# Norwich Western Link

# Environmental Statement – Non-Technical Summary

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# Foreword

This Environmental Statement – Non-Technical Summary accompanies an application submitted by Norfolk County Council (**"the Applicant"**) for planning permission under the Town and Country Planning Act 1990.

If granted, the planning permission would enable the construction, operation and maintenance of an approximately 6 kilometre long dual-carriageway road connecting the A1067 Fakenham Road with the A47,with a new dualled section of A1067 to the existing A1270 roundabout, and which is referred to in the application as the Norwich Western Link (the **"Proposed Scheme"**).

This is a non-technical summary of the Environmental Statement accompanying the application for planning permission for the Proposed Scheme which the Applicant is required to produce in accordance with Regulation 18(3)(e) of, and paragraph 9 of Schedule 4 to, the Town and Country Planning (Environmental Impact Assessment) Regulations 2017.

# Glossary of Abbreviations and Defined Terms

The definition of key terms used in this report are provided below.

| Term | Definition |
|---|---|
| Biodiversity | Abbreviated form of 'biological diversity' referring to variability among living organisms from all sources including, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part. |
| Cycleway | A highway which provides a right of way for all pedal cycles, including electrically-assisted cycles, with or without a right of access on foot, excluding mopeds. |
| Environmental Impact Assessment | The term 'Environmental Impact Assessment' describes a procedure that must be followed for certain types of projects before they can be given 'development consent'. The procedure is a means of drawing together, in a systematic way, an assessment of a project's likely significant environmental effects. |
| Footpath | A thoroughfare that is intended for use only by pedestrians and not other forms of traffic. |
| Greenhouse Gases | Any gases that contribute to the greenhouse effect that causes global warming. These are primarily carbon dioxide, methane, nitrous oxide, ozone, chlorofluorocarbons (CFCs) and water vapour. |
| Landscape Character Areas | Is a community led record of landscape character, creating a detailed bespoke evidence base. It describes the character and value of the local landscape, including its historic, ecological, and cultural qualities, and the character of settlements and how they have developed over time. |
| No Work Zones | Areas of existing habitat, within the Red Line Boundary, within which no construction works shall take place. |

| Term | Definition |
|---|---|
| Proposed Scheme | This is a proposed new highway to link the A1270 Broadland Northway, from its junction with the A1067 Fakenham Road (to the north) to the A47 trunk road near Honingham (to the south). |
| Public Rights of Way | A public right of way is a highway over which the public have a right of access along the route. |
| Receptor | In general terms, something that could be adversely affected by contamination (e.g. people, an ecological system, property or a water body). |
| Red Line Boundary | All areas of land required temporarily or permanently for the construction and operational activities of the Proposed Scheme, including the Site Boundary, areas for Environmental Enhancement and Essential Mitigation, and areas identified as No Work Zones.All areas of land required temporarily or permanently for the construction and operational activities of the Proposed Scheme would be contained within the Red Line Boundary. |
| Restricted Byways | A highway which provides a right of way on foot, on horseback, or leading a horse, cycling and for any vehicles other than those mechanically propelled. There may also be a right to drive animals along a restricted byway. |
| Scheduled monuments | A site that's legally protected because of its historical importance. |
| Site Boundary | The areas within which all construction and operational activities for the Proposed Scheme will take place, including areas for temporary use during construction and No Work Zones within this boundary, but not including Essential Environmental Mitigation. |

| Term | Definition |
|---|---|
| Site of Special Scientific Interest (SSSI) | A Site of Special Scientific Interest (SSSI) is a conservation designation denoting a protected area in the United Kingdom and Isle of Man. A SSSI usually describes an area of particular interest to science due to the rare species of fauna or flora it contains - or even important geological or physiological features that may lie in its boundaries. |
| Source Protection Zones | Zones which are designated for public drinking water supplies and show the risk associated with activities that have the potential to impact water quality. |
| Special Area of Conservation | A Special Areas of Conservation (SACs) is a strictly protected site designated under the EC Habitats Directive. |
| The Applicant | Norfolk County Council as the promoter of the Proposed Scheme. |

# 1 Role of this Non-Technical Summary

1.1.1 The Applicant has carried out an Environmental Impact Assessment (**"EIA"**) to inform the design of the Proposed Scheme, identify the impact of the Proposed Scheme on the environment during construction and operation, and to assist the decision maker in deciding whether or not to grant planning permission. An Environmental Statement has been prepared which reports in detail the findings of the EIA process. The EIA has been undertaken in accordance with the Town and Country Planning (Environmental Impact Assessment) Regulations 2017 (**"EIA Regulations"**). The purpose of the EIA is to identify the likely significant effects of the Proposed Scheme on the environment (including on human health and amenity). Where a negative (or 'adverse') likely significant effect is identified, the Environmental Statement makes recommendations to avoid, or reduce the severity of, the negative effect. The Environmental Statement then assesses the resulting (or 'residual') effect, taking into account the measures recommended to avoid or reduce the significance of the negative effect. The method for assessing significant effects can vary depending on the environmental topic, and where appropriate the Environmental Statement will also report on likely significant positive (or 'beneficial') effects.This document is the Non-Technical Summary of the Environmental Statement. This Non-Technical Summary refers to significant effects when providing conclusions about the Proposed Scheme's predicted effects on the environment. The term 'significant' is not defined in the EIA Regulations but it is used within the Environmental Statement to have the same meaning that it does in other contexts. That is, something which is sufficiently great or important to be worthy of attention – and likely to be material to deciding whether or not planning permission should be granted. Chapter 5 of the Environmental Statement sets out a general approach to assessing whether a likely environmental effect is significant and individual environmental topics adapt this approach as appropriate to their approaches to assessment.

# 2 Description of the Proposed Scheme

## 2.1 Introduction

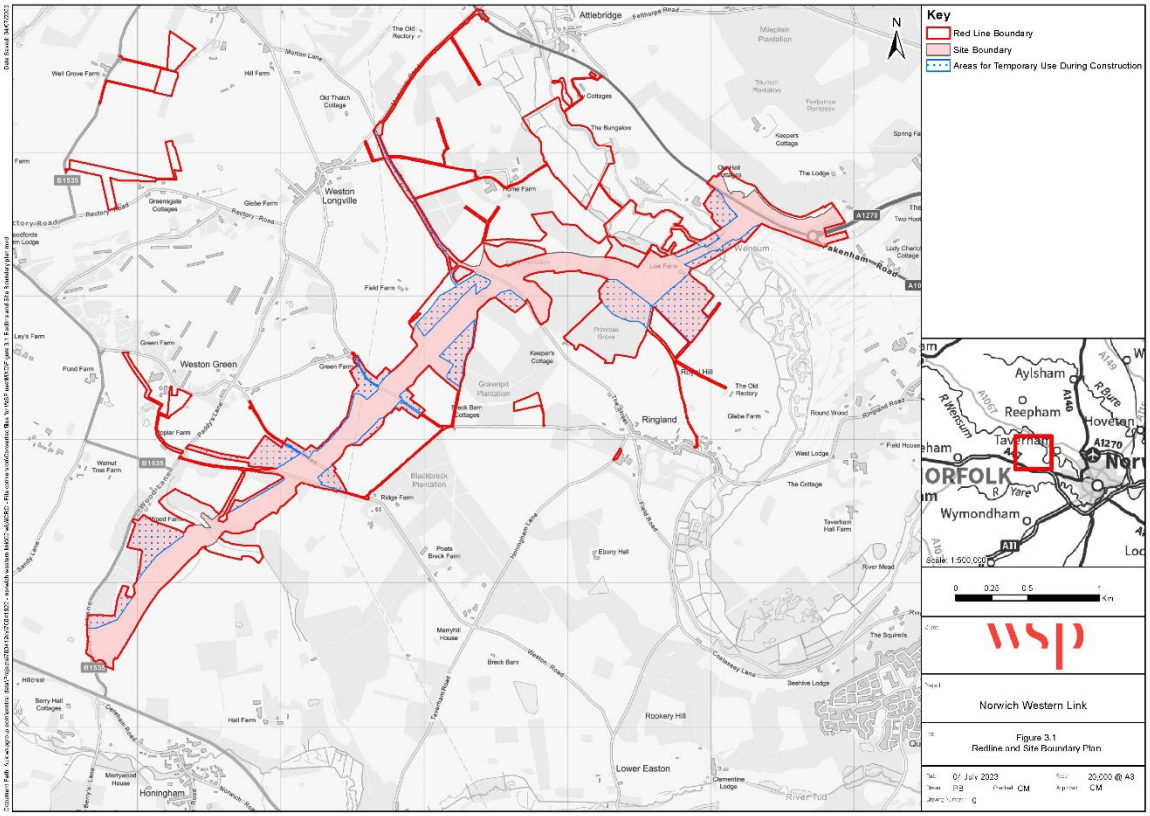
2.1.1 The following sections provide an overview of the Proposed Scheme and an overview of the land on which it is proposed to be built. Chapter 2 Existing Site, and Chapter 3 Description of the Proposed Scheme, of the Environmental Statement provides a full description of the existing site and of the Proposed Scheme.

## 2.2 Overview of the Proposed Scheme's location

2.2.1 The Proposed Scheme is located approximately 10 kilometres to the north-west of the city of Norwich. In addition to Norwich, the nearest settlements to the Proposed Scheme are Weston Longville, Ringland, Weston Green, Honingham and Easton.

2.2.2 The land that is the subject of the planning application is enclosed by a red line. The land within this red line is referred to in this NTS as the **"Red Line Boundary"**. The Site Boundary for the Proposed Scheme is located within the Red Line Boundary and includes the areas where the main engineering works (structures, carriageway, drainage, earthworks etc) will be undertaken, and also areas for temporary use during construction, such as works compounds, storage sites, and welfare facilities. The Red Line Boundary additionally includes areas for Environmental Enhancement and Essential Mitigation, and areas identified as No Work Zones. The Red Line Boundary and Site Boundary are illustrated in **Plate 2-1** below.

**Plate 2-1 Red Line Boundary and Site Boundary Plan**




## 2.3 Description of the location of the Proposed Scheme

### Landscape and existing land use

2.3.1 The Proposed Scheme is located between the A1067 Fakenham Road towards its northern extent, and the A47 near Honingham at its southern extent. The A47 near Honingham is proposed to be improved by National Highways' (the national body with responsibility for England's trunk roads, including motorways) A47 North Tuddenham to Easton scheme, and the Proposed Scheme would connect to the A47 National Highways' scheme at a new roundabout at Honingham being built by National Highways.

2.3.2 The landscape that would be crossed by the Proposed Scheme generally has gentle rolling hills crossed by shallow river valleys and watercourses.

2.3.3 At the northern part of the Proposed Scheme, the landscape features the River Wensum, its valley and associated flood plain bordered by gentle slopes

featuring trees. The valley floor features lowland grazing meadows and marshes.

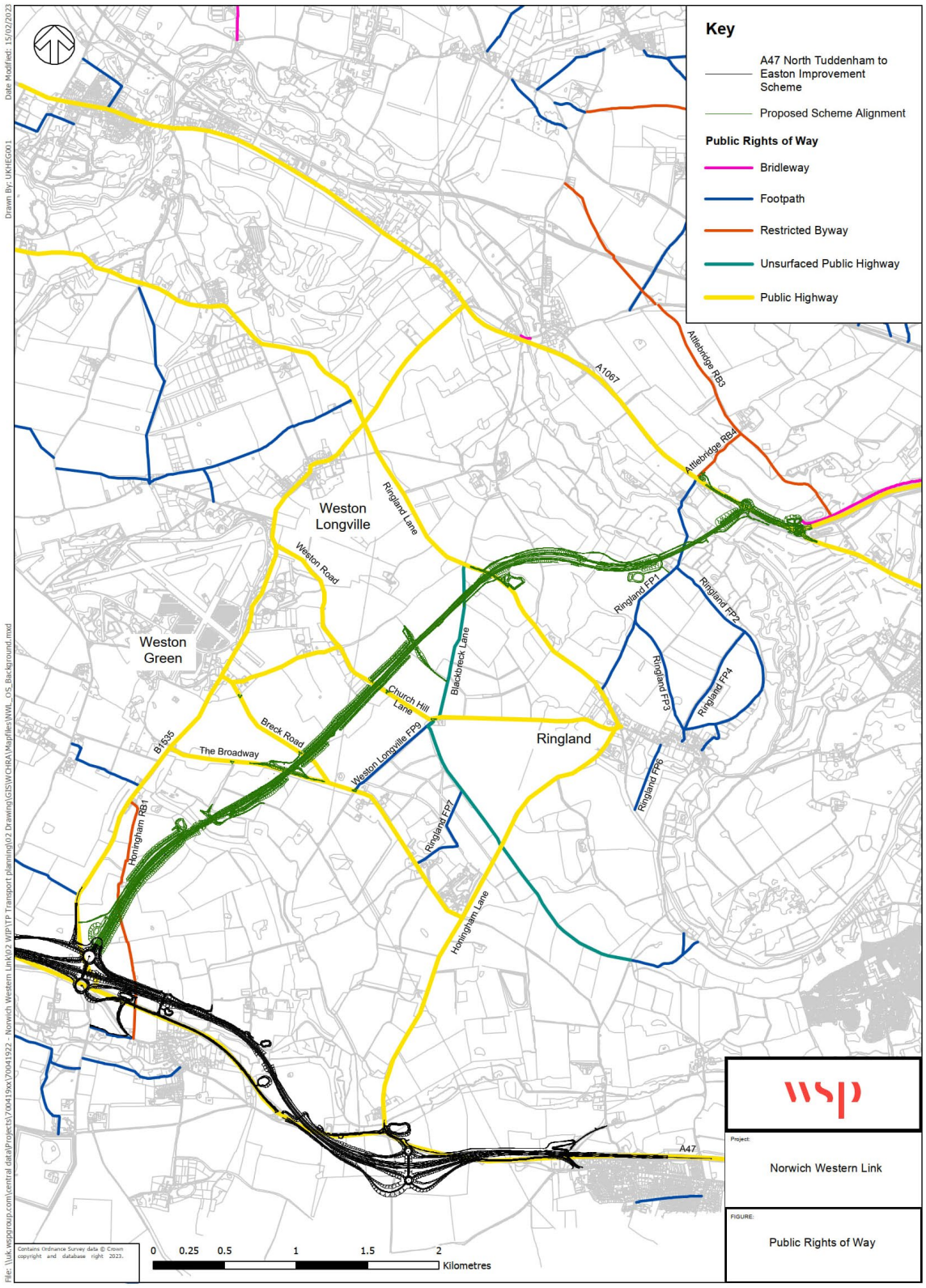
2.3.4 Moving south towards the southern extent of the Proposed Scheme, the landscape is one of gently rolling hills rising to the west from the River Wensum and River Tud valley to a flatter area that extends south-west beyond the limits of the Proposed Scheme. The southern part of the Proposed Scheme features mixed woodland, farmland and small villages, with the existing A47 being a dominant feature of the landscape to the south.

2.3.5 The majority of the land within the Red Line Boundary is used as farmland, with some woodland. There are two homes within the Red Line Boundary and there are four businesses that access their premises from highways that are within the Red Line Boundary. A change of use for the two homes is sought within the planning application for the Proposed Scheme.

2.3.6 Within a 500-metre Study Area from the main engineering elements of the Proposed Scheme there are recreational facilities, including two golf clubs, one shooting ground, one yoga studio and public open space near Marl Hill Road. There are no recreational facilities or public open space within the Red Line Boundary of the Proposed Scheme.

2.3.7 There are three footpaths (Ringland FP1, Weston Longville FP9 and Honingham FP5), three restricted byways (Honingham RB1, Attlebridge RB3 and Attlebridge RB4) and two cycleways (Marriott's Way circular along the Broadway and an unnamed cycleway at the roundabout between the A1270 Fakenham Road and the A1270 Broadlands Northway) within the Red Line Boundary. The public rights of way that would be crossed by the Proposed Scheme are shown in **Plate 2-2** below:

## Plate 2-2 Existing Routes Crossing the Proposed Scheme



## 2.4 Key environmental features

2.4.1 The key environmental features that are considered in the Environmental Statement include the following:

- **Local Air Quality** – there are no Air Quality Management Areas within the Red Line Boundary. An Air Quality Management Area is an area that the local authority has identified as having poor air quality that requires improvement. The closest Air Quality Management Area is 7.3 kilometres away in central Norwich;
- **Noise and Vibration** – there are approximately 50 homes and one business, which are treated as being sensitive to high levels of noise, within 600 metres of the main engineering works of the Proposed Scheme;
- **Heritage** – there is one listed building within the Red Line Boundary. Listed buildings are given legal protection from harmful development to conserve their features of special historic or architectural interest. Within 1 kilometre of the Red Line Boundary there are 17 listed buildings but there are no scheduled monuments or other heritage features that benefit from specific legal protection. There are other features within 1 kilometre of the Red Line Boundary of historic interest that do not have specific legal protection including features associated with Attlebridge airfield (a World War Two site), Honingham Park (an 18th century landscaped park), and indications of human activity from pre-historic times through to the post-medieval period.
- **Landscape** – there are no legally protected landscapes within 2 kilometres of the main engineering works such as Areas of Outstanding Natural Beauty, National Parks, registered Historic Parks and Gardens, or Country Parks.
- **Biodiversity –** the Proposed Scheme crosses the River Wensum which is a Special Area of Conservation (**"SAC"**) and a Site of Special

Scientific Interest (**"SSSI"**). SACs are sites that have legal protection for the conservation of species and habitats and SSSIs are protected for features of ecological or geological scientific interest. The Norfolk Fens SAC Norfolk is approximately 6 kilometres to the south-west and the Paston Great Barn SAC, which is designated for the protection of Barbastelle Bats is 26 kilometres to the north-east. There are five further SSSIs within 5 kilometres of the main engineering works and six further sites within 2 kilometres of the main engineering works that have been identified by the local authority as of importance at a county level. There are also two areas of ancient woodland in close proximity to the main engineering works and some particularly old trees (known as "veteran" trees) have been identified within the area identified for the main engineering works.

- **Water environment** – the Proposed Scheme crosses the River Wensum and a tributary of the River Tud (known as the "Foxburrow Stream"). The River Tud, which connects to the River Wensum, is approximately 300 metres to the south of the Proposed Scheme. The main engineering works are within Groundwater Source Protection Zone 3 and so the rocks beneath the ground contribute the flow of water underground (referred to as "groundwater") towards places where underground water is extracted for use. The Proposed Scheme is also within an area that has been identified as being at risk from pollution from agricultural activities, known as a Nitrate Vulnerable Zone.

- **Flood Risk** – the majority of the main engineering works is located in the low-risk Flood Zone 1, areas where there is less than a 1 in 1000 chance of flooding in a year. Parts of the main engineering works associated with the crossing of the River Wensum are located in the medium risk Flood Zone 2 which has between a 1 in 1000, and 1 in 100, chance of flooding in a year and the high risk Flood Zone 3 where the risk of flooding is greater than 1 in 100 in a year.

- **Geology and Soils** – the nearest site that has been identified in policy as requiring protection to allow for the extraction of minerals is approximately 500 metres to the north of the Proposed Scheme. Parts of the Proposed Scheme are in areas identified by local authority safeguarding policy as containing sand and gravel. The majority of the land within the Proposed Scheme is considered to be lower quality agricultural land but around 85 hectares has been identified as the "Best and Most Versatile" in accordance with Government guidance.

## 2.5 Overview of the Proposed Scheme

2.5.1 The Applicant has applied for planning permission for the construction, operation and maintenance of an approximately 6 kilometres long dual-carriageway road connecting the A1067 Fakenham Road and the A47 (being developed by National Highways pursuant to its application for development consent under the Planning Act 2008 for the A47 North Tuddenham to Easton Development Consent Order 2022) with a dualled section of A1067 to the existing A1270 roundabout.

2.5.2 The Proposed Scheme includes the following key permanent elements:

- Improvements to the roundabout junction of the A1067 Fakenham Road and the A1270 Broadland Northway.
- Dualling of part of the A1067 Fakenham Road westwards from its existing roundabout junction with the A1270 Broadland Northway to a new four arm roundabout (including maintenance access) located approximately 400 metre to the north-west.
- Construction of an approximately 6 kilometre long dual carriageway road from the new roundabout to a new junction with the A47 near Honingham, being provided by National Highways as part of its A47 North Tuddenham to Easton scheme. Apart from a short section where it meets the A47 North Tuddenham to Easton scheme, the majority of the Proposed Scheme will be unlit.

- Construction of a new viaduct to carry the new dual carriageway link over the flood plain of the River Wensum.
- Construction of the Nursery Woodland green bridge (**"GB5"**) over the new dual carriageway road to maintain habitat connectivity with the surrounding woodland. The Nursery Woodland green bridge is to be used only for maintenance access on foot and will not be opened to the public.
- Construction of a retaining wall bordering the northbound carriageway side of the new dual carriageway road to minimise loss of trees close to the new road.
- Construction of the Ringland Lane underbridge (**"BR2"**) to carry the new road over Ringland Lane.
- Construction of the Morton green bridge (**"GB4"**) over the new dual carriageway road to provide habitat connectivity and to provide access across the new road for people on foot, bicycle or horseback.
- Construction of the Broadway green bridge (**"GB1"**) to carry the Broadway over the new dual carriageway road and to provide habitat connectivity. The Broadway would be closed to public motor vehicle traffic (save for access) but would provide access over the new road for people on foot, bicycle, horse and horse drawn vehicles.
- Construction of the Foxburrow Plantation green bridge (**"GB2"**) to provide habitat connectivity, private means of access and maintenance access over the new road.
- Construction of the Tud tributary culvert/ bat underpass which is a dual purpose wildlife underpass and culvert to allow wildlife and the Tud tributary (Foxburrow Stream) to pass under the new road.

- Public right of way diversions and the closure and re-provision of private means of access to land in the vicinity of the Proposed Scheme.
- Landscape and environmental mitigation and enhancement including the provision of earth bunds, replacement and improved habitats.
- Construction of a highway drainage system and associated drainage basins.
- Works to divert and protect existing utilities infrastructure.
- Essential Environmental Enhancement and Mitigation areas.
- Change of use via planning permission of Low Farm from residential to Use Class E, to enable use as a site office during construction of the Proposed Scheme.

2.5.3 The Proposed Scheme also includes other temporary works to assist in its construction including:

- Creation of temporary construction compounds, haul routes, site accesses, lay down and materials storage areas.
- Construction of a temporary works platform crossing the River Wensum to facilitate construction of the River Wensum viaduct.

## 2.6 Overview of the construction methodology

### Indicative programme

2.6.1 If planning permission is granted and the necessary statutory orders confirmed it is anticipated that construction would begin in 2026 and the Proposed Scheme would be open to the public in 2029.

### Construction activities

2.6.2 Key construction activities include:

- **Enabling works** - setting up compounds, haul roads, early environmental mitigation and site security including fencing.
- **Site clearance** – clearing the site ready for construction including the removal of vegetation and the stripping and storage of topsoil.
- **Earthworks** – constructing drainage to protect earthworks, bulk earthworks (embankments and cuttings), stockpile maintenance and logistics.
- **Structures (viaduct and other bridges and underpasses, retaining walls and culverts)** - temporary works platform installation for the River Wensum viaduct, piling, steel and concrete works, structural fills and beams and bridge deck installation.
- **Drainage and ancillary works** – installation of the surface water drainage system including highway drains, drainage basins and related infrastructure.
- **Pavement** – constructing the road surface and sub-surface.
- **Finishing works** - installing street furniture such as vehicle restraint system (barriers), signage and fencing.

**Construction Environmental Management Plan**

2.6.3 Construction would be carried out in accordance with the environmental protection measures outlined in the Outline Construction Environmental Management Plan submitted with the application. If planning permission is granted, the Applicant would use the Outline Construction Environmental Management Plan as a basis to produce a final Construction Environmental Management Plan for approval by the County Planning Authority. The full plan would set out in detail how the measures in the Outline Construction Environmental Management Plan would be implemented.

### Construction compounds and site access

2.6.4 It is anticipated that access to the site of the Proposed Scheme will be from the A1067, Ringland Lane, Paddy's Lane, and Wood Lane. Construction traffic would be managed through a Construction Traffic Management Plan.

2.6.5 The main construction compound and material storage area is expected to be located centrally, directly south of Breck Lane, in the vicinity of the proposed Broadway green bridge (**GB1**). A works logistics area is also proposed at the northeastern extent of the Proposed Scheme, to the south of the A1067, to support works at that location. Further welfare and logistics areas are anticipated at the location of the proposed Ringland Lane bridge (BR2) with a material storage area to the west of Weston Road. Other welfare and storage areas are expected to be located to the west of the central compound location, near Wood Lane, and north of the Proposed Scheme's connection with National Highways' A47 North Tuddenham to Easton scheme. These arrangements will be further refined by the contractor within the limits of the Red Line Boundary.

### Working hours

2.6.6 The normal core working hours are proposed to be 07:00 to 19:00 Monday to Friday, 08:00 to 13:00 on Saturday and with no work carried out on Sundays or bank holidays. There will be some times when work is needed outside of these core hours such as access to the viaduct works areas and works on the A1067 where for traffic management reasons it would cause less disruption for work to take place at night.

### Construction lighting management plan

2.6.7 Lighting during construction will be kept to the minimum necessary for security and safety in accordance with the Construction Lighting Management Plan. This will ensure that temporary lighting will be switched off when not in use, will be carefully designed to minimise disturbance to wildlife and will use technical measures such as hoods and cowls to ensure lighting is kept to where it is needed and minimise lighting where it is not.

### 2.7 Maintenance and operation

2.7.1 Once constructed, the Proposed Scheme would be operated by the local highway authority Norfolk County Council and will be maintained and operated in accordance with its maintenance regime. The viaduct over the River Wensum will require inspections every six years and access to all elements of the bridge, including the piers, will be required to allow this to take place.

2.7.2 Landscape planting will be carefully managed once it has been planted to ensure that it becomes successfully established in accordance with an approved LEMP. Any fallen or dead trees within the first three years of planting will be replaced.

### 2.8 Decommissioning

2.8.1 It is not considered that the Proposed Scheme will be demolished at the end of its design life. Where demolishing of any element of the Proposed Scheme is required in the future the demolition activity will be subject to the relevant planning and environmental legislation and policy, including the EIA Regulations (or any replacement).

## 3 Alternatives

### 3.1 Introduction

3.1.1 The Proposed Scheme has been developed over a long period of time during which a wide range of alternative schemes have been considered before the Applicant concluded that the Proposed Scheme is the appropriate means of achieving its objectives.

### 3.2 Early scheme development

3.2.1 The Applicant carried out an initial scoping exercise in 2014 in its A47 to A1067 Western Link Road Scoping Study 2014. This looked at a range of different routes in the corridor between the A47 and the A1067 and considered public transport only options.

3.2.2 In 2016, the Applicant published the Norwich Western Link Technical Report 2016 which further developed the options considered in the 2014 report. It considered public transport options as alternatives to a new road but concluded that a bus-only option would not reduce strategic traffic using local roads in the corridor.

3.2.3 In 2017, the Applicant published the Norwich Western Link Technical Report 2017. This report considered a long list of 13 'in principle' engineering solutions to cross the River Wensum. These included different types of bridge and a tunnel option.

## 3.3 Norwich Western Link Option Assessment Report March 2019 (updated from report first issued in November 2018)

3.3.1 Building on that 2017 work, this report, first published in November 2018, and updated in 2019 following a request from the Applicant's Environment, Development and Transport Services Committee, considered additional options. This report considered a wide range of differing routes for the road together with consideration of three different engineering options for a tunnel option.

3.3.2 The report concluded that a cut and cover tunnel would be the simplest option in engineering terms, however it had the potential to sever or significantly impact the flow of underground water associated with the River Wensum floodplain and other bodies of water. A bored tunnel, using a tunnel boring machine, was found to require expensive specialised machinery and, because of the need for the tunnel to pass deeply under the River Wensum flood plain, would require more land at each end of the tunnel to manage the steepness of the tunnel approaches. A mined tunnel, excavated without boring or removing the overlaying rock and soil, was found to present significant challenges associated with excavating below the water table and working with soft-grained material and chalk. Given these difficulties and potential environmental effects, a tunnel option was ruled out at this stage.

3.3.3 In terms of route options above ground, a long list of 82 options was generated to cover a wide range of possible routes, transport modes and geography. The long list included both built infrastructure and non-infrastructure interventions and improvements which were categorised as (with the number of options considered shown in brackets); new link highway options (44), network improvement schemes (8), demand management (3), active travel (8), information (3), freight (3), public transport options (12) and a "do nothing" option (1).

3.3.4 The 82 options were assessed using government guidance which evaluates the options against criteria reflecting the strategic, economic, managerial, financial and commercial aspects of each option. Due to the environmental sensitivity of the options being considered the assessment was expanded to also cover an environmental topic. The environmental topic assessed the options against their effects on air quality, noise, greenhouse gases, landscape/townscape, biodiversity, cultural heritage and the water environment.

3.3.5 All of the options were first assessed by comparing them to the "do nothing" option, and any options that did not perform at least as well as the "do nothing" option were discarded. A total of 34 options scored at least as well as the "do nothing" option and were taken through to the next stage of option appraisal. At this stage all remaining single carriageway new road options were also discounted. This was because dual carriageway options would produce a more precautionary assessment in terms of the land required, costs and environmental impacts, and because dual carriageways in general terms provide more benefits in terms of increased road capacity, resilience and economic benefits.

3.3.6 This left a total of 26 options to take forward to the second round of appraisal, which were re-categorised into "Non-Highway Options", "New Link Highway Options" and "Existing Link Upgrade Options". These were then assessed against 12 specific scheme objectives (which were later consolidated into 6

criteria and re-scored) and, following further refinement, were sifted down to three new highway link options, one link upgrade and 10 non-highway options.

3.3.7 The non-highways options in general scored lower against the specific objectives when compared with the highway options, suggesting that individually they would be less likely to achieve the specific objectives unless part of a wider package alongside highways measures. It is considered that when packaged together the best performing non-highway options would still not offer a combined solution that is comparatively effective at meeting the scheme objectives and preventing traffic using the minor roads through the west of Norwich.

3.3.8 While the non-highway options were not taken forward as options for the scheme itself, they were taken forward to inform the measures that are included in the Proposed Scheme's Sustainable Transport Strategy. The Sustainable Transport Strategy sets out a range of measures that form part of the Proposed Scheme as well as Complementary Sustainable Transport Measures that would be brought forward by Norfolk County Council separately to improve sustainable transport by taking advantage of reductions in traffic using local roads once the Proposed Scheme is open for public use. The **Sustainable Transport Strategy** (Document Reference: 4.02.00) document accompanying the application sets these measures out in more detail.

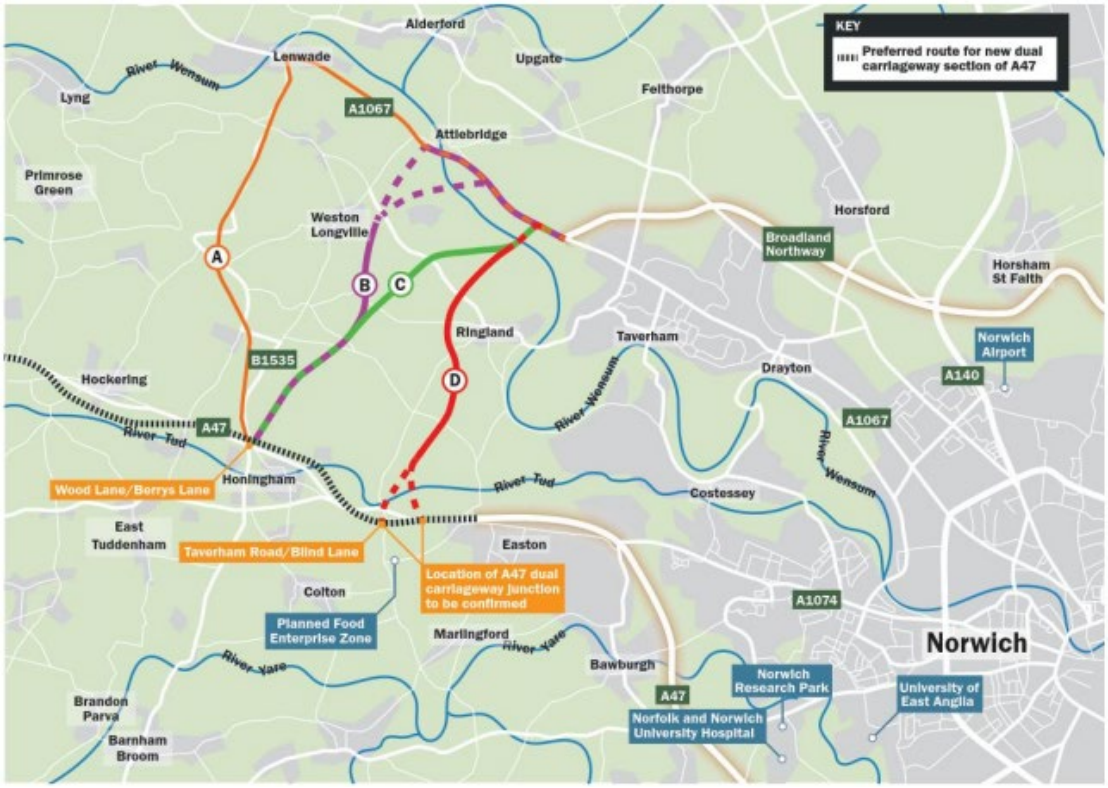
## 3.4 Option Selection Report 2019

3.4.1 This report considered six route options for a new highway to connect the A47 and the A1067 corridor, building upon the options previously considered in the March 2019 report. Each option was assessed against strategic and local objectives using the following criteria: engineering, cost, traffic and economic assessment, environment (including biodiversity) and feedback from public consultation on the shortlisted options.

3.4.2 The six shortlisted routes are shown in **Plate 3-1** below and were in summary:

- **Route Option A** - Runs from the A47 at its junction with Wood Lane and Berrys Lane to the A1067 Fakenham Road, at its junction with Porters Lane and the B1535 to the south.
- **Route Option B East** – Runs from the A47 at its junction with Wood Lane and Berrys Lane to the A1067 connecting to a new junction to the east of the existing junction connecting the A1067 to A1270.
- **Route Option B West** - Runs from the A47 at its junction with Wood Lane and Berrys Lane to the A1067 connecting to a new junction near Attlebridge.
- **Route Option C** - Runs from the A47 at its junction with Wood Lane and Berrys Lane to the A1067 Fakenham Road to the west of its junction with the A1270.
- **Route Option D East** - Runs from the A47 to the east of its junction with Taverham Road to the A1067 Fakenham Road, at its junction with Porters Lane and the B1535 to the south.
- **Route Option D West -** Runs from the A47 at its junction with Taverham Road to the A1067 Fakenham Road to the west of its junction with the A1270.
- **Route Option D East -** Runs from the A47 to the east of its junction with Taverham Road to the A1067 Fakenham Road, at its junction with Porters Lane and the B1535 to the south.

**Plate 3-1 Shortlist Highway Options**




3.4.3 In terms of scoring against environmental criteria, the report concluded that Options D (west) and (east) had the worst environmental performance across the majority of environmental criteria. This was mainly due to these options being close to the edge of the Norwich urban area (where more people are likely to be affected by noise and air quality impacts) and because of the additional impacts associated with a second viaduct needed to cross the River Tud and its associated impacts on landscape, water environment and geology and soils. Despite its overall poor environmental performance, Options D (west) and (east) did offer lesser impacts to biodiversity and the historic environment than Options A and B (east) and (west). Options D and C were found to have similar adverse impacts with large adverse effects for biodiversity and moderate adverse effects for the historic environment.

3.4.4 In relation to the River Wensum Special Area of Conservation and Site of Special Scientific Interest, the report concluded that Options D, C or B (east)

were all assessed as having broadly similar adverse effects associated with the viaduct crossing the protected site.

3.4.5 In relation to engineering, Option C was the overall best-performing option across 9 engineering factors which were land use and constraints, junctions and links, topography and profile, structures, drainage, public utilities, connection with the A47, departures from standards and buildability.

3.4.6 In relation to public consultation, Option D was the most supported option and Option C was the second most supported option. Options B and A received significantly less support compared to Options C and D.

3.4.7 Taking into account all the criteria above, the report concluded that on balance compared to the other options, Option C reflects a solution which offers good value for money, is publicly acceptable but less environmentally intrusive and would be easier to build, cheaper to install and present a lower risk to deliver through the planning process. Option C was therefore taken forward as the preferred route.

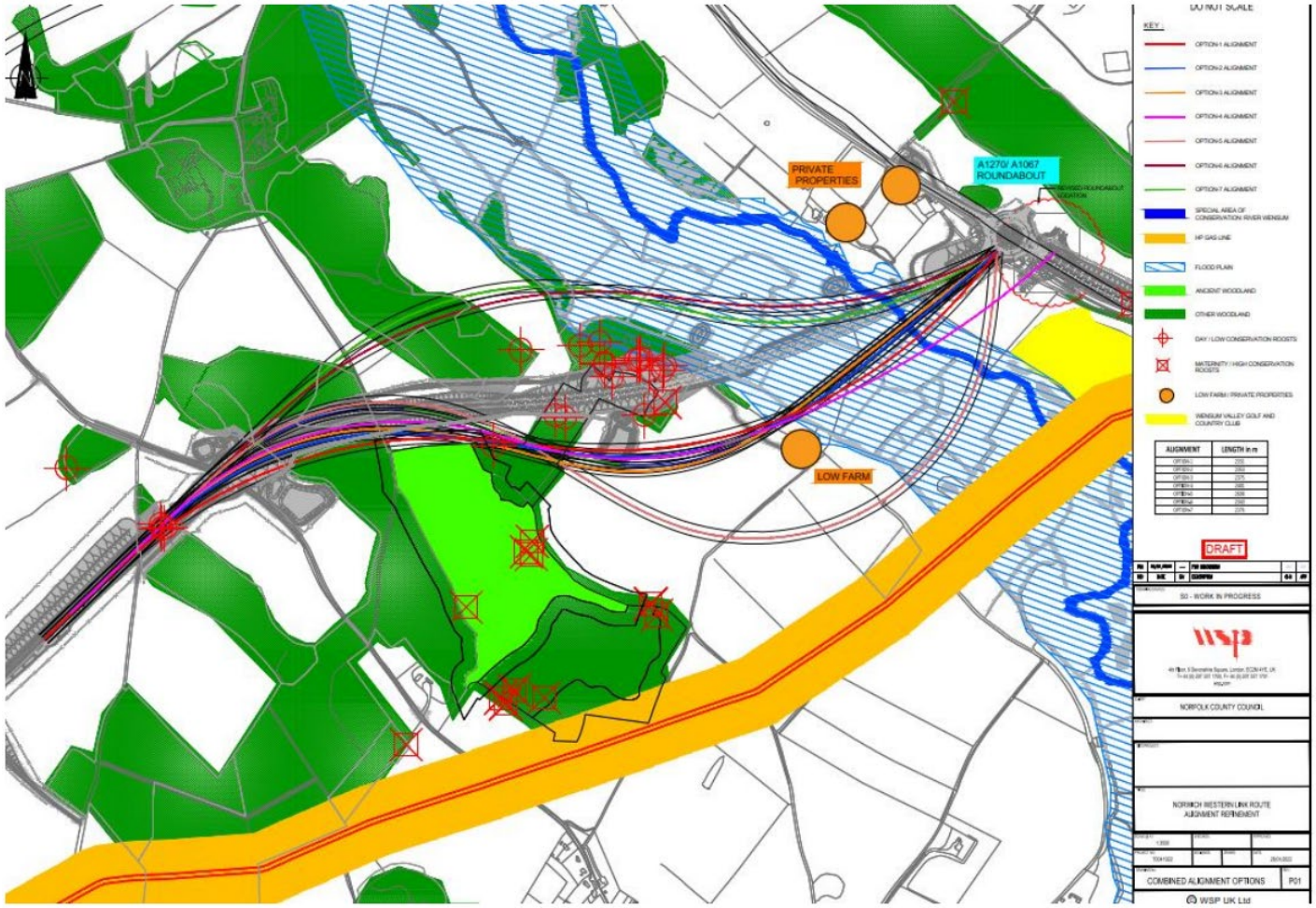
### 3.5 Alignment Refinement Appraisal Report 2022

3.5.1 Ecological surveys carried out during the development of the preferred route identified an important site to Barbastelle Bats on the preferred route. In the light of this information, the Applicant carried out a further assessment to consider alternative alignments that would avoid direct impacts to this sensitive site.

3.5.2 An alignment refinement exercise was undertaken where seven alignment refinement options were developed as outlined in **Plate 3-2** below.

3.5.3 This report used the same criteria and methodology as the 2019 report for assessing environmental effects, taking into account the additional environmental baseline information that had been gathered in the intervening period. It also assessed the change in total project cost resulting from the refinements and considered their engineering feasibility.

**Plate 3-2 Alignment Refinement Options**



3.5.4 All refinement options were assessed as successfully avoiding a direct impact on the important Barbastelle Bat site. Refinement Options 4 and 5 were considered more favourably as they resulted in a lower loss of the woodlands used by the bats.

3.5.5 Refinement Option 4 was considered to have a lesser impact on the River Wensum Special Area of Conservation and Site of Special Scientific Interest and other habitats for wildlife. Option 5 was considered to have the greatest impact on the River Wensum site and habitats as a result of the longer, curved viaduct it used to cross it. The larger viaduct would have greater potential for casting shadows on the habitats beneath and it also led to the greatest negative impact on the landscape. Options 6 and 7 were also considered to be perform less favourably than Option 4.

3.5.6 Options 1 to 3 were found to have direct impacts on the Primrose Grove ancient woodland and would have required the loss of ancient woodland. Options 4 and 5 maintain a 'buffer' distance from this ancient woodland whereas Options 6 and 7 avoid impacts and were furthest away from this ancient woodland. However, despite this, Options 6 and 7 were found to perform worst for most of the other environmental criteria. Options 1 to 4 were assessed as having greater impacts on the historic environment.

3.5.7 In terms of engineering and cost, Option 4 was considered to be easier and less expensive to build than Option 5, because of its shorter and more direct viaduct crossing of the River Wensum. Options 1 to 3 were considered easier to build and less expensive than Options 4 and 5. However, Options 1 to 3 did not perform as favourably in environmental terms than Options 4 and 5. Options 6 and 7 were assessed as being the most difficult and expensive Options to build. The report concluded that the Option 4 re-alignment was the most suitable taking into account its balance of environmental impacts, buildability and cost whilst still achieving the high level and specific objectives of the project.

### 3.6 Review of Option Selection Report Conclusions in Light of 2022 Alignment Report

3.6.1 The refinements to Option C were reviewed in 2023 to confirm that the preferred route remained the best performing option against the routes considered in 2019. This review confirmed that Option C Refined was the best performing option (see **Appendix 4.3** (Document Reference: 3.04.03)**)**.

# 4 Air Quality

### 4.1 Introduction and baseline environment

4.1.1 The studies carried out into the effects of the Proposed Scheme on air quality have considered both its construction and operational phases. In particular, the assessment has considered emissions associated with dust and vehicle emissions during the construction phase, and vehicle emissions when the Proposed Scheme is operational.

4.1.2 Construction works have the potential to generate dust during earthworks and construction activities, and from the movement of vehicles onto public highways. Dust emissions can cause annoyance through soiling of buildings and surfaces and can adversely impact human health and wildlife. Temporary changes to traffic on local roads are expected over the construction period, in-particular the addition of vehicles associated with the construction works which will add to general traffic emissions on certain roads.

4.1.3 Operational effects are associated with changes to the emissions from vehicles caused by re-routing of traffic.

4.1.4 The baseline air quality study shows that pollutant levels meet all current air quality standards for public health, with measured levels being lower than legal limits. Overall, it is concluded that baseline air quality is good in relation to public health standards.

## 4.2 Construction effects

4.2.1 The effects of dust generated during construction were assessed for people and wildlife. The assessment identified a large potential dust risk and recommended a range of good practice measures to manage this risk. The recommended measures are included in the **Outline Construction Environmental Management Plan** (Document Reference: 3.03.01). Taking into account those measures the assessment concludes that there is a negligible (not significant) effect to air quality due to dust during the construction of the Proposed Scheme.

4.2.2 The assessment considered the potential effects of changes to vehicle emissions caused by construction traffic on people (human health) and wildlife. In relation to the effects on people, the assessment concluded that changes in air quality, are likely to be negligible (not significant). In relation to wildlife the significance of these effects on wildlife is considered in **Chapter 10: Biodiversity** (Document Reference: 3.10.00) of the Environmental Statement and are summarised in **section 8** of this Non-Technical Summary below.

## 4.3 Operational effects

4.3.1 The assessment considered the potential effects of changes to vehicle emissions caused by re-routing of traffic on people (human health) and wildlife. In relation to the effects on people, the assessment concluded that changes in air quality, both positive and negative, are predicted to be negligible (not significant) and recommended no further mitigation. In relation to wildlife the significance of these effects on wildlife is considered in **Chapter 10: Biodiversity** (Document Reference: 3.10.00) of the Environmental Statement, and are summarised in **section 8** of this Non-Technical Summary below.

# 5 Noise and Vibration

## 5.1 Introduction and baseline environment

5.1.1 Noise and vibration assessments have focussed on identifying likely significant effects on residents and businesses located near to the Proposed Scheme both during construction and once it opens to traffic, setting out appropriate mitigation to avoid or reduce adverse effects.

5.1.2 During construction there is the potential for impacts from noise and vibration from construction activities (including piling) and from construction traffic. During operation there is the potential for impacts associated with traffic using the road.

5.1.3 At the northern end of the Proposed Scheme, noise levels are currently dominated by road traffic from Fakenham Road (A1067). Moving south there is some contribution to the baseline noise levels from road traffic on the nearby local roads, albeit at a low level. At the southern end of the Proposed Scheme, noise levels are dominated by road traffic from the A47. Generally, for homes and businesses not located near to either the A1067 or A47, the Proposed Scheme is situated in a mainly rural area and the existing noise levels are low.

## 5.2 Construction effects

5.2.1 The construction phase assessment found adverse noise and/or vibration effects could potentially occur at homes near to the Proposed Scheme. After taking into account the mitigation measures proposed in the **Outline Construction Environmental Management Plan** (Document Reference: 3.03.01), the assessment concluded that significant adverse effects would occur, temporarily, for the homes located close to the Proposed Scheme.

## 5.3 Operational effects

5.3.1 The operation phase assessment found that close to the Proposed Scheme significant adverse effects are predicted for 12 homes as a result of noise

levels from the Proposed Scheme. Mitigation measures including a low noise road surface, screening from earthworks and the River Wensum Viaduct barrier are included in the Proposed Scheme design. However, significant effects remain for the 12 homes. Further afield, there would be a combination of significant beneficial effects resulting from a reduction in traffic flows predicted on some existing local roads, but also significant adverse effects on other existing local roads as a result of increases in traffic flows. This is a consequence of traffic re-routing to take advantage of the Proposed Scheme. No practicable mitigation can be proposed for these adverse effects.

# 6 Cultural Heritage

## 6.1 Introduction and baseline

6.1.1 The assessment of cultural heritage has focussed on identifying and describing potential impacts within two topic areas; buried heritage assets (including archaeological artefacts, monuments or landscape features) and above ground heritage assets (buildings, structures and landscapes of heritage interest and their wider setting).

6.1.2 There is the potential for impacts in both the construction and operation phases. During construction these impacts could take the form of partial or complete loss of known buried heritage assets and the permanent removal of historic landscape where the ground is disturbed by construction activities. During operation these impacts could take the form of permanent physical changes to heritage assets and their wider settings.

6.1.3 The baseline heritage environment includes one listed building within the Red Line Boundary. Listed buildings are given legal protection from harmful development to conserve their features of special historic or architectural interest. Within 1 kilometre of the Red Line Boundary there are 17 listed buildings but there are no scheduled monuments or other heritage features that benefit from specific legal protection. There are other features within 1 kilometre of the Red Line Boundary of historic interest that do not have

specific legal protection including features associated with Attlebridge airfield (a World War Two site), Honingham Park (an 18th century landscaped park), and indications of buried heritage assets from human activity from pre-historic times through to the post-medieval period.

## 6.2 Construction effects

6.2.1 The construction phase assessment found there is the potential for significant adverse effects to buried heritage assets including paleoenvironmental remains (evidence of environmental conditions in the distant past) (Document Reference: 3.08.05), Bronze Age and Early-to-Middle Iron Age remains, Prehistoric remains, Romano-British remains and Late medieval remains. The assessment (Document Reference: 3.08.04) recommends that targeted archaeological excavations are carried out prior to construction in areas where significant remains have been identified and that an archaeological watching brief is maintained in relation to remains of lesser significance. Taking into account this mitigation, the assessment concludes there would be no significant environmental effects.

## 6.3 Operational effects

6.3.1 The operation phase assessment found that there would be no significant adverse effects to above ground heritage assets or their settings, with one exception. That exception relates to Low Farm Barn which is a listed building within the Red Line Boundary. The Proposed Scheme would not lead to any direct impact on the listed building but the barn's rural agricultural setting would be impacted by the Proposed Scheme's presence, although despite this, it would still be possible to understand the asset as an agricultural barn in a farmland setting. The impact is assessed as being moderate adverse, which is significant. No additional mitigation is proposed.

6.3.2 The National Planning Policy Framework requires that the significance of heritage assets should be considered in the planning process. The impact or harm of the Proposed Scheme on the significance of Low Farm Barn is considered in the **Historic Environment Desk Based Assessment** in

**Appendix 8.1** (Document Reference: 3.08.01) and concludes that the Proposed Scheme causes less than substantial harm.

# 7 Landscape and Visual Effects

## 7.1 Introduction and baseline

7.1.1 The assessment of landscape and visual effects has focussed on identifying and describing potential impacts of the Proposed Scheme to the landscapes of which it would form a part and the visual impact the Proposed Scheme would have on people living and working in its vicinity.

7.1.2 The Proposed Scheme has the potential to impact on views and experiences of people living, working and enjoying recreation in its vicinity during the construction phase through the presence of construction materials and activities and during the operational phase through the presence of the Proposed Scheme and those using it.

7.1.3 The baseline landscape conditions are described in detail in **Chapter 9: Landscape and Visual Effects** (Document Reference: 3.09.00) of the Environmental Statement. In summary, the landscape in which the Proposed Scheme is located is predominantly rural in nature, featuring medium-sized fields containing woodlands and arable farmland interspersed by settlements and scattered farmsteads. The Proposed Scheme is located within the A1 – Wensum River Valley and D2 Weston Green Tributary Farmland Landscape Character Areas. These Landscape Character Areas have been established by Broadland District Council to assist it in assessing the landscape effects of planning proposals. The Proposed Scheme is also adjacent to two other Landscape Character Areas defined by Broadland District Council and an additional two defined by Breckland District Council. In relation to the future baseline, there are no committed developments that would affect the conclusion of the assessment that are expected to come forward before the anticipated opening of the Proposed Scheme. The future baseline also considers the impact of ash dieback disease, which affects ash trees and is

likely to spread across the UK; however, it is not considered that this change to the future baseline will alter the assessment's assumptions in relation to existing vegetation, due to the time required to materially impact existing vegetation.

7.1.4 The baseline for the visual effects assessment identified 15 representative viewpoints that reflect how people living, working and enjoying recreational activities in the area experience views within the vicinity of the Proposed Scheme.

## 7.2 Construction effects

7.2.1 The construction assessment found the impacts on viewpoints is greatest in the construction phase and reduces as the Proposed Scheme opens for use and the landscape planting grows over time. Visual effects during construction were found to be in the range of neutral (not significant) to moderate adverse (significant), with moderate adverse effects only experienced at 3 of the 15 representative viewpoints used in the assessment. These three viewpoints are associated with Weston Road and two public rights of way that are close to the main engineering works and which have open views of the construction activities.

## 7.3 Operational effects

7.3.1 The operational assessment found that in the first year of operation, taking into account mitigation, the effects are expected to be in the range of neutral (not significant) to moderate-large adverse (significant) with significant effects only experienced at one of the 15 representative viewpoints used in the assessment, the restricted byway Honingham RB1. This is as a result of close distance open views of the Proposed Scheme. The proposed planting on earth bunds will reduce these adverse effects as it becomes established over time, reducing the effects to slight-moderate adverse (not significant).

# 8 Biodiversity

## 8.1 Introduction and baseline

8.1.1 The assessment of potential effects to biodiversity has focussed on the potential impacts of the Proposed Scheme on habitats, protected species and designated sites of ecological importance, other than those that relate to bats which are reported separately in **Chapter 11: Bat Ecology** of the Environmental Statement (Document Reference: 3.10.11).

8.1.2 The Proposed Scheme has the potential during its construction and operation to adversely affect species and habitats. This could be as a result of a range of potential factors including loss or deterioration of habitats, accidental spills of pollutants, noise and vibration from construction and operation traffic or sediment and chemical run-off.

8.1.3 The baseline biodiversity studies identified the presence of a range of habitats that are international, national and county level designated sites and a range of protected and other species of conservation value.

## 8.2 Construction effects

8.2.1 The construction phase assessment has shown that, taking into account the proposed mitigation, the majority of species and habitats assessed would not be significantly affected by the Proposed Scheme. However, despite the mitigation measures there would remain significant effects associated with habitat loss affecting notable and veteran trees. The Applicant is committed to a **Compensation Strategy** (Document Reference: 6.01.01) that seeks to compensate the environment for the loss or harm to these irreplaceable trees, but compensation would not reduce the significance of the adverse effect associated with their loss or deterioration.

## 8.3 Operational effects

8.3.1 The operational phase assessment has shown that, taking into account the proposed mitigation, the majority of species and habitats assessed would not

be significantly affected by the Proposed Scheme. However, emissions from vehicles using the Proposed Scheme are assessed as leading to habitat degradation on veteran trees, ancient woodland and at other sites that are of importance at a county or national level. An Air Quality Compensation Strategy is proposed to compensate the environment from the predicted degradation, but the implementation of that strategy will not lessen the significance of the effect.

8.3.2 In relation to the River Wensum Special Area of Conservation and other sites of international ecological importance, a Habitats Regulation Assessment has been carried out. It concludes that the Proposed Scheme will not adversely affect the integrity of the River Wensum Special Area of Conservation, or any other sites of international ecological importance.

# 9 Bats

## 9.1 Introduction and baseline

9.1.1 The assessment of potential effects to bats has focussed on the potential impacts of the Proposed Scheme on bat species of ecological importance.

9.1.2 The Proposed Scheme has the potential during its construction and operation to adversely affect bat species and the habitats which they use. This could be as a result of a range of potential factors including loss or deterioration of foraging and commuting habitats, loss of protected roosts, accidental spills of pollutants, noise and vibration from construction and operation traffic, risk of collisions with vehicles or sediment and chemical run-off.

9.1.3 The baseline bat focussed studies identified the presence of a range of protected bat species of conservation value.

## 9.2 Construction effects

9.2.1 The construction phase assessment has shown that despite the mitigation measures there would remain significant effects associated with barbastelle, brown long-eared bat, *Myotis* species and soprano pipistrelle. The Applicant is

committed to the measures set out in the **Outline Bat Mitigation Strategy** (Document Reference: 3.11.06) that seeks to mitigate and compensate for the loss or harm to these bat species, which will be delivered pursuant to the Final CEMP(s), Construction Lighting Management Plan and the obtaining of a EPS Mitigation Licence from Natural England. It concludes that the Proposed Scheme will in the long-term reduce the significance of the adverse effect associated with their habitat loss or deterioration. However, a significant adverse effect will remain until the habitat creation and compensation measures have reached their target condition. The Applicant is committed to the measures set out in the **Outline Bat Monitoring Strategy** (Document Reference: 3.11.07), that will be developed into final measures secured by the EPS Licence that will monitor the performance of the committed mitigation and compensation.

## 9.3 Operational effects

9.3.1 The operational phase assessment has shown that despite the mitigation measures there would remain significant effects associated with barbastelle, brown long-eared bat, *Myotis* species and soprano pipistrelle. Significant effects will remain until the habitat improvement measures have reached their target condition. Green bridges have been designed in accordance with the most recent scientific research, and principles of design. The measure of the success of the green bridges are dependent on multiple factors and will be monitored throughout the operation of the project.

9.3.2 The Applicant is committed to the measures set out in the **Outline Bat Mitigation Strategy** (Document Reference: 3.11.06) that seeks to mitigate and compensate for the loss or harm to these bat species, which will be delivered pursuant to compliance with the secured plans, the approved LEMP and the EPS Licence obtained from Natural England. Emissions from vehicles using the Proposed Scheme are assessed as leading to habitat degradation at the habitats which support these bat species. An **Outline Air Quality Compensation Strategy** (Document Reference: 6.01.01) is proposed to compensate for the environment from the predicted degradation. The

assessment concludes that the Proposed Scheme will in the long-term reduce the significance of the adverse effect associated with their habitat loss or deterioration. However, a significant adverse effect will remain until the habitat creation and compensation measures have reached their target condition.

9.3.3 The Applicant is committed to the measures set out in the **Outline Bat Monitoring Strategy** (Document Reference: 3.11.07), that will be developed into final measures secured by the EPS Licence that will monitor the performance of the committed mitigation and compensation.

# 10 Road Drainage and the Water Environment

## 10.1 Introduction and baseline

10.1.1 Assessments have been carried out to determine the impacts of the Proposed Scheme on the water environment from construction-related pollution; surface water and groundwater pollution from highway run-off, pollution from accidental spillages, changes to the patterns of erosion and deposition of sediments and groundwater flows, and flood risk to and from the Proposed Scheme. In addition, a Water Framework Directive Assessment has been undertaken to consider the Proposed Scheme's consistency with plans to manage and improve the quality of large-scale bodies of surface and underground water.

10.1.2 The Proposed Scheme crosses the River Wensum which is a main river. It also crosses an ordinary watercourse the Foxburrow Stream, which flows into the River Tud, and two other minor watercourses. The groundwater lying underneath the Proposed Scheme supports river flows and water supplies used by people. In terms of flood risk, the majority of the land on which the Proposed Scheme is located is in areas at low risk of flooding. However, there are areas at higher risk of flooding, predominantly in and around the watercourses that would be crossed by the Proposed Scheme.

## 10.2 Construction effects

10.2.1 The construction phase assessment found there were likely significant effects to River Wensum in the water environment once proposed mitigation measures are taken into account due to the Very High sensitivity of the River Wensum. These measures are set out in the Outline Construction Environmental Management Plan and include requirements for the safe storage of materials, emergency response plans for spillages, safe re-fuelling of construction machinery, control of runoff and treatment of any polluted water prior to discharge. In relation to groundwater, the risks associated with removing groundwater from excavations and from installing piles deep underground to support structures (such as the River Wensum viaduct) can be safely managed through a Dewatering Management Plan and Piling Risk Assessment.

## 10.3 Operation effects

10.3.1 The operation phase assessment found there were likely significant effects to some flood risk receptors in water environment once the proposed mitigation was taken into account. The proposed drainage system would ensure that risks to surface water from run-off, spills and other contaminants would be appropriately managed. Predicted local effects to groundwater from de-icing salts spread on the Proposed Scheme during winter can be reduced through appropriate maintenance of the drainage system and by carefully managing the quantities and types of products used to de-ice the road. The Flood Risk Assessment assessed that there would be a significant effect to agricultural land and Ringland Lane located upstream of the Ringland Lane attenuation feature as a result of the Proposed Scheme. Taking into account the proposed drainage system and proposed mitigation measures, the Proposed Scheme itself was not subject to an inappropriate level of flood risk.

# 11 Geology and Soils

## 11.1 Introduction and baseline

11.1.1 The assessment of geology and soils has focussed on potentially contaminated soils and any associated risk to human health, the water environment and wildlife as well as assessed the potential effects to soils supporting good quality agricultural land.

11.1.2 Potential construction-related impacts are the disturbance of contaminated land and the potential effects arising from this on construction workers, people on neighbouring land, the water environment and wildlife (in particular habitats that are dependent on groundwater), the ability of soils used during construction to continue to support growth after construction and the impacts of construction activities on below-ground infrastructure (such as electricity cables and gas pipe-lines).

11.1.3 Historical mapping shows the area surrounding the Proposed Scheme to have generally been agricultural land, plantations with roads and access tracks that have remained relatively unchanged. However, multiple clay and marl pits (pits dug to extract nutrient rich clay (marl) to be used as an agricultural fertilizer) ponds, plant nurseries and associated properties are located within 250 metres of the Proposed Scheme. Potential sources of contamination include: potentially made ground (previously used land, such as earthworks), infilled land and alluvium (loose clay, silt, sand, or gravel) to the north of the Proposed Scheme, and fertilisers and pesticides from agriculture and plantations at many locations across the Proposed Scheme. There is also a former landfill site near to the Proposed Scheme.

## 11.2 Construction effects

11.2.1 The construction phase assessment found that taking into account the proposed mitigation there would be no significant effects associated with geology and soils, with one exception. The proposed mitigation measures set out in the Outline Construction Environmental Management Plan, which

include further ground investigation work to identify contaminated land and make it safe, measures to address any unexploded bombs (from World War Two) and standard measures to protect workers during construction, will mitigate the risks. The significant adverse effect relates to agricultural soils. The assessment concludes that the proposed mitigation, including a Materials Management Plan to manage soil handling and storage, will protect soils temporarily used during construction. However, the Proposed Scheme would permanently remove more than 20 hectares of the best and most versatile agricultural land from production resulting in a very large adverse effect (significant).

### 11.3 Operation effects

11.3.1 The nature of the Proposed Scheme is such that there is not a significant risk it will affect geology and soils once it is in operation. As a result, it was agreed through the EIA Scoping process that operational effects would not be assessed in detail.

## 12 Material Assets and Waste

### 12.1 Introduction and baseline

12.1.1 The assessment of materials and waste focuses on the use of materials that are required to construct the Proposed Scheme and the waste likely to be produced during construction.

12.1.2 In relation to materials, the baseline studies identified that as the land on which the Proposed Scheme would be located is largely agricultural and woodland, it currently requires a negligible use of construction materials. The East of England has, in general, a slightly lower than average availability of some construction materials. However, the availability of other construction materials typically required for highways construction schemes in the East of England and across the UK, indicates that stocks, production and sales remain buoyant.

12.1.3 In relation to waste, the baseline studies identified that the availability of materials recovery infrastructure in the East of England, and across England in general, suggests that there is strong potential to divert the waste arising from the Proposed Scheme from landfill. There is also the potential to re-use, the waste produced during the construction of the Proposed Scheme on-site or for other local projects. Baseline data indicates that in the absence of future provisions, inert (not chemically reactive, including concrete and debris that will not decompose), non-inert (including timber and other organic materials and can be re-used) and total landfill capacity is likely to become an increasingly sensitive receptor throughout the duration of the construction phase and first full year of operation.

## 12.2 Construction effects

12.2.1 The construction phase assessment sets out the quantities of materials that would be required to construct the Proposed Scheme, taking into account commitments to use materials gathered from the site and use materials with a high percentage of recycled content. It concludes there would not be a significant effect in relation to materials. In relation to waste, the assessment takes into account the proposed re-use on site of materials that are excavated (the 'cut and fill balance') as well as the generation of waste material during construction. It concludes that the quantity of waste generated during construction, taking into account measures to reduce, reuse, recycle and recover waste, would be equivalent to only a fraction (less than 1%) of the remaining capacity of regional waste management facilities. The effect is assessed as being slight (not significant).

## 12.3 Operation effects

12.3.1 The Proposed Scheme would require only very small quantities of materials and generate only very small quantities of waste during operation, for example, materials and waste associated with minor repairs to the road surface and the replacement of street furniture, which are unlikely to result in

significant effects to waste and materials. As a result, no detailed assessment of the operation phase has been carried out.

# 13 Greenhouse Gases

## 13.1 Introduction and baseline

13.1.1 The assessment of greenhouse gases has focussed on the generation by the Proposed Scheme of greenhouse gases ("GHG") during its construction and operation phases and its impact on climate change.

13.1.2 GHG have the potential to be emitted during the construction phase through the production, processing and use of the materials required to construct the Proposed Scheme and to transport them to it as well as the as the disposal of habitats removed as a result of the scheme) and energy use from construction plant and equipment. During operation GHG have the potential to be emitted as a result of changes to how people use roads, the modes of transport used to make journeys and changes in the carbon storage of habitats due to land use change.

13.1.3 The baseline studies considered what the GHG emissions would be if the Proposed Scheme were not built and operated. In the case of the construction baseline, it was found that without the Proposed Scheme construction emissions would be zero. In the case of the operation baseline, total emissions have been calculated using forecasts of traffic (without the Proposed Scheme) to predict average annual and total GHG emissions in 2029 (the assumed first year of operation of the Proposed Scheme) and 2044 (the future modelled year). The average annual and total GHG emissions from 2029 to 2088 have also been included for comparison with the 60-year operational period of the Proposed Scheme.

## 13.2 Construction effects

13.2.1 The construction phase assessment found the total GHG emissions from the construction of the Proposed Scheme is estimated to be 122,837 tonnes of

carbon dioxide equivalent. This is to be a likely direct moderate adverse residual effect on GHG emissions (significant). The quantity of GHG could be further reduced by using a range of measures, for example innovative construction methods such as optimising the gradients of haul and access roads/points to reduce plant use and minimise the need for quick acceleration and braking to save fuel, as well as switching construction materials for lower-carbon alternatives where feasible.

### 13.3 Operation effects

13.3.1 The operation phase assessment found that the total GHG emissions from the operation of the Proposed Scheme is estimated to be 294,952 tonnes of carbon dioxide equivalent over 60 years of operation. The Proposed Scheme in operation would make only a very minor contribution to national and local climate budgets. There is likely to be a direct moderate adverse (significant) residual effect on GHG emissions.

## 14 Climate Resilience

### 14.1 Introduction and baseline

14.1.1 The assessment of climate resilience focuses on the capacity of the Proposed Scheme to resist the effects of a changing climate during its construction and operation.

14.1.2 In terms of baseline the Proposed Scheme is located in the East of England. Measurements from the nearest weather station, around 17.5 kilometres to the south-east to the Proposed Scheme, shows the region being drier than most parts of the UK throughout the year, however rainfall at the weather station is slightly higher than the average for the East of England. Climate change is expected to lead to wetter and warmer winters and drier and hotter summers, more intense rainfall and a reduction in average snowfall.

14.1.3 Potential impacts to the Proposed Scheme during construction include flooding and waterlogging on the site, and other effects of increased rainfall,

overheating machinery and unsafe working conditions in warmer summers. Potential impacts during operation include drainage infrastructure becoming overwhelmed by increased rainfall, and soil erosion affecting the stability of structures, and other effects of increased rainfall, damage to structures from materials expanding in high heat and increased wind pressure affecting the stability and strength of structures.

### 14.2 Construction effects

14.2.1 The construction phase assessment took into account a range of good practice measures set out in the **Outline Construction Environmental Management Plan** (Document Reference: 3.03.01), such as the use of appropriate drainage, tracking weather forecasts and responding appropriately and using dust control measures. It concluded that with the implementation of those measures the Proposed Scheme would be resilient and the effect of climate change on the Proposed Scheme is considered to be not significant.

### 14.3 Operation effects

14.3.1 The operation phase assessment found that the design of the Proposed Scheme and the Applicant's maintenance regime (to monitor its condition) included the measures necessary to avoid any significant adverse effects in relation to its resiliency to the effects of climate change.

## 15 Population and Human Health

### 15.1 Introduction and baseline

15.1.1 The assessment of population and human health has focussed on a range of aspects including land-use and accessibility, private property and housing, community land and assets, and human health.

15.1.2 The Proposed Scheme may have potential effects on population and human health during construction resulting from the temporary and permanent acquisition of private land. This is expected to temporarily make it more

difficult for people to access neighbouring communities and community assets (such as recreational facilities). There is also the potential for disruption to the public rights of way network and health effects related to physical activity, mental health and social cohesion. Potential impacts during operation include changes to journey length caused by route diversions on the public rights of way network, and health outcomes associated with physical activity, accessibility, social cohesion and mental health.

15.1.3 The baseline assessment considered the populations of wards within 500 metres of the Red Line Boundary, homes and businesses that have a direct means of access to their property from land within the Red Line Boundary, highways (including public rights of way) used by walkers, cyclists and horse riders within 500 metres of the Red Line Boundary, and land uses within the Red Line Boundary.

## 15.2 Construction effects

15.2.1 The construction phase assessment found there would be adverse effects ranging from slight (not significant) to moderate and large (significant) to a on a number of landholdings and private properties as a result of the acquisition of land required for the Proposed Scheme. No mitigation is proposed.

15.2.2 There would also be adverse effects (significant) from the temporary disruption of WCH routes in the locality of the Proposed Scheme. These significant effects relate to the use of some public rights of way in the locality, to residents of Weston Longville and to two businesses. No mitigation is proposed, however alternative routes will be advertised.

15.2.3 There would be adverse effects ranging from slight (not significant) to moderate (significant) on a number of receptors including businesses, private property and community land and assets due to reduced access and severance during construction. Proposed mitigation includes maintaining access where practicable and providing alternative access when this is not feasible. Traffic will be managed through a Construction Traffic Management Plan.

15.2.4 The human health construction phase assessment found a range of positive, neutral and negative effects to human health arising from changes to journey length caused by temporary diversions on the public rights of way network, and health outcomes associated with physical activity, accessibility, social cohesion and mental health.

### 15.3 Operation effects

15.3.1 The operation phase assessment found there would be a moderate adverse effect resulting from changes to walking, cycling and horse-riding routes that would cross the Proposed Scheme such as Weston Road. These results predominantly relate to the permanent diversion of some routes increasing some journey times, potentially making those routes less appealing particularly to more vulnerable users. There are other positive effects (not significant) associated with improvements to the local walking, riding and horse riding facilities.

15.3.2 The human health operation phase assessment found a range of positive, neutral and negative effects to human health arising from to journey length caused by route diversions on the public rights of way network, and health outcomes associated with physical activity, accessibility, social cohesion and mental health.

## 16 Major Accidents and Disasters

### 16.1 Introduction and baseline

16.1.1 The assessment of major accidents and disasters focusses on two aspects; the vulnerability of the Proposed Scheme to major accidents and disasters and the Proposed Scheme's potential to cause a major accident or disaster.

16.1.2 The Proposed Scheme has the potential to have significant effects during construction through the striking of underground services such as a high pressure gas pipe-line or through aircraft striking cranes (the Proposed Scheme lies within the 13 kilometre safeguarding zone of Norwich Airport).

The potential significant effects during operation relate to the potential collapse of the roadway into a void due to the presence of chalk beneath part of the Proposed Scheme.

16.1.3 The baseline studies considered any features that could be a potential hazard to the Proposed Scheme such as sinkholes and any major accident hazard pipelines within the Red Line Boundary. It also considered people and property near to the Proposed Scheme that could be at risk if a major accident and / or disaster occurred.

16.1.4 The future baseline, taking into account a changing climate, is not expected to affect the outcomes of this assessment.

## 16.2 Construction effects

16.2.1 The construction phase assessment considered the processes and procedures that govern the design and construction of the Proposed Scheme together with relevant legislation, such as health and safety legislation. It concludes that the major accident and disaster risks relating to striking underground services like the pipeline and aircraft striking cranes would be managed to be as low as is reasonably practicable and recommends no additional mitigation.

## 16.3 Operation effects

16.3.1 The operation phase assessment considered risks during operation relating to the potential collapse of the road into a void due to the presence of chalk beneath part of the Proposed Scheme and how they would be managed. It found that major accident and disasters risks would be managed to be as low as is reasonably practicable and recommended no additional mitigation.

# 17 Traffic and Transport

## 17.1 Introduction and baseline

17.1.1 The assessment of traffic and transport considers potential effects of the Proposed Scheme on users of the local transport network in the immediate vicinity. The results of the assessment are presented by comparing the future situation with the Proposed Scheme in place against a future baseline without it. The following types of impacts are considered:

- Severance (pedestrian and cyclist);
- Delay (pedestrian, cyclist and drivers);
- Amenity (pedestrian and cyclist);
- Fear and Intimidation;
- Accidents and safety; and
- Hazardous/abnormal Loads

17.1.2 The Proposed Scheme responds to recent transport policy requirements and includes provision for pedestrians, cyclists and horse riders, such as new green bridges crossing the highway and new sections of Public Rights of Way which join up and enhance the existing network and connect with National Highways Improvement Scheme Proposals.

17.1.3 The baseline studies for traffic and transportation considered the current state of the road network for pedestrians, cyclists and drivers and travel by public transport. It also considered local public rights of way and other routes used by pedestrians, cyclists and horse riders. The studies showed that the existing network is not currently well used by these types of users.

## 17.2 Construction effects

17.2.1 The construction assessment found there will be a temporary increase in HGV traffic during the construction period. HGV movements will generally be for the delivery of plant and materials and the removal of construction waste. Site

workers and visitors will also generate traffic movements. The works will be carried out in phases, construction traffic will be contained within the site with internal haul roads where possible to minimise movement on existing rural roads. Beyond the site boundary appropriate traffic management measures will be put in place for safe construction access and to protect members of the public. The assessment found that Marl Hill Road and Ringland Road are expected to experience the highest effect, but taking into account the measures recommended for inclusion in the CEMP to manage and monitor construction traffic associated with the Proposed Scheme, there would be no significant adverse effects to traffic and transportation.

## 17.3 Operation effects

17.3.1 The Proposed Scheme is not expected to generate new trips on the network but rather result in the redistribution of vehicle journeys. This means some routes could receive an uplift in traffic, while others receive a corresponding reduction and beneficial traffic relief.

17.3.2 To manage the effects of the redistribution of traffic predicted as a result of the Proposed Scheme a range of traffic mitigation measures have been assessed. These include:

- Access restrictions at Station Road and Felthorpe Road to deter through traffic travelling through Attlebridge village from Reepham Road and Broad Lane.
- Turning restrictions at the B1149 junction with Shortthorn Road, Felthorpe;
- Speed reduction measures along the Street and Taverham Road, Felthorpe.
- Improved crossing facilities and speed reduction measures through Horsford.
- Speed reduction measures through Barnham Broom village.

- Speed limit reduction through Kimberley.
- Speed limit reductions in the north of Wymondham.
- Speed limit reductions through Carleton Forehoe.

17.3.3 The assessment found that in the opening year (2029) and in the future assessment year (2044), taking into account the proposed mitigation, there would be no significant adverse effects to traffic and transportation. All links would experience a negligible to minor adverse/beneficial effect, however Old Fakenham Road and Shorthorn Road are expected to see a permanent moderate beneficial effect on severance, which is significant.

# 18 Cumulative Effects

## 18.1 Introduction and baseline

18.1.1 The assessment of cumulative effects has considered two forms of cumulative impacts; different environmental impacts interacting on common receptors (effect interactions) and impacts of the Proposed Scheme combined with impacts of other developments in the area (in-combination effects).

18.1.2 Information on other developments within a 2 kilometre Study Area from the Proposed Scheme from other environmental assessments and supporting planning documents were gathered to inform the in-combination assessment.

18.1.3 Potential cumulative effects could relate to the interaction of multiple environmental effects on one receptor (for example, one premises being subject to noise and landscape and visual impacts), resulting in a significant effect interaction, or effects arising from the Proposed Scheme and in combination with one or more other development proposals, resulting in significant effects.

## 18.2 Construction effects

18.2.1 The assessments carried out in the Environmental Statement found that during construction the health and amenity of residents living along the

Proposed Scheme have the potential to be negatively affected during construction. Annoyance due to noise from traffic and construction, visual disturbance, disruption to access to services, and disruption to journeys could combine to result in adverse effects on residents causing lower levels of quality of life and wellbeing during construction. There would be a moderate adverse significant in-combination effect on residents during construction that would be short-term and temporary during construction.

18.2.2 Users of Public Right or Ways (PRoWs) may experience significant Effect Interactions associated with visual disruption, reduced accessibility, delay, and changes to routes during the construction phase. There would be a moderate adverse significant in-combination effect on users of PRoWs and WCH during construction that would be short-term and temporary during construction.

18.2.3 There are five committed developments that are considered likely to result in temporary moderate adverse (significant) residual In-Combination Effects during construction on Population and Human Health, Landscape & Visual and Traffic and Transport receptors.

## 18.3 Operational effects

18.3.1 The assessments carried out in the Environmental Statement found that during the operation of the Proposed Scheme there will be no significant cumulative residual effects both in relation to effect interactions from multiple environmental effects or those effects arising from the Proposed Scheme in combination with one or more other development proposals.