY TRAFFIC (AADT)

Forecast year AADT plots: At-grade junctions with the A47

Annual Average Daily Traffic (AADT) flow plots have been produced for all five scheme options for the 2040 forecast year. Figure 14 shows the AADT flow for the 2040 Do Nothing forecast year i.e. without the Norwich Western Link assuming At-grade junctions on the Highways England A47 scheme.

FIGURE 14: 2040 DO NOTHING AADT FLOW

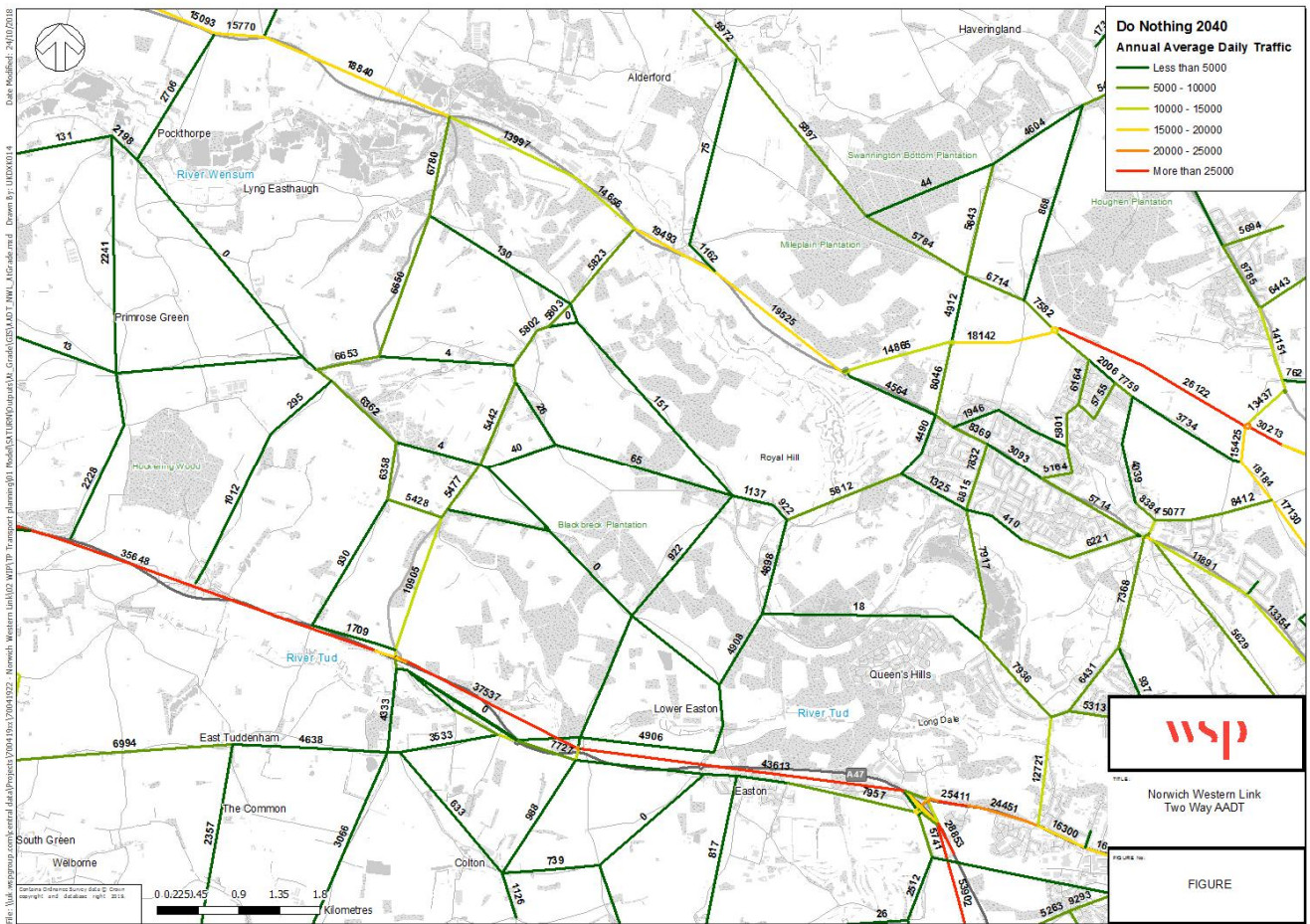


Figure 15 to Figure 19 shows the AADT flow for the 2040 scheme options i.e. with the Norwich Western Link forecast year assuming At-grade junctions on the Highways England A47 scheme.

FIGURE 15: 2040 OPTION A - AADT FLOW

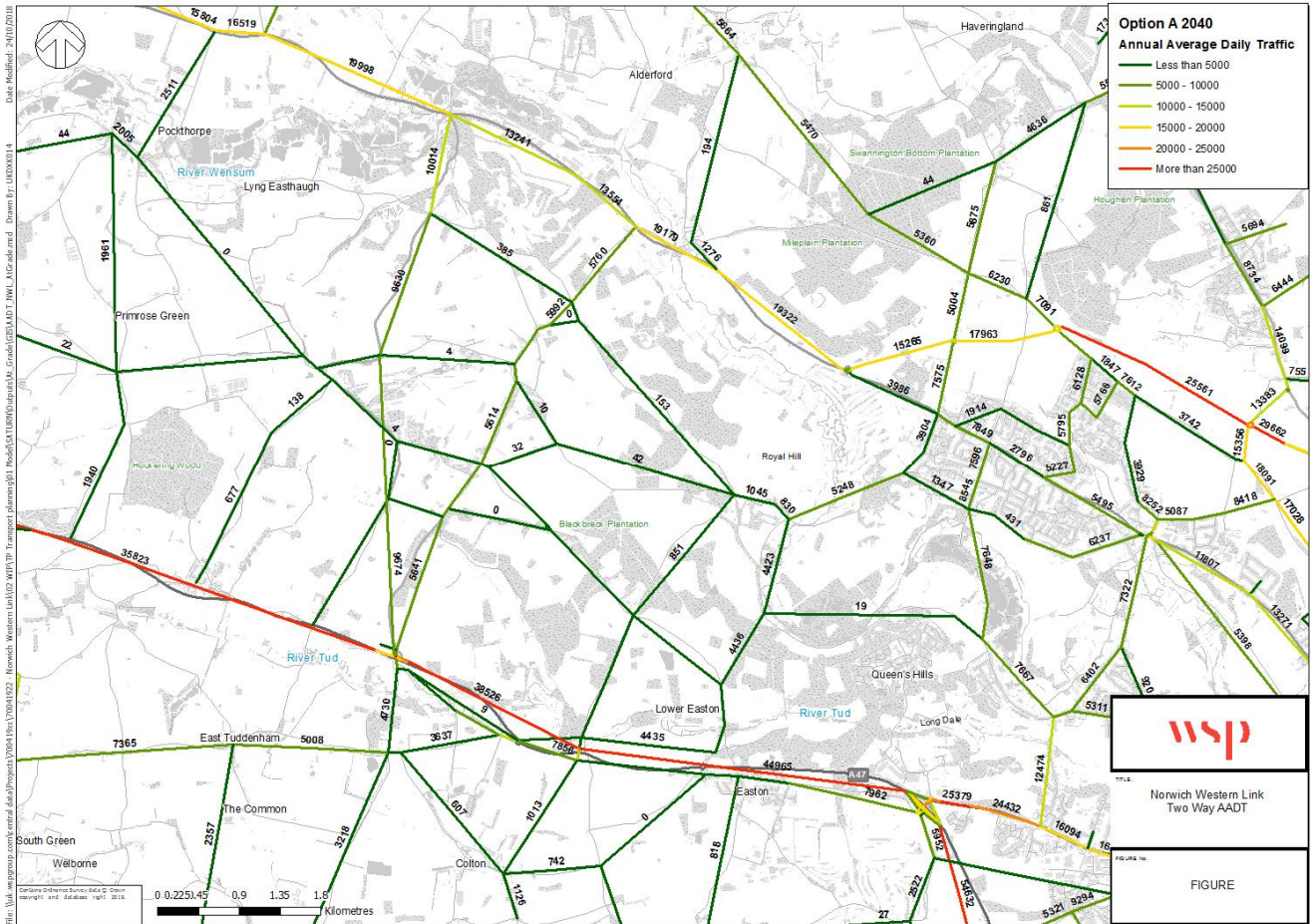


FIGURE 16: 2040 OPTION B - AADT FLOW

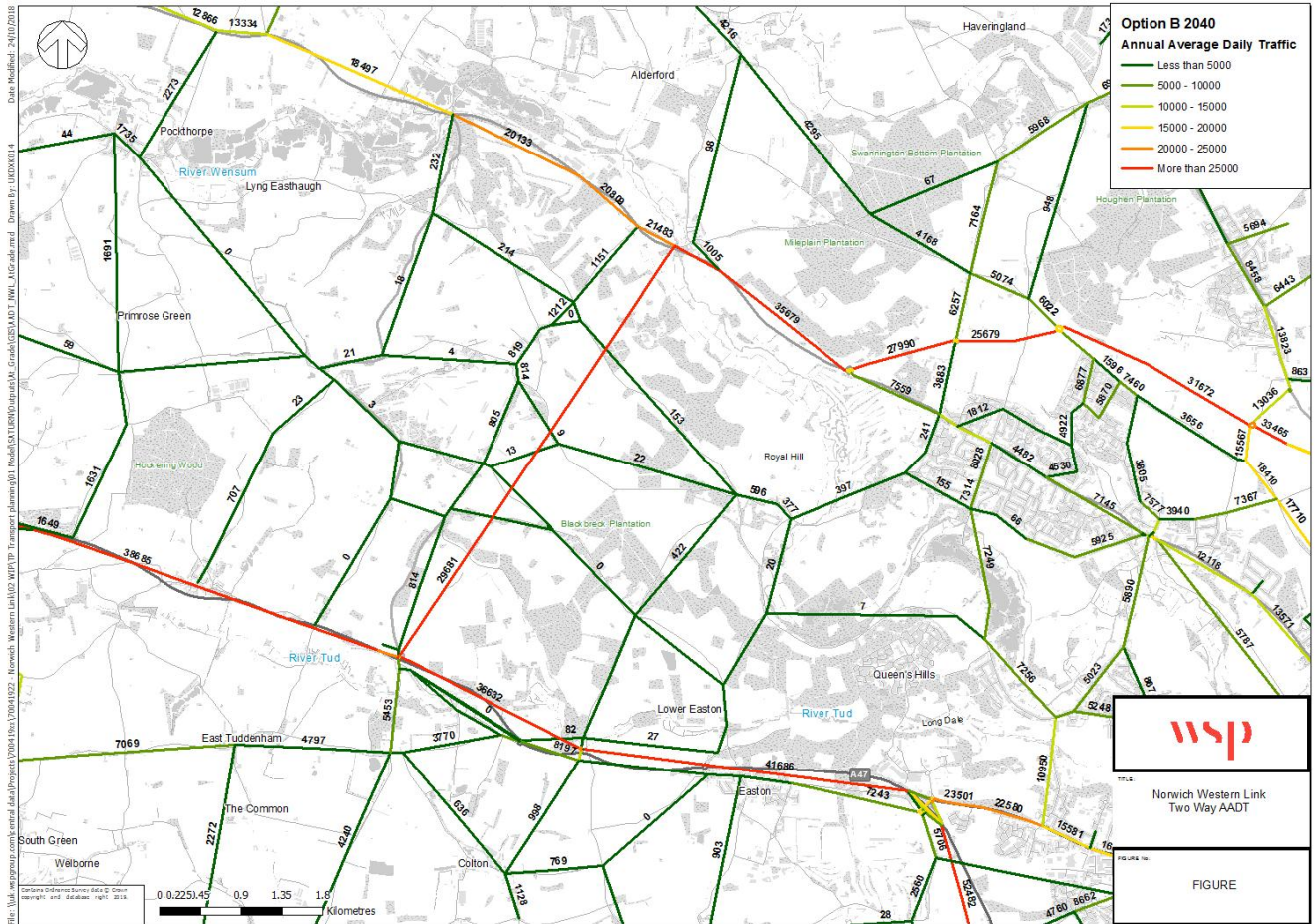


FIGURE 18: 2040 OPTION C - AADT FLOW

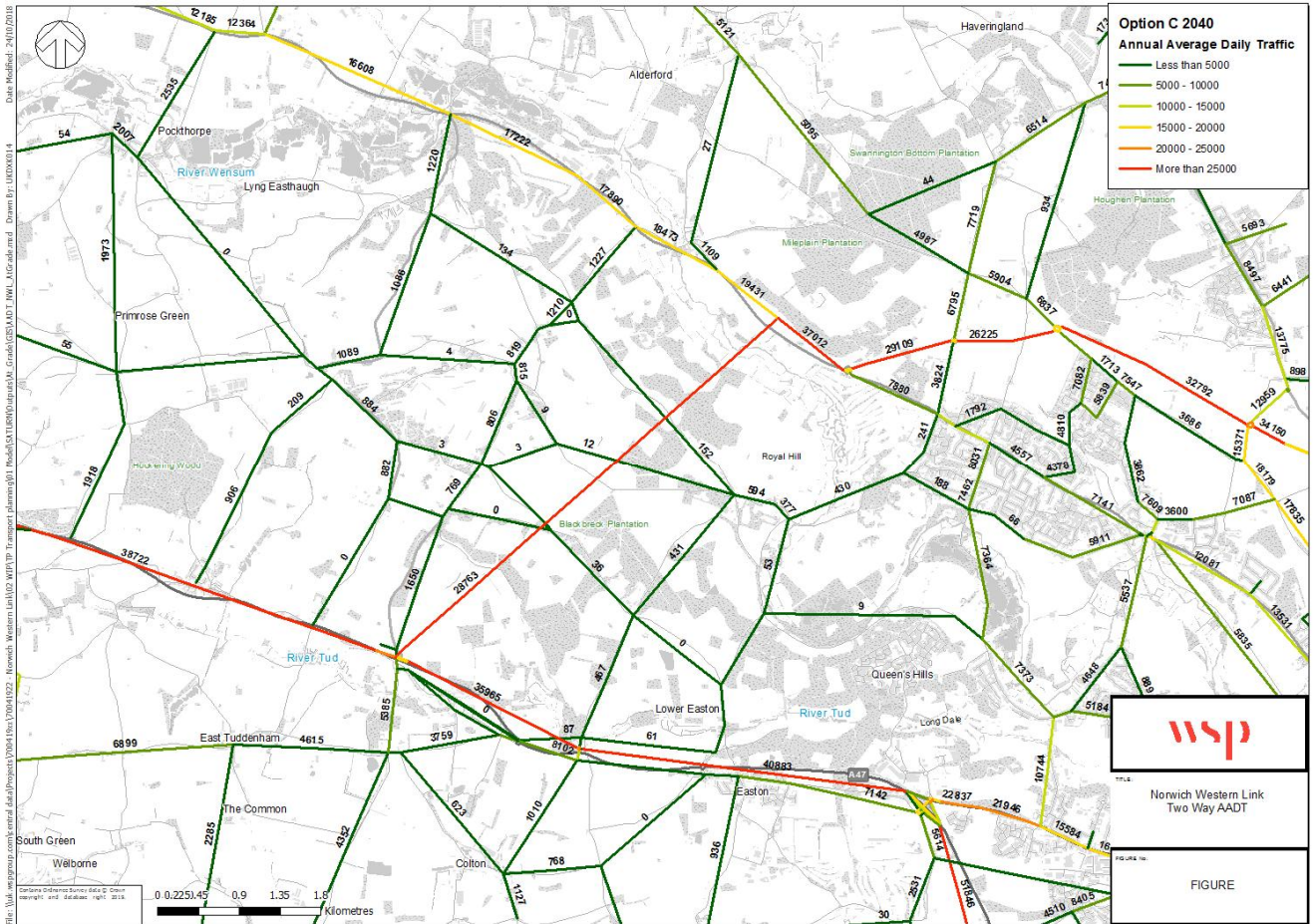
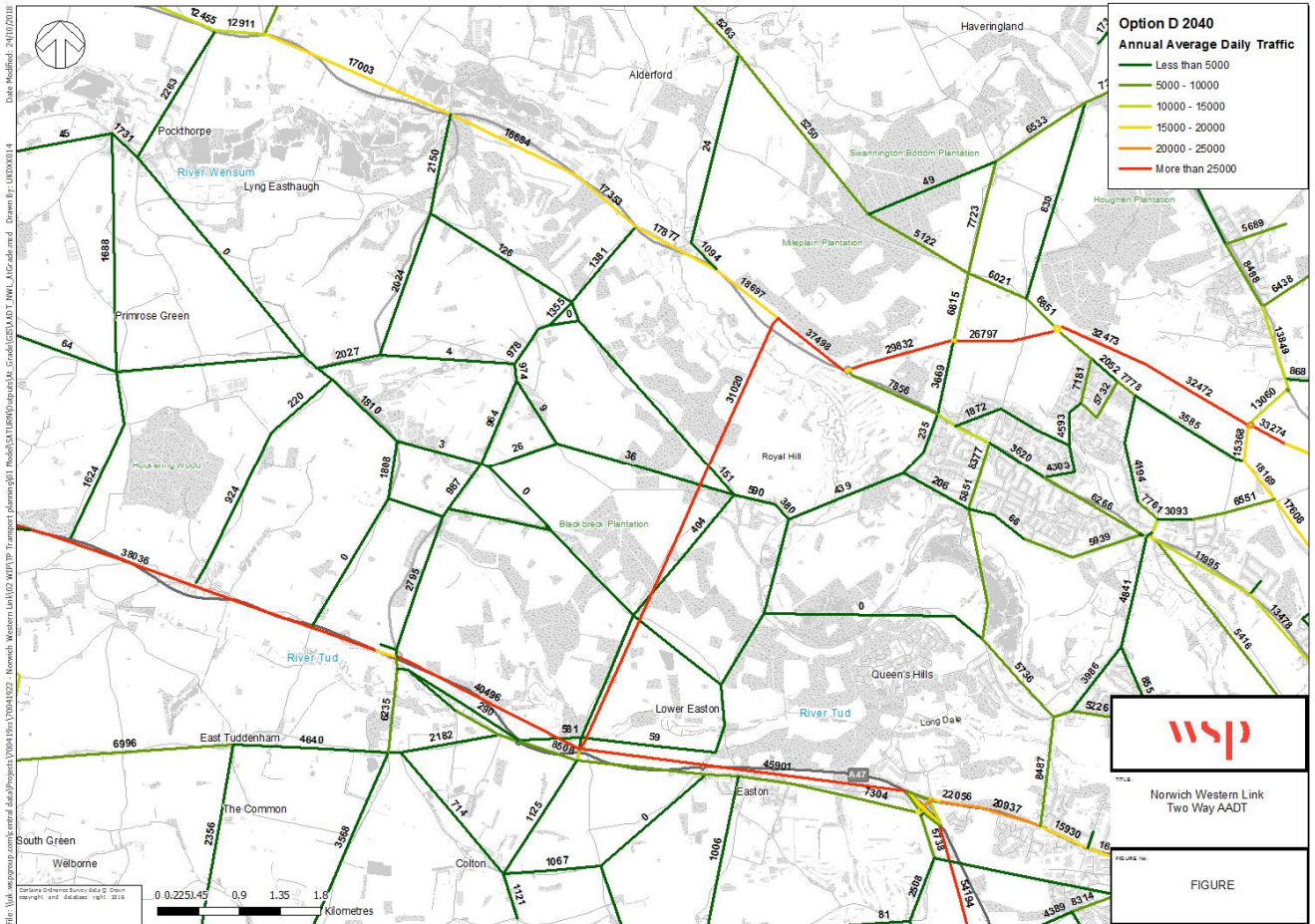


FIGURE 19: 2040 OPTION D - AADT FLOW



AADT flow net difference plots

Figure 20 to Figure 24 shows the AADT difference flow between the 2040 Do Nothing and the 2040 scheme options forecast year i.e. with the Norwich Western Link assuming At-grade junctions on the Highways England A47 scheme.

FIGURE 20: 2040 OPTION A MINUS 2040 DO NOTHING - AADT FLOW

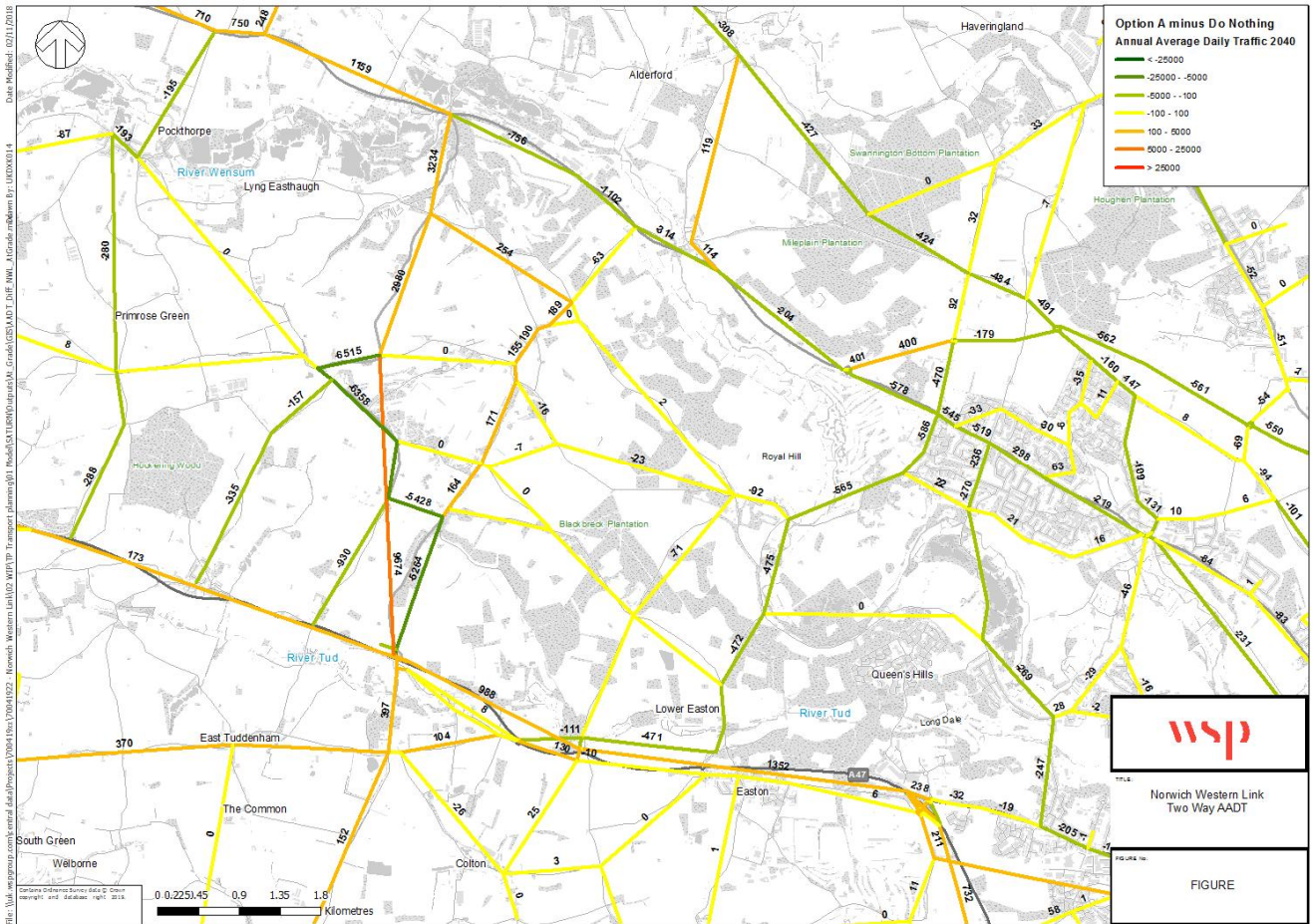


FIGURE 22: 2040 OPTION B ALT MINUS 2040 DO NOTHING - AADT FLOW

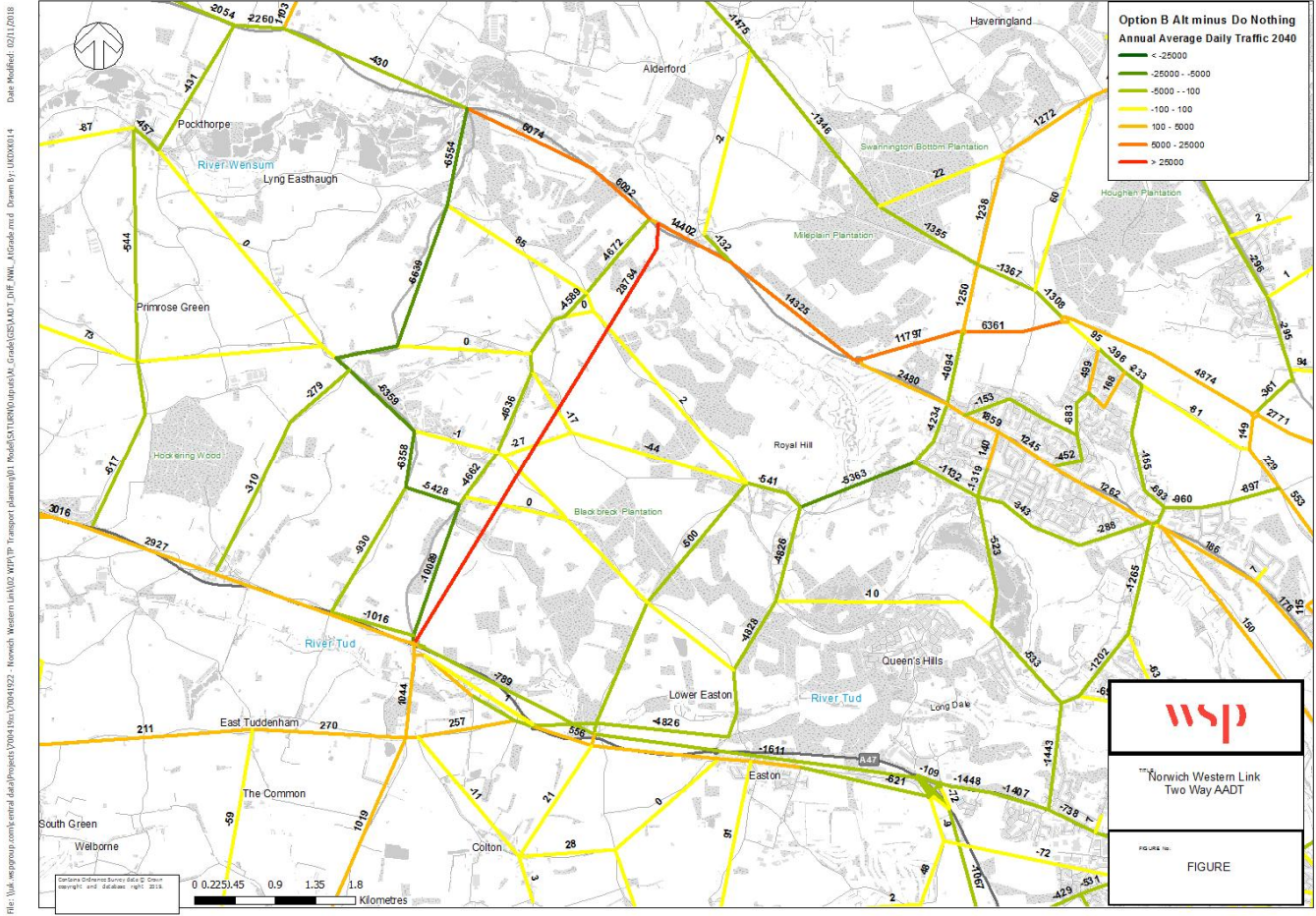


FIGURE 23: 2040 OPTION C MINUS 2040 DO NOTHING - AADT FLOW

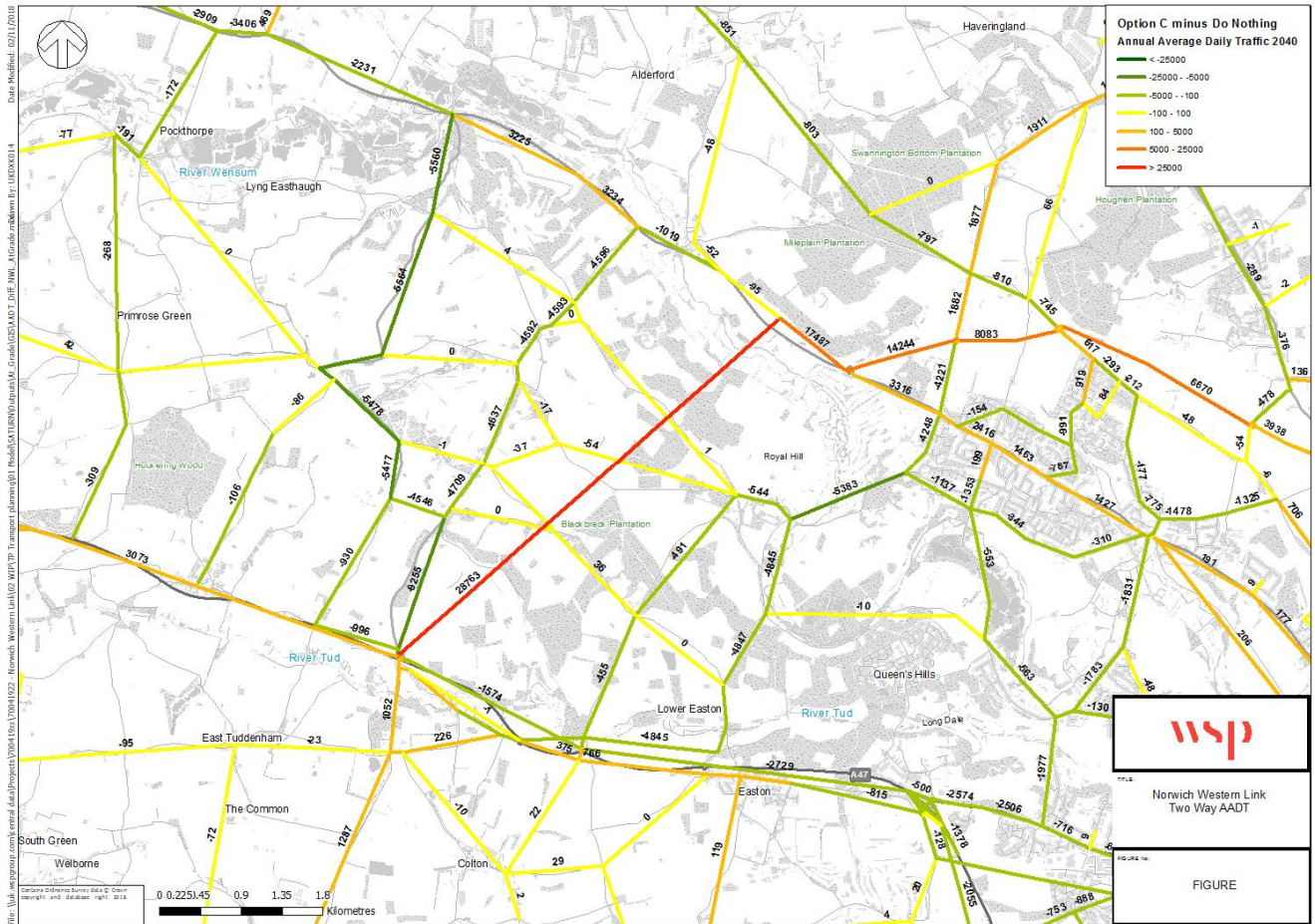
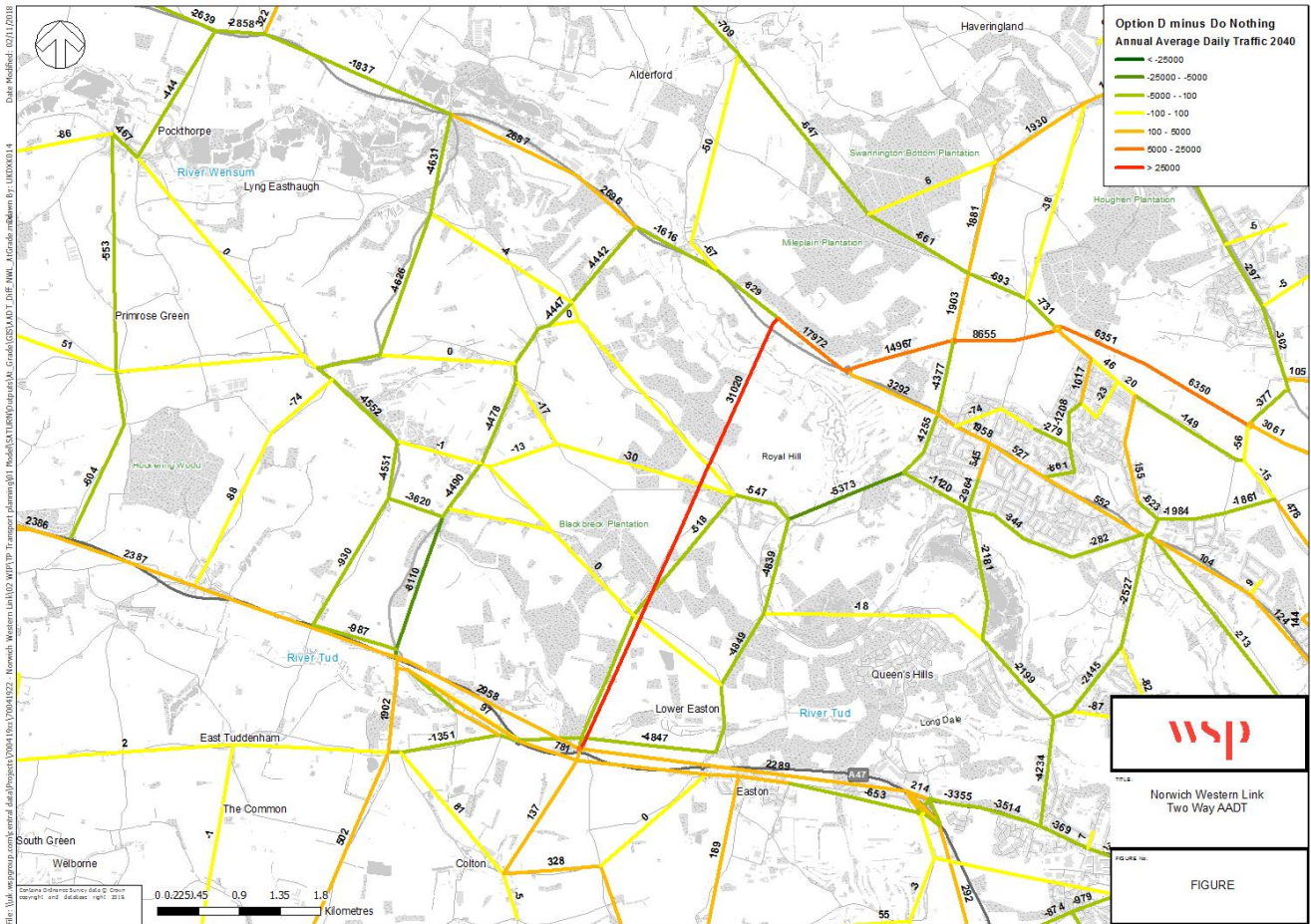


FIGURE 24: 2040 OPTION D MINUS 2040 DO NOTHING - AADT FLOW



Forecast year AADT flows: Grade-separated junctions with the A47

Figure 25 shows the AADT flow for the 2040 Do Nothing forecast year i.e. without the Norwich Western Link assuming Grade-separated junctions on the Highways England A47 scheme.

FIGURE 25: 2040 DO NOTHING AADT FLOW

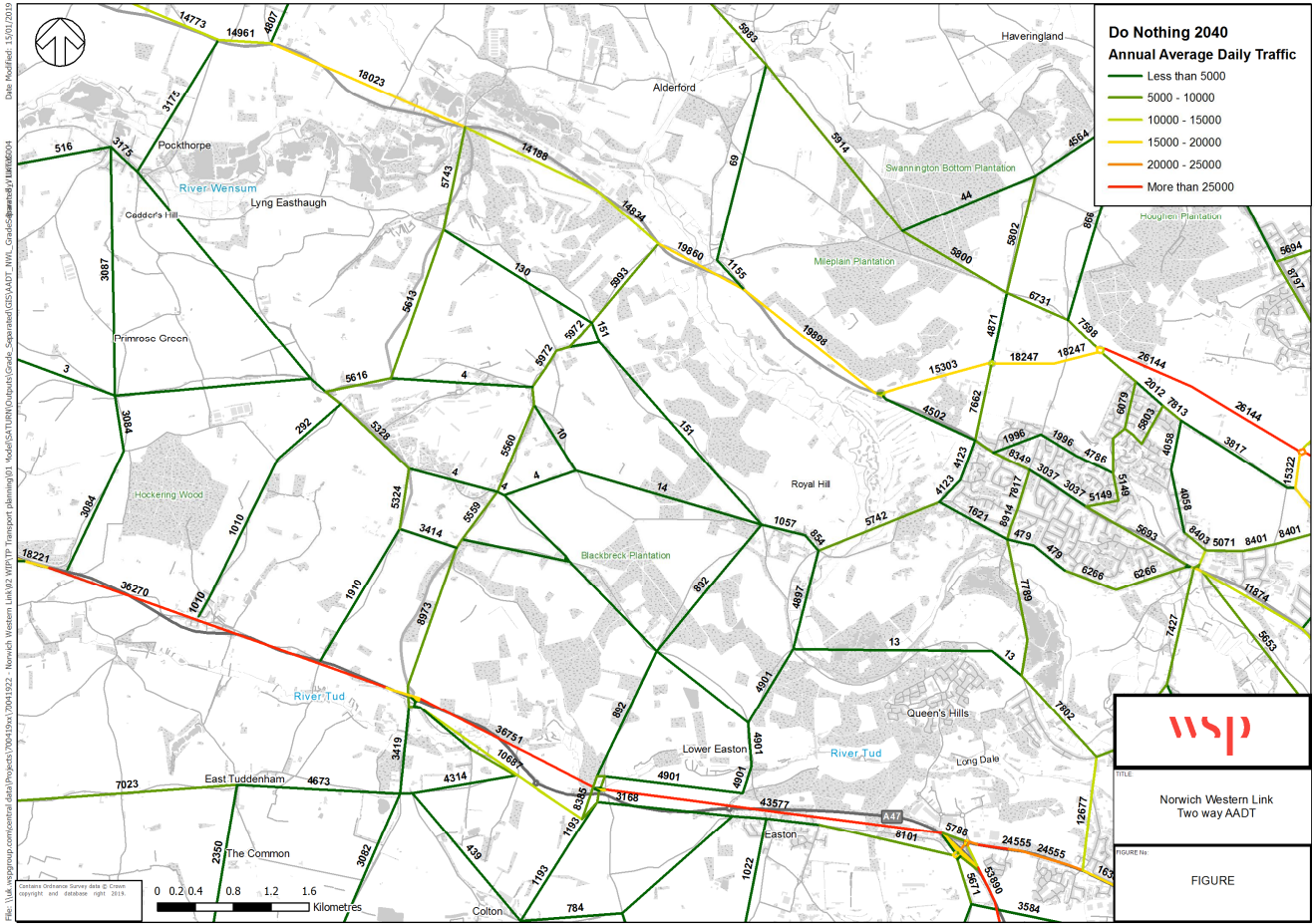


Figure 26 to Figure 30 shows the AADT flow for the 2040 scheme options i.e. with the Norwich Western Link forecast year assuming Grade-separated junctions on the Highways England A47 scheme.

FIGURE 27: 2040 OPTION B - AADT FLOW

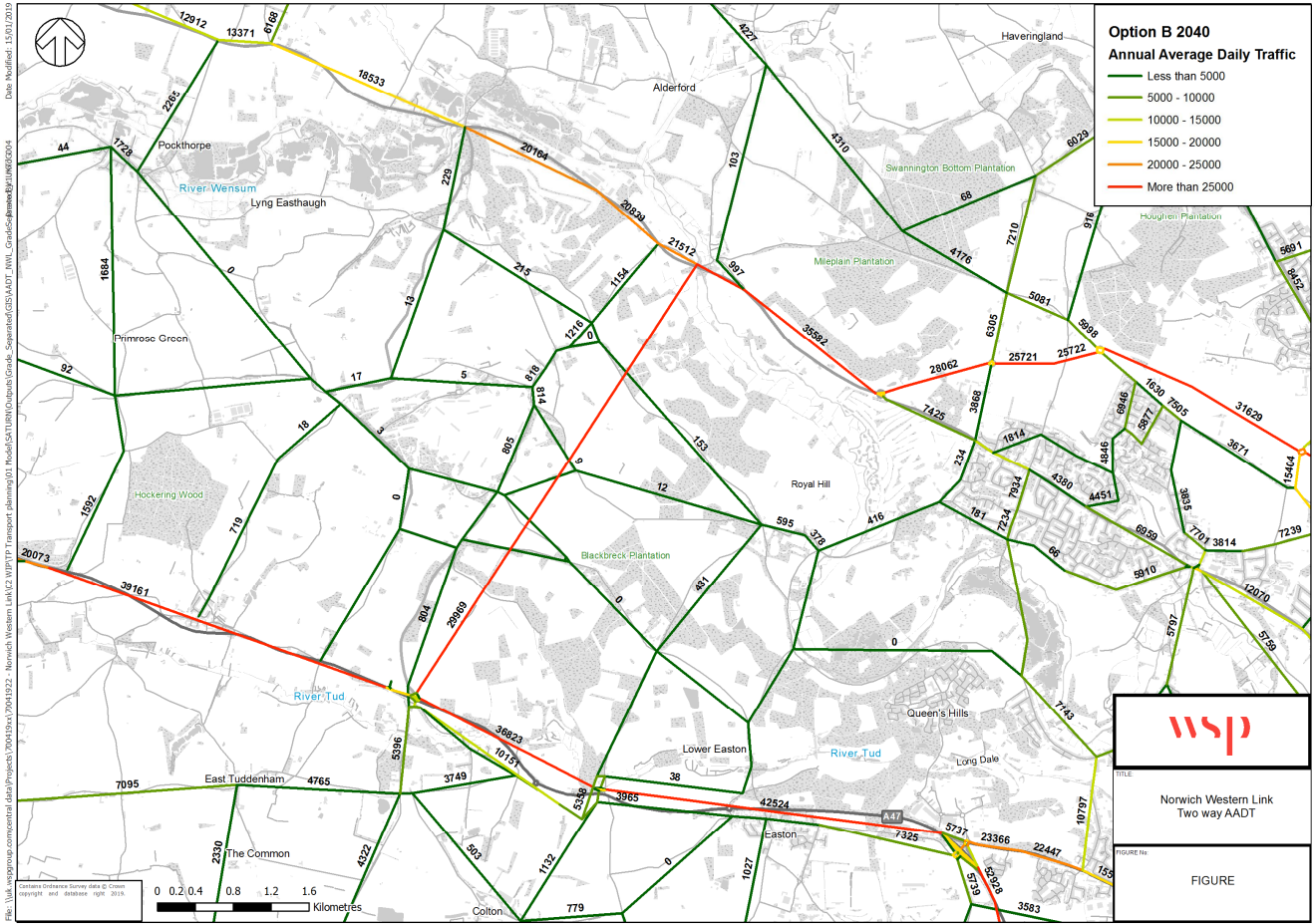


FIGURE 28: 2040 OPTION B ALT - AADT FLOW

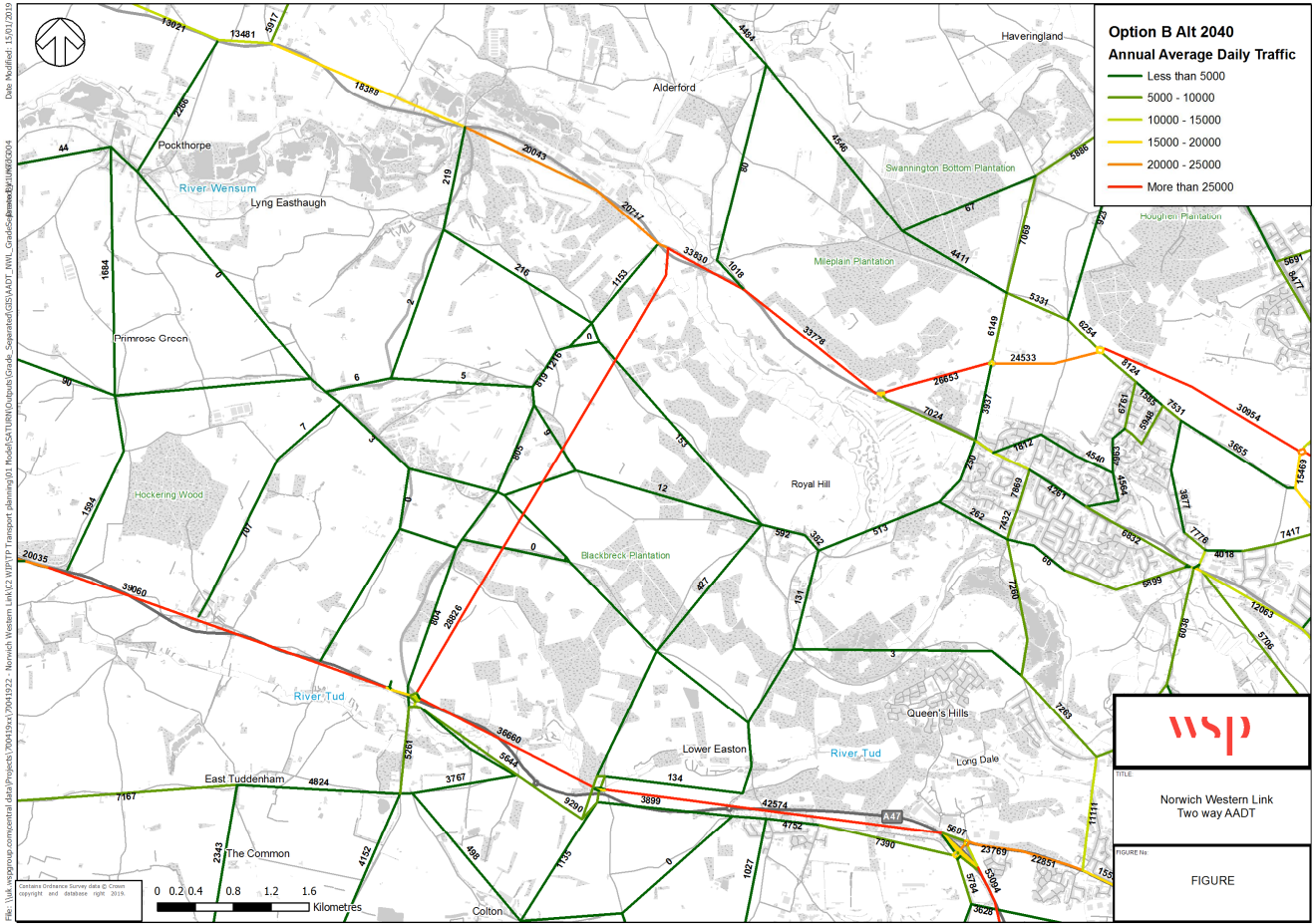
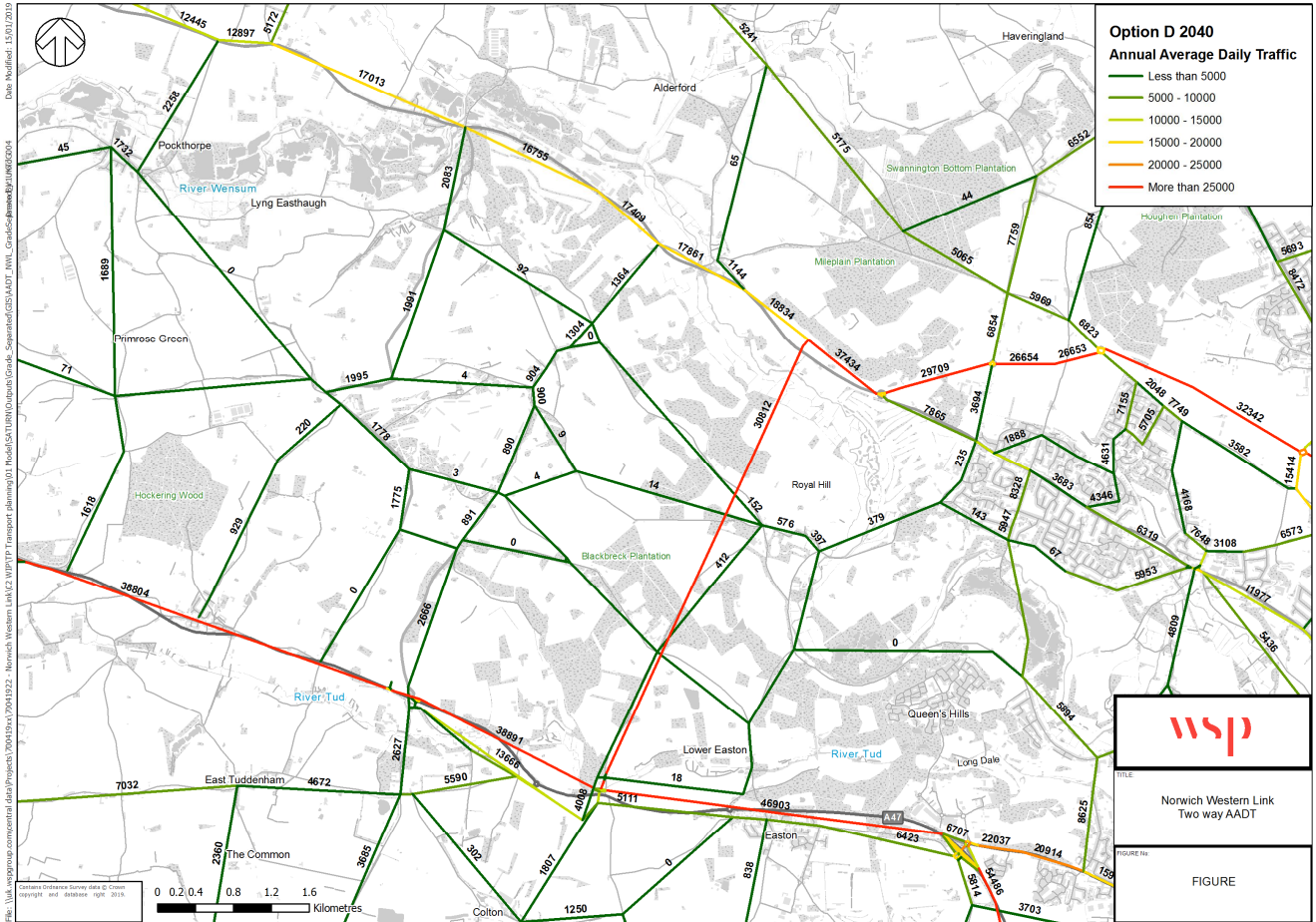


FIGURE 30: 2040 OPTION D - AADT FLOW



AADT flow difference plots

Figure 31 to Figure 35 shows the AADT difference flow between the 2040 Do Nothing and the 2040 scheme options forecast year i.e. with the Norwich Western Link assuming Grade-separated junctions on the Highways England A47 scheme.

FIGURE 31: 2040 OPTION A MINUS 2040 DO NOTHING - AADT FLOW

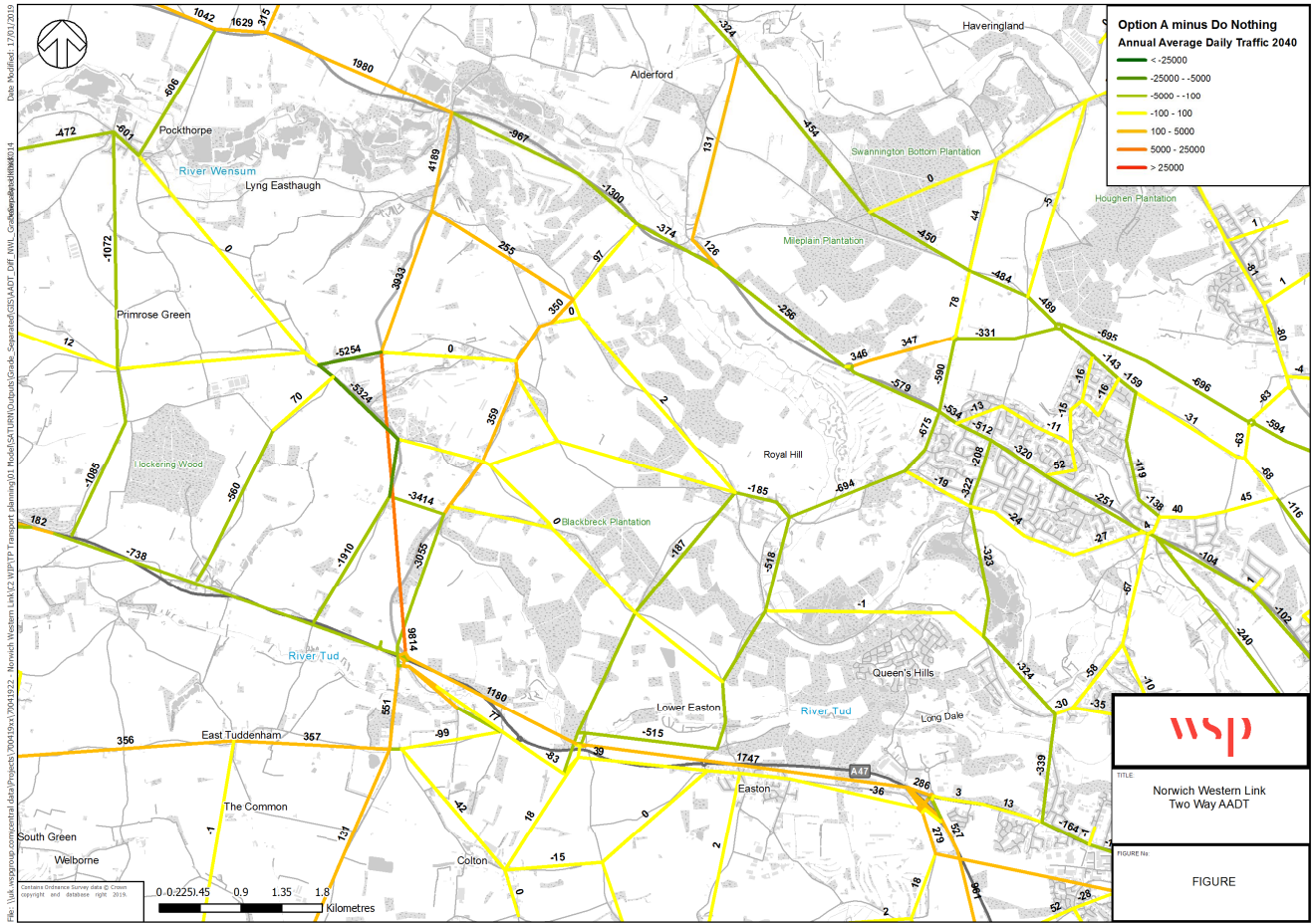


FIGURE 32: 2040 OPTION B MINUS 2040 DO NOTHING - AADT FLOW

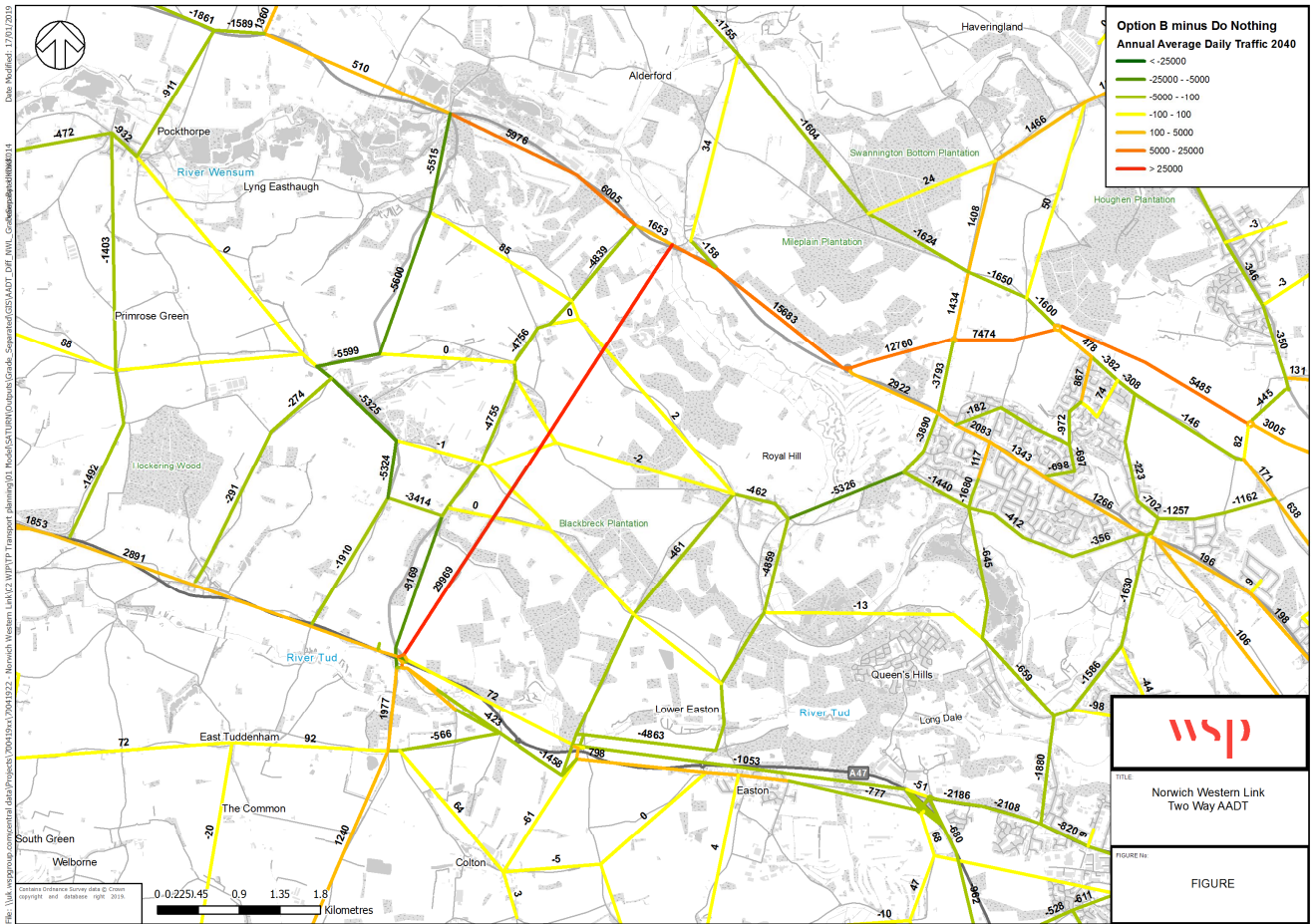


FIGURE 33: 2040 OPTION B ALT MINUS 2040 DO NOTHING - AADT FLOW

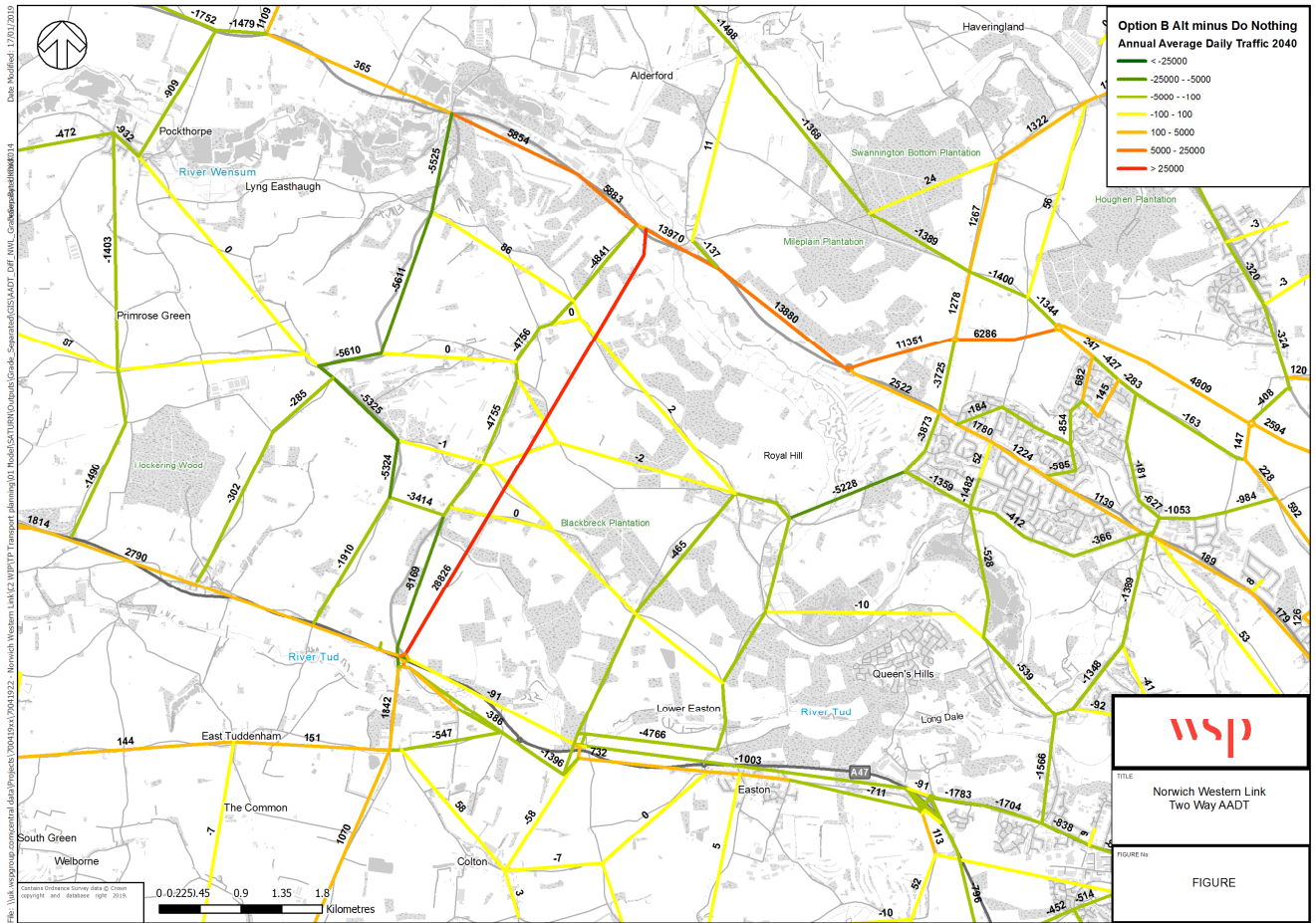


FIGURE 34: 2040 OPTION C MINUS 2040 DO NOTHING - AADT FLOW

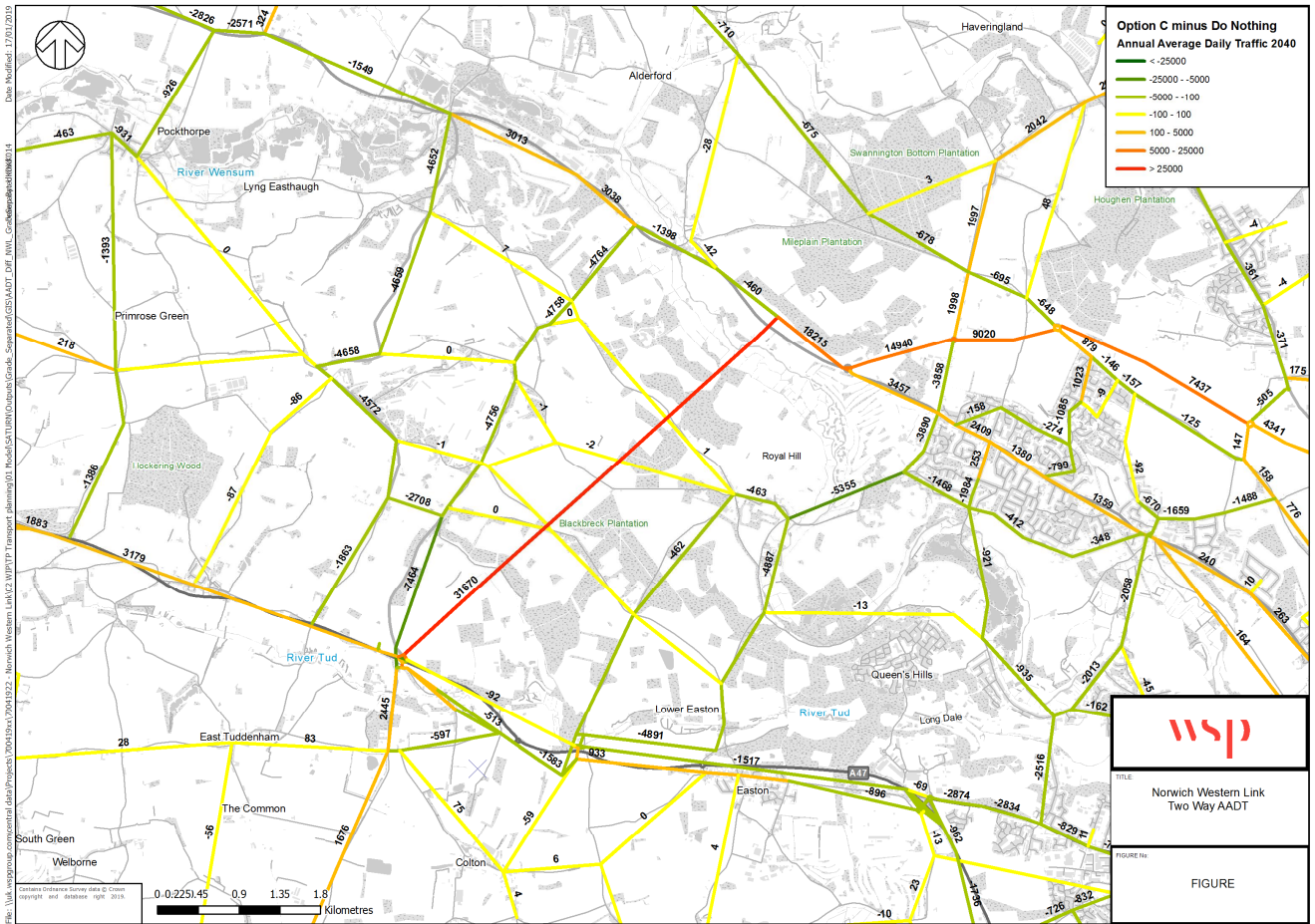
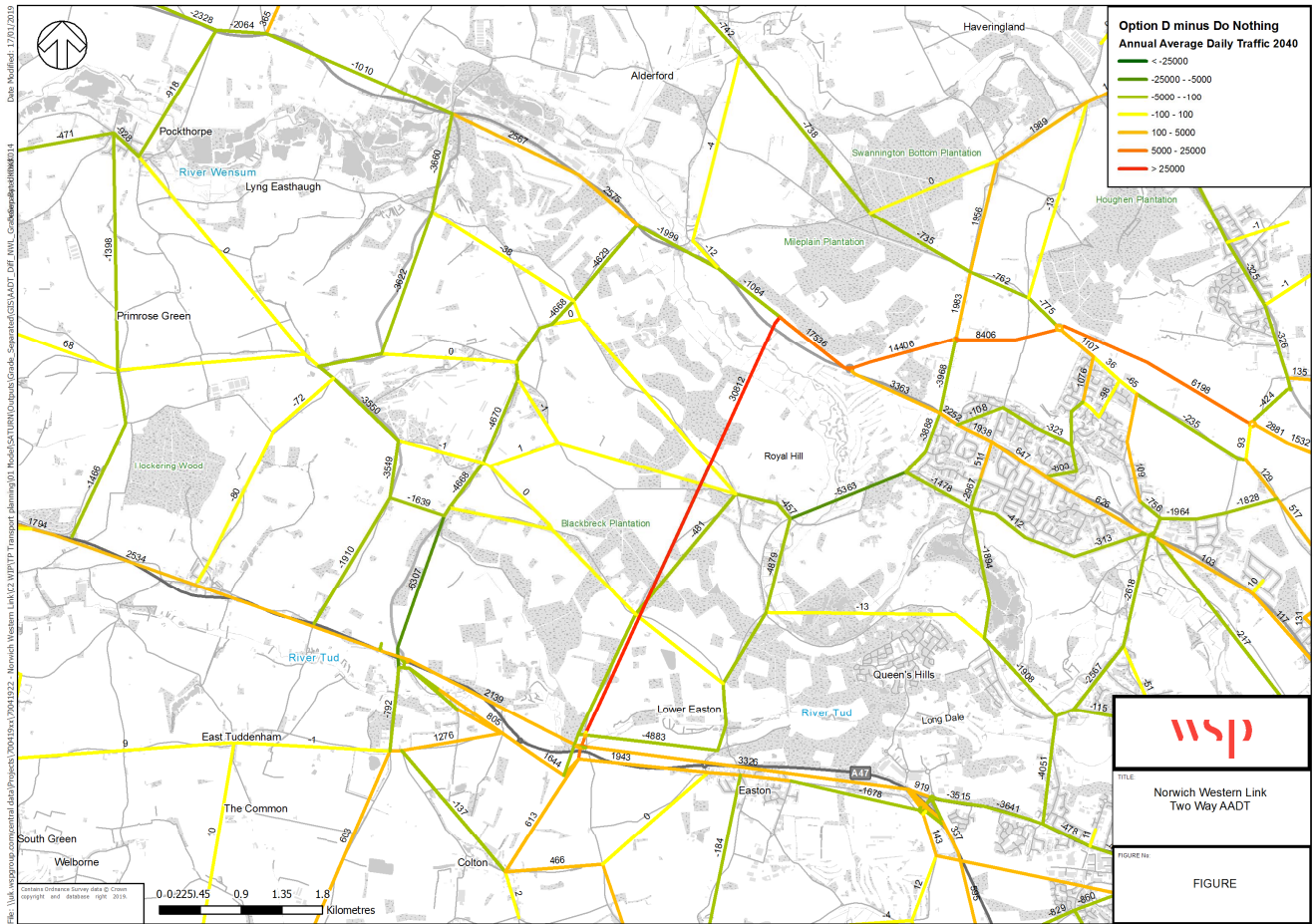


FIGURE 35: 2040 OPTION D MINUS 2040 DO NOTHING - AADT FLOW



ECONOMIC APPRAISAL APPROACH

Economic Appraisal Process

The appraisal of the economic elements associated with the scheme has been undertaken in accordance with WebTAG Unit A1.1 Cost-Benefit Analysis (May 2018) using the DfT’s standard appraisal software:

- Transport User Benefit Appraisal (TUBA) version 1.9.11 with TUBA Economics File (version 1.9.11) using TAG Data Book v1.10 (May 2018).

The following economic elements have been considered for this stage of the assessment of the proposed Norwich Western Link scheme options:

- Time Savings
- Vehicle Operating Costs
- Scheme Costs
- Indirect tax revenue.

TUBA was used to carry out the economic appraisal of the Norwich Western Link scheme options. All costs and benefits reported by TUBA are based on willingness to pay and expressed in the market price unit of account.

Economic parameters

The economic appraisal was undertaken in TUBA Version 1.9.11 with the TUBA input consisting of two files containing the economic data and scheme data.

The economic input file contains all of the economic data and parameters required by TUBA in the economic appraisal. The TUBA Economics File (version 1.9.11) has used TAG Data Book v1.8.10 (May 2018) which was the latest available at the time.

The scheme input file contains data regarding scheme costs, user classes, modelled years, annualisation factors and input matrices.

Modelled years

The economic appraisal was carried out over a 60 year period, from 2025 (opening year) to a horizon year of 2084 as this is the standard period over which travel time benefits are calculated.

Traffic flow information have been based on the SATURN forecast year transport models (2025, 2040 and 2050).

Annualisation factors have been applied to convert peak period flows into annual flows. Details are provided in the following sections.

Time scales / annualisation

TUBA makes a distinction between time slices and time periods. Standard time periods are defined in the economics file as:

- AM Peak (Weekday 07:00 – 10:00)
- PM Peak (Weekday 16:00 – 19:00)
- Inter-peak (Weekday 10:00 – 16:00)
- Off-peak (Weekday 19:00 – 07:00)
- Weekend.

The SATURN model does not include weekend and the off-peak periods as origin-destination data were not collected for these time periods, therefore it has not been possible to determine potential benefits for these periods.

The SATURN model has been assigned as an AM peak hour model, average Inter peak hour model and a PM peak hour period which enables the benefits for these peak periods to be used in TUBA.

In order to model the time slices in TUBA, an annualisation factor is required to convert to each time period. The annualisation factor is given by $h \times d$ where h is the number of this time slice in the time period and d is the number of days a year containing the time period. The annualisation factor is specified in the scheme input file.

From the information detailed above, the modelled time slices used to represent the weekday benefit are detailed below:

- AM peak period average hour time slice
- PM peak period average hour time slice
- Average Inter-peak period average hour time slice.

There are 253 peaked weekdays (excludes weekdays falling on bank holidays) meaning that the annualisation factors that have been used are:

- AM peak (07:00-10:00): 693
- PM peak (16:00-19:00): 673
- Inter-peak (10:00-16:00): 1,518.

These have been based on the recent observed count information collected within the study area by Norfolk County Council which looked at traffic flow volumes/patterns in the vicinity of the Norwich Western Link as part of the on-going monitoring of the impact of the Norwich Northern Distributor Road (NNDR).

The benefits produced in this assessment represent a conservative estimate of the total benefits produced from the scheme. This is due to two main reasons:

- No benefits were calculated for weekday off-peak periods (19:00 – 07:00)
- No benefits have been calculated for weekends or bank holidays.

Matrix input

Matrix inputs were required for the number of trips and journey time for each user class and also for trip distance. The trip distance and journey time matrices were taken from the SATURN model directly for the 2025, 2040 and 2050 forecast year models.

Journey purpose / user class

The trip matrices were split into the following vehicle types and journey purposes shown in Table 1. The correspondence between the SATURN matrix user classes and TUBA user classes is also shown.

In line with the production of the Norwich Area Transportation Strategy (NATS) model a Passenger Car Unit (PCU) value of '2.3' was used in converting HGV (vehicle units) to PCU whereas other vehicle classes remain constant i.e. 1 veh unit = 1 pcu for Car and LGV. For use within TUBA the HGV user class needs to be converted to vehicles therefore a factor of 0.43 i.e. $1/2.3$ has been used.

All HGV were defined as Vehicle Type 4 (OGV1) in TUBA. As these have lower operating costs than OGV2, this is likely to have resulted in a conservative estimate of benefits attributable to HGV.

TABLE 1: TUBA TO SATURN MATRIX USER CLASS CORRESPONDENCE

SATURN USER CLASS	VEHICLE TYPE	JOURNEY PURPOSE	TUBA USER CLASS	TUBA PURPOSE	PCU TO VEHICLE FACTOR
1	Car	Business	1	Business	1
2	Car	Commuting	2	Commuting	1
3	Car	Other	3	Other	1
4	LGV	LGV	4	LGV Personnel	1
4	LGV	LGV	5	LGV Freight	1
5	HGV	HGV	6	OGV1	0.43

Scheme costs

The scheme costs have been set out within Table 2 showing the estimated risk and inflation costs associated with each of the scheme options, at Q3 2018 prices, with the base cost of each option shown as well. These costs reflect the information contained within the Option Appraisal Report (OAR) and follow guidance in DfT TAG Unit A1-1 and TAG Unit A1-2.

TABLE 2: SCHEME COSTS WITH INFLATION AND ESTIMATED RISK

SCHEME ELEMENT	OPTION A	OPTION B	OPTION B ALT	OPTION C	OPTION D
Base Cost	£42,946,446	£116,178,134	£91,532,946	£117,639,333	£122,094,678
Estimated Risk	£13,330,000	£27,870,000	£27,925,049	£24,080,000	£27,370,000
Sub-total	£56,276,446	£144,048,134	£119,457,996	£141,719,333	£149,464,678
Inflation	£4,097,398	£11,448,908	£9,549,815	£11,379,317	£11,887,967
Total	£60,373,844	£155,497,042	£129,007,811	£153,098,650	£161,352,646

Table 3 sets out the level of Optimism Bias that has been applied to each of the base costs for each of the scheme options.

TABLE 3: SCHEME COSTS WITH OPTIMISM BIAS, INFLATION AND ESTIMATED RISK

SCHEME ELEMENT	OPTION A	OPTION B	OPTION B ALT	OPTION C	OPTION D
Base Cost	£42,946,446	£116,178,134	£91,532,946	£117,639,333	£122,094,678
Optimism Bias	£10,881,317	£40,962,453	£28,240,771	£42,798,078	£44,566,102
Sub-total	£53,827,763	£157,140,587	£119,773,717	£160,437,411	£166,660,780
Estimated Risk	£13,330,000	£27,870,000	£27,925,049	£24,080,000	£27,370,000
Inflation	£4,097,398	£11,448,908	£9,549,815	£11,379,317	£11,887,967
Total	£71,255,161	£196,459,495	£157,248,581	£195,896,728	£205,918,747

The scheme costs, with allowance for risk, inflation and optimism bias (29.5% for the roadworks and 44.5% for the structures), that have been used as the latest available, at Q3 2018 prices, for input into the TUBA scheme economic program are shown in Table 4.

TABLE 4: SCHEME COSTS FOR INPUT INTO TUBA

SCHEME ELEMENT	OPTION A	OPTION B	OPTION B ALT	OPTION C	OPTION D
Construction	£44,996,984	£162,004,383	£122,368,007	£164,361,067	£171,945,137
Land	£14,434,719	£14,204,564	£19,584,575	£10,990,528	£12,480,468
Preparation	£7,600,794	£13,018,209	£9,833,142	£13,207,586	£13,817,020
Supervision	£4,222,664	£7,232,339	£5,462,857	£7,337,547	£7,676,122
Total	£71,255,161	£196,459,495	£157,248,581	£195,896,728	£205,918,747

Travel time changes calculation

Travel time savings are monetised as a perceived benefit, reflecting users' willingness to pay for a quicker journey. The value of those savings differs depending on the reason for the trip, of which three are defined in TAG; business users, commuters, and non-commuting consumers e.g. leisure trips.

The costs and benefits for travel time savings have been assessed using TUBA. The trip length, trip volume and journey time information needed for this has been taken from the relevant SATURN models.

The costs and benefits for travel time savings have been assessed using TUBA. The transport model, described in previous sections, has been used to extract time, distance and trip matrices from a Fixed Demand Model assessment for use within the TUBA assessment.

Vehicle operating cost changes

Vehicle operating cost savings accrue in two categories; fuel costs, a function of the speed of the vehicle through the network and fuel efficiency, and non-fuel costs such as oil, tyres, vehicle maintenance depreciation and business vehicle capital costs, largely a function of the distance travelled by the vehicle.

The costs and benefits for vehicle operating costs have been assessed using TUBA. The trip length, trip volume and journey time information needed for this has been skimmed from the relevant SATURN models.

TRANSPORT ECONOMIC EFFICIENCY

Table 5 outlines a summary of the results for the Norwich Western Link scheme options which are based on having the Highways England A47 scheme (at-grade junctions) as the Do Nothing i.e. without Norwich Western Link.

TABLE 5: ANALYSIS OF MONETISED COSTS AND BENEFITS (£M) – AT-GRADE WITH THE A47

TYPE	OPTION A	OPTION B	OPTION B ALT	OPTION C	OPTION D
Greenhouse Gases	1.068	-0.621	-0.830	1.373	-0.526
Economic Efficiency: Consumer Users (Commuting)	18.373	75.789	73.398	90.062	71.922
Economic Efficiency: Consumer Users (Other)	22.440	73.656	70.693	84.786	64.108
Economic Efficiency: Business Users and Providers	18.765	76.833	73.037	86.588	72.242
Wider Public Finances (Indirect Taxation Revenues)	-2.149	1.164	1.570	-2.671	1.150
Present Value of Benefits (PVB)	58.497	226.821	217.868	260.138	208.896
Broad Transport Budget	50.216	136,918	109.485	136.262	143.447
Present Value of Costs (PVC)	50.216	136.918	109.485	136.262	143.447
Net Present Value (NPV)	8.281	89.903	108.383	123.876	65.449
Benefit to Cost Ratio (BCR)	1.17	1.66	1.99	1.91	1.46

Table 5 shows that the Norwich Western link scheme options are forecast to provide BCR of:

- Option A: 1.17
- Option B: 1.66
- Option B2: 1.99
- Option C: 1.91
- Option D: 1.46.

Table 6 outlines a summary of the results for the Norwich Western Link scheme options which are based on having the Highways England A47 scheme (grade-separated junctions) as the Do Nothing i.e. without Norwich Western Link.

TABLE 6: ANALYSIS OF MONETISED COSTS AND BENEFITS (£M) – GRADE-SEPARATED WITH THE A47

TYPE	OPTION A	OPTION B	OPTION B ALT	OPTION C	OPTION D
Greenhouse Gases	0.614	-0.050	-0.383	1.533	0.422
Economic Efficiency: Consumer Users (Commuting)	20.662	121.547	114.850	133.364	116.397
Economic Efficiency: Consumer Users (Other)	24.911	104.853	98.547	116.124	108.973
Economic Efficiency: Business Users and Providers	18.425	97.469	91.549	107.463	92.480
Wider Public Finances (Indirect Taxation Revenues)	-1.109	0.520	1.144	-2.650	-0.305
Present Value of Benefits (PVB)	63.503	324.339	305.708	355.834	317.967
Broad Transport Budget	50.216	136.918	109.485	136.262	143.447
Present Value of Costs (PVC)	50.216	136.918	109.485	136.262	143.447
Net Present Value (NPV)	13.287	187.421	196.222	219.572	174.520
Benefit to Cost Ratio (BCR)	1.27	2.37	2.79	2.61	2.22

Table 6 shows that the Norwich Western link scheme options are forecast to provide BCR of:

- Option A: 1.27
- Option B: 2.37
- Option B2: 2.79
- Option C: 2.61
- Option D: 2.22.

It must be stressed that the BCR have been based on using:

- Travel time benefits only through TUBA and does not include potential benefits from accidents, air quality, noise etc
- The SATURN model does not include weekend and the off-peak periods as origin-destination data were not collected for these time periods, therefore it has not been possible to determine potential benefits for these periods
- Fixed Demand origin-destination matrix with no Variable Demand Model (VDM) assumed at this stage.



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