

# A47-A1067 Western Link Road

Scoping Study

September 2014

Norfolk County Council

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# 1 Introduction

## 1.1 Background and Context

A preliminary assessment of alternative western corridors for a new link between the A47 and A1067 was carried out in 2004/05. This proposal was considered within the Stage 2 assessment work for the Norwich Northern Distributor Road (NDR) scheme, but was not taken forward for inclusion in the Preferred Route due to environmental constraints.

The proposed NDR scheme, currently being examined under the Nationally Significant Infrastructure Projects (NSIP) process, achieves all its objectives, and is a fundamental part of the Norwich Area Transportation Strategy (NATS). However, feedback from consultation on the NDR scheme indicates that there is a strong desire for a new link between the A47 and A1067, termed a Western Link Road (WLR) for the purposes of this study. Delivery of a WLR could have additional benefits for the Norwich sub-region through further enhancing strategic connections and addressing specific concerns expressed by Members of Norfolk County Council (NCC) in respect of:

- The desire to provide relief to existing traffic problems in the Taverham/Costessey Ringland and Weston Longville/Hockering areas. These problems relate principally to the long-standing adverse impacts of through traffic on the local road network; and
- The desire to improve access to the Queens Hills residential development, currently served from a single access through the Longwater Employment Area, to the A47/A1074 Longwater Interchange. This junction suffers from congestion at peak times affecting both residential and business users.

Mott MacDonald has therefore been commissioned to undertake a scoping study to investigate potential route options for a WLR, as described in the following sections of this report.

## 1.2 Terms of Reference

This report has been prepared in response to a brief issued by NCC in May 2014, which requires:

- Consideration of potential route options for a new link between the A47 and A1067;
- Use of the NATS transport model to assess the strategic impacts on traffic patterns, against a baseline of growth assumptions and measures contained in the Joint Core Strategy, which include the NDR in the form submitted for a Development Consent Order;
- A high level review of environmental constraints, with reference to existing NDR documents; and
- Preparation of high level cost estimates.

The brief also requires the development of scheme objectives in line with guidance in the Department for Transport's 'Early Assessment and Sifting Tool' (EAST) to enable an initial sifting of route options. A public transport option has also been developed and included in the sifting process.

The option development and sifting process has been carried out generally in accordance with Steps 4 to 6 of the Department for Transport's current Transport Analysis Guidance (January 2014) and relevant guidance in the Design Manual for Roads and Bridges (DMRB). Whilst mapping of environmental constraints is included, a wider consideration of opportunities and constraints for current and future scenarios, leading to establishment of the need for an intervention has not formed part of this study.

Problem identification and the need for intervention have been derived from earlier work undertaken by NCC and prior consultations. A structured investigation of these issues, in line with DfT TAG guidance, would be necessary in further stages of scheme development.

It should also be noted that this study is a scoping exercise, carried out without formal stakeholder consultation or detailed traffic modelling necessary to provide measures of Value for Money. The study will provide high level information for NCC to consider, ahead of any decision to investigate the feasibility of a Western Link Road, to the level of a full DMRB Stage 1 Assessment Report.

### 1.2.1 Potential Alignments

The brief for this element of the study is to prepare updated environmental constraints mapping for the study area for review, together with existing NDR documents, to determine the full range of routes to be considered. The specific NDR documents referred to in the brief are:

- Stage 1 Environmental Assessment Report (January 2003); and
- Preliminary Assessment of Alternative Western Corridor Options (March 2005).

### 1.2.2 Strategic Impacts

The strategic impacts of the full range of options under consideration are to be assessed using the latest NATS transport model that was developed to support the Development Consent Order (DCO) application for the NDR scheme. This model was recently updated with 2012 origin and destination data and planning data supplied by district councils. The existing forecast years of 2017 and 2032 are to be used for the assessment, with all testing of routes based on the NDR do-something scenarios. The routes for modelling are to be carefully selected to represent the full range of possible routes.

## 1.3 Structure of Report

The structure of this report is as follows:

- **Study Area** – identifies the area considered;
- **Sifting Objectives** – presents the scheme objectives that have been agreed for appraisal of alternative routes and the sifting criteria used in a RAG (Red/Amber/Green) assessment;
- **Environmental Constraints** – presents the results of a desk based study to identify existing constraints in the study area and European legislation relating to the River Wensum Special Area of Conservation;
- **Option Development and Assessment** – describes the development of a public transport option and alternative route options for a Western Link Road. Details of the traffic modelling work carried out are presented, leading to a consideration of carriageway standards, with reference to DfT advice. A potential forward programme for further development of the scheme and the derivation of estimates of capital costs and development costs are also shown;
- **Sifting Appraisal** – presents the appraisal results in the form of a RAG matrix and describes the factors considered in assessing performance against each objective; and



- **Conclusions** – sets out the key conclusions which can be drawn from this scoping study and recommendations for further work.

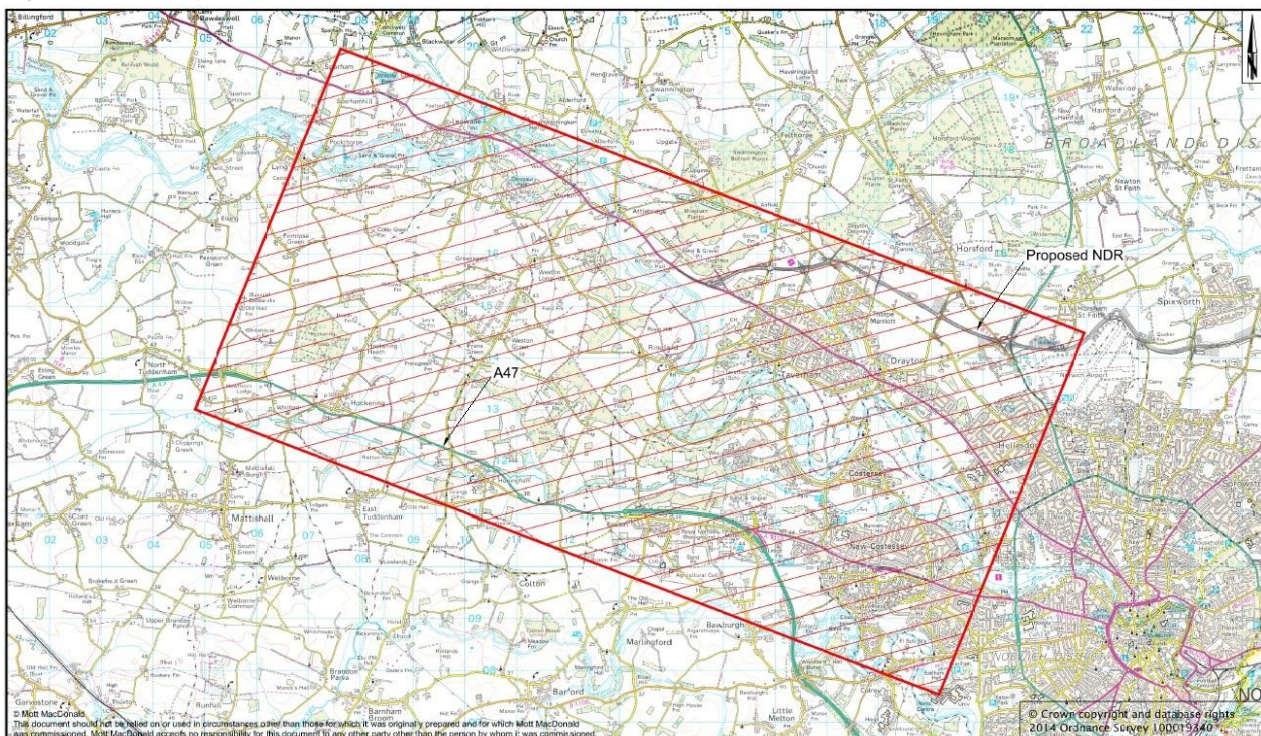
## 2 Study Area

### 2.1 Study Area

The study area for the identification of potential alignments for a route between the A47 and A1067 is shown in Figure 2.1 below. This is bounded by:

- The A47 trunk road between the North Tuddenham junction and the Longwater Interchange;
- The A1074 Dereham Road between the Longwater Interchange and the A140 Outer Ring Road;
- The A140 Outer Ring Road between the A1074 and A1067;
- The A1067 Drayton High Road / Fakenham Road between the A140 Outer Ring Road and Lenwade; and
- Hockering Road, Blind Lane and Lyng Road between the A1067 at Lenwade and the A47 North Tuddenham junction.

Figure 2.1: Study Area



Source: Mott MacDonald

## 3 Sifting Objectives and Criteria

### 3.1 Sifting Objectives

A set of sifting objectives have been adapted from recommendations contained in the Department for Transport's 'Early Assessment and Sifting Tool' (EAST). These include Specific Local Objectives that have been agreed in discussion with NCC officers and reflect the concerns expressed by local stakeholders and NCC Members (**see 1.1**). The sifting objectives are set out below in Table 3.1.

Table 3.1: Objectives Used for Sifting Process

Strategic
<b>Specific Local Objectives</b>
1a. Improve strategic connectivity
1b. Reduce adverse impacts in Taverham/Costessey area caused by traffic routeing between the A47 and A1067
1c. Reduce adverse impacts in Ringland area caused by traffic routeing between the A47 and A1067
1d. Reduce adverse impacts in Weston Longville/Hockering area caused by traffic routeing between the A47 and A1067
1e. Accessibility for Queens Hills
<b>Wider Transport and Government Objectives</b>
1f. Sustainable travel opportunities – public transport, cycling and walking
Economic
2a. Connectivity – impact on journey times and distance
2b. Facilitate delivery of housing
Carbon
3a. Carbon emissions
Socio-distributional Impacts
4a. Impact on accessibility for vulnerable groups
Local Environment
5a. Impact on River Wensum SAC/SSSI
5b. Impact on other Designated Sites
5c. Impact on heritage and landscape
5d. Impact on air quality and noise
Well Being
6a. Severance
6b. Enabling access to goods, services, people and places
Managerial
7a. Implementation timetable
7b. Public acceptability
Financial
8a. Capital cost
Commercial
9a. Potential for government and/or developer funding

### 3.2 RAG Sifting Criteria used in Assessment

A set of criteria have been developed for each objective to help differentiate the performance of alternative route options against sifting objectives. These have been developed in RAG (Red/Amber/Green) format and are shown below in Table 3.2.

Table 3.2: RAG Criteria used to assess Options against Objectives

	Green	Amber	Red
<b>1. Strategic</b>			
<i>1a. Improve strategic connectivity</i>	Scheme provides direct connections to strategic network	Scheme provides some indirect connections to strategic network	Scheme would provide no connections to strategic network
<i>1b - 1d. Reduce adverse impacts on local communities caused by traffic routeing between A47 and A1067</i>	Scheme would significantly reduce strategic traffic on local routes	Scheme would decrease strategic traffic on some local routes	Scheme would have little impact or increase strategic traffic on local routes
<i>1e. Accessibility for Queens Hills</i>	Scheme would offer the opportunity to provide a new direct access for Queens Hills	Scheme would reduce traffic on the local road network creating conditions in which a second access for Queens Hill may become feasible	Scheme would not offer any opportunity to provide a second access for Queens Hills
<i>1f. Sustainable travel opportunities - public transport, cycling, walking</i>	Scheme would facilitate improved public transport provision and better footway and cycle route connections	Scheme has a broadly neutral impact on public transport provision, cycle routes and footways	Scheme has a negative impact on public transport provision, cycle and footway routes
<b>2. Economic</b>			
<i>2a. Connectivity - impact on journey times and distances</i>	Scheme would reduce journey times and distances for a significant number of trips	Scheme would reduce journey times and distances for some trips	Scheme would have little impact or increase journey times and distances.
<i>2b. Facilitate delivery of housing</i>	Scheme would facilitate strategic sites for residential development which otherwise would not be developable	Scheme would improve connections to proposed residential developments	Scheme would not facilitate delivery of housing
<b>3. Carbon</b>			
<i>3a. Carbon emissions</i>	Scheme would have positive impact on carbon emissions	Scheme would have broadly neutral impact on carbon emissions	Scheme would have negative impact on carbon emissions
<b>4. Socio-distributional Impacts</b>			
<i>4a. Impact on accessibility for vulnerable groups</i>	Scheme would improve accessibility for vulnerable users	Scheme would have broadly neutral impact on accessibility for vulnerable users	Scheme would reduce accessibility for vulnerable groups
<b>5. Local Environment</b>			

5a. <i>Impact on River Wensum SAC/SSSI</i>	No foreseeable direct or indirect impacts on the River Wensum, either during construction or operation	Possible direct or indirect impacts on the River Wensum, either during construction or operation, for which there may be mitigation	Probable direct or indirect impacts on the River Wensum, either during construction or operation, for which there is no mitigation
5b. <i>Impact on other Designated Sites</i>	No foreseeable direct or indirect impacts on Sites, either during construction or operation	Possible direct or indirect impacts on Sites, either during construction or operation	Probable direct or indirect impacts on Sites, either during construction or operation
5c. <i>Impact on heritage &amp; landscape</i>	Scheme would have minimal impact on heritage and/or landscape	Scheme would have some impact on heritage and/or landscape	Scheme would have a significant negative impact on heritage and/or landscape
5d. <i>Impact on air quality &amp; noise</i>	Scheme would have a positive or neutral impact in terms of air quality and noise	Low number of dwellings will experience deterioration in air quality and/or noise due to traffic	Large number of dwellings would experience deterioration in air quality and/or noise due to traffic
<b>6. Well Being</b>			
6a. <i>Severance</i>	No local footway, cycle route or highway connections between villages will be severed.	Small diversions may be required to some existing local footway, cycle route and highway connections	Some footway, cycle route and highway connections may be cut off with no alternative route provided.
6b. <i>Enabling access to goods, services, people and places</i>	Scheme would significantly improve access to goods, services, people and places	Scheme would offer some access improvements to goods, services, people and places	Scheme would not improve access to goods, services, people and places
<b>7. Managerial</b>			
7a. <i>Implementation timetable</i>	Scheme deliverable in short-term (within 1 year)	Scheme deliverable in medium term	Scheme deliverable in long term (over 5 years)
7b. <i>Public acceptability</i>	Scheme expected to have broad public support	Scheme expected to generate some public objections.	Scheme expected to generate significant public objections.
<b>8. Financial Case</b>			
8a. <i>Capital Cost (£m) - 2014 estimate for S2/D2AP standard schemes, including 44% Optimism Bias</i>			
<b>9. Commercial</b>			
9a. <i>Potential for government and/or developer funding</i>	Government and/or developer funding likely	Government and/or developer funding could be limited	Government and/or developer funding unlikely

## 4 Environmental Constraints

Environmental features within the study area have been mapped to produce a set of Environmental Constraints plans. These are appropriate to this initial level of assessment and have been grouped into the following categories,

- Ecology (including Designated Sites);
- Water; and
- Cultural Heritage.

These features are shown on drawings MMD-339207-C-SK-00-XX-0002 to -0004 (**see Appendix A**) and described in the following paragraphs.

### 4.1 Designated Sites for Nature Conservation

#### 4.1.1 Statutory Designated Sites

Two categories of statutory designated sites can be found within the area of interest. These are Special Areas of Conservation (SAC) and Sites of Special Scientific Interest (SSSI). SACs are protected at European level under the EU's Habitats Directive (92/43/EEC) for conserving biodiversity. SSSIs are protected at UK level under the Countryside and Rights of Way Act (as amended in 2000) to conserve important ecological or historical features.

Running through the area of interest from northwest to southeast, the River Wensum is designated as both an SAC and as an SSSI. This site is thus protected by two levels of overlapping legislation. Its ecological features that qualify the site for such protection at a European level, within its SAC designation, include its characterisation by *Ranunculion fluitantis* and *Callitriche-Batrachion* vegetation and the presence of white-clawed crayfish (*Austropotamobius pallipes*). Within the area of interest there are three additional SSSIs. These are Hockering Wood, Alderford Common, and Swannington Upgate Common.

#### 4.1.2 County Wildlife Sites

County Wildlife Sites in Norfolk are designated to support both locally and nationally threatened wildlife, and many sites will contain Habitats and Species of Principal Importance as listed in Section 41 of the Natural Environment and Rural Communities (NERC) Act. These are all the habitats and species in England that were identified as requiring action in the UK Biodiversity Action Plan (UK BAP) and continue to be regarded as conservation priorities in the subsequent UK Post-2010 Biodiversity Framework. Such sites are managed by the local Wildlife Trust together with representatives of the local authority and other local wildlife conservation groups.

Within the area of interest there are 73 County Wildlife Sites. These are:

- East Hills;
- Land South of River Tud 1;
- Land South of River Tud 2;
- Red Bridge;
- Long Dale;

- Snakes Hills;
- Wensum Meadow;
- Brickfield Farm;
- Costessey Pits (East);
- Low Road Meadow;
- Taverham Mill;
- Gravel Pits;
- Fen West of East Tuddenham;
- Sparham Pools;
- Lake Opposite Fustyweed;
- Pits near Mill Street;
- Lakes near Lyng;
- Pits near Lyng Easthaugh;
- Grassland adj. River Wensum;
- Clippings Green Farm;
- Park Grove;
- Mouse Wood;
- Meadow Adjacent to Sandy Lane;
- Great Witchingham Common;
- Canham's Hill;
- Ringland Hills;
- Ringland Pits;
- Church Hill Common;
- Broom and Spring Hills;
- Attlebridge Hills;
- Triumph and Foxburrow Plantations;
- Weston Meadow;
- Lake Adjacent to Concrete Plant;
- Bush Meadow Plantation;
- Land adjoining Swannington Bottom;
- Lenwade Pits (East);
- Lenwade Pits (West);
- Walsingham Plantation;
- Whinney Hills and Common;
- Pyehurn Lane Woodland;
- Green Lane;
- Meadows by Cushion's Common Plantation;
- The Wilderness;
- Black Park and The Thicket;
- Horsford Heath;
- Brickkiln Grove;
- Waterloo Plantation;
- Horsford Rifle Range;
- Drayton Wood;

- Marlpit Paddocks;
- Disused Railway, Hellesdon;
- Hellesdon Mill Meadow;
- Mile Cross Meadows;
- Land South of Cadder's Hill;
- Botany Bay Farm;
- Wensum Pastures at Morton Hall;
- Holly Woods;
- Old Covert, Wood Lane;
- Wensum Mount Farm;
- Harman's Grove;
- Hall Hills/Ringland Covert;
- Land adjoining River Tud;
- Blyth's Wood;
- Jennis Wood;
- Land south of Blyth's Wood;
- Land adjoining Foxburrow Plantation;
- Fen Plantation;
- Lyng Easthaugh Meadows;
- Horsford Woods;
- Lord's Hill, Easton Reeds and Blackhill Wood;
- Marriott's Way;
- Horsham Meadows; and
- Hellesdon Pastures.

#### **4.1.3 Ancient Woodland**

Ancient woodland is land that has had a continuous woodland cover since at least 1600 AD. Such land may be either semi-natural woodland (ASNW) which retains a native tree and shrub cover that has not been planted (although it may have been managed by coppicing or felling and allowed to regenerate naturally), or plantation on ancient woodland sites (PAWS) where the original tree cover has been felled and replaced by planting. Ancient woodlands are considered particularly important because they are exceptionally rich in wildlife.

Within the area of interest there are 17 areas of Ancient Woodland. These are:

- Lords Hills;
- Old Holly Woods;
- Jennis Wood;
- Blyth's Wood;
- Days Grove;
- Harman's Grove;
- Park Grove;
- Rough Ground;



- Snake Wood;
- Blackhill Wood;
- Mileplain Plantation;
- Hockering Wood;
- Mouse Wood;
- Cobb's Hills;
- Primrose Grove;
- Park Grove; and
- Easton Reeds.

#### **4.1.4 Veteran Trees**

Veteran trees are trees which, due to their size, age or condition, are of special interest biologically, culturally or aesthetically. Tree preservation orders (TPOs) protect special trees by preventing the tree from being cut down, uprooted or damaged without the written consent of the Local Planning Authority. TPOs provide legal protection for trees and woodlands under the Town and Country Planning Act 1990. There are 74 Veteran Trees spread throughout the area of interest.

#### **4.1.5 Roadside Nature Reserves**

Norfolk Roadside Nature Reserves are part of a joint scheme between Norfolk County Council and the Norfolk Wildlife Trust. The aim of this scheme is to protect and promote the verges of Norfolk's roadside that contain rare and scarce plant and insect species and help to complete the protection of non-statutory sites of wildlife interest in parallel with the County Wildlife Site system.

There are four Roadside Nature Reserves within the area of interest. These are:

- Fakenham Road;
- Drayton High Road;
- Ringland; and
- Cherry Tree Lane.

#### **4.1.6 Other**

There are no National Nature Reserves or Local Nature Reserves within the area of interest.

## **4.2 The Water Environment**

### **4.2.1 Flood Zones**

The Environment Agency's Flood Zones refer to the probability of river and sea flooding ignoring the presence of man-made defences. Flood Zone 3 demarks land that could be flooded by a river with a 1 in 100 or greater annual probability. Flood Zone 2 demarks the area of land that could be subject to major flooding from a river with a 1 in 1000 annual probability. Flood Zone 1 is the remaining land area which has

less than a 1 in 1000 annual probability of river flooding and is left “clear” on flood risk maps. In the area of interest, Flood Zones 2 and 3 are shown to coincide with the floodplains of the Rivers Wensum and Tud.

#### **4.2.2 Groundwater Source Protection Zones (SPZs)**

Groundwater Source Protection Zones (SPZs) indicate those areas where groundwater supplies are at risk from potentially polluting activities and accidental releases of pollutants. SPZs are primarily a policy tool used to control activities close to water supplies intended for human consumption. The Environment Agency use the zones in conjunction with the Groundwater Protection Policy to set up pollution prevention measures in areas which are at a higher risk, and to monitor the activities of potential polluters nearby. There are three SPZs:

- SPZ1 – Inner Protection Zone is defined as the 50-day travel time from any point below the water table to the source. This zone has a minimum radius of 50 metres;
- SPZ2 – Outer Protection Zone is defined by a 400-day travel time from a point below the water table; and
- SPZ3 – Source Catchment Protection Zone is defined as the area around a source within which all groundwater recharge is presumed to be discharged at the source. In confined aquifers, the source catchment may be displaced some distance from the source.

Within the area of interest all three categories of SPZ can be seen to exist.

### **4.3 Cultural Heritage**

#### **4.3.1 Conservation Areas**

A Conservation Area is an area which has been designated because of its special architectural or historic interest, the character or appearance of which it is considered desirable to preserve or enhance. There are six Conservation Areas within the area of interest. From West to East, these are in:

- Lyng;
- Mattishall;
- Costessey;
- Costessey Lane;
- Hellesdon Road; and
- Mile Cross.

#### **4.3.2 Scheduled Ancient Monuments**

A Scheduled Ancient Monument is a nationally important archaeological site or historic building given protection against unauthorised change. These sites are protected under the Ancient Monuments and Archaeological Areas Act 1979. There are eight Scheduled Ancient Monuments within the area of interest. These are:

- Two round barrows on Horsford Heath 1;
- Two round barrows on Horsford Heath 2;

- Village cross 160 m South of St Margaret's Church;
- Tumulus in the Warren;
- Round barrow N of Sandy Lane;
- Drayton Lodge;
- Horsford Castle; and
- Round barrow SE of the Lodges.

### **4.3.3 Listed Buildings**

A listed building is a building which has been designated because of its special architectural or historic interest and (unless the list entry indicates otherwise) includes not only the building itself but also:

- any object or structure fixed to the building; and
- any object or structure within the curtilage of the building which, although not fixed to the building, forms part of the land and has done so since before 1 July 1948.

Listed buildings can be seen to be present throughout the area of interest.

### **4.3.4 Historic Parks and Gardens**

There are no Historic Parks and Gardens within the area of interest.

## **4.4 Environmental Legislation relevant to River Wensum SAC**

### **4.4.1 The Conservation of Habitats and Species Regulations 2010**

Council Directive 92/43/EEC on the Conservation of natural habitats and of wild fauna and flora, known as the Habitats Directive was adopted in 1992. The Directive is the means by which the European Union meets its obligations under the Bern Convention. The directive has been transposed into national law under the Conservation of Habitats and Species Regulations. The Conservation of Habitats and Species Regulations 2010 consolidate all the various amendments made to the Conservation of Habitats and Species Regulations 1994 in respect of England and Wales.

SACs are strictly protected sites designated under the EC Habitats Directive. Article 3 of the Habitats Directive requires the establishment of a European network of important high-quality conservation sites that will make a significant contribution to conserving the 189 habitat types and 788 species identified in Annexes I and II of the Directive (as amended). The listed habitat types and species are those considered to be most in need of conservation at a European level (excluding birds). Of the Annex I habitat types, 78 are believed to occur in the UK. Of the Annex II species, 43 are native to, and normally resident in, the UK.

## 4.4.2 River Wensum SAC

### 4.4.2.1 Annex I habitats that are a primary reason for selection of this site as an SAC

Water courses of plain to montane levels with the *Ranunculon fluitantis* and *Callitricho-Batrachion* vegetation. The Wensum represents sub-type 1 in lowland eastern England. Although the river is extensively regulated by weirs, *Ranunculus* vegetation occurs sporadically throughout much of the river's length. Stream water-crowfoot *R. penicillatus* ssp. *pseudofluitans* is the dominant *Ranunculus* species but thread-leaved water-crowfoot *R. trichophyllus* and fan-leaved water-crowfoot *R. circinatus* also occur.

### 4.4.2.2 Annex II species that are a primary reason for selection of this site as an SAC

White-clawed (or Atlantic stream) crayfish *Austropotamobius pallipes*. The Wensum is a chalk-fed river in eastern England, and is an eastern example of riverine white-clawed crayfish *Austropotamobius pallipes* populations. As with most of the remaining crayfish populations in the south and east of England, the threats from non-native crayfish species and crayfish plague are severe. Designation of the river as a SAC provides as much protection as can be afforded to such vulnerable populations.

### 4.4.2.3 Annex II species present as a qualifying feature, but not a primary reason for site selection:

- Desmoulin's whorl snail *Vertigo moulinsiana*;
- Brook lamprey *Lampetra planeri*; and
- Bullhead *Cottus gobi*.

Sections of the River Wensum SAC are currently in an unfavourable condition and therefore vulnerable to further deterioration. This is the result of silt ingress and reduced water flows due to abstraction.

## 4.4.3 Habitats Directive and Planning

The purpose of the Habitats and Wild Birds Directives is to restore and maintain Europe's biodiversity by protecting its most important habitats and species. This is achieved, in part, through the designation of protected sites. The Directives require competent authorities (those with decision making powers) to assess the impact of plans or projects that would be likely to have a significant effect on these "European sites", in this case the River Wensum SAC, either alone or in combination with other plans or projects. Normally, competent authorities cannot consent to plans or projects without first having ascertained that they will not have an "adverse effect on the integrity of a European site" (AEoI) following such an assessment. It is considered that due to the failing status of the River Wensum SAC any adverse impact would have an impact on the integrity of the Site.

However, article 6(4) of the Habitats Directive provides a derogation which would allow a plan or project to be approved in limited circumstances even though it would or may have an AEoI on a European site. Article 6(4) applies to sites protected under both the Habitats and Wild Birds Directives.

Under article 6(4) a plan or project can only proceed provided three sequential tests are met, which are:

- There must be no feasible alternative solutions to the plan or project which are less damaging to the affected European site(s);
- There must be “imperative reasons of overriding public interest” (IROPI) for the plan or project to proceed; and
- All necessary compensatory measures must be secured to ensure that the overall coherence of the network of European sites is protected.

These tests must be interpreted strictly and developments which may result in an adverse effect on the integrity of a European site can only be authorised once the above tests have been met.

There may be circumstances where a development that may be damaging to a European site is needed for an imperative reason of overriding interest. As long as the other requirements of article 6(4) are met, such developments can be approved, where it can be shown to be necessary, to ensure this interest is met.

#### **4.4.4 Derogation Tests**

##### **4.4.4.1 Test 1: Alternative Solutions**

The purpose of the alternative solutions test is to determine whether there are any other feasible ways to deliver the overall objective of the plan or project which will be less damaging to the integrity of the European site affected.

It is the competent authority’s responsibility to assure itself there are no feasible alternative solutions. The competent authority should determine the range and type of possible alternatives that should be considered, and use its judgement to decide what is reasonable in any particular case. Where necessary it may consult others on potential alternative solutions. In some cases the competent authority may need to consider options that have not been identified by the applicant. In addition a “do-nothing” option must be considered.

Alternative solutions are limited to those which would deliver the same overall objective as the original proposal.

If the competent authority decides that there are feasible alternative solutions to the plan or project which would have lesser effects on the European site, it cannot give consent for the plan or project to proceed.

##### **4.4.4.2 Test 2: Overriding Public Interest (IROPI)**

Having established there are no feasible alternative solutions, the competent authority must be able to identify “imperative reasons of overriding public interest” (IROPI) that justify the plan or project despite the environmental damage it will cause.

The type of IROPI that a competent authority can consider will depend on the nature of the site that will be affected.

In this case the River Wensum SAC hosts a priority habitat or species and so the competent authority can only consider reasons relating to human health, public safety, or beneficial consequences of primary importance to the environment; or other imperative reasons of overriding public interest only after having regard to the opinion of the European Commission.

When identifying IROPI a competent authority must consider whether all three elements of IROPI are met:

- Imperative: the plan or project is necessary (whether urgent or otherwise) for one or more of the reasons outlined above;
- Overriding: the interest served by the plan or project outweighs the harm to the integrity of the site as assessed in light of the weight to be given to the protection of such sites under the directive; and
- Public Interest: a public good is delivered rather than a solely private interest.

Public interest can occur at national, regional or local level, provided the other elements of the test are met.

#### 4.4.4.3 Test 3: Compensatory Measures

The Habitats Directive seeks to create a coherent ecological network of protected sites. Therefore if harm to one site is allowed – because there are no alternatives and IROPI can be shown – it must be compensated for, so that the coherence of the network as a whole is maintained.

Compensatory measures can include, among other things:

- The re-creation of a comparable habitat, which can in time be designated as a European site;
- The re-creation of a comparable habitat as an extension to an existing European site; and
- In exceptional circumstances the classification of a new SAC for comparable features.

The competent authority (liaising with the statutory nature conservation body and others as necessary) must have confidence that the compensatory measure will be sufficient to offset the harm.

# 5 Option Development and Assessment

## 5.1 Public Transport

There is a requirement to consider a public transport option (or options) as an alternative to road building options for inclusion in the sifting exercise. Any public transport option worthy of inclusion in the initial sifting exercise should meet as many as possible of the following criteria:

- Improves local accessibility and connectivity;
- Provides an alternative to local car journeys routing between the A47 and A1067;
- Complements and minimises overlap with existing bus services;
- Provides new links to key trip attractors and transport hubs;
- Provides access to a range of destinations beyond the route directly served through interchange opportunities; and
- Is realistic in terms of the level of resources required relative to potential patronage.

### 5.1.1 Existing Situation

There is no existing orbital bus route linking communities on the north-western fringes of the Norwich urban area or providing direct links to key trip attractors in West Norwich.

As a consequence, residents of Taverham and Thorpe Marriott travelling to the Norfolk and Norwich University Hospital (NNUH) by public transport currently have to catch two buses, changing in the city centre and involving journey times from the centre of Taverham of between 56 and 65 minutes.

Konectbus service 10 currently operates between the Costessey Park & Ride site adjacent to the A47 at Longwater and NNUH every 30 minutes on Mondays to Fridays. The current service requires one bus. There is potential to extend this service northwards across the Wensum Valley to provide a significant enhancement to the existing local bus network at the cost of only one additional bus.

### 5.1.2 Option Description

The public transport option identified for the sifting exercise is an extended bus route based on the existing Konectbus service 10, operating between Thorpe Marriott and NNUH via Taverham, Costessey (West End and Longwater Lane), Dereham Road, Costessey Park & Ride and the existing route to NNUH.

Alternatively, subject to the provision of the proposed northern access to Queens Hills from Ringland Lane, the route could serve Queens Hills and the Longwater retail and employment areas.

Drawing no. MMD-339207-C-SK-00-XX-0011 (see **Appendix B**) shows the proposed route and the potential alternative route serving Queens Hills.

Table 5.1 shows an indicative operating cycle for this route, demonstrating that the round trip can be completed within a cycle time of 60 minutes, enabling a 30 minute interval service to be provided with two buses, one of these being the vehicle currently required for the existing Konectbus service 10.

Table 5.1: Indicative Operating Cycle for Thorpe Marriott – Taverham – Costessey – NNUH Bus Route

Timing point	Running Time (minutes)	
	Intermediate	Cumulative
Norfolk & Norwich University Hospital, Forecourt	-	-
Colney, John Innes Institute	3	3
Costessey, Park & Ride	7	10
New Costessey, Roundwell Medical Centre	4	14
Costessey, West End	2	16
Taverham, Church	5	21
Thorpe Marriott, Hazel Close	4	25
Thorpe Marriott, Bill Todd Way	1	26
Thorpe Marriott, Broadgate	3	29
Taverham, Church	4	33
Costessey, West End	5	38
New Costessey, Roundwell Medical Centre	2	40
Costessey, Park & Ride	4	44
Colney, John Innes Institute	5	49
Norfolk & Norwich University Hospital, Forecourt	5	54

Table 5.2 demonstrates how this route meets the criteria identified for a public transport option worthy of inclusion in the sifting exercise.

Table 5.2: Fit with Criteria for Public Transport Option

Criteria	Comment
Improves local accessibility and connectivity	Significantly improves accessibility to NNUH from communities to North West of Norwich
Provides an alternative to local car journeys routing between the A47 and A1067	30 minute interval service provides a viable alternative to some local car journeys routing between the A47 and A1067
Complements and minimises overlap with existing bus services	Complements existing radial bus routes on A1074 Dereham Road and A1067 Drayton Road/Fakenham Road corridors. Extension of existing service minimises overlap with existing network.
Provides new links to key trip attractors and transport hubs	Provides new links to NNUH, Norwich Research Park and also potentially to Longwater retail and employment area
Provides access to a range of destinations beyond the route directly served through interchange opportunities	Provides access to UEA by interchange at Costessey P&R. Interchange opportunities at NNUH with First services 11, 21 and Konectbus service 9. Interchange opportunities at Taverham and Thorpe Marriott with First



Criteria	Comment
	services 28, 29 and Norfolk Green service X29.
Is realistic in terms of the level of resources required relative to potential patronage	Only one additional bus required on Mondays to Fridays. Two buses required to provide a Saturday service as Konectbus service 10 does not currently operate on Saturdays.

## 5.2 Road Building Options

In discussion with NCC and with reference to previous studies, a total of 13 potential route alignments for a new link connecting the A47 to the A1067 and NDR have been identified. These have been allocated a colour (Purple, Brown, Red, Blue, Orange and Green) in line with the references used in the 2005 study 'Preliminary Assessment of Alternative Western Corridor Options'. Plans for each route option are shown on drawing nos. MMD-339207-C-SK-00-XX-0006 to -0009 (see **Appendix B**) and described below in Table 5.3.

It is important to note that whilst these route options are considered to provide a full spectrum of alternatives for a WLR scheme, more detailed work, required to deliver a full DMRB Stage 1 Option Assessment Report, may identify either additional route options or variants to those considered in this study.

Table 5.3: Route Alignments

Route	Description
Purple 1	A1067 Attlebridge, passing east of Weston Longville, to A47 west of Honingham at Wood Lane/Berrys Lane junction (2005 Purple)
Purple 2	A1067 Attlebridge, passing east of Weston Longville, to A47 east of Honingham at Norwich Road roundabout
Brown	A1067 Attlebridge, passing east of Weston Longville, to A47 west of Easton (2005 Brown)
Red	A1067/NDR terminal at Deighton Hills, passing to the west of Ringland, to the A47 west of Easton (2005 Red)
Blue 1	A1067 east of NDR terminal at Deighton Hills, passing south-east of Ringland, through Ringland Hills, to the A47 west of Easton (2005 Blue)
Blue 2	A1067/NDR terminal at Deighton Hills, passing south-east of Ringland, through Ringland Hills, to the A47 west of Easton
Orange 1	A1067 east of NDR terminal at Deighton Hills, passing east of Ringland and west of Queens Hills, through Longwater Employment Area, to the A47/A1074 Longwater Interchange
Orange 2	As Orange 1 but connecting to A1067/NDR terminal at Deighton Hills
Orange 3	A1067 east of NDR terminal at Deighton Hills, passing east of Ringland, between Queens Hills and Costessey, through Longwater Employment Area, to the A47/A1074 Longwater Interchange
Orange 4	As Orange 3 but connecting to A1067/NDR terminal at Deighton Hills
Orange 5	A1067 east of NDR terminal at Deighton Hills, passing east of Ringland and between Queens Hills and Costessey, to the A1074 east of Longwater
Orange 6	As Orange 5 but connecting to A1067/NDR terminal at Deighton Hills

Route	Description
Green	Proposed A140 NDR junction, passing north-west of Hellesdon to the A1067, and south of Costessey to the A1074 east of Longwater (2005 Green)

### 5.3 Traffic Modelling

The NATS transport model has been used to carry out model runs against a baseline of growth assumptions and measures contained in the Joint Core Strategy, which include the NDR in the form submitted for a Development Consent Order. The NDR is included in the future year road network for both forecast years of 2017 and 2032.

Four generic options have been modelled which represent the spectrum of route alignments and potential carriageway standards. These are shown on drawing no. MMD-339207-C-SK-00-XX-0005 (see **Appendix C**) and described below:

- **Model Run 1** – representing the Green route, furthest east of all routes considered, which would connect the A1074 Dereham Road to the NDR, with 3 intermediate junctions;
- **Model Run 2** – representing the Orange routes, connecting the A1067 with an ‘idealised’ junction on the A47 between Easton and Longwater, with no intermediate junctions. As such, the predicted traffic flows using the route are likely to represent maximum figures as other junction arrangements for the A47 could result in increased distances and travel times.
- **Model Run 3** – representing the Red route, which would connect the A47 just west of Easton to the A1067 and NDR terminal junction. No intermediate junctions were modelled, with some of the side roads assumed to be stopped up. This run has been taken as also being representative of the two Blue routes.
- **Model Run 4** – representing the Purple 2 route, which would connect the A47, east of Honingham, to the A1067 at Attlebridge. It has been modelled with three intermediate junctions, each with a staggered at-grade crossroads, maintaining access to and from the side roads. This run has been taken as also being representative of the Purple 1 and Brown routes.

Model Runs 1, 2 and 4 all assume that the new link road would be a single carriageway with a speed limit of 60 mph, whereas Model Run 3 is based on a dual carriageway at 70 mph.

All of the Model Runs were completed for 2017 and 2032 and the travel choice impacts were considered by using DIADEM to be consistent with the NDR modelling work. DIADEM takes into account changes in traffic demand predicted as a result of new infrastructure, in this case increased road capacity and reduced travel times for certain movements through the wider area. These impacts can change traffic demand through a combination of mode switch away from public transport and/or increase in the frequency that car trips are made.

Figures C.1 to C.8 in **Appendix C** show the predicted flows on the road network for each Model Run in 2017 and 2032, together with a comparison to ‘With NDR’ runs and the 2012 Base Model. North-south

flows through the Weston Longville/Weston Green/Hockering area have been adjusted to take account of the proposed traffic management measures to restrict traffic volumes through the local communities, as reported for the NDR work. All flows are shown at Annual Average Daily Traffic (AADT) levels.

Traffic demands for the new Link Road are summarised in Table 5.4, in the form of AADT for each route. Model Run 1 attracts the highest demand, with the middle section carrying over 34,000 vehicles per day in 2032. As the locations of the Link Road options move further west the routes become less attractive, with the demand with Model Run 4 being around 50% of that for Model Run 2.

Table 5.4: Forecast 2017/2032 AADT - Model Runs 1 to 4

Forecast Year		Annual Average Daily Traffic Volume	
		2017	2032
Model Run 1 (Green)	north section	17,900	23,400
	mid section	30,000	34,600
	south section	23,100	27,100
Model Run 2 (Orange)		19,900	25,100
Model Run 3 (Red)		14,100	18,200
Model Run 4 (Purple)	north section	10,000	13,500
	south section	9,500	13,200

Key findings from the traffic modelling are highlighted below:

- The Green and Orange routes are very effective at relieving 'rat-running' through the Taverham/Costessey area to the A1074. However, the Green route would give a large increase in traffic on the A1067 through Hellesdon;
- The Purple, Brown and Red routes show a limited reduction in 'rat-running' through the Taverham/Costessey area but these routes are very effective in reducing the flows through the Weston Longville/Weston Green/Hockering area. The Green route is least effective in relieving this area;
- All routes result in minimal change to the flow on the NDR east of its junction with the A140, apart from the Green route which attracts 9% more traffic onto the NDR;
- Between its A140 and A1067 junctions, there is a significant increase in flow on the NDR with both the Red and Orange routes, with a smaller increase with the Purple and Brown routes. With the Green route there is some reduction on the NDR west of the A140 but the NDR still carries over 18,000 vehicles/day;
- The Green and Orange routes show an increase of 12% or more on the A47 east of Longwater, compared between 3% and 4% for the Red, Purple and Brown routes;
- All routes show an increase on the A47 at Honingham of between 4% and 8%; and
- Purple, Brown, Red and Orange routes give an increase of between 9% and 15% on the A1067 at Morton, but there is only a 3% increase with the Green route.

From these forecasts it is clear that a new Link Road would not only result in re-assignment of local trips away from north-south 'rat runs' but would also attract trips from the wider Norwich area.

## 5.4 Carriageway Standards

Forecasts of AADT derived from the four Model Runs have been compared with recommended opening year economic flow ranges in Table 2.1 of DfT Advice Note TA46/97 'Traffic Flow Ranges For Use In the Assessment Of New Rural Roads', shown below in Table 5.5.

Table 5.5: Economic Flow Ranges in Table 2.1 of DfT Advice Note TA46/97

Carriageway Standard	Minimum Opening Year AADT	Maximum Opening Year AADT
Single Carriageway (S2)		Up to 13,000
Wide Single Carriageway (WS2)	6,000	21,000
Dual 2-lane All Purpose Carriageway (D2AP)	11,000	39,000
Dual 3-lane All Purpose Carriageway (D3AP)	23,000	54,000

Comparison of traffic model forecasts with these opening year flow ranges indicates that the Purple and Brown routes are only likely to be economically viable at a single carriageway S2 standard. For the Red, Blue, Orange and Green routes this comparison suggests that a dual 2-lane carriageway D2AP standard would be the starting point for economic assessment, although single carriageway standards may require consideration.

Detailed traffic modelling, including that necessary to produce measures of Value for Money in the form of Benefit to Cost Ratios, is required to draw firm conclusions on appropriate standards for these route options.

## 5.5 Estimates of Capital Cost

Preliminary estimates of capital cost for each route option have been developed with reference to advice contained in the 'Little Black Book - Construction Benchmarks: Highway Construction and Asset Management – 2010/11', prepared by Franklin & Andrews.

These estimates are based on scheme lengths and a number of assumptions, which are set out below:

- Number and size of structures (bridge or viaduct) on each route;
- Number and type of junctions on each route;
- Land purchase at £11,000 per acre;
- Construction inflation of 20% for the period 2010 to 2014;
- The Orange and Green routes include a £13.3m estimate for A47 Longwater Interchange Dual Bridge Improvement (ref. Longwater-Easton Transport Strategy – May 2014).
- The costs of remediation works to Costessey Landfill site, required for Orange 5, Orange 6 and Green routes, are not yet known; and
- An uplift of 44% to allow for 'Optimism Bias' at Stage 1 of highway scheme development (ref. Transport Analysis Guidance, Unit 3.5.9, The Estimation and Treatment of Scheme Costs).

The capital cost estimates derived from this exercise are shown in Tables 5.6 and 5.7 below. A sheet showing in detail the development of these figures is contained in **Appendix D**.

Table 5.6: Capital Cost Estimates – 2014 Prices – Single Carriageway Standard

Route	Cost Estimate (2014 Prices)	44% Optimum Bias	Total Cost Estimate including 44% Optimum Bias
Purple 1	£19.7m	£8.7m	£28.3m
Purple 2	£22.5m	£9.9m	£32.4m
Brown	£24.0m	£10.5m	£34.5m
Red	£38.0m	£16.7m	£54.7m
Blue 1	£37.2m	£16.4m	£53.6m
Blue 2	£37.7m	£16.6m	£54.3m
Orange 1	£47.8m	£21.0m	£68.8m
Orange 2	£48.2m	£21.2m	£69.5m
Orange 3	£51.4m	£22.6m	£74.1m
Orange 4	£51.9m	£22.8m	£74.7m
Orange 5	£54.6m	£24.0m	£78.6m
Orange 6	£55.1m	£24.2m	£79.3m
Green	£54.7m	£24.1m	£78.8m

Table 5.7: Capital Cost Estimates – 2014 Prices – Dual Carriageway Standard

Route	Cost Estimate (2014 Prices)	44% Optimum Bias	Total Cost Estimate including 44% Optimum Bias
Red	£56.4m	£24.8m	£81.2m
Blue 1	£55.4m	£24.4m	£79.8m
Blue 2	£56.0m	£24.6m	£80.7m
Orange 1	£63.6m	£28.0m	£91.6m
Orange 2	£64.2m	£28.3m	£92.5m
Orange 3	£69.0m	£30.3m	£99.3m
Orange 4	£69.6m	£30.6m	£100.2m
Orange 5	£72.9m	£32.1m	£105.0m
Orange 6	£73.5m	£32.3m	£105.8m
Green	£71.2m	£31.3m	£102.5m

## 5.6 Forward Programme and Scheme Development Costs

### 5.6.1 Forward Programme

As all of the current road building options are offline (they do not sit wholly within existing highway boundaries), it is assumed that a planning application will be required and that this application will be made through the Town and Country Planning Act.

In order to prepare sufficient scheme information to support the application there are a number of discreet scheme assessment stages that should be followed. These are described in the Design Manual for Roads and Bridges Volume 5, TD 37/93 (Scheme Assessment Reporting). Whilst the County Council as Highway Authority does not have to follow the prescriptions of DMRB, the manual does provide a structured delivery process that is recognised nationally. In addition, any tie-in to the A47 will need to be designed in accordance with DMRB as all trunk road interfaces must be designed to DfT standards.

TD 37/93 requires that a design scheme is developed through three assessment stages, which are:-

- Stage 1 – initial overview of reasons for the scheme , environmental constraints and existing traffic issues
- Stage 2 – consideration of options leading to a “Preferred Route Announcement”
- Stage 3 – detailed design of chosen route, planning application and approval, delivery of design documentation for construction procurement

Each stage produces a Scheme Assessment Report which can be provided to decision makers to inform appropriate decision-making before the start of each subsequent stage.

Similar schemes delivered for local authorities and the Highways Agency are typically progressed with the following initial programme durations: -

- Stage 1 – 6 months to one year depending on level of traffic information available at the start of the scheme
- Stage 2 – two years (needs at least one full year of environmental surveys)
- Stage 3 – up to three years depending on the complexity and size of the scheme (assuming that the scheme gains planning permission and is not unduly challenged in Court)

## 5.6.2 Scheme Development Costs

An estimate of the costs associated with developing each of the scheme options through the planning process has been undertaken, based on standard percentages of the capital costs estimates. These are summarised in Tables 5.8 and 5.9 below and detailed in **Appendix D**.

Table 5.8: Scheme Development Costs – Single Carriageway Options

Route	DMRB Stages 1 & 2	DMRB Stage 3	Prep & Construction Supervision	Total Scheme Development Cost
Purple 1	£0.4m	£1.2m	£1.0m	£2.6m
Purple 2	£0.5m	£1.3m	£1.1m	£2.9m
Brown	£0.5m	£1.4m	£1.2m	£3.1m
Red	£0.8m	£2.2m	£1.9m	£4.9m
Blue 1	£0.8m	£2.2m	£1.8m	£4.8m
Blue 2	£0.8m	£2.2m	£1.9m	£4.9m
Orange 1	£1.0m	£2.8m	£2.4m	£6.2m
Orange 2	£1.0m	£2.9m	£2.4m	£6.3m
Orange 3	£1.1m	£3.1m	£2.5m	£6.7m

Route	DMRB Stages 1 & 2	DMRB Stage 3	Prep & Construction Supervision	Total Scheme Development Cost
Orange 4	£1.1m	£3.1m	£2.5m	£6.7m
Orange 5	£1.1m	£3.3m	£2.7m	£7.1m
Orange 6	£1.1m	£3.3m	£2.7m	£7.1m
Green	£1.1m	£3.3m	£2.7m	£7.1m

Table 5.9: Scheme Development Costs – Dual Carriageway Options

Route	DMRB Stages 1 & 2	DMRB Stage 3	Prep & Construction Supervision	Total Scheme Development Cost
Red	£1.1m	£3.4m	£2.8m	£7.3m
Blue 1	£1.2m	£3.3m	£2.7m	£7.2m
Blue 2	£1.2m	£3.3m	£2.8m	£7.3m
Orange 1	£1.3m	£3.8m	£3.1m	£8.2m
Orange 2	£1.3m	£3.8m	£3.2m	£8.3m
Orange 3	£1.4m	£4.1m	£3.4m	£8.9m
Orange 4	£1.5m	£4.1m	£3.4m	£9.0m
Orange 5	£1.5m	£4.3m	£3.6m	£9.4m
Orange 6	£1.5m	£4.4m	£3.6m	£9.5m
Green	£1.5m	£4.2m	£3.5m	£9.2m

## 6 Sifting Appraisal

The output from the initial sifting of options is presented in the form of a RAG matrix in **Appendix E**. Key considerations from the appraisal are summarised below.

### 6.1 Public Transport

**Strategic** – this option would improve connections to the Norfolk and Norwich University Hospital (NNUH) and Norwich Research Park (NRP) from the Costessey, Taverham and Thorpe Marriott areas. The service may slightly reduce traffic in the Costessey and Taverham areas but would have no impact on villages further west such as Weston Longville, Hockering and Ringland. This option may facilitate the opening of a bus-only second access into Queens Hills but would not reduce traffic to a level where the access could be opened up for all vehicles. Wider public transport availability is in line with government objectives to promote travel by sustainable modes.

**Economic** – this option would offer significant journey time savings for public transport trips to the NNUH and NRP, from the north-western suburbs of Norwich. The option would not facilitate the delivery of any forthcoming housing allocations.

**Carbon** – the impact on carbon levels would be broadly neutral. This is the case for all options, so is not discussed further.

**Socio-Distributional Impacts** – an increase in public transport options for the public would be likely to improve accessibility for vulnerable users.

**Local Environment** – the use of existing highway networks, and the theoretical slight drop in traffic volumes in some locations, would mean that there would be positive or neutral impacts on the Wensum SAC/SSSI, other Designated Sites, heritage and landscape, and in terms of air quality and noise.

**Wellbeing** – no severance would occur as no additional routes would be required. Improved public transport connections to the NNUH and NRP will benefit some people.

**Managerial / Financial Case / Commercial** – it is envisaged that this option could be delivered within a year, should demand forecasts suggest it is worth pursuing. Subsidy from either Norfolk County Council or a developer would be required.

### 6.2 Purple / Brown Routes

**Strategic** – these routes would provide a direct connection between the A47 and A1067, but not the NDR. They significantly reduce traffic on local roads in the Weston Longville/Hockering area as well as providing lesser reductions in the Ringland area. Minimal traffic reductions are forecast in the Costessey and Taverham areas meaning that these routes would not sufficiently alleviate traffic around the Queens Hills area to enable the construction of a second access for Queens Hills onto the existing local road network.



These routes would have a broadly neutral impact on sustainable travel opportunities. This is the case for all route options, so is not discussed further.

**Economic** – these routes are located the furthest away from the Norwich urban area and consequently attract the lowest traffic demand of all of the routes, so are likely to provide the lowest economic benefits, in terms of road user travel time. For traffic heading to Norwich Airport from the south, the A47 and NDR from the east of Norwich would provide a quicker route. The Purple routes are not in proximity to any proposed housing allocations and therefore do not directly facilitate the delivery of housing. The Brown route meets the A47 further east towards Easton and may therefore provide some benefits to housing allocations in the Easton area.

**Socio-Distributional Impacts** – a new highway would be unlikely to provide benefits to vulnerable users as their car use is generally limited. This is the case for all route options, so is not discussed further.

**Local Environment** – These routes connect to the A1067 west of the existing crossing of the River Wensum and Attlebridge, leading to possible impacts on the River Wensum SAC/SSSI, but at a level which could potentially be mitigated. The Purple 1 and Brown routes directly impact on Designated Sites (CWS 2116 Land adjoining Foxburrow Plantation and CWS 2105 Hall Hills/Ringland Covert), which also has consequences in terms of landscape impact. The Purple 2 route indirectly affects these sites.

Landscape views from Weston Longville are likely to be adversely affected by all routes and the context of some heritage features may be affected. In terms of air quality and noise a small number of properties are adversely affected.

**Wellbeing** – these routes require only small diversions to the local highway network. A higher standard route between the A47 and A1067 would improve access to services, goods etc.

**Managerial** – the planning, consultation, development and construction of a new highway of this size is expected to take over five years. This is the case for all route options, so is not discussed further.

Less than 50 properties are located within 250m either side of these routes. Public support for these routes is likely to be less than for some other options given its distance from the urban area.

**Financial Case** – forecasts of opening year flows indicate that a single carriageway standard is appropriate for these routes. Estimates of capital cost (at 2014 prices) are £28m to £35m, which include a 44% allowance for optimism bias.

**Commercial** – government and/or developer funding of these options is considered to be unlikely. This is the case for all route options, so is not discussed further.

### 6.3 Red Route

**Strategic** – this route would provide a direct connection between the A47 and NDR/A1067 terminal at Deighton Hills and is forecast to significantly reduce traffic levels in the Weston Longville/Hockering and

Ringland areas. It would provide some traffic 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.

**Economic** – this route offers a direct connection between the A47, NDR and A1067 leading to journey time savings. It connects to the A47 near Easton and complements the delivery of housing allocations in the Easton area.

**Local Environment** – this route requires a new crossing of the River Wensum leading to significant adverse impacts on the River Wensum SAC/SSSI and the need for significant and potentially prohibitively expensive engineering mitigation. Other Designated Sites along the Wensum valley (including Primrose Grove Replanted Ancient Woodland and CWS2128 Land Adjoining River Tud) would be directly and indirectly affected.

The Red route would have significant adverse impacts on the landscape of the Wensum and Tud valleys and Ringland Hills. A small number of properties would be likely to experience adverse impacts in terms of air quality and/or noise.

**Wellbeing** – the Red route may sever a number of minor roads, with no direct alternative being provided. A higher standard route between the A47 and NDR/A1067 would improve access to services, goods etc.

**Managerial** – less than 10 properties would be located within 250m either side of this route. Public support for this route is likely to be higher than for most of the other routes given that it provides a direct connection between the A47, NDR and A1067.

**Financial Case** – forecasts of opening year flows indicate that either a single or dual carriageway standard could be appropriate for this route. Estimates of capital cost (at 2014 prices) are £55m for a single carriageway standard or £81m for a dual carriageway standard, which include a 44% allowance for optimism bias.

## 6.4 Blue Routes

**Strategic** – these routes provide direct connections onto the A47 and in the case of the Blue 2 route, also the A1067/NDR terminal at Deighton Hills. The Blue 1 route makes an indirect connection with the NDR, meeting the A1067 to the east of its junction with the NDR. These routes significantly reduce traffic levels in the Weston Longville/Hockering and Ringland areas and provide some traffic relief in the Costessey and Taverham areas. As the Blue 1 route meets the A1067 nearer to Taverham, it is considered that this might sufficiently relieve traffic on local roads to enable the construction of a second access for Queens Hills onto the existing local road network.

**Economic** – the impacts of these routes in terms of journey times and distances are considered to be broadly similar to those of the Red route. Both of these routes meet the A47 near Easton and complement the delivery of housing allocations in the Easton area.

**Local Environment** – these routes run parallel, and close to, the River Wensum for some distance and require a new crossing, leading to significant adverse impacts on the River Wensum SAC/SSSI and the need for significant and potentially prohibitively expensive engineering mitigation. Other Designated Sites along the Wensum valley (CWS 2104 Harman’s Grove Replanted Ancient Woodland and CWS2128 Land Adjoining River Tud) would be directly affected.

The route would have significant adverse impacts on the landscape of the Wensum and Tud valleys and Ringland Hills. A small number of properties would be likely to experience adverse impacts in terms of air quality and/or noise.

**Wellbeing** – these routes require small diversions to local highways. A higher standard route between the A47 and NDR/A1067 would improve broad access to services, goods etc., but these routes have adverse local impacts in their severance of Wensum Valley Golf Club.

**Managerial** – less than 10 properties are located within 250m either side of the Blue 2 route, and less than 25 for the Blue 1 route. Public support for these routes is likely to be higher than for most of the other routes given that they provide a direct connection between the A47, NDR and A1067.

**Financial Case** – forecasts of opening year flows indicate that either a single or dual carriageway standard could be appropriate for these routes. Estimates of capital cost (at 2014 prices) for both routes are £54m for a single carriageway standard and £80m for a dual carriageway standard, which includes a 44% allowance for optimism bias.

## 6.5 Orange Routes

**Strategic** – The Orange 2 and Orange 4 routes provide a direct connection between the A47 at Longwater Interchange and the NDR/A1067 terminal at Deighton Hills, whilst the other Orange routes provide some indirect connections using the A1067 and A1074. All routes would require major improvement of the A47 Longwater Interchange and significantly reduce traffic levels in the Costessey/Taverham, Ringland and Weston Longville/Hockering areas. All routes pass close to the Queens Hills area, offering the opportunity for either a new direct connection or construction of a second access onto the local road network.

**Economic** – these routes would draw strategic traffic through the A47 Longwater Interchange, conflicting with local movements associated with the Longwater Employment Area, Queens Hills and planned development at Easton. However, improvement of Longwater Interchange should result in savings in overall travel time. Apart from enabling the creation of a new access to Queens Hills these routes do not directly facilitate the delivery of housing.

**Local Environment** – these routes run parallel, and close to, the River Wensum for some distance and require a new crossing, leading to significant adverse impacts on the River Wensum SAC/SSSI and the need for significant and potentially prohibitively expensive engineering mitigation. Other Designated Sites along the Wensum valley (including Blyth’s Wood Ancient Woodland, Easton Reeds Replanted Ancient Woodland, CWS 2112 Blyth’s Wood, CWS 2115 Land south of Blyth’s Wood, CWS 257 Lords Hill and

Easton Reeds, CWS 252 Brickfield Farm, CWS 248 Snake's Hill, CWS 247 Long Dale) would be directly and indirectly affected.

These routes would have significant adverse impacts on the landscape of the Wensum and Tud valleys. A significant number of properties are likely to experience adverse impacts in terms of air quality and/or noise given proximity of these routes to Taverham, Queens Hills and Old Costessey, although the Orange 1 and Orange 2 routes affect fewer properties than the other routes.

**Wellbeing** – these routes require small diversions to local highways. A higher standard route between the A47/A1074 and NDR/A1067 would improve broad access to services, goods etc., but these routes have adverse local impacts in their severance of Wensum Valley Golf Club.

**Managerial** – The Orange 1 and Orange 2 routes would pass to the west of Queens Hills affecting around 60 properties located within 250m either side of the route alignments. Properties affected by the other Orange routes are higher, at around 250 to 300, and they pass between Queens Hills and Costessey making them likely to generate significant public objections.

**Financial Case** – forecasts of opening year flows indicate that either a single or dual carriageway standard could be appropriate for these routes. Estimates of capital cost (at 2014 prices) are £69m to £79m for a single carriageway standard and £92m to £106m for a dual carriageway standard, which include a 44% allowance for optimism bias.

## 6.6 Green Route

**Strategic** – this route would provide a direct connection to the NDR and Norwich Airport, however, its connection to the A47 is indirect and via a new signalised junction on the A1074. The Green route is forecast to significantly reduce traffic levels in the Costessey/Taverham, Ringland and Weston Longville/Hockering areas. It would also sufficiently relieve traffic on local roads to enable the construction of a second access for Queens Hills, onto the existing local road network.

**Economic** – this route provides the most direct link to Norwich Airport and destinations to the north and north-east of Norwich, offering significant journey time and distance savings. This route does not directly facilitate the delivery of housing.

**Local Environment** – this route runs close to the River Tud for some distance and requires a new crossing of the River Wensum, leading to significant adverse impacts on the River Wensum SAC/SSSI and the need for significant and potentially prohibitively expensive engineering mitigation. Other Designated Sites (CWS 2022 Drayton Wood and CWS 2106 Wensum Mount Farm) would be directly affected.

The Green route would have adverse impacts on the landscape of the Wensum and Tud valleys, although these impacts are limited by its location within the urban fringe. A significant number of properties are likely to experience adverse impacts in terms of air quality and/or noise given its proximity to Hellesdon, Taverham and Old Costessey,

**Wellbeing** – this route requires small diversions to local highways and other routes. A higher standard connection, linking the A47/A1074, A1067 and NDR, would improve access to services, goods etc.

**Managerial** – this route is likely to raise the greatest level of public objection as it affects more properties than any of the other options and bisects urban areas. Around 400 properties are located within 250m either side of the route alignment.

**Financial Case** – forecasts of opening year flows indicate that either a single or dual carriageway standard could be appropriate for this route. Estimates of capital cost (at 2014 prices) are £79m for a single carriageway standard and £103m for a dual carriageway standard, which include a 44% allowance for optimism bias.

## 7 Conclusions and Recommendations

This report presents the results of a scoping study which considers 13 alternative alignments for a potential Western Link Road, connecting the A47 to the A1067. These routes are based largely on those developed during previous work in 2004/5, with minor amendments e.g. to suit the location of the NDR terminal roundabout on the A1067 at Deighton Hills. A public transport option which creates an orbital route between Taverham and the Norfolk and Norwich University Hospital / Norwich Research Park has also been considered.

The sifting process has been carried out generally in accordance with Steps 4 to 6 of the Department for Transport's current Transport Analysis Guidance (January 2014). This process has utilised the DfT's 'Early Assessment and Sifting Tool' (EAST), a RAG (Red/Amber/Green) decision support tool which is consistent with Transport Business Case principles. A set of sifting objectives and RAG criteria have been developed, which include Specific Local Objectives, agreed in discussion with NCC officers, and which reflect concerns expressed by local stakeholders and NCC Members (**see 1.1**).

To inform the sifting process a desk based study has been carried out to map environmental constraints, the results of which are described, together with European and National designations that provide protection to wildlife habitats along the River Wensum SAC. The impact of alternative routes on traffic patterns, and in particular existing local roads between the A47 and A1067, has been examined using the NATS transport model, against a baseline of growth assumptions and measures contained in the Joint Core Strategy, which include the NDR in the form submitted for a Development Consent Order. High level estimates of capital cost (at 2014 prices) for each route alignment have been developed, which include an allowance for 'optimism bias', in accordance with DfT guidance.

Traffic modelling work required to produce Value for Money measures in the form of Benefit to Cost Ratios for route options has not been carried out within this study. However, consideration has been given to recommended economic flow ranges for single and dual carriageway standards, as set out in DfT guidance. No stakeholder consultations have been carried out as part of this study.

Output from the study is presented in the form of a sifting matrix (**see Appendix E**) showing the results of the RAG assessment. Some key conclusions which can be drawn from this study are summarised below:

- The Orange and Green routes provide the greatest benefits in terms of Specific Local Objectives i.e. to remove through traffic from local roads between the A47 and A1067, enable a second access to be formed for Queens Hills and contribute to improved strategic connectivity. The Red and Blue routes are less effective in meeting these Objectives;
- The Purple and Brown routes are the least effective in terms of Specific Local Objectives and do not provide significant relief to local roads in the Taverham/Costessey and Ringland areas, or the conditions under which a second access could be formed for Queens Hills. Whilst not examined formally as part of this study, this conclusion also applies to further offline improvement of the Lenwade-Hockering route;

- A comparison of traffic model forecasts with opening year flow ranges set out in DfT standard TA46/97 indicates that the Purple and Brown routes are only likely to be economically viable at a single carriageway S2 standard. For the Red, Blue, Orange and Green routes this comparison suggests that a dual 2-lane carriageway D2AP standard would be the starting point for economic assessment, although single carriageway standards may require consideration;
- The Red, Blue, Orange and Green routes would have to provide new crossings of the River Wensum SAC/SSSI. The level and feasibility of engineering mitigation of adverse impacts during both construction and operation have not yet been raised with statutory environmental stakeholders, placing significant risks and uncertainty over capital costs and hence deliverability of these options; and
- The Orange 5, Orange 6 and Green routes require significant remediation works to the Costessey landfill site, placing further risks and uncertainty over their cost and deliverability.

Should a decision be taken to investigate the feasibility of a Western Link Road scheme, to the level of a DMRB Stage 1 Option Assessment Report, we have the following recommendations:

- Further work should focus on the Red, Blue, Orange and Green options (or any further variants which may be identified). For the Purple and Brown routes to be taken forward, there would be a need to consider associated measures, given they are least effective in meeting Specific Local Objectives:
- Formal consultation will be required with statutory environmental stakeholders regarding the River Wensum SAC/SSSI and potential mitigation measures;
- The level of remediation works required to Costessey Landfill site should be investigated; and
- More detailed traffic modelling, including that necessary to produce measures of Value for Money, will need to be carried out to provide Benefit to Cost Ratios and, where appropriate, inform the comparison of single and dual carriageway standards for alternative route options.

# Appendices

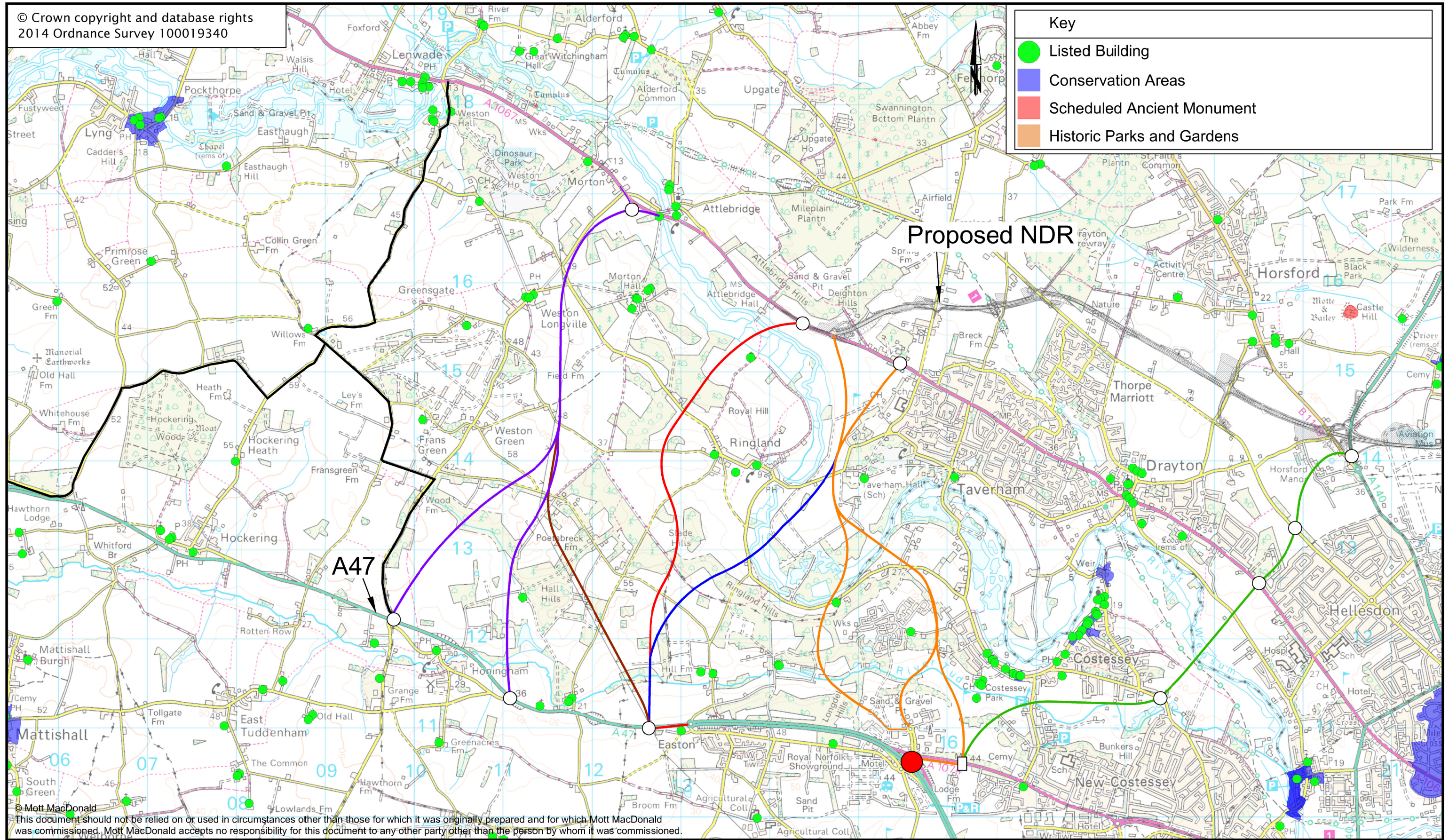
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Appendix E. RAG Sifting Matrix	39



# Appendix A. Environmental Constraints Mapping

**Key**

- Listed Building
- Conservation Areas
- Scheduled Ancient Monument
- Historic Parks and Gardens



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



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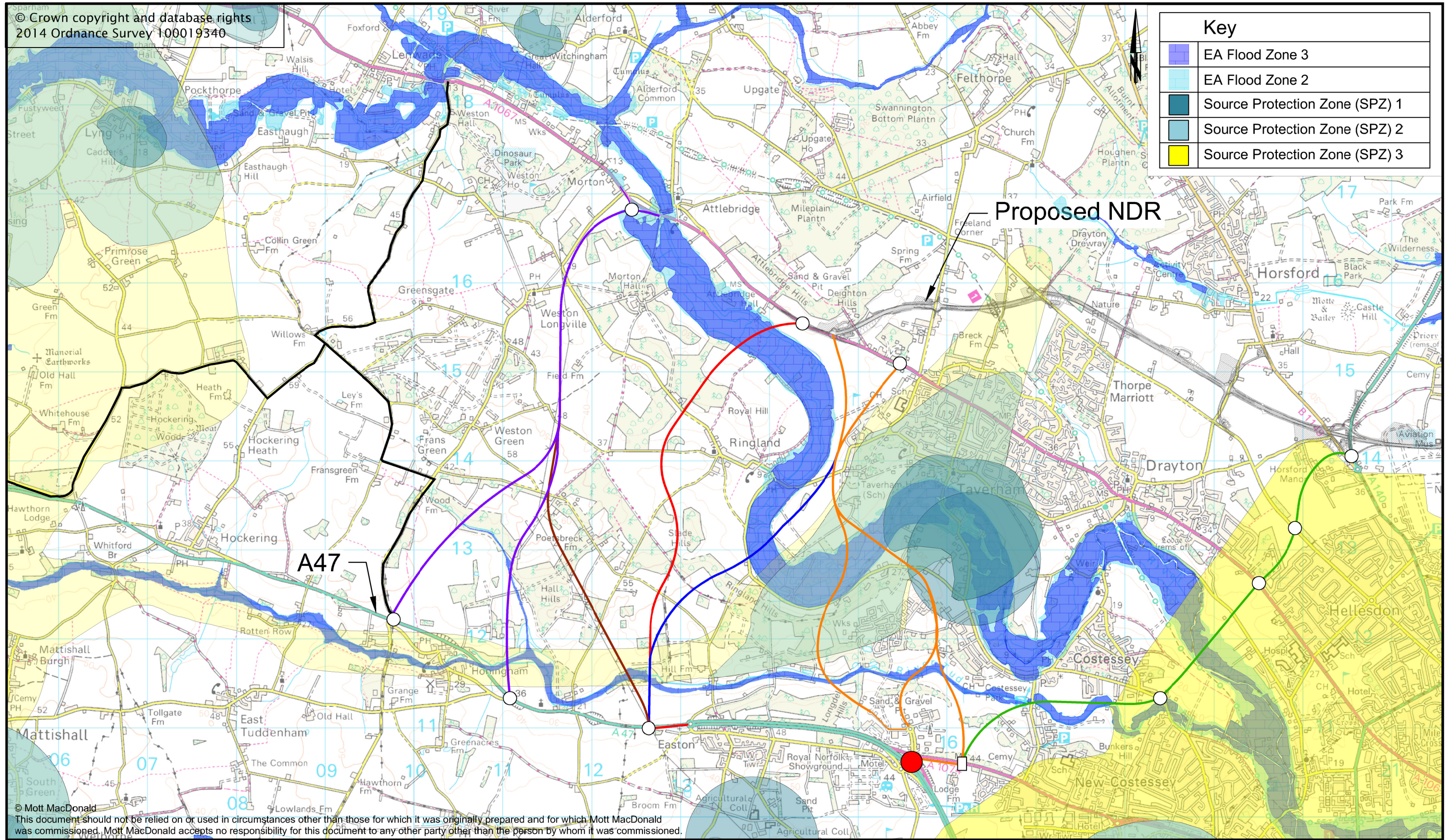
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Environmental Constraints - Cultural  
Heritage

Drawing Number  
MMD-339207-C-SK-00-XX-0004

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Checked	GC
Approved	MEP
Scale at A3	1:40,000
Rev	Status
P1	PRE

Key	
	EA Flood Zone 3
	EA Flood Zone 2
	Source Protection Zone (SPZ) 1
	Source Protection Zone (SPZ) 2
	Source Protection Zone (SPZ) 3



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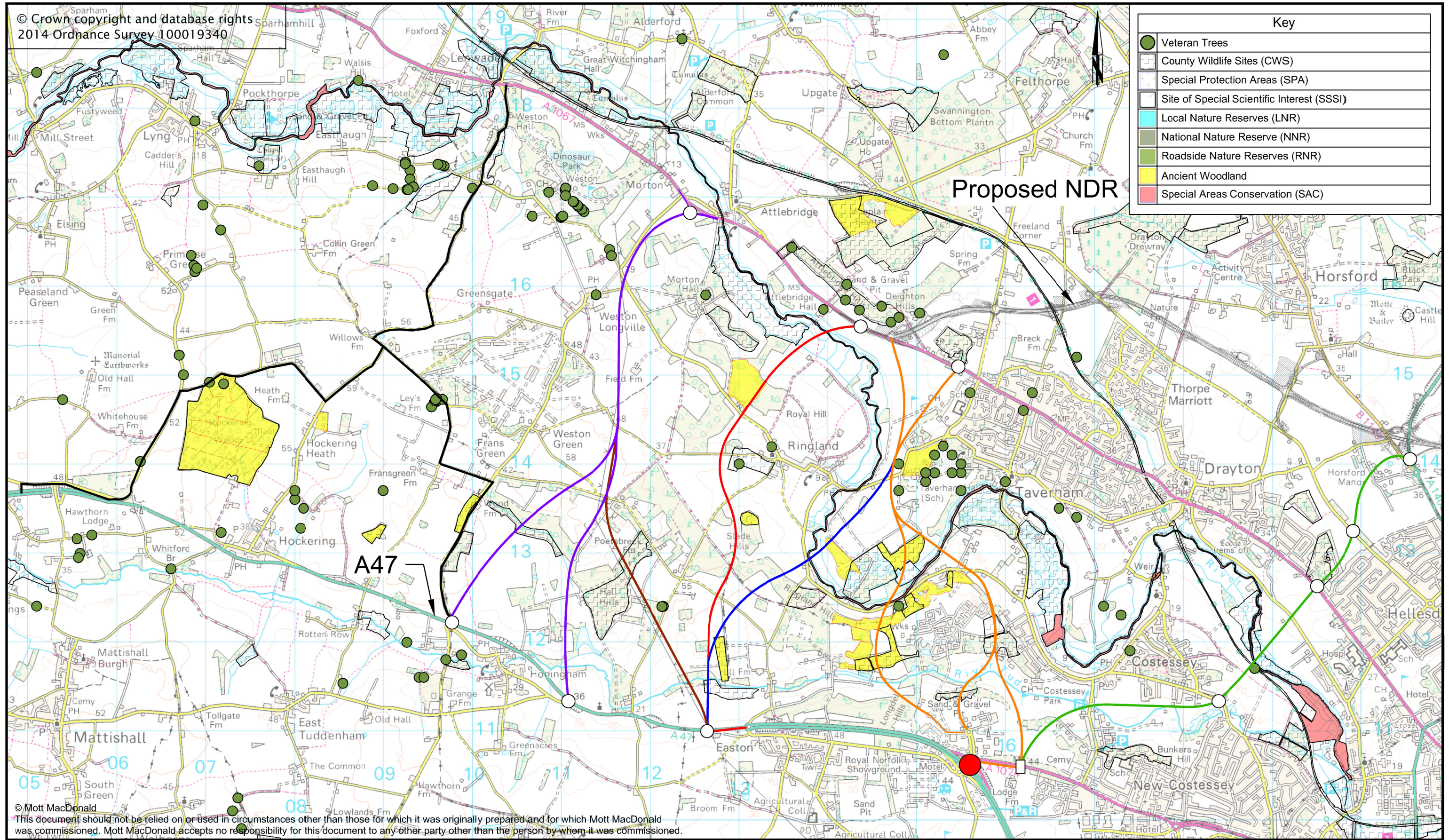
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Title  
A47 - A1067 Link Road  
Environmental Constraints - Water  
Drawing Number  
MMD-339207-C-SK-00-XX-0003

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Approved	MEP
Scale at A3	1:40,000
Rev	Status
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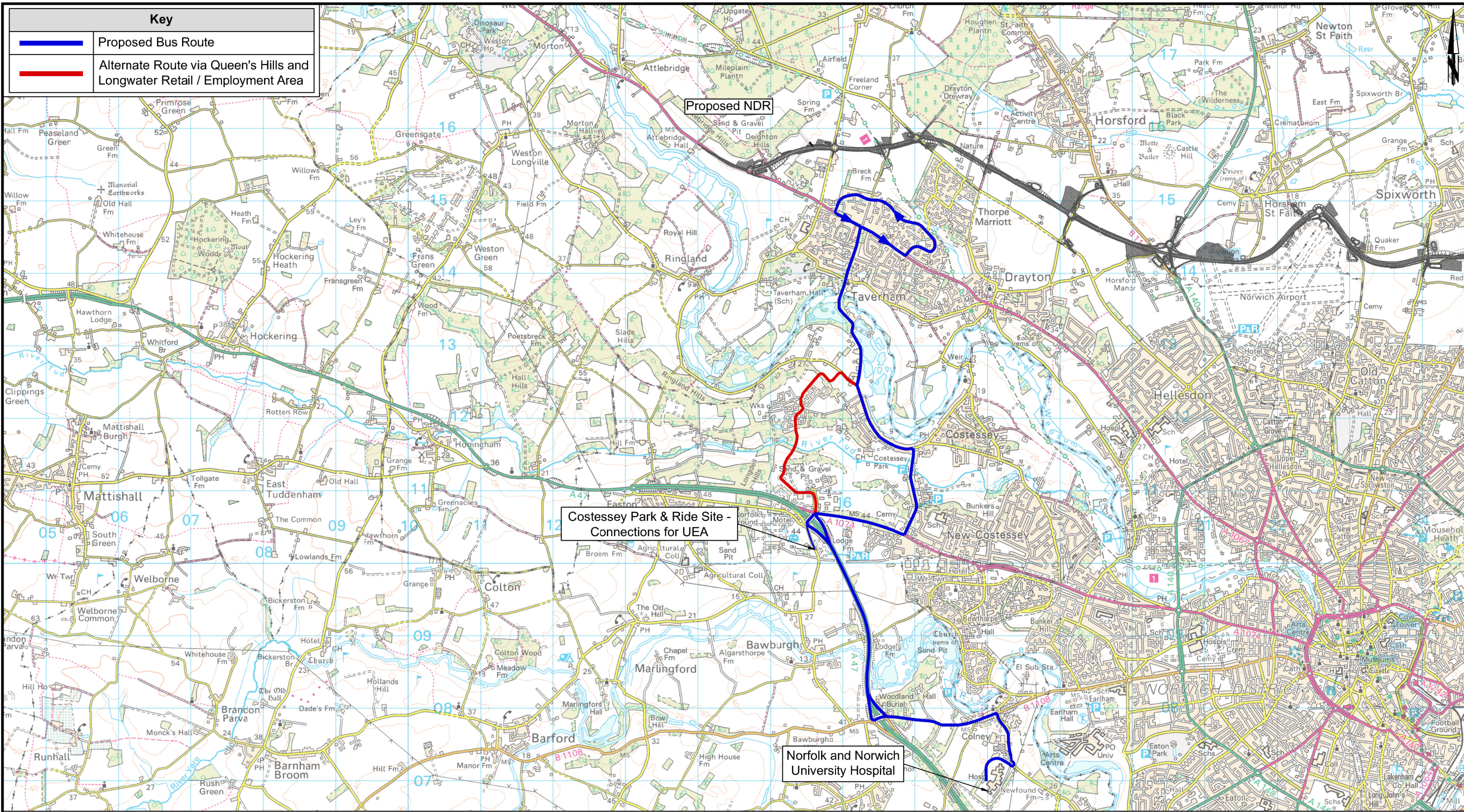
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	County Wildlife Sites (CWS)
	Special Protection Areas (SPA)
	Site of Special Scientific Interest (SSSI)
	Local Nature Reserves (LNR)
	National Nature Reserve (NNR)
	Roadside Nature Reserves (RNR)
	Ancient Woodland
	Special Areas Conservation (SAC)



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									Scale at A3 1:40,000	
								Drawing Number MMD-339207-C-SK-00-XX-0002	Rev	Status
									P1	PRE

## Appendix B. Route Option Plans



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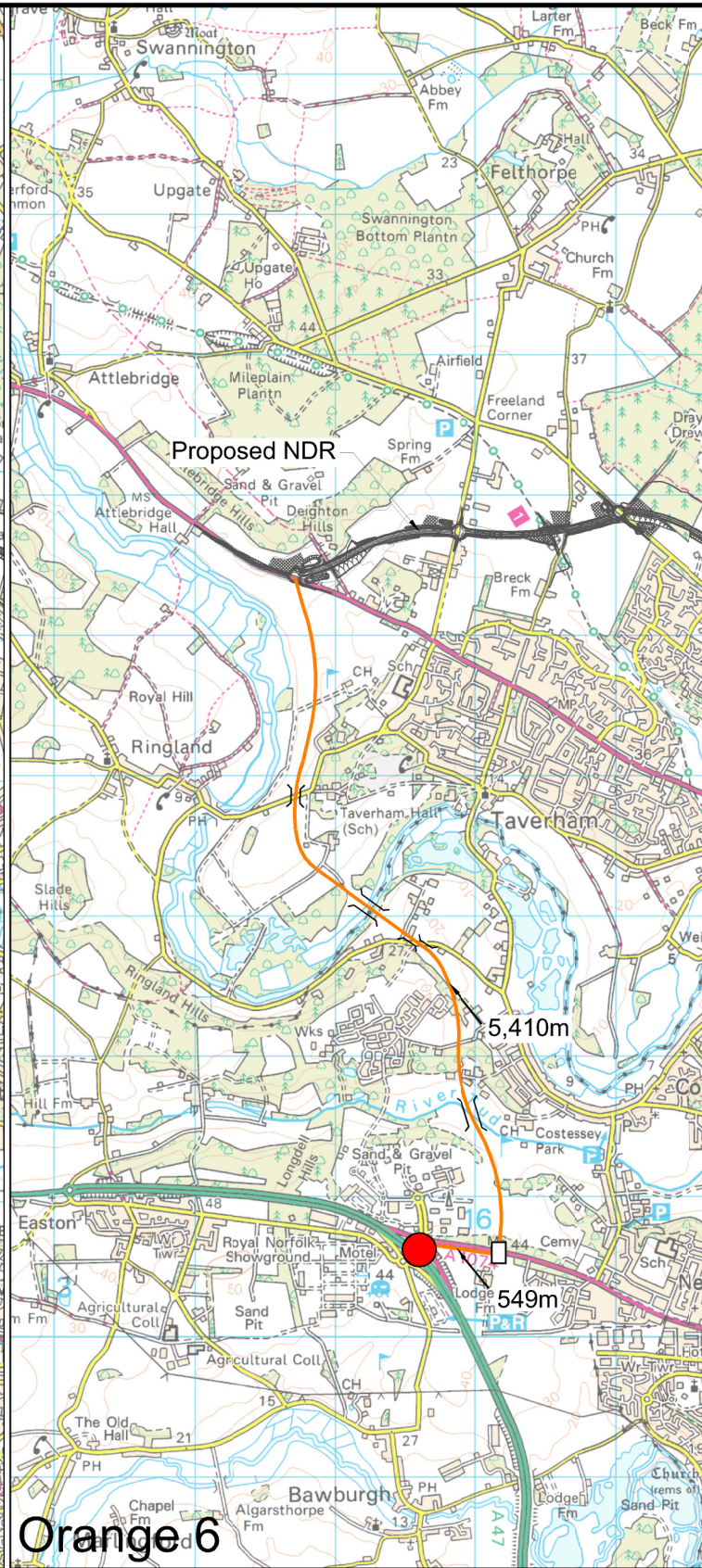
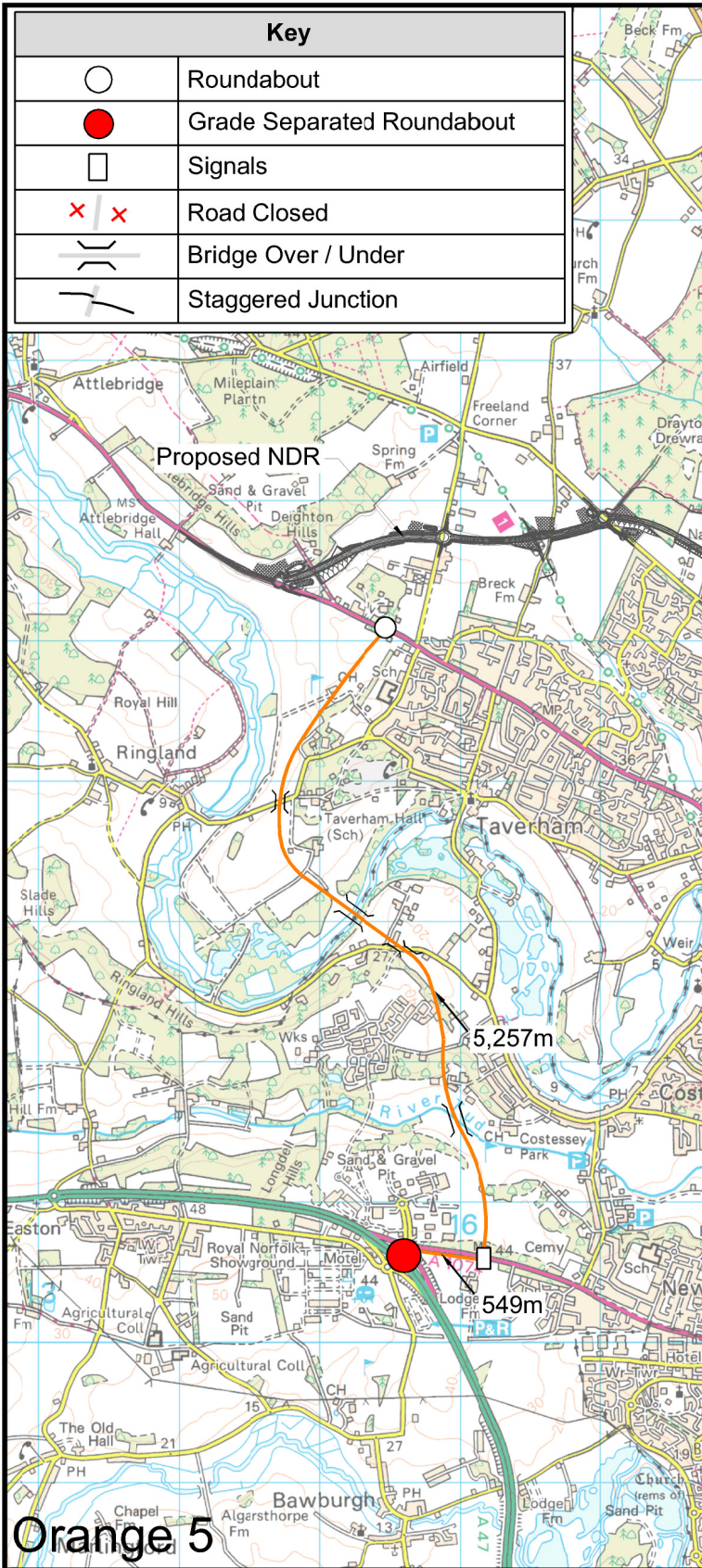
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PI	07/14	NJC	First Issue	GC	MEP

Title  
 A47-A1067 Western Link Road  
 Public Transport Option  
 New bus route between Thorpe  
 Marriott and Norfolk and Norwich  
 University Hospital

Drawing Number  
 MMD-339207-C-SK-00-XX-0011

Drawn	NJC
Checked	GC
Approved	MEP
Scale at A3	NTS
Rev	Status
P1	PRE

Key	
○	Roundabout
●	Grade Separated Roundabout
□	Signals
✕ ✕	Road Closed
≡	Bridge Over / Under
⌋	Staggered Junction



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Rev	Date	Drawn	Description	Ch'kd	App'd	Title
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P2	08/14	AW	Second Issue	GC	MEP	Orange 5&6 / Green Route

Drawn NJC  
 Checked GC  
 Approved MEP  
 Scale at A3  
 NTS

Drawing Number  
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Rev	Status
P2	PRE

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□	Signals
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	Bridge Over / Under
—/—	Staggered Junction



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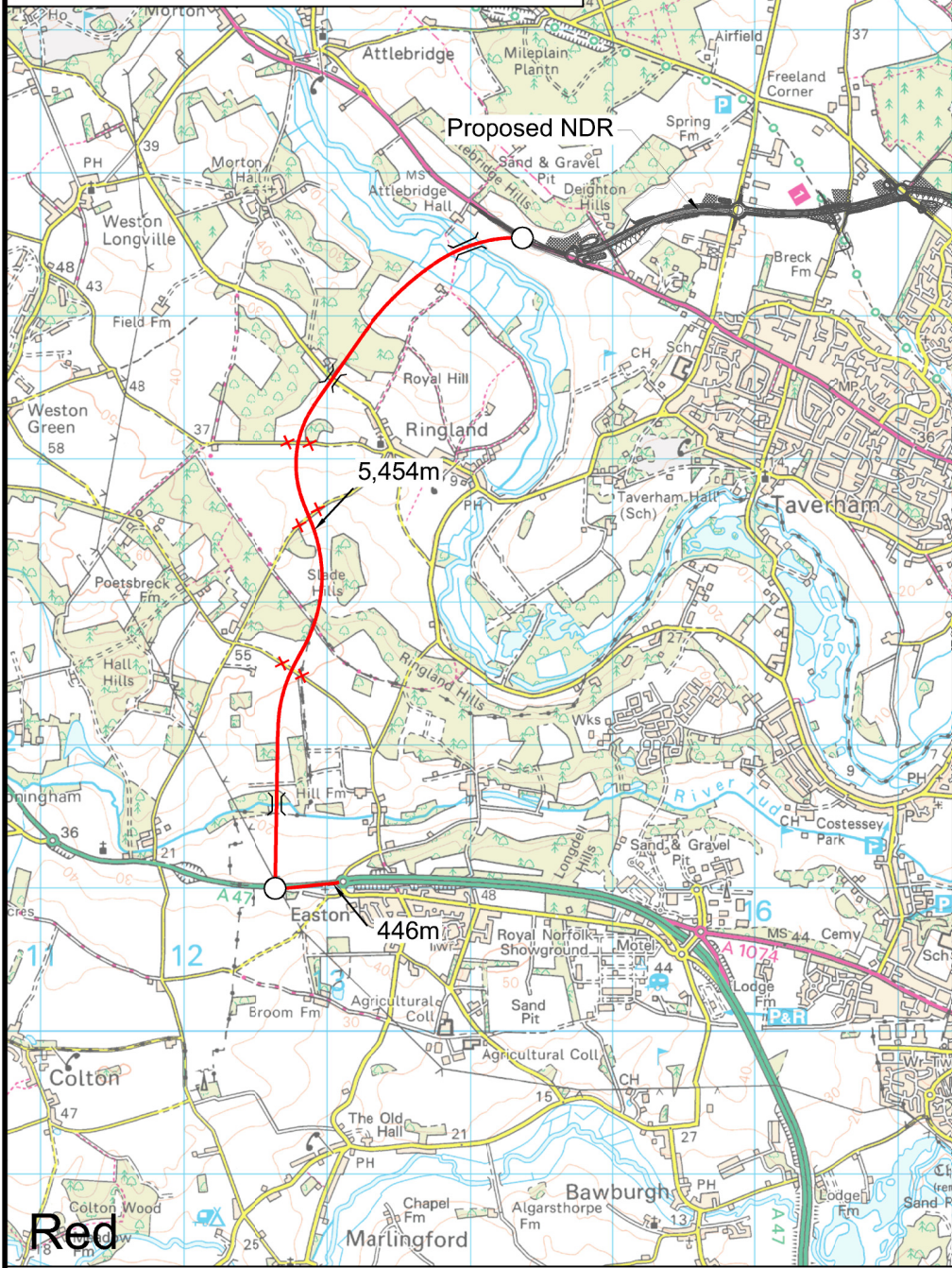
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P2	08/14	AW	Second Issue	GC	MEP	

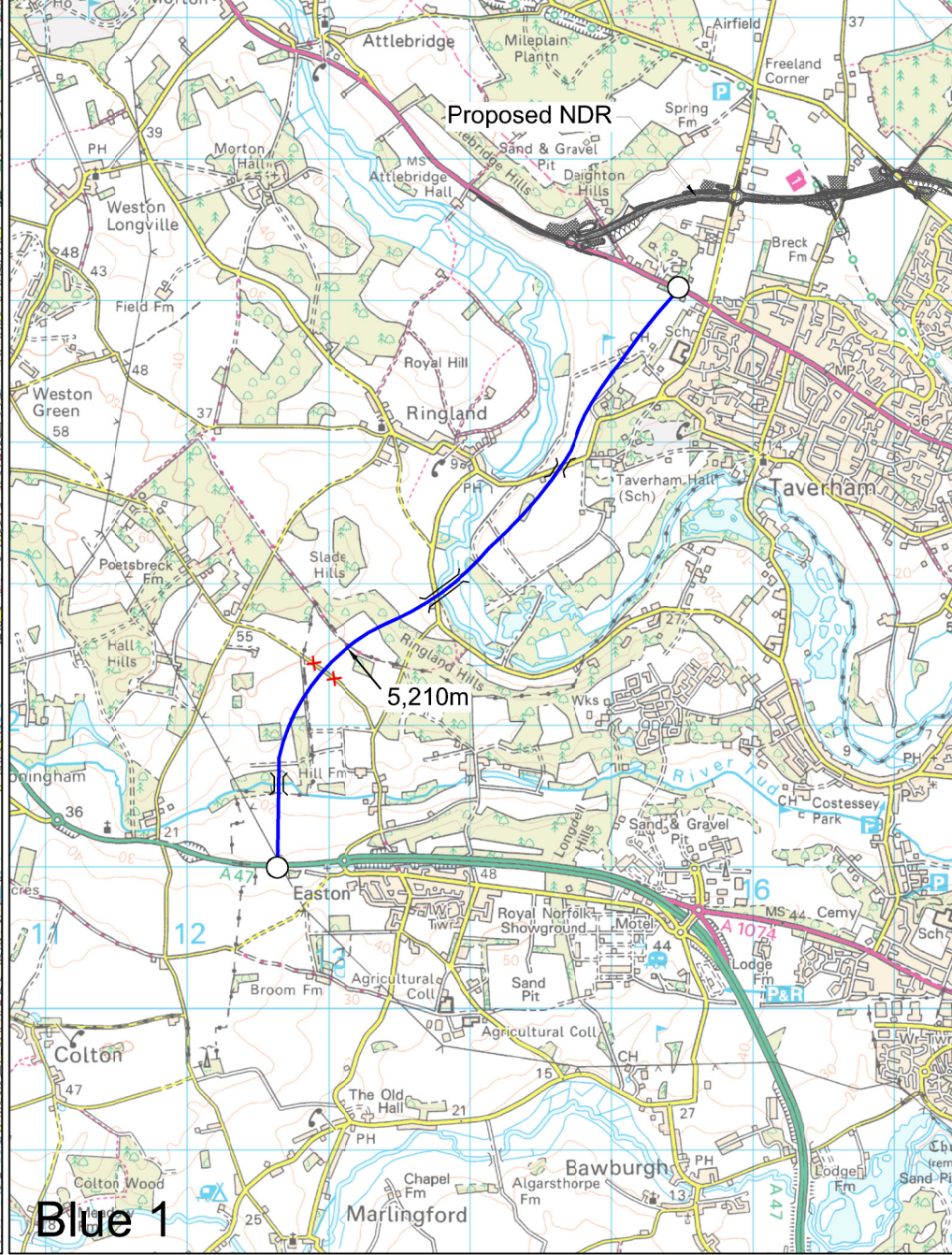
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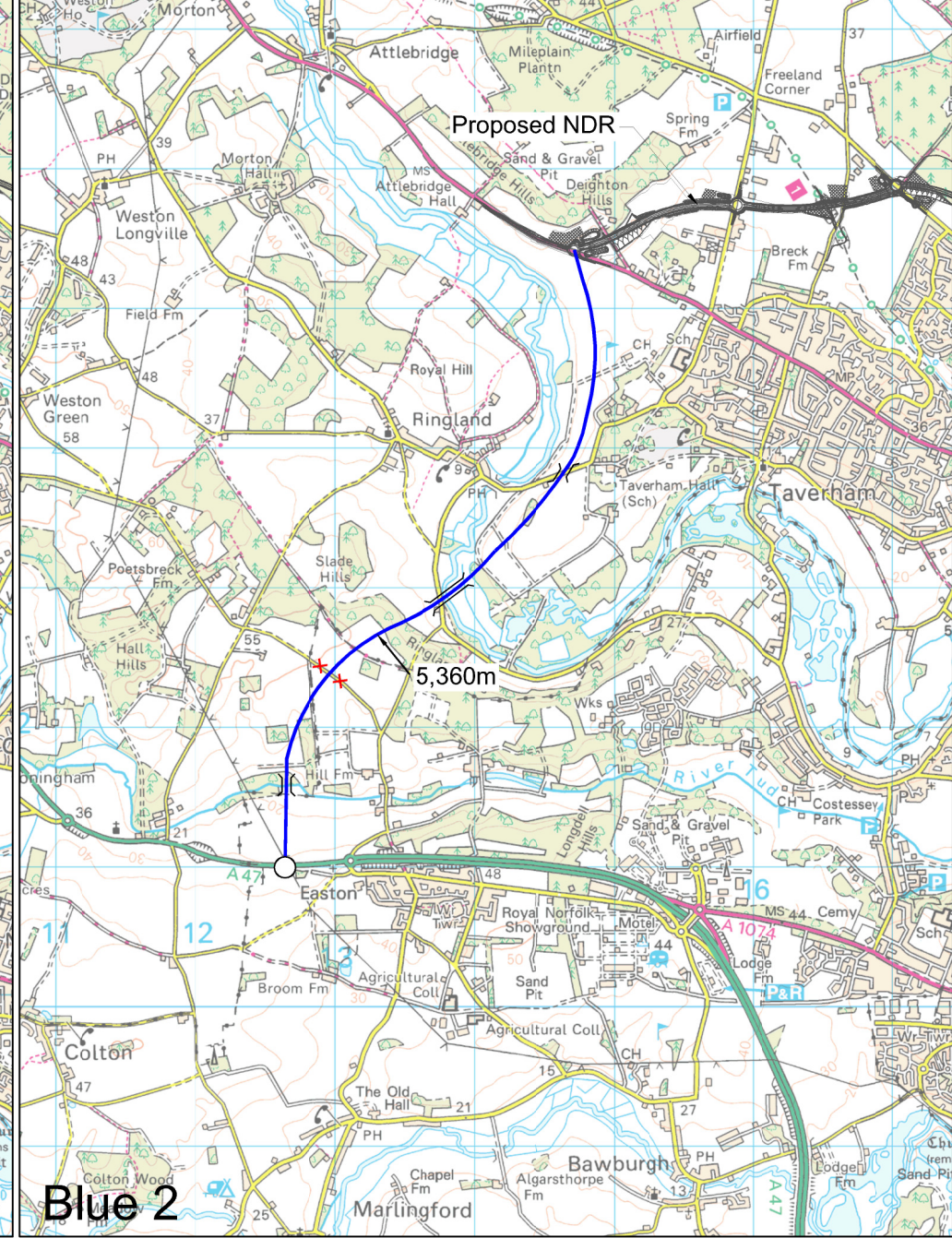
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●	Grade Separated Roundabout
□	Signals
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— / —	Bridge Over / Under
— / —	Staggered Junction



Red



Blue 1



Blue 2

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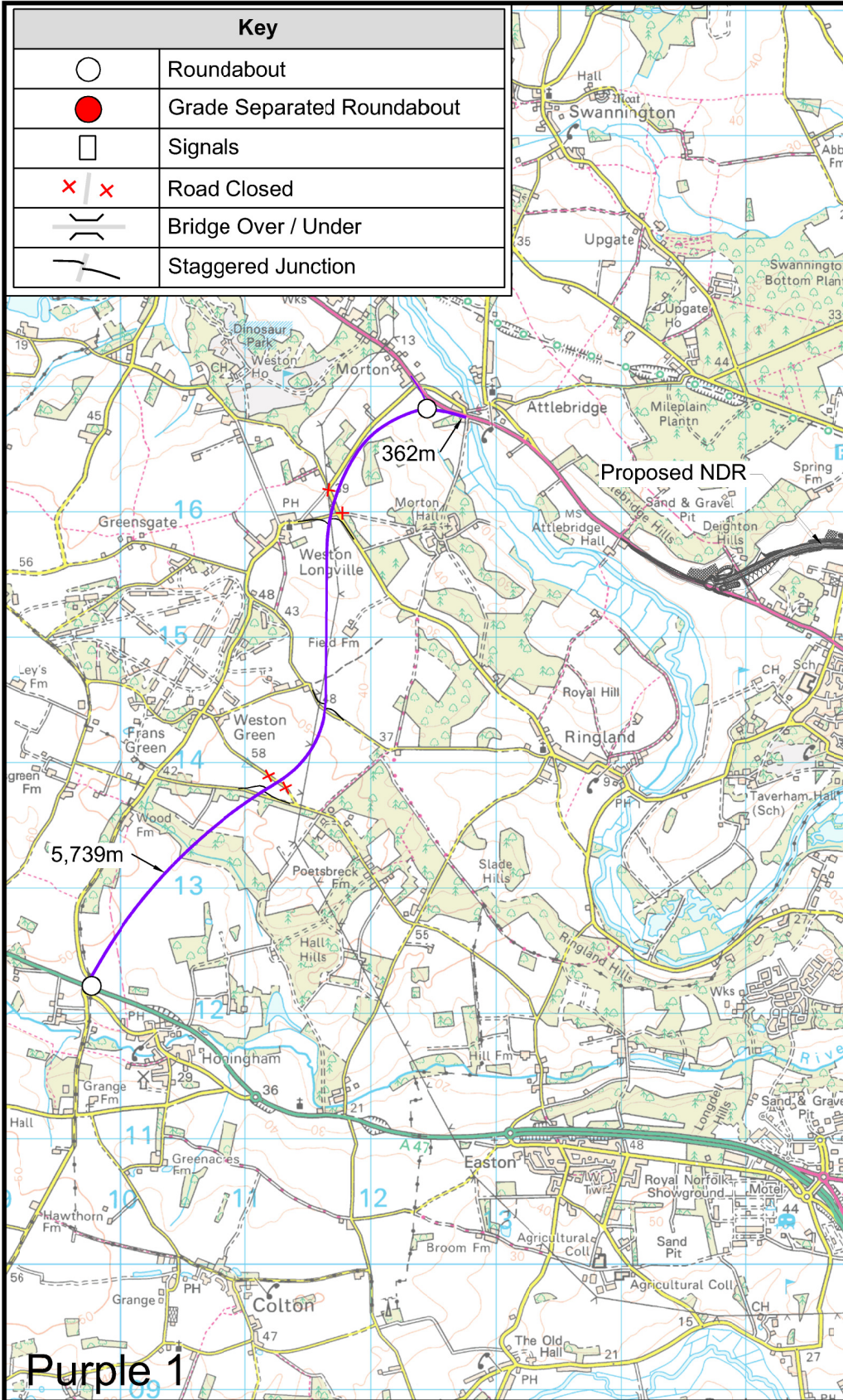
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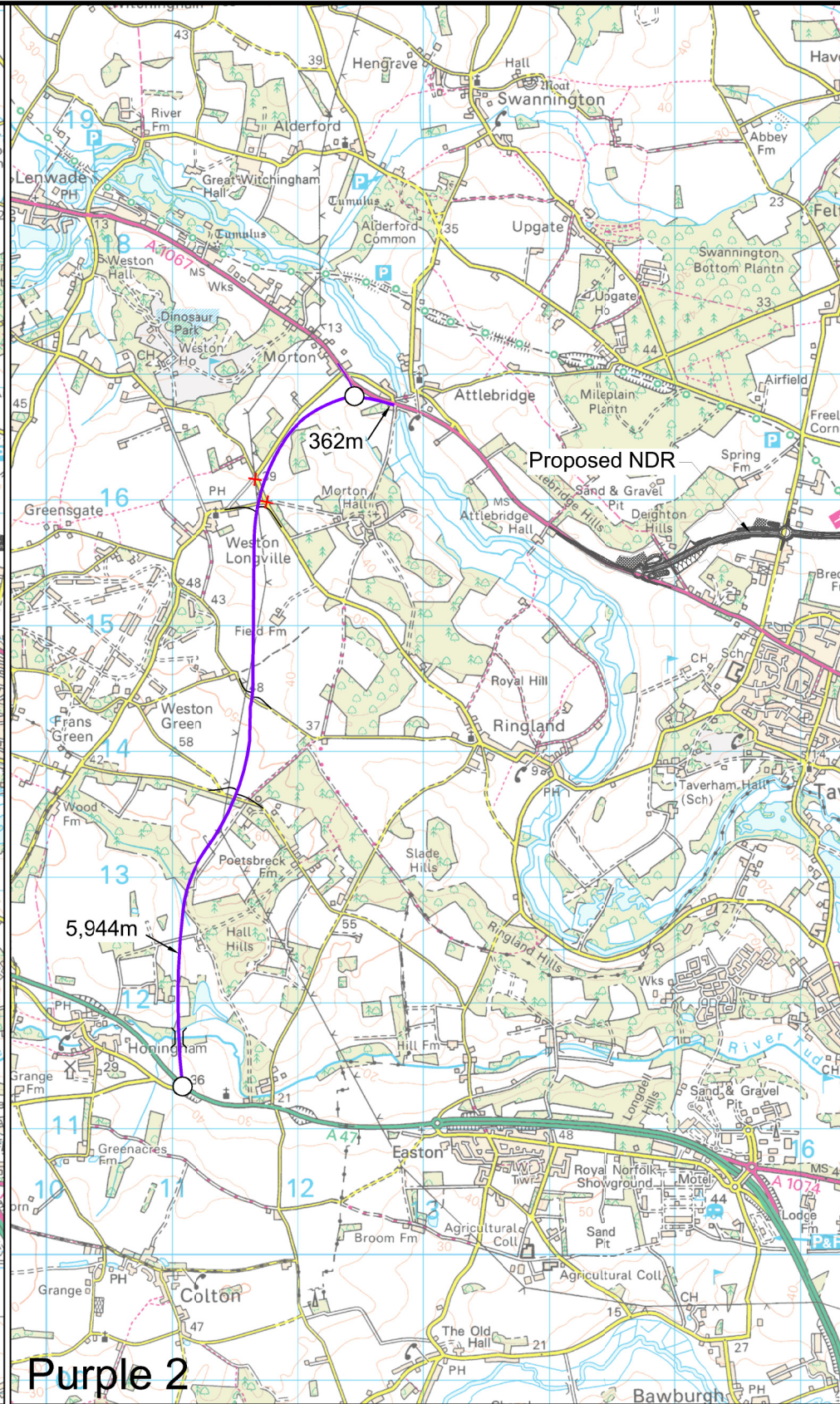
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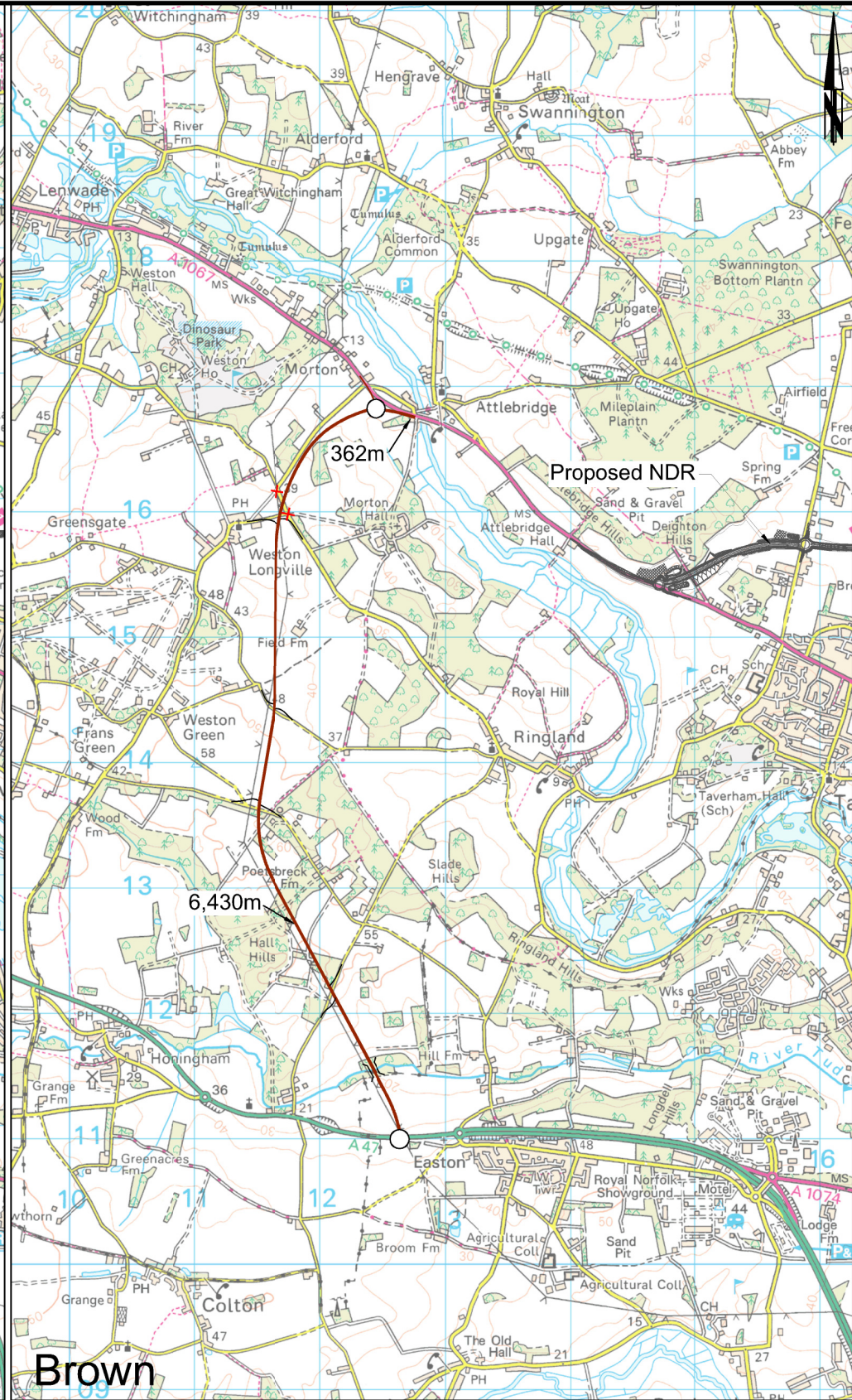
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✕ ✕	Road Closed
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Purple 1



Purple 2



Brown

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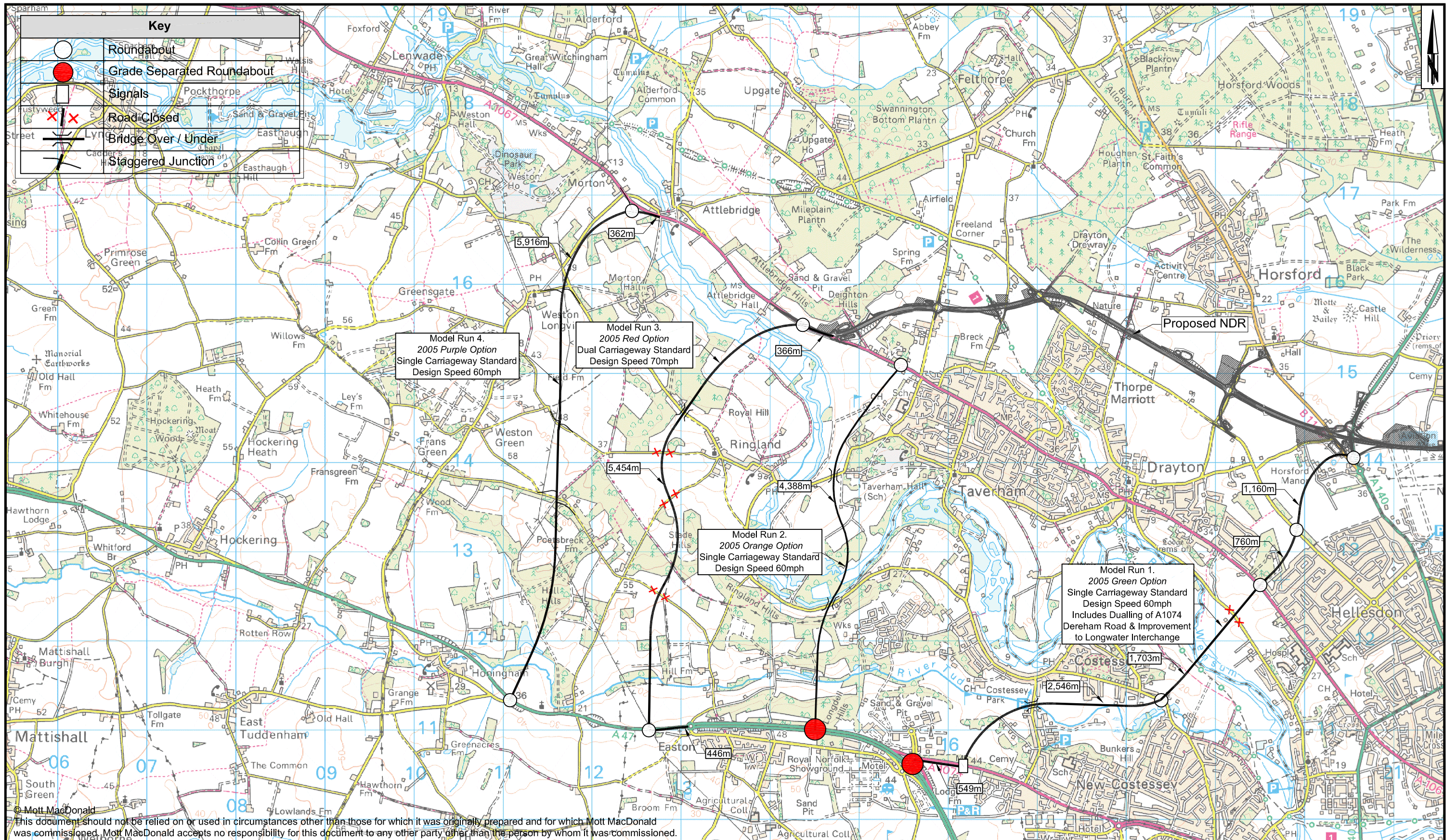
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P2	08/14	AW	Second Issue	GC	MEP	

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# Appendix C. Traffic Modelling



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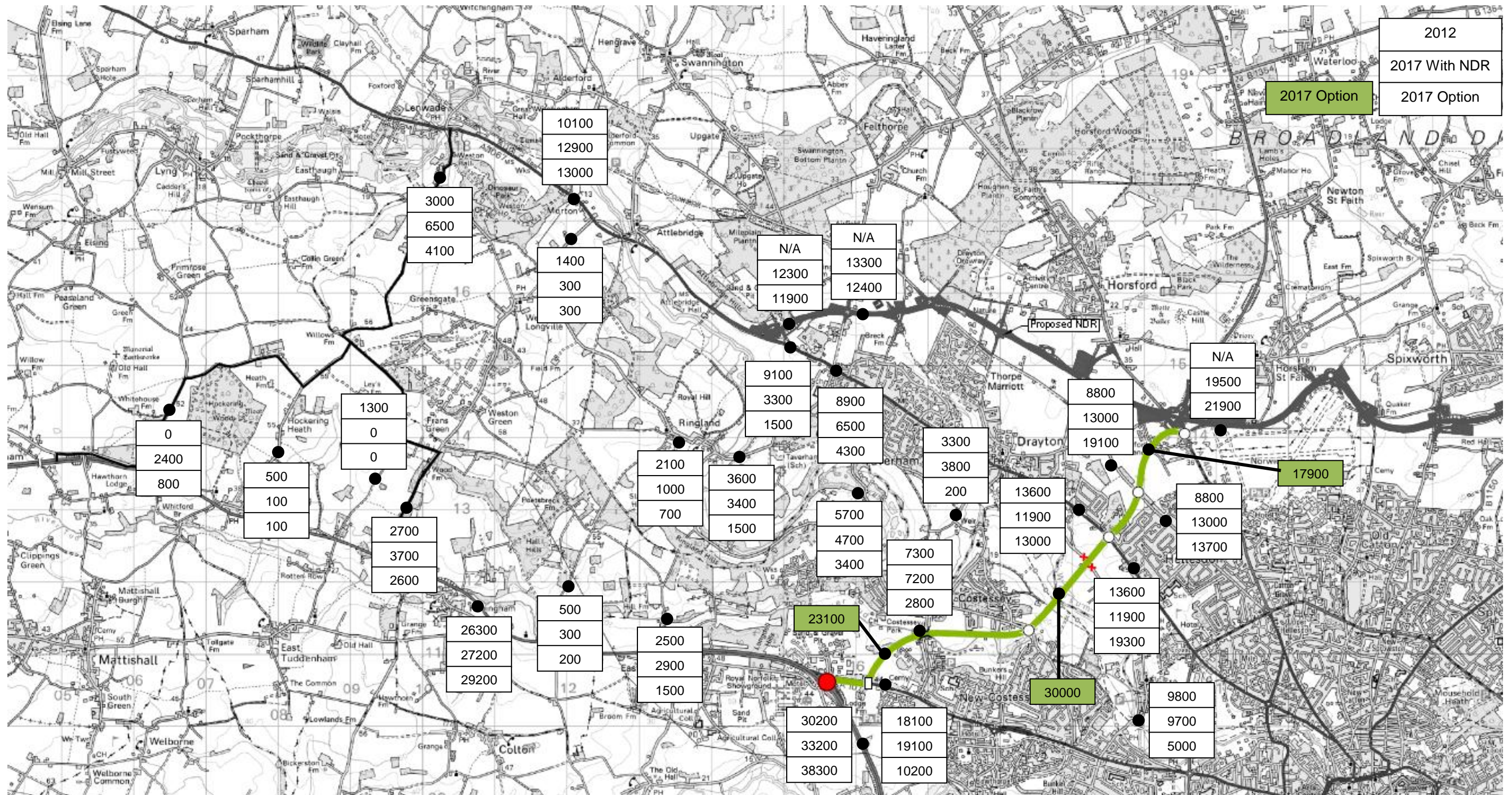
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P3	8/14	AW	Second Issue	GC	MEP

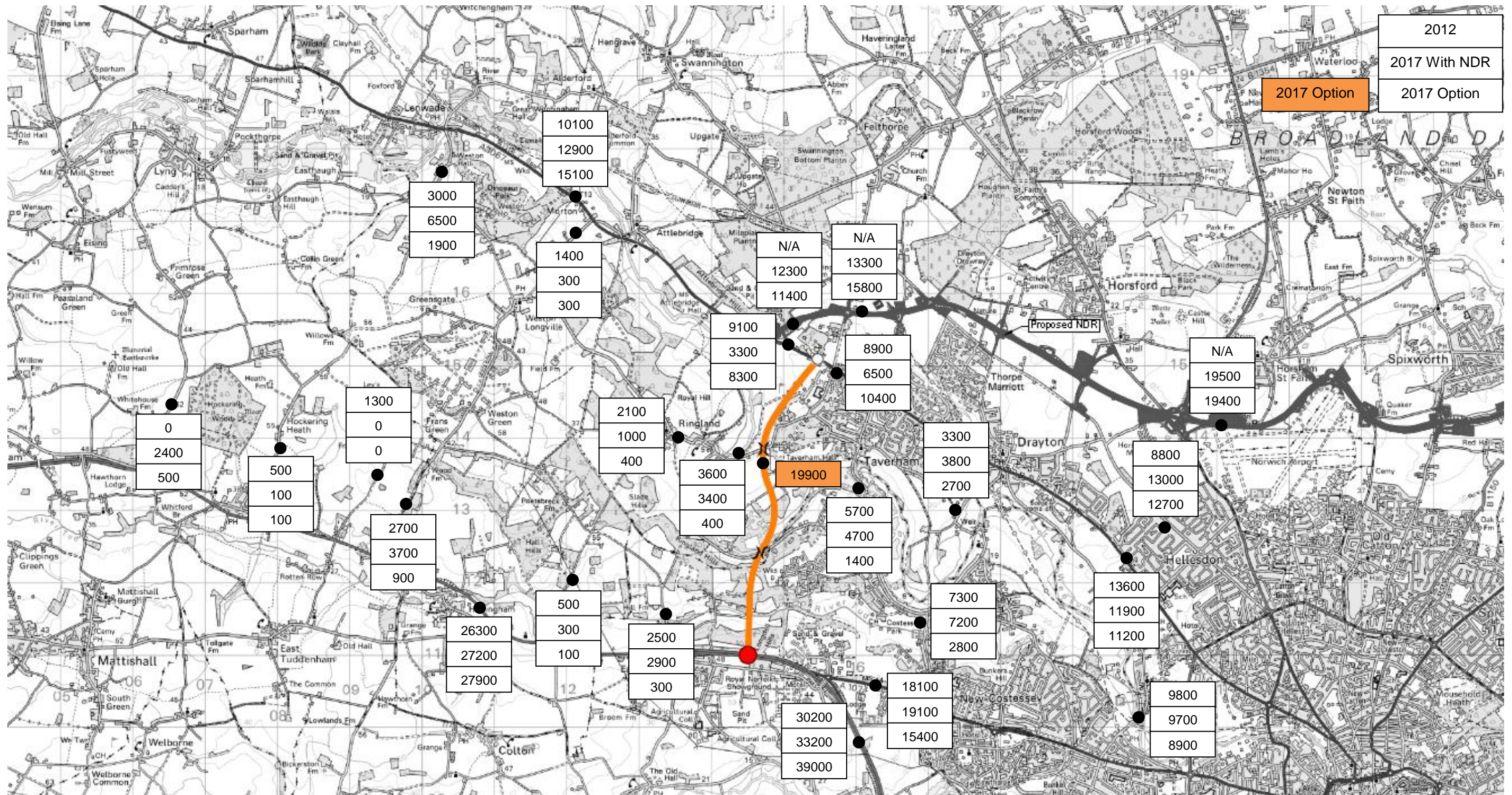
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Figure C.1: Predicted Traffic Flows – 2017 Model Run 1



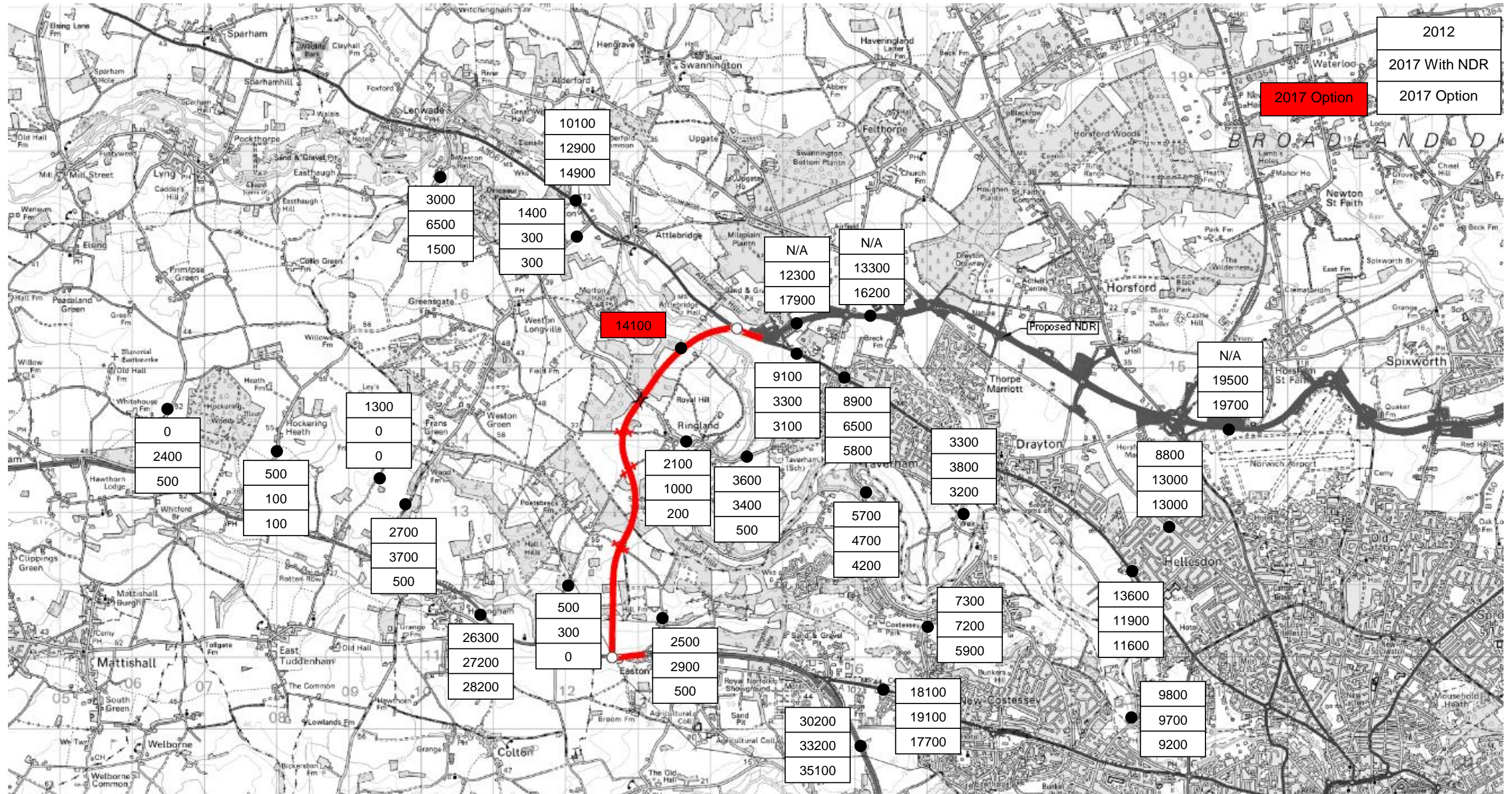
Source: Annual Average Daily Traffic volumes based on NDR DCO Model

Figure C.2: Predicted Traffic Flows – 2017 Model Run 2



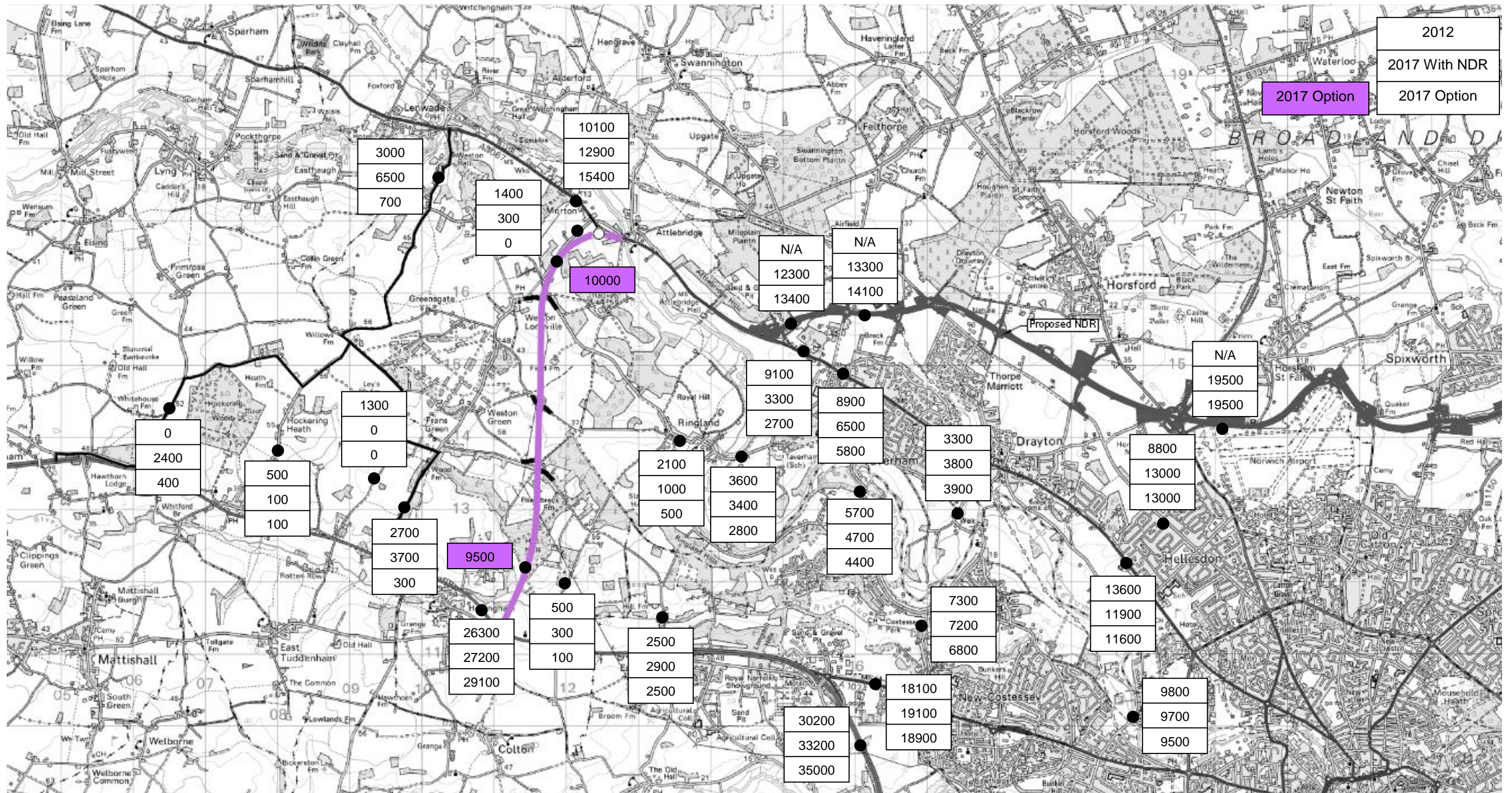
Source: Annual Average Daily Traffic volumes based on NDR DCO Model

Figure C.3: Predicted Traffic Flows – 2017 Model Run 3



Source: Annual Average Daily Traffic volumes based on NDR DCO Model

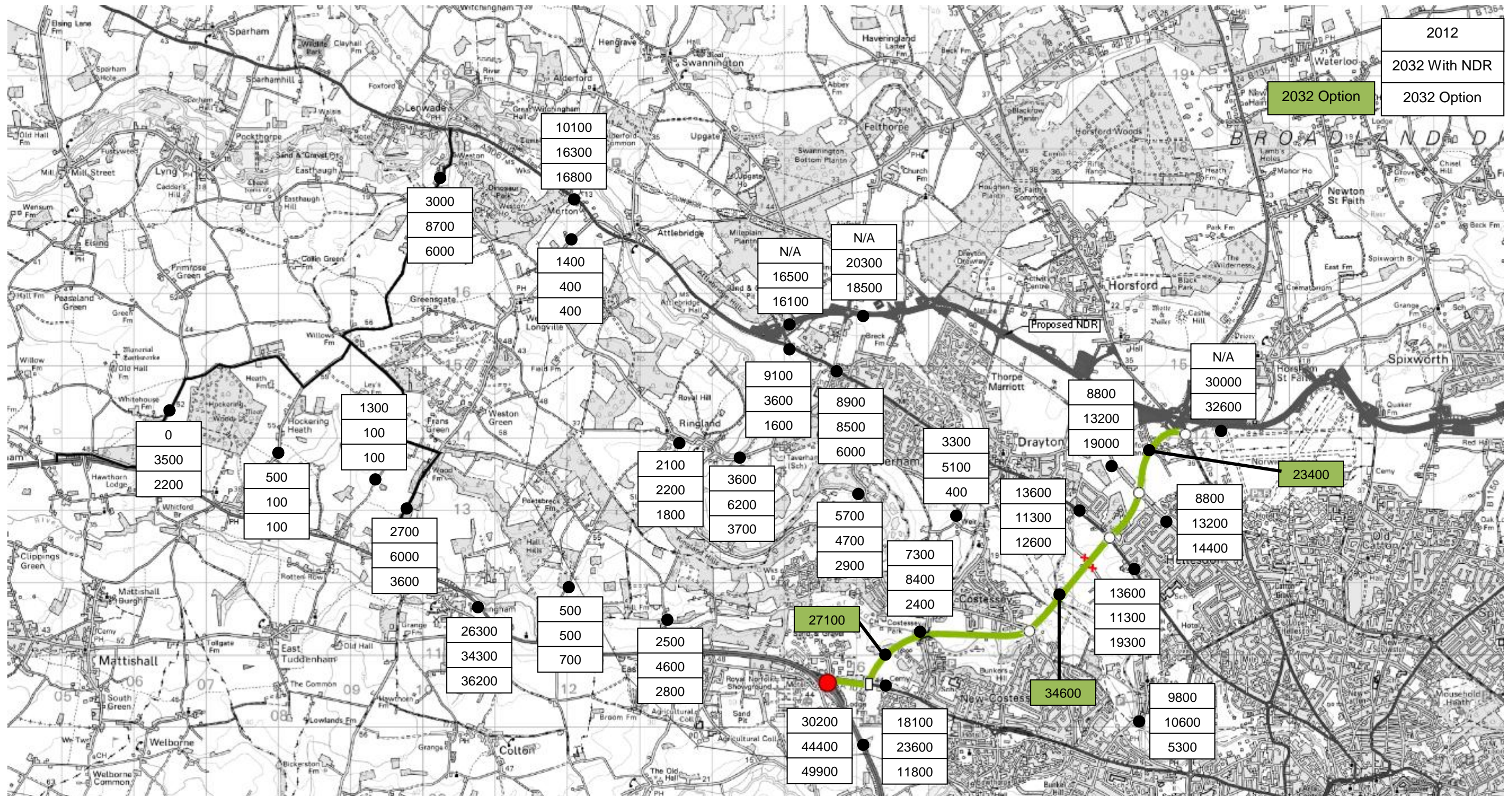
Figure C.4: Predicted Traffic Flows – 2017 Model Run 4



Source: Annual Average Daily Traffic volumes based on NDR DCO Model

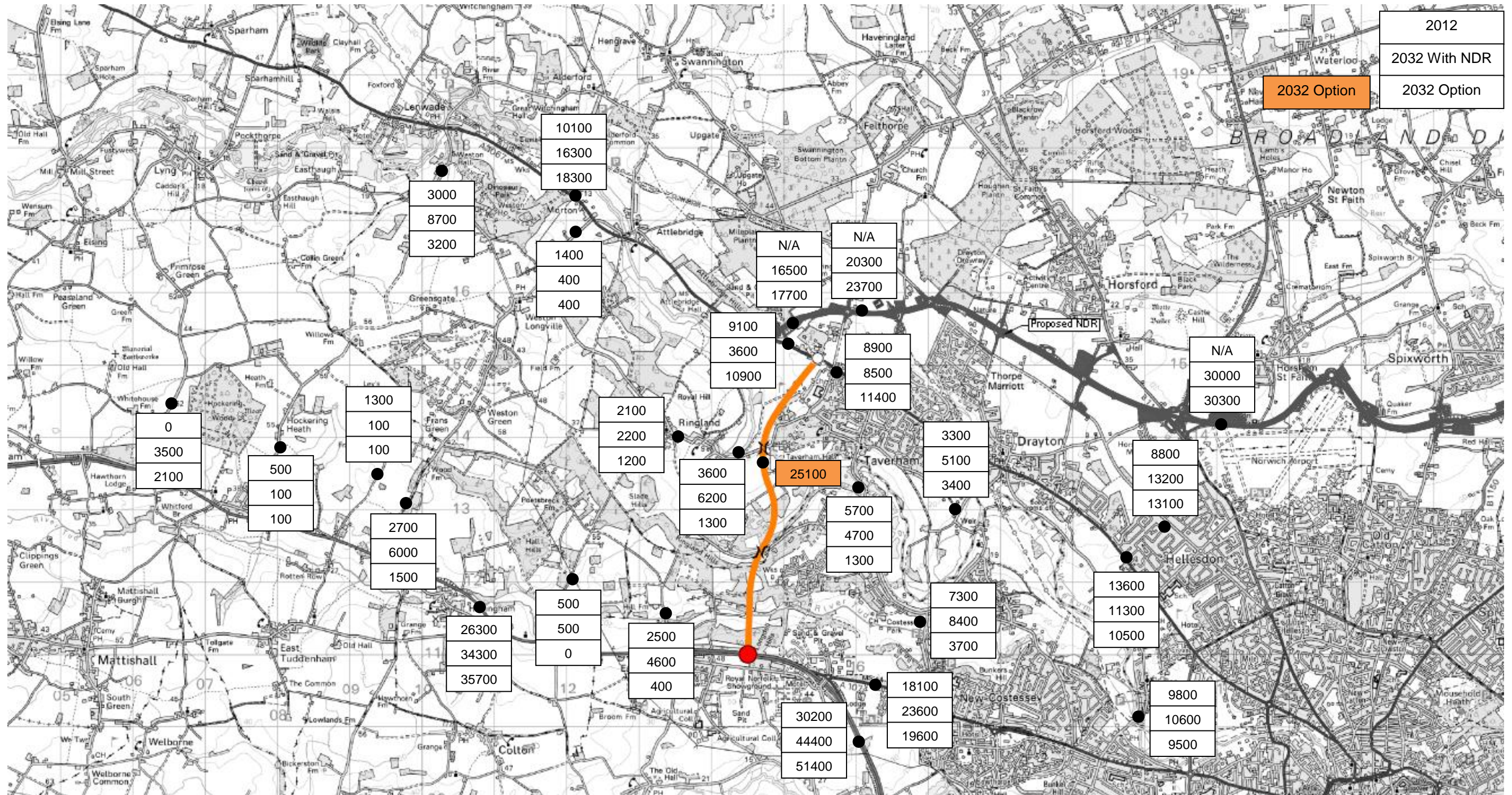


Figure C.5: Predicted Traffic Flows – 2032 Model Run 1



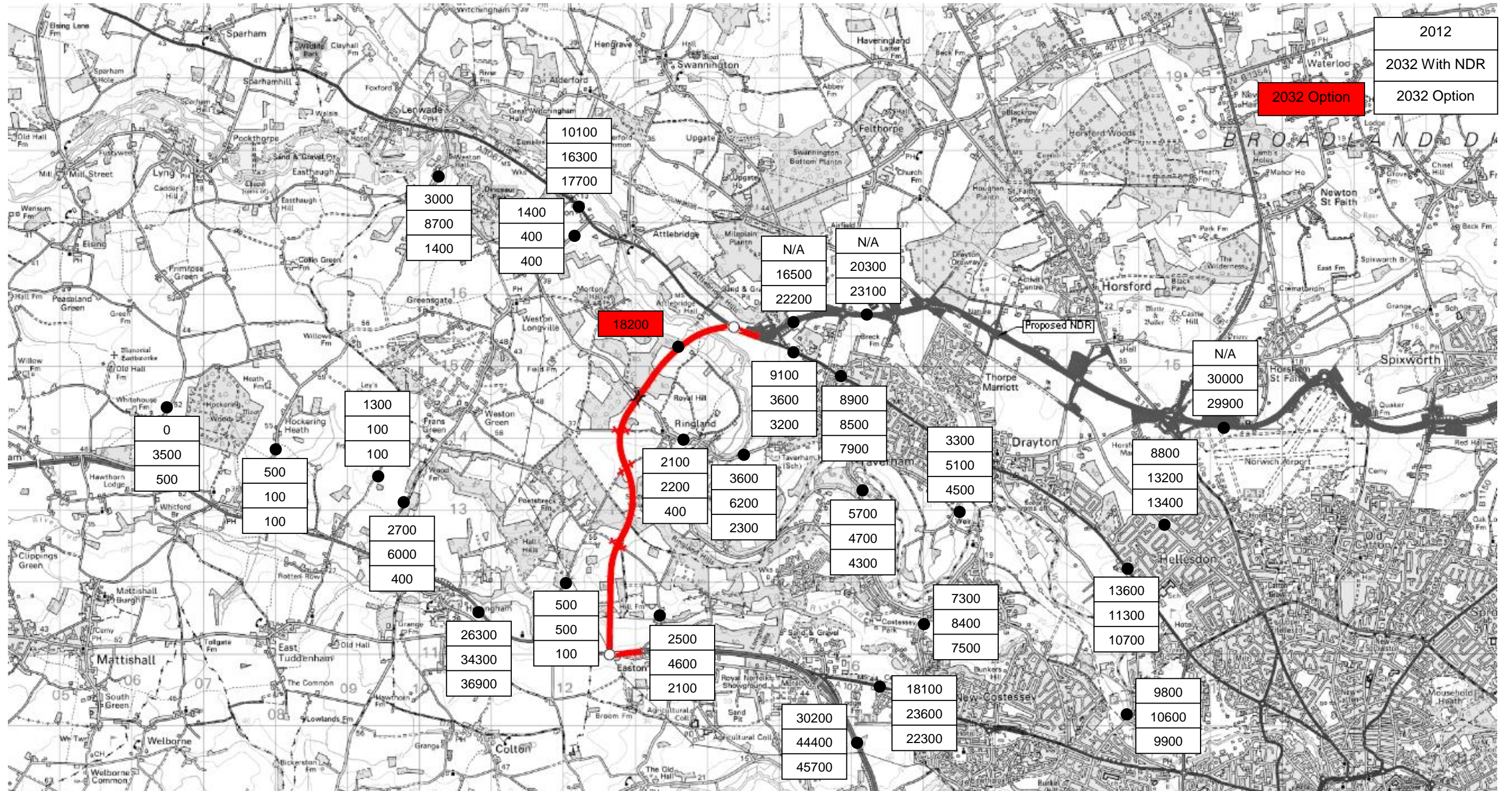
Source: Annual Average Daily Traffic volumes based on NDR DCO Model

Figure C.6: Predicted Traffic Flows – 2032 Model Run 2



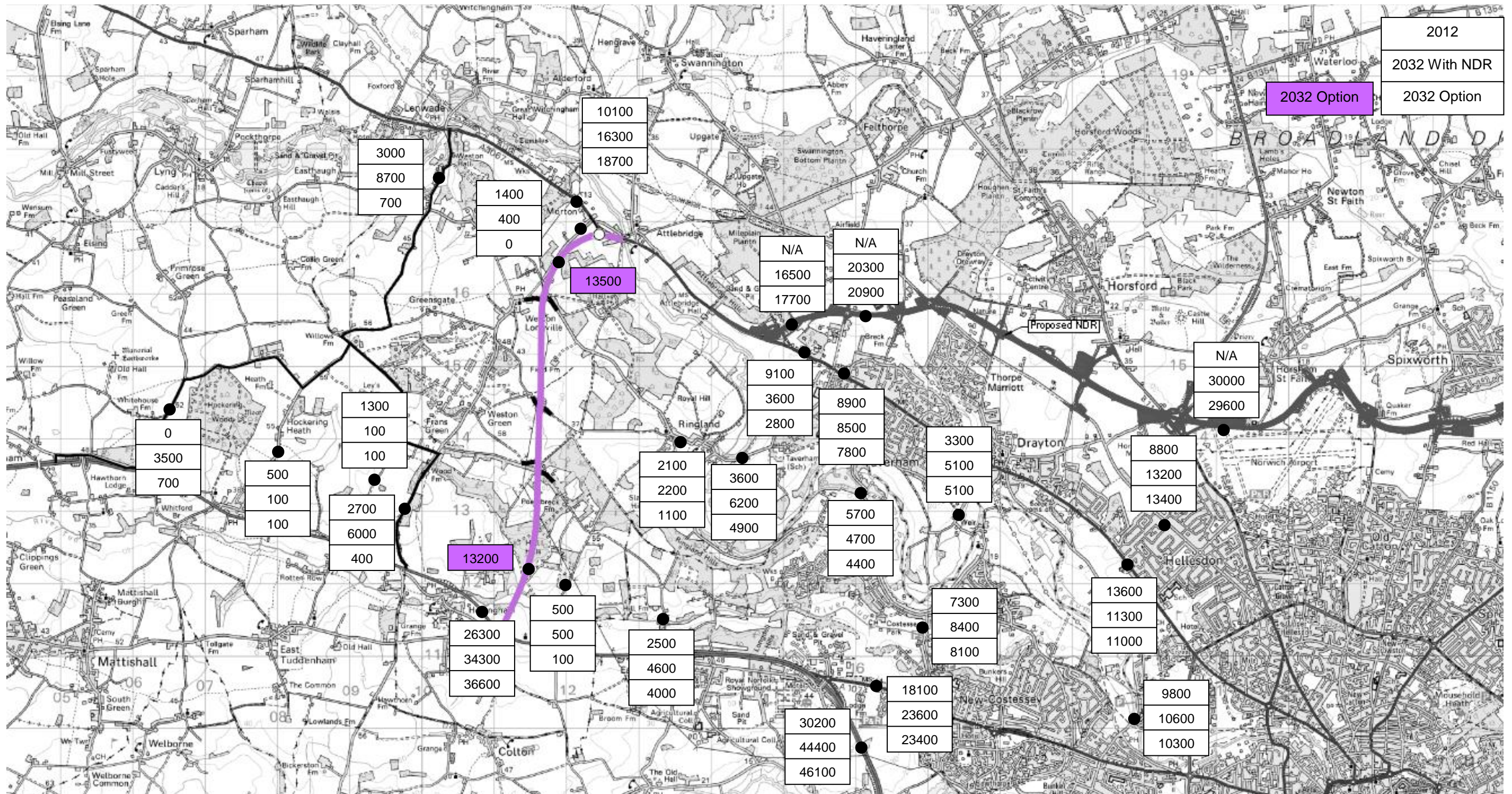
Source: Annual Average Daily Traffic volumes based on NDR DCO Model

Figure C.7: Predicted Traffic Flows – 2032 Model Run 3



Source: Annual Average Daily Traffic volumes based on NDR DCO Model

Figure C.8: Predicted Traffic Flows – 2032 Model Run 4



Source: Annual Average Daily Traffic volumes based on NDR DCO Model

# Appendix D. Scheme Capital and Development Cost Estimates

## A47 - A1067 Western Link Road - Capital Cost Estimates (incl Land)

Assumptions	LENGTH (metres)	Purple 1 (single)	Purple 2 (single)	Brown (single)	Red (single)	Red (dual)	Blue 1 (single)	Blue 1 (dual)	Blue 2 (single)	Blue 2 (dual)	Orange 1 (single)	Orange 1 (dual)	Orange 2 (single)	Orange 2 (dual)	Orange 3 (single)	Orange 3 (dual)	Orange 4 (single)	Orange 4 (dual)	Orange 5 (single)	Orange 5 (dual)	Orange 6 (single)	Orange 6 (dual)	Green (single)	Green (dual)											
		6101	6306	6792	5454	5900	5210	5656	5360	5806	4486	4486	4636	4636	4854	4954	5103	5103	5806	5806	5959	5959	6718	6718											
	Unit for measure																																		
Single (assumed width 6.5m carriageway with 2.5m total for verges etc.)	standard carriageway with positive drainage system. Unlit except for main junctions. No excessive planting required. No cycleways or footways	9	54909	56754	61128	49086		46890		48240			40374		41724			44586		45927			52254	53631	60462										
Dual (assumed width of 13m carriageway with 2.5m total for verges)	standard carriageway with positive drainage system. Unlit except for main junctions. No excessive planting required. No cycleways or footways	15.5						91450		87668			89993		69533			71858		76787			79096.5	89993	92365	104129									
At grade roundabout	Assumed - lit, but no structures required	£500,000	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	4	4										
Signalised Junction	Assumed - lit, but no structures required	£500,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1										
Over/under bridge - single	cost of £12,000/m2 assumed, applied to deck size assumed at 14m span x 11m width for single carriageway cost of £12,000/m2 assumed, applied to deck size assumed at 14m span x 17.5m width for dual carriageway	£1,848,000	0	1	1	2	0	2	0	2	2	0	2	0	3	0	3	0	3	0	3	0	3	0	1	0									
Over/under bridge - dual	cost of £30,000/m2 assumed, applied to deck size 11m wide x 40m long (assumed - no info)	£2,940,000	0	0	0	0	2	0	2	0	2	0	2	0	3	0	3	0	3	0	3	0	3	0	1										
Viaduct across river - single	cost of £30,000/m2 assumed, applied to deck size 17.5m wide x 40m long (assumed - no info)	£13,200,000	0	0	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0										
Viaduct across river - dual	cost of £30,000/m2 assumed, applied to deck size 17.5m wide x 40m long (assumed - no info)	£21,000,000	0	0	0	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1										
Road Construction	Assumed as £2,500/lin metre for single (high range from F+A price book 2010) Assumed as £3,200/lin metre for dual (high range from F+A price book 2010)	£2,500 £3,200	£15,252,500	£15,765,000	£16,980,000	£13,635,000		£13,025,000		£13,400,000			£11,215,000		£11,590,000			£12,385,000		£12,757,500			£14,515,000	£14,897,500	£16,795,000										
								£18,880,000		£18,099,200			£18,579,200		£14,355,200			£14,835,200		£15,852,800			£16,329,600	£18,579,200	£19,068,800	£21,497,600									
	<b>Sub Total @ 2010 prices</b>	<b>£16,252,500</b>	<b>£18,613,000</b>	<b>£19,828,000</b>	<b>£31,531,000</b>	<b>£46,760,000</b>		<b>£30,921,000</b>		<b>£45,979,200</b>			<b>£28,986,000</b>		<b>£42,215,200</b>			<b>£31,629,000</b>		<b>£46,172,800</b>			<b>£34,259,000</b>	<b>£49,399,200</b>	<b>£34,641,500</b>	<b>£49,888,800</b>	<b>£34,343,000</b>	<b>£47,937,600</b>							
	Inflation (2010 to Q2 2014 - ESTIMATED)	20%	£3,250,500	£3,722,600	£3,965,600	£6,306,200		£9,352,000		£6,184,200			£9,195,840		£6,259,200			£9,291,840		£5,722,200			£8,347,040	£5,797,200	£8,443,040	£6,325,800	£9,234,560	£6,400,300	£9,329,920	£6,851,800	£9,879,840	£6,928,300	£9,977,760	£6,868,600	£9,587,520
Longwater Dual Bridge Improvement (Q1 2014)	taken from Longwater and Easton Transport Strategy - May 2014	£13,340,000											£13,340,000		£13,340,000			£13,340,000		£13,340,000			£13,340,000	£13,340,000	£13,340,000	£13,340,000	£13,340,000	£13,340,000	£13,340,000	£13,340,000	£13,340,000	£13,340,000	£13,340,000	£13,340,000	£13,340,000
Land Purchase	Assumed at £11,000/acre average for agricultural land (@ Q2 2014) - assumed as length x width x 1.1 factor to allow for tie-ins etc.)	£11,000	£164,180	£169,696	£182,775	£146,769		£273,438		£140,203			£262,130		£144,239			£269,082		£120,720			£207,906	£124,756	£214,858	£133,314	£229,596	£137,323	£236,501	£156,241	£269,082	£160,358	£276,173	£180,783	£311,349
	<b>Sub Total @ 2014 prices inc. land</b>	<b>£19,667,180</b>	<b>£22,505,296</b>	<b>£23,976,375</b>	<b>£37,983,969</b>	<b>£56,385,438</b>		<b>£37,245,403</b>		<b>£55,437,170</b>			<b>£37,699,439</b>		<b>£56,020,122</b>			<b>£47,793,920</b>		<b>£63,630,146</b>			<b>£48,247,956</b>	<b>£64,213,098</b>	<b>£51,428,114</b>	<b>£68,976,956</b>	<b>£51,879,123</b>	<b>£69,556,021</b>	<b>£54,607,041</b>	<b>£72,888,122</b>	<b>£55,070,158</b>	<b>£73,482,733</b>	<b>£54,732,383</b>	<b>£71,176,469</b>	
	Optimism Bias - Stage 1 (TAG 2.5.9)	44%	£8,653,559	£9,902,330	£10,549,605	£16,712,946		£24,809,593		£16,387,977			£24,392,355		£16,587,753			£24,648,854		£21,029,325			£27,997,264	£21,229,101	£28,253,763	£22,628,370	£30,349,860	£22,826,814	£30,604,649	£24,027,098	£32,070,774	£24,230,870	£32,332,402	£24,082,249	£31,317,646
<b>GRAND TOTAL</b>		<b>£28,320,739</b>	<b>£32,407,627</b>	<b>£34,525,979</b>	<b>£54,696,915</b>	<b>£81,195,031</b>		<b>£53,633,380</b>		<b>£79,829,525</b>			<b>£54,287,192</b>		<b>£80,668,975</b>			<b>£68,823,244</b>		<b>£91,627,410</b>			<b>£69,477,057</b>	<b>£92,466,861</b>	<b>£74,056,483</b>	<b>£99,326,816</b>	<b>£74,705,937</b>	<b>£100,160,670</b>	<b>£78,634,139</b>	<b>£104,958,895</b>	<b>£79,301,028</b>	<b>£105,815,135</b>	<b>£78,814,632</b>	<b>£102,494,115</b>	

## A47 - A1067 Western Link Road - Development Cost Estimates

	<b>Purple 1 (single)</b> A1067 Attlebridge, passing east of Weston Longville, to A47 west of Honingham at Wood Lane/Berrys Lane junction (2005 Purple)	<b>Purple 2 (single)</b> A1067 Attlebridge, passing east of Weston Longville, to A47 east of Honingham at Norwich Road roundabout.	<b>Brown (single)</b> A1067 Attlebridge, passing east of Weston Longville, to A47 west of Easton (2005 Brown)	<b>Red (single)</b> A1067 at NDR terminal, passing to the west of Ringland, to the A47 west of Easton (2005 Red).	<b>Red (dual)</b> Same as Red 1, but dualled	<b>Blue 1 (single)</b> A1067 east of NDR terminal, passing south-east of Ringland, through Ringland Hills, to the A47 west of Easton (2005 Blue).	<b>Blue 1 (dual)</b> Same as Blue 1, but dualled	<b>Blue 2 (single)</b> A1067 at NDR terminal, passing south-east of Ringland, through Ringland Hills, to the A47 west of Easton.	<b>Blue 2 (dual)</b> Same as Blue 2, but dualled	<b>Orange 1 (single)</b> A1067 east of NDR terminal, passing east of Ringland and west of Queens Hills, through Longwater Employment Area, to the A47/A1074 Longwater Interchange.	<b>Orange 1 (dual)</b> Same as Orange 1, but dualled	<b>Orange 2 (single)</b> As Orange 1 but connecting to A1067 at NDR terminal	<b>Orange 2 (dual)</b> Same as Orange 2, but dualled	<b>Orange 3 (single)</b> A1067 east of NDR terminal, passing east of Ringland, between Queens Hills and Costessey, through Longwater Employment Area, to the A47/A1074 Longwater Interchange	<b>Orange 3 (dual)</b> Same as Orange 3, but dualled	<b>Orange 4 (single)</b> As Orange 3 but connecting to A1067 at NDR terminal	<b>Orange 4 (dual)</b> Same as Orange 4, but dualled	<b>Orange 5 (single)</b> A1067 east of NDR terminal, passing east of Ringland and between Queens Hills and Costessey, to the A1074 east of Longwater.	<b>Orange 5 (dual)</b> Same as Orange 5, but dualled	<b>Orange 6 (single)</b> As Orange 5 but connecting to A1067 at NDR terminal	<b>Orange 6 (dual)</b> Same as Orange 6, but dualled	<b>Green (single)</b> Proposed A140 NDR junction, passing north-west of Hellesdon to the A1067, and south of Costessey to the A1074 east of Longwater (2005 Green).	<b>Green (dual)</b> Same as Green, but dualled
<b>Capital Cost £</b>	<b>£28,320,739</b>	<b>£32,407,627</b>	<b>£34,525,979</b>	<b>£54,696,915</b>	<b>£81,195,031</b>	<b>£53,633,380</b>	<b>£79,829,525</b>	<b>£54,287,192</b>	<b>£80,668,975</b>	<b>£68,823,244</b>	<b>£91,627,410</b>	<b>£69,477,057</b>	<b>£92,466,861</b>	<b>£74,056,483</b>	<b>£99,326,816</b>	<b>£74,705,937</b>	<b>£100,160,670</b>	<b>£78,634,139</b>	<b>£104,958,895</b>	<b>£79,301,028</b>	<b>£105,815,135</b>	<b>£78,814,632</b>	<b>£102,494,115</b>
DMRB 1 and 2 (16% of 9%)	£407,819	£466,670	£497,174	£787,636	£1,169,208	£772,321	£1,149,545	£781,736	£1,161,633	£991,055	£1,319,435	£1,000,470	£1,331,523	£1,066,413	£1,430,306	£1,075,765	£1,442,314	£1,132,332	£1,511,408	£1,141,935	£1,523,738	£1,134,931	£1,475,915
DMRB 3 and planning (46% of 9%)	£1,172,479	£1,341,676	£1,429,376	£2,264,452	£3,361,474	£2,220,422	£3,304,942	£2,247,490	£3,339,696	£2,849,282	£3,793,375	£2,876,350	£3,828,128	£3,065,938	£4,112,130	£3,092,826	£4,146,652	£3,255,453	£4,345,298	£3,283,063	£4,380,747	£3,262,926	£4,243,256
Prep and construction supervision (38% of 9%)	£968,569	£1,108,341	£1,180,788	£1,870,634	£2,776,870	£1,834,262	£2,730,170	£1,856,622	£2,758,879	£2,353,755	£3,133,657	£2,376,115	£3,162,367	£2,532,732	£3,396,977	£2,554,943	£3,425,495	£2,689,288	£3,589,594	£2,712,095	£3,618,878	£2,695,460	£3,505,299
Total development and supervision 9%	£2,548,866	£2,916,686	£3,107,338	£4,922,722	£7,307,553	£4,827,004	£7,184,657	£4,885,847	£7,260,208	£6,194,092	£8,246,467	£6,252,935	£8,322,017	£6,665,084	£8,939,413	£6,723,534	£9,014,460	£7,077,073	£9,446,301	£7,137,093	£9,523,362	£7,093,317	£9,224,470
<b>Capital Cost plus Development and Supervision Costs</b>	<b>£30,869,605</b>	<b>£35,324,313</b>	<b>£37,633,318</b>	<b>£59,619,637</b>	<b>£88,502,584</b>	<b>£58,460,384</b>	<b>£87,014,182</b>	<b>£59,173,040</b>	<b>£87,929,183</b>	<b>£75,017,336</b>	<b>£99,873,877</b>	<b>£75,729,992</b>	<b>£100,788,878</b>	<b>£80,721,567</b>	<b>£108,266,229</b>	<b>£81,429,472</b>	<b>£109,175,131</b>	<b>£85,711,212</b>	<b>£114,405,196</b>	<b>£86,438,121</b>	<b>£115,338,497</b>	<b>£85,907,949</b>	<b>£111,718,586</b>

# Appendix E. RAG Sifting Matrix



## Green, Amber & Red Criteria for Each Objective

	Green	Amber	Red
<b>1. Strategic</b>			
<b>Specific Local Objectives</b>			
1a. Improve strategic connectivity	Scheme provides direct connections to strategic network	Scheme provides some indirect connections to strategic network	Scheme would provide no direct connections to strategic network
1b - 1d. Reduce adverse impacts on local communities caused by traffic routing between A47 and A1067	Scheme would significantly reduce strategic traffic on local routes	Scheme would decrease strategic traffic on some local routes	Scheme would have little impact or increase strategic traffic on local routes
1e. Accessibility for Queens Hills	Scheme would offer the opportunity to provide a new direct access for Queens Hills	Scheme would reduce traffic on the local road network creating conditions in which a second access for Queens Hills may become feasible	Scheme would not offer any opportunity to provide a second access for Queens Hills
<b>Wider Transport and Government Objectives</b>			
1f. Sustainable travel opportunities - public transport, cycling, walking	Scheme would facilitate improved public transport provision and better footway and cycle route connections	Scheme has a broadly neutral impact on public transport provision, cycle routes and footways	Scheme has a negative impact on public transport provision, cycle and footway routes
<b>2. Economic</b>			
2a. Connectivity - impact on journey times and distances	Scheme would reduce journey times and distances for a significant number of trips	Scheme would reduce journey times and distances for some trips	Scheme would have little impact or increase journey times and distances.
2b. Facilitate delivery of housing	Scheme would facilitate strategic sites for residential development which otherwise would not be developable	Scheme would improve connections to proposed residential developments	Scheme would not facilitate delivery of housing
<b>3. Carbon</b>			
3a. Carbon emissions	Scheme would have positive impact on carbon emissions	Scheme would have broadly neutral impact on carbon emissions	Scheme would have negative impact on carbon emissions
<b>4. Socio-distributional Impacts</b>			
4a. Impact on accessibility for vulnerable groups	Scheme would improve accessibility for vulnerable users	Scheme would have broadly neutral impact on accessibility for vulnerable users	Scheme would reduce accessibility for vulnerable groups
<b>5. Local Environment</b>			
5a. Impact on River Wensum SAC/SSSI	No foreseeable direct or indirect impacts on the River Wensum, either during construction or operation	Possible direct or indirect impacts on the River Wensum, either during construction or operation, for which there may be mitigation	Probable direct or indirect impacts on the River Wensum, either during construction or operation, for which there is no mitigation
5b. Impact on other Designated Sites	No foreseeable direct or indirect impacts on Sites, either during construction or operation	Possible direct or indirect impacts on Sites, either during construction or operation	Probable direct or indirect impacts on Sites, either during construction or operation
5c. Impact on heritage & landscape	Scheme would have minimal impact on heritage and/or landscape	Scheme would have some impact on heritage and/or landscape	Scheme would have a significant negative impact on heritage and/or landscape
5d. Impact on air quality & noise	Scheme would have a positive or neutral impact in terms of air quality and noise	Low number of dwellings will experience deterioration in air quality and/or noise due to traffic	Large number of dwellings would experience deterioration in air quality and/or noise due to traffic
<b>6. Well Being</b>			
6a. Severance	No local footway, cycle route or highway connections between villages will be severed.	Small diversions may be required to some existing local footway, cycle route and highway connections	Some footway, cycle route and highway connections may be cut off with no alternative route provided.
6b. Enabling access to goods, services, people and places	Scheme would significantly improve access to goods, services, people and places	Scheme would offer some access improvements to goods, services, people and places	Scheme would not improve access to goods, services, people and places
<b>7. Managerial</b>			
7a. Implementation timetable	Scheme deliverable in short-term (within 1 year)	Scheme deliverable in medium term	Scheme deliverable in long term (over 5 years)
7b. Public acceptability	Scheme expected to have broad public support	Scheme expected to generate some public objections.	Scheme expected to generate significant public objections.
<b>8. Financial Case</b>			
8a. Capital Cost (£m) 2014 estimate for S2/D2AP standard scheme, incl 44% Optimism Bias			
<b>9. Commercial</b>			
9a. Potential for government and/or developer funding	Government and/or developer funding likely	Government and/or developer funding is possible	Government and/or developer funding unlikely

# A47 - A1067 Western Link Road - Sifting Matrix - First Issue

	Baseline	Public Transport	Purple 1	Purple 2	Brown	Red	Blue 1	Blue 2	Orange 1	Orange 2	Orange 3	Orange 4	Orange 5	Orange 6	Green
	With completion of NDR DCO scheme	Provide Orbital Bus Route between Taverham and the University of East Anglia / Science Park	A1067 Attlebridge, passing east of Weston Longville, to A47 west of Honingham at Wood Lane/Berrys Lane junction (2005 Purple)	A1067 Attlebridge, passing east of Weston Longville, to A47 east of Honingham at Norwich Road roundabout. Model Run 4.	A1067 Attlebridge, passing east of Weston Longville, to A47 west of Easton (2005 Brown)	A1067 at NDR terminal, passing to the west of Ringland, to the A47 west of Easton (2005 Red). Model Run 3.	A1067 east of NDR terminal, passing south-east of Ringland, through Ringland Hills, to the A47 west of Easton (2005 Blue).	A1067 at NDR terminal, passing south-east of Ringland, through Ringland Hills, to the A47 west of Easton.	A1067 east of NDR terminal, passing east of Ringland and west of Queens Hills, through Longwater Employment Area, to the A47/A1074 Longwater Interchange	As Orange 1 but connecting to A1067 at NDR terminal	A1067 east of NDR terminal, passing east of Ringland, between Queens Hills and Costessey, through Longwater Employment Area, to the A47/A1074 Longwater	As Orange 3 but connecting to A1067 at NDR terminal	A1067 east of NDR terminal, passing east of Ringland and between Queens Hills and Costessey, to the A1074 east of Longwater.	As Orange 5 but connecting to A1067 at NDR terminal	Proposed A140 NDR junction, passing north-west of Hellesdon to the A1067, and south of Costessey to the A1074 east of Longwater (2005 Green).
<b>1. Strategic</b>															
<b>Specific Local Objectives</b>															
1a. Improve strategic connectivity															
1b. Reduce adverse impacts in Taverham/Costessey area caused by traffic routeing between A47 and A1067															
1c. Reduce adverse impacts in Ringland area caused by traffic routeing between A47 and A1067															
1d. Reduce adverse impacts in Weston Longville/Hockering area caused by traffic routeing between A47 and A1067															
1e. Accessibility for Queens Hills															
<b>Wider Transport and Government Objectives</b>															
1f. Sustainable travel opportunities - public transport, cycling, walking															
<b>2. Economic</b>															
2a. Connectivity - impact on journey times and distances															
2b. Facilitate delivery of housing															
<b>3. Carbon</b>															
3a. Carbon emissions															
<b>4. Socio-distributional Impacts</b>															
4a. Impact on accessibility for vulnerable groups															
<b>5. Local Environment</b>															
5a. Impact on River Wensum SAC/SSSI															
5b. Impact on other Designated Sites															
5c. Impact on heritage & landscape															
5d. Impact on air quality & noise															
<b>6. Well Being</b>															
6a. Severance															
6b. Enabling access to goods, services, people and places															
<b>7. Managerial</b>															
7a. Implementation timetable															
7b. Public acceptability															
<b>8. Financial Case</b>															
8a. Capital Cost (£m)															
		-	£28m	£32m	£35m	£55m (single) / £81m (dual)	£54m (single) / £80m (dual)	£54m (single) / £81m (dual)	£69m (single) / £92m (dual)	£69m (single) / £93m (dual)	£74m (single) / £99m (dual)	£75m (single) / £100m (dual)	£79m (single) / £105m (dual)	£79m (single) / £106m (dual)	£79m (single) / £103m (dual)
<b>9. Commercial</b>															
9a. Potential for government and/or developer funding															