

# A47 North Tuddenham to Easton Dualling

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**Volume 6**  
**6.1 Environmental Statement**  
**Chapter 2 – The Proposed Scheme**

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Planning Act 2008

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Infrastructure Planning

Planning Act 2008

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

The A47 North Tuddenham to Easton  
Development Consent Order 202[x]

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**ENVIRONMENTAL STATEMENT CHAPTER 2  
THE PROPOSED SCHEME**

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## Table of contents

2.	The Proposed Scheme	1
2.1.	The need for the Proposed Scheme	1
2.2.	Proposed Scheme objectives	1
2.3.	Location of the Proposed Scheme	2
2.4.	Proposed Scheme description	3
2.5.	Baseline scenario	19
2.6.	Construction, operation and long-term management	22
2.7.	Embedded environmental mitigation	33

## Tables

Table 2.1	Construction phasing programme .....	23
Table 2.2	Proposed compound details .....	25

## 2. The Proposed Scheme

### 2.1. The need for the Proposed Scheme

- 2.1.1. The North Tuddenham to Easton section of the A47 connects key economic growth areas in Norfolk. The current road is unable to cope with the high traffic volume and there are limited opportunities to overtake slower moving vehicles on this single carriageway.
- 2.1.2. Highways England aim to address these issues by making the A47 between North Tuddenham and Easton in Norfolk a dual carriageway. This will complete the dual carriageway between Norwich and Dereham, supporting economic growth, improve safety and ease congestion in the area.
- 2.1.3. The A47 corridor was identified as a key area in need of investment under the Roads Investment Strategy. The A47 currently experiences high levels of congestion especially at peak times, and has a poor safety record.
- 2.1.4. There are several reasons for these delays. Investigations to date have highlighted the following issues:
- development in the local area
  - road layout (single carriageway with limited opportunities to overtake)
  - difficulty of accessing and crossing the A47 (due to the number of direct accesses from local side roads to the existing A47)
  - standard of the road and junctions
  - accident rates along the existing A47 which cause delays to local traffic
  - traffic levels outgrowing the capacity of the road, causing tailbacks and delays
  - limited opportunities for overtaking slower moving vehicles
- 2.1.5. In developing the Proposed Scheme, Highways England aim to address these issues by improving the traffic flow, reducing journey times on the route, increasing the route safety and resilience and improving the environment. The improvements to the Proposed Scheme will also support economic growth.

### 2.2. Proposed Scheme objectives

- 2.2.1. The Proposed Scheme aims to meet the following objectives:

## Supporting economic growth

- 2.2.2. Reduce congestion related delay, improve journey time reliability and increase the overall capacity for future traffic growth to help enable regional development and growth in Norwich and its surrounding area.

## A safer and reliable network

- 2.2.3. Improve safety for all road users and those living in the local area by improving safety issues at junctions along the A47. Improve user satisfaction by quicker and more reliable journeys.

## A more free-flowing network

- 2.2.4. Increase resilience in coping with incidents such as collisions, breakdowns, maintenance and extreme weather. Support the smooth flow of traffic and improve journey times reliability by maximising the operational capability at the junctions and along the 9km carriageway.

## Improved environment

- 2.2.5. Protect the environment by minimising adverse impacts and, where possible, deliver benefits.

## An accessible and integrated network

- 2.2.6. Ensure the new road layout considers local communities and safe access to the A47. Provide a safer route between communities for cyclists, walkers, horse-riders and other vulnerable users of the network, taking into consideration how their requirements can be addressed with improved connectivity.

## Value for money

- 2.2.7. Ensure the Scheme is affordable and delivers good value for money.

## 2.3. Location of the Proposed Scheme

- 2.3.1. The Proposed Scheme is located between the villages of North Tuddenham and Easton where there is currently a section of single carriageway.
- 2.3.2. The A47 from North Tuddenham to Easton is located approximately 10km to the west of Norwich and forms part of the main arterial highway route connecting Norwich and Great Yarmouth to King's Lynn and then on to Peterborough, Leicester and the Midlands. The Proposed Scheme is an offline alignment running parallel to the north and south of the existing A47. It bypasses Hockering to the south, passes to the north of Honingham and connects to the existing A47

to the west of Easton. The layout extents are shown in the location plan **(TR010038/APP/2.1)**.

- 2.3.3. The area surrounding the Proposed Scheme is predominantly arable land enclosed by winding country lanes and hedgerows, with pockets of ancient woodland and remnant heath cut through by pastoral river valleys. The broadly flat, rural landscape is an ancient countryside with a long-settled agricultural character. The eastern scheme extents are more gently undulating relative to the broadly flat landscape of the western extents.

## 2.4. Proposed Scheme description

- 2.4.1. The preferred route for the Proposed Scheme was announced in August 2017. Since then, the Proposed Scheme design has been developed through an iterative process in parallel with the environmental assessment. The development of the Proposed Scheme design has been informed by knowledge of environmental constraints, the environmental assessment of emerging design proposals and engagement with stakeholders (including responses received during statutory consultation).
- 2.4.2. The Proposed Scheme comprises the dualling of a section of the A47 between North Tuddenham and Easton, including the creation of two grade separated junctions (Wood Lane junction and Norwich Road junction), associated side road alterations and walking, cycling and horse-riding connections along the length of the Proposed Scheme.
- 2.4.3. A summary of the key design elements of the Proposed Scheme is presented below. All elements are based on the November 2020 preliminary design and any minor changes in line with the limits of deviation will be outlined at the detailed design stage. Description text should be read in conjunction with:
- Figure 1.1 (Scheme overview) **(TR010038/APP/6.2)**
  - Figure 2.1 (Environmental Constraints) **(TR010038/APP/6.2)**
  - Figure 2.2 (The Proposed Scheme) **(TR010038/APP/6.2)**
  - Figure 2.3 (Proposed Works) **(TR010038/APP/6.2)**
  - Environmental Masterplan **(TR010038/APP/6.8)**
  - General Arrangement drawings **(TR010038/APP/2.2)**
  - Works Plans **(TR010038/APP/2.4)**

### Mainline

- 2.4.4. The new mainline dual carriageway would be predominantly offline with exceptions at the route tie-ins at Fox Lane to the west and Easton to the east.

- 2.4.5. After the Fox Lane junction the mainline gradually moves offline to the south of the existing A47, passing Hockering approximately 200m further south than the existing A47. After Hockering, the mainline gradually sweeps north, crossing the existing A47 between the existing side roads Sandy Lane and the B1535 Wood Lane. The first of two proposed new grade separated junctions, Wood Lane junction, is located where the existing Wood Lane and Berrys Lane meet the A47. From this junction the mainline runs largely parallel to the existing A47 to the north, passing to the north of existing areas of woodland and the village of Honingham. The mainline crosses the River Tud before passing back over the existing A47 south of St Andrew's Church. The second of the two new grade separated junctions, Norwich Road junction, is located south of the existing staggered junction of Taverham Road and Blind Lane. The mainline then crosses back over to the north side of existing A47 before tying into the existing dual carriageway section at Easton. The existing roundabout at Easton would be removed as part of the Proposed Scheme.
- 2.4.6. As part of the overall route strategy to improve safety and reliability there would be no direct access provided onto the proposed A47 mainline other than at the grade separated junctions and for maintenance access. Currently, Low Lane, Church Lane, Berrys Lane and Blind Lane have access onto the existing A47. As part of the Proposed Scheme, access from these roads will be permanently closed.
- 2.4.7. Two new lay-bys would be provided on the route, one eastbound and one westbound. Both lay-bys would sit south of Hockering with an approximate 100m stagger between the two. The lay-bys will be type A with merge tapers and shall be located approximately 3.5km and 4km from the existing lay-bys to the west on the eastbound and westbound carriageways of the A47.
- 2.4.8. Two observation platforms would be provided on the mainline for use by the Police as well as Highways England Traffic Officers and maintenance providers undertaking the necessary duties to maintain the safe operation of the Strategic Road Network. The location of the platforms is based on the criteria set out in the relevant standard as well as through consultation with Norfolk Constabulary. The eastbound observation platform will be located between the diverge and merge slip roads immediately to the east of the Wood Lane junction underbridge. The westbound observation platform will be located south east of Hockering, approximately 600m east of the westbound lay-by.

### Fencing, barriers, road signage

- 2.4.9. Boundary fencing in the form of timber post and rail, would be provided to delineate the highway boundary and is indicated in Figure 2.2 (The Proposed Scheme) (TR010038/APP/6.2).

- 2.4.10. Anti-glare screening would also be provided at a number of points to mitigate the effects of headlight glare between side roads and the proposed mainline. This screening would be achieved through close boarded fencing or a barrier mounted paddle system.
- 2.4.11. Safety barriers and road signage are also included in the Proposed Scheme.
- 2.4.12. Safety barriers would be provided in the verge on both the mainline and side roads where necessary and following an appropriate risk assessment.
- 2.4.13. A double-sided steel barrier would be provided in the central reserve with the central reserve construction make-up being unpaved.
- 2.4.14. Road signage covering warning and regulatory signage as well as informative and advanced direction signage would be provided.
- 2.4.15. Badger fencing is proposed to the west of Wood Lane junction.

### **De-trunking the existing A47**

- 2.4.16. The existing A47 south of Hockering, between Low Lane to the west and the junction of Church Lane and Sandy Lane to the east, would be retained and de-trunked, becoming a local authority adopted road.
- 2.4.17. The existing A47 north of Honingham, between Berrys Lane to the west and the existing roundabout with Norwich Road, west of St Andrew's Church, would be retained and de-trunked, becoming a local authority adopted road. A new combined footway/cycleway would be provided adjacent to the eastbound carriageway providing improved connectivity for pedestrians and cyclists.
- 2.4.18. The existing A47 immediately south of St Andrew's Church, between the Church and Taverham Road would be retained and de-trunked, becoming a local authority adopted road. As the western end of this section would be stopped up in front of the Church, a turning head would be provided to enable vehicles to turn and access the link to Taverham Road.

### **Wood Lane junction**

- 2.4.19. The Wood Lane grade separated junction is located where the existing Wood Lane and Berrys Lane meet. The roundabouts would be located to the north and south of the mainline to enable road users to leave or join the mainline and access the local side road network.
- 2.4.20. The junction is positioned in a cutting with the mainline rising on an embankment to provide sufficient clearance between the mainline and links between the proposed roundabouts.



- 2.4.21. If granted planning approval, the Norwich Western Link (NWL) scheme, promoted by Norfolk County Council, would be connected to the A47 via the Wood Lane junction.

### Norwich Road junction

- 2.4.22. Norwich Road grade separated junction is located close to where the existing Taverham Road and Blind Lane meet. The roundabouts would be located to the north and south of the mainline to enable road users to leave or join the mainline and access the local side road network.

- 2.4.23. The junction is positioned in a cutting with the mainline rising on an embankment to provide sufficient clearance between the mainline and links between the proposed roundabouts.

### Side roads and accesses

- 2.4.24. As part of the overall route strategy to improve safety and reliability there would be no direct access provided onto the mainline other than from the grade separated junctions. As a result of this a number of existing side roads and accesses that currently have direct access onto the A47 would be severed as part of the works and would be realigned to tie into the proposed new grade separated junctions (as shown on Figure 2.2 in **TR010038/APP/6.2**).

### *Existing A47 between Fox Lane and Hockering*

- 2.4.25. A new link road connection between North Tuddenham and Hockering would be provided to link the existing B1147 east of North Tuddenham and the existing A47 west of Hockering. A new priority junction with Lyng Road would result in the east/west movement becoming the priority over the north/south movement to and from the village of Lyng.

### *Low Road*

- 2.4.26. The existing Low Road would be severed for users as a result of the Proposed Scheme mainline. Access along Low Road would only be retained for agricultural and a private residential property access. Road users would be required to use the existing and proposed road network via the Fox Lane junction or via the Mattishall Lane Link Road to travel between Hockering and destinations west of the proposed severed Low Road.

### *Mattishall Lane Link Road*

- 2.4.27. The existing Mattishall Lane would be severed by the new A47 dual carriageway. A new underbridge would be provided west of Mattishall Lane to create a new Mattishall Lane Link Road between the existing A47 and Mattishall Lane south of

the new A47 mainline. A connection would be provided south of the A47 mainline to the existing Mattishall Lane to maintain connectivity to the existing properties.

2.4.28. The existing Mattishall Lane junction with the existing A47 would be reduced in size due to the existing A47 becoming a class B road during the de-trunking process.

2.4.29. An additional walking and cycling link would be provided to connect the shared use path as part of the new Mattishall Lane Link Road to Hockering.

#### *Mill Lane*

2.4.30. The existing Mill Lane, which provides access to an existing business, would be severed. A new access track would be provided from the existing Mattishall Lane and would provide access to a detention basin as well as the existing business.

#### *Church Lane*

2.4.31. The northern extents of Church Lane would be severed as a result of the Proposed Scheme mainline. South of the new A47 mainline Church Lane would be stopped-up which would remove the current crossroads on the existing A47 at the junction of Church Lane and Sandy Lane.

2.4.32. A new access track between Church Lane and the property at Hillcrest would be provided and would also provide maintenance access to a detention basin.

#### *B1535 Wood Lane*

2.4.33. Wood Lane is a Norfolk County Council appointed Heavy Goods Vehicle route. As a result of the new grade separated junction at Wood Lane the existing road would be realigned slightly to the west and a new priority junction would be created on the new link between the existing A47 east of Hockering, from the Sandy Lane junction, and the Wood Lane junction northern roundabout.

#### *Berrys Lane*

2.4.34. Berrys Lane currently ties into the existing A47 and would be stopped up as a result of the Proposed Scheme. The diversionary route would require road users to navigate south and then along Mattishall Road before coming west along the de-trunked A47. A new footway/cycleway would be provided linking the stopped-up Berrys Lane and the realigned Dereham Road.

### *Dereham Road*

- 2.4.35. Dereham Road would be realigned and tie into the existing A47 between the southern roundabout of Wood Lane junction and the proposed Hall Farm access track.

### *Hall Farm Access*

- 2.4.36. As part of the Proposed Scheme the existing private access to Hall Farm would be severed. A new access track would be provided, together with an underpass below the new mainline, to tie-in with the existing A47 north of Honingham. The Hall Farm underpass would also facilitate the diversion of a restricted byway (Honingham RB1).
- 2.4.37. A new link would be provided between the realigned Dereham Road and the existing A47 to provide a route between Hall Farm and Wood Lane junction.

### *Existing A47 east and west of St Andrew's Church*

- 2.4.38. The existing A47 immediately west of St Andrew's Church would be severed as a result of the realigned mainline. To maintain local access, a new link would be provided between the Honingham roundabout on the existing A47, east of Honingham, and the southern roundabout at the proposed Norwich Road junction. This would provide connectivity for Honingham and surrounding communities to the east.
- 2.4.39. Agricultural access would be retained to the west of St Andrew's Church. Within this area to the west, a new concrete pad for the farmer to load during harvest periods would be provided as part of the Proposed Scheme. The current concrete pad to the west of the church would be removed as part of the Proposed Scheme. Car parking spaces would be provided to the front of the Church as part of the Proposed Scheme.
- 2.4.40. Connectivity to St Andrew's Church would be maintained by re-use of the existing A47 immediately south of the Church and connecting to the realigned Taverham Road to the east.
- 2.4.41. A walking and cycling underpass (Honingham Church underpass) would be provided from Honingham roundabout on the existing A47, east of Honingham, and the west of St Andrew's Church to maintain connectivity.

### *Blind Lane*

- 2.4.42. The existing Blind Lane would be severed as part of the Proposed Scheme. Access along Blind Lane would only be retained for agricultural access. Road users would be required to either go east towards Easton and then onto the

Longwater junction or go west through Colton and then take the road north west to Mattishall Road. The new link road between Easton and Norwich Road junction can also be used to access the A47.

### *Taverham Road*

- 2.4.43. As a result of the proposed Norwich Road junction, Taverham Road would be realigned slightly at the south to tie-into the northern roundabout of Norwich Road junction.

### *Existing A47 Between Blind Lane and Easton*

- 2.4.44. The Proposed Scheme severs the existing A47 between Blind Lane and Easton roundabout, at the intersection of Church Lane and Dereham Road. To maintain connectivity, a link would be provided from the southern roundabout of Norwich Road junction and would tie-in with Dereham Road to the east of St Peter's Church and south of the existing Easton roundabout.

### *Easton Roundabout*

- 2.4.45. Easton Roundabout would be removed as a result of the Proposed Scheme. Traffic would flow freely along the existing A47 at this location. A walking and cycling overbridge (Easton footbridge) would be provided to maintain north and south connectivity for walkers and cyclists.

### *Church Lane (Easton)*

- 2.4.46. Church Lane, Easton, would be stopped up to vehicles at the intersection with Ringland Road and Ringland Lane. Road users would be required to either go east towards Easton and then onto the Longwater junction or follow Ringland Road and Weston Road to the west and connect to the Norwich Road junction along Taverham Road.
- 2.4.47. Access for agriculture would be provided to the north of Church Lane. Walkers and cyclists would still be able to travel along Church Lane, connecting to the proposed Easton footbridge. The proposed footbridge for walkers and cyclists will connect north and south Easton over the A47 as a replacement to the at grade crossing.

## **Walking, cycling and horse-riding**

- 2.4.48. Connectivity for pedestrians and cyclists would be improved through the provision of a network of shared use paths adjacent to the side roads (both new and realigned). Where the shared use paths are located adjacent to a carriageway, a separation strip would provide a buffer between pedestrians and cyclists and the trafficked carriageway.

2.4.49. The Proposed Scheme would provide numerous new Walking, Cycling and Horse-riding (WCH) facilities between Sandy Lane (east of Hockering) and Easton to provide a continuous link for WCH users between these points. The new facilities to be provided and the facilities to be replaced are summarised below:

- A new combined footway/cycleway<sup>1</sup> would be provided along the new side road between Sandy Lane (to the east of Hockering) and the proposed Wood Lane roundabout.
- A new combined footway/cycleway would be provided between the Wood Lane roundabout and Honingham that would, in part, form the diversion route for PRoW Honingham RB1. This new route would pass around the stub of the future Norwich Western Link road route and beneath the new A47 alignment at the proposed Hall Farm underpass.
- A new combined footway/cycleway would be provided on the northern frontage of downgraded A47 at Honingham, between the realigned Dereham Road in the west and the existing Honingham roundabout in the east.
- A new combined footway/cycleway would be provided on the new alignment of Dereham Road to provide a connection to the proposed upgraded Honingham FP3, which would become a bridleway.
- Honingham FP3 would be upgraded to bridleway status and diverted onto an improved track alongside the existing footpath alignment and suitable for cyclists to use. This improvement would allow a link between Berrys Lane and Wood Lane via Dereham Road, the Hall Lane underpass and associated WCH facilities.
- A new combined footway/cycleway would be provided to the east of Honingham between the Honingham roundabout and St Andrew's Church. This proposed facility would pass beneath the new A47 alignment (Honingham Church underpass) on a traffic free route and replace the existing provision that would be removed as part of the Proposed Scheme.
- Improvement of the existing footway between St Andrew's Church and Taverham Road to provide a combined footway/cycleway along the existing A47 alignment to be downgraded.
- A new combined footway/cycleway would be provided to the north of the new A47 alignment between Taverham Road and Ringland Road. The route would sit parallel but remote to the eastbound mainline. The shared use path would connect to the approach ramps for the proposed grade separated footbridge over the new A47 dual carriageway where Easton roundabout is currently located.
- A new overbridge (Easton footbridge) suitable for pedestrians and cyclists would be provided between Dereham Road and Church Lane at Easton

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<sup>1</sup> The DCO documentation accompanying the Environmental Statement refers to the footway/cycleway as a cycle track. For the purposes of the EIA, this infrastructure is called footway/cycleway.

which would replace the at-grade crossings of the A47 at the existing Easton roundabout and at Ringland Lane/Dog Lane that would be removed.

2.4.50. In addition, the Proposed Scheme would stop up and abandon PRoW Hockering FP12 that currently serves no purpose for WCH users and is no longer required.

2.4.51. The Proposed Scheme would have a direct impact upon users of the following PRoW:

- Honingham RB1 (PRoW 31)
- Hockering FP7 (PRoW 12)

2.4.52. The effects to these paths is reported in Chapter 12 (Population and human health) (**TR010038/APP/6.1**).

## Road Surfacing

2.4.53. The mainline pavement surface would be a Thin Surface Course System, which is a low noise surface, with any bridge decks requiring Hot Rolled Asphalt (HRA) as a surface course. The surfacing of any local authority roads would be developed during the detailed design stage. For the purposes of the environmental assessment, the local authority roads have been modelled as HRA. Similarly, the specification of the full pavement make-up (i.e. the specific aggregate base) for all roads within the Proposed Scheme would be refined during the detailed design stage.

## Structures

2.4.54. The Proposed Scheme includes seven new structures. These structures comprise:

- Mattishall Lane Link Road underbridge (S16)
- Wood Lane junction underbridge (S03)
- Hall Farm underpass (S04)
- River Tud Crossing (S05)
- Honingham Church underpass (S18)
- Norwich Road junction underbridge (S07)
- Easton footbridge (S17)

2.4.55. The structures are described in further detail in the following sections. The structure has undergone an optioneering exercise which is included in the Scheme Design Report (TR010038/APP/7.3 ). The structure parameters provided below are the maximum worst case parameters used for the environmental assessment needs to reflect the Rochdale Envelope approach.

The design option considerations for each structure is provided in the Scheme Design Report (**TR010038/APP/7.3**).

### *Mattishall Lane Link Road underbridge*

2.4.56. A new underbridge would be constructed to the west of the existing Mattishall Lane alignment. This underpass would serve pedestrians and cyclists as well as vehicular traffic. This underpass would have an internal horizontal width of 10.5m and a minimum headroom of 5.3m plus an allowance for the deflection of the structure, in accordance with DMRB CD127. The structure would also satisfy the minimum headroom required for the walking and cycling route which is 2.7m, in accordance with DMRB CD143. The preferred structural option is a precast concrete jointed portal solution.

### *Wood Lane junction underbridge*

2.4.57. A new underbridge would be constructed as part of the new grade separated Wood Lane junction. This structure would be a 32m wide in situ reinforced concrete integral structure with a clear span of 15.3m. The minimum headroom clearance would be 5.3m plus allowances for structural deflections, in accordance with DMRB CD127. The preferred structural option is a pre-stressed concrete beam bridge.

### *Hall Farm underpass*

2.4.58. As part of the Proposed Scheme, the existing private access to Hall Farm would be severed. A new underbridge crossing under the mainline would therefore be provided to maintain access. The structure would accommodate a segregated shared use path to the west side of the carriageway which would maintain existing north and south connectivity for walkers and cyclists. This structure would be a 32m long precast jointed portal with an in-situ base slab forming a box structure. The box would have an internal width of 8.0m and a minimum headroom clearance of 4.5m plus allowances for structural deflections.

### *River Tud Crossing*

2.4.59. The Proposed Scheme mainline crosses the River Tud east of Honingham. A new crossing would be provided over the River Tud.

2.4.60. The bridge has been designed in consultation with the Environment Agency. The clear span of the structure would be 37.5m to meet proximity requirements from the Environment Agency in relation to the River Tud extents. The structure is likely to consist of a steel composite deck that would be supported on full height abutments that would be placed on piled foundations. The structure would have a width of 32m and a skew of approximately 20 degrees. The soffit of the deck

would ensure a 300mm freeboard above the 1 in 100-year flood event (with 65% allowance for climate change). The soffit of the deck would also ensure that a 2.7m clearance is achieved above the shared use path, in accordance with DMRB CD143.

### *Norwich Road junction underbridge*

- 2.4.61. A new underbridge would be constructed as part of the new grade separated Norwich Road junction. This structure would be a 32m wide in-situ reinforced concrete integral structure with a clear span of 15m. The minimum headroom clearance would be 5.3m plus allowances for structural deflections. The preferred structure would be a pre-stressed concrete beam deck that would be connected into a concrete diaphragm, supported on contiguous bored piles. The structure would be constructed top-down due to the existing ground level.

### *Honingham Church underpass*

- 2.4.62. Honingham Church underpass is proposed to provide a WCH link under the A47. The structure is located west of St Andrew's Church, Honingham. Consultation has been carried out with the Parish and Local Liaison Group to ascertain an appropriate location for the structure. The preferred structure is a precast box. The internal width of the underpass would be 4.0m to provide a suitable unsegregated shared use path in accordance with DMRB CD143. The minimum headroom clearance would be 2.7m in accordance with DMRB CD143. The dimensions of the underpass have been designed for pedestrians, cyclists, and dismounted equestrian use. The length of the structure would be 40m.

### *Easton footbridge*

- 2.4.63. A new footbridge crossing the A47 carriageway at the location of the existing Easton roundabout is proposed. The proposed structure would be a steel composite deck spanning 36m over the A47 supported on bankseats on top of reinforced earth approach embankments to the north and south to tie-in with the WCHR route design. The structure would be designed with a clear width between parapets of 3.5m to provide enough unsegregated shared use width for pedestrians and cyclists. No equestrian requirements would be necessary for this structure. The headroom clearance from carriageway level to the soffit of the footbridge would be 5.7m.



### *Honingham Bypass*

- 2.4.64. Honingham Bypass is an existing concrete deck bridge providing a crossing for the existing A47 carriageway over the River Tud. The use of the structure would change from just vehicular to include a cycle track over it. Consequently, the existing 1m high parapets will be reviewed and a suitable upgraded system proposed if deemed necessary that achieves a parapet height of 1.8m in accordance with Department of Transport safety design guidance. No other modification works are envisaged for the structure.
- 2.4.65. Multiple options will be considered for the parapet replacement including: removal of existing parapets and replacing with a new system directly onto the existing edge beam anchorages; or leaving the existing parapets in-situ and installing the new system within the existing carriageway verges. A re-design of the carriageway layout will also be considered which would not require any modification works to the structural elements.
- 2.4.66. The preferred option would be selected following consideration of buildability, cost, environmental, and health and safety management during construction.

### *Culverts*

- 2.4.67. The Proposed Scheme includes two new culverts. These culverts comprise:
- Existing West culvert / New West culvert 'S08/S08A'; and
  - Newgate House culvert 'S01'.

#### *Existing West culvert (S08) and New West culvert (S08A)*

- 2.4.68. The Proposed Scheme requires an extension of the existing culvert adjacent to Oak Farm below the proposed A47 mainline. A new culvert would also be required below the proposed new side road (Main Road) that would tie into the de-trunked A47 west of Hockering. The new culvert would be constructed to carry an unnamed tributary of the River Tud below Main Road. This structure would be a 43m long concrete pipe culvert with an internal diameter of 750mm, headwalls would be formed by precast concrete units. This new culvert will cross the side road at a skew in order to tie into the existing watercourse.
- 2.4.69. There would also be an extension of the existing culvert to provide passage of the tributary underneath the full width of the new A47 carriageway. This structure would be a 38m long concrete pipe culvert, inclusive of the existing section and would have an internal diameter of 750mm. The extended culvert shall continue on the existing line and will be perpendicular to the proposed mainline. A new headwall would be formed at the northern end of this extended culvert.

### *Newgate House culvert (S01)*

- 2.4.70. A new culvert would be constructed to maintain an unnamed tributary to the River Tud located east of Hockering at Newgate House. This structure would be a 1.75m by 1.75m precast concrete portal frame. The culvert would be 44m in length. This structure would be designed to maintain a minimum 600mm freeboard above the design flood levels for the Proposed Scheme and would also provide a mammal ledge with suitable access upstream and downstream of the culvert. The ledge would have minimum 150mm clearance above the design flood levels and would also have a minimum 600mm clearance to the soffit of the structure.
- 2.4.71. There are permits, consents and licenses which would be required to carry out certain works as part of the Proposed Scheme. These are detailed in table 4-3 of the Environmental Management Plan (**TR010038/APP/7.4**) and within the Consents and agreements position statement (**TR010038/APP/3.3**).

### **Lighting**

- 2.4.72. The environmental assessment has been undertaken on a lighting design described below. This is a worst case scenario approach to the assessment. Discussions with relevant stakeholders and further work would be completed in later stages of detailed design to reduce and avoid road lighting where possible and safe to do so, thereby meaning the actual potential effect of the lighting would be reduced from that being assessed.

### *Lighting design*

- 2.4.73. The current lighting design proposes 10m height lighting columns with LED luminaires, located in verges (or at the back of footways where applicable) and oriented perpendicular to the carriageway. Luminaires would be mounted with zero-degree tilt and a minimum as installed luminous intensity of G4, to ensure glare and upward light spill is minimised.
- 2.4.74. Electrical supply to the lighting columns would be connected to a feeder pillar with a private cable network routed through ducting that is buried in verges and beneath the carriageway where applicable.
- 2.4.75. Engagement with Norfolk County Council has resulted in no new lighting being required on the Council side roads as a result of the Proposed Scheme.

### *Wood Lane junction*

- 2.4.76. The existing A47 carriageway section in proximity to the Wood Lane junction is currently unlit.

2.4.77. No new lighting is proposed for the A47 mainline, however, lighting is proposed on the two new roundabouts with the approach and exit roads being lit to provide approximately five seconds of driving time at the expected traffic speed.

#### *Norwich Road junction*

2.4.78. The existing A47 carriageway section in proximity to the Norwich Road junction is currently unlit.

2.4.79. No new lighting is proposed for the A47 mainline, however, lighting is proposed for the two new roundabouts with the approach and exit roads being lit to provide approximately five seconds of driving time at the expected traffic speed.

### **Drainage**

2.4.80. The drainage design for the Proposed Scheme has been developed with advice provided from the appropriate environmental specialists. The assessment of drainage in relation to the water environment is reported in Chapter 13 (Road drainage and the water environment) (**TR010038/APP/6.1**). Figure 2.1 shows the existing water environment features for the Proposed Scheme and the Drainage Plans show the Proposed Scheme drainage design (**TR010038/APP/2.8**).

2.4.81. Several organisations have been consulted regarding the drainage of the Proposed Scheme:

- The Environment Agency
- Anglian Water
- Norfolk County Council
- Norfolk Rivers District Internal Drainage Board
- Breckland Council
- Broadland District Council
- South Norfolk Council

#### *Existing drainage*

2.4.82. Where possible, existing drainage would be retained at the tie-ins with the existing A47. Existing systems may be relocated in some sections on the approaches to junctions at the eastern and western extents of the Proposed Scheme, to maintain the operation of the drainage on the existing section of the A47.

2.4.83. Where existing direct discharges to streams are not taking any increased road run-off from the Proposed Scheme, these outfalls would remain in place.

### *Detention basins and wetland areas*

- 2.4.84. These Sustainable Drainage Systems (SuDS) systems would be designed to accommodate a 1 in 100 year storm event plus an uplift of 20% for climate change (an additional 20% added capacity over and above this volume has also been provided in accordance with DMRB CG 501).
- 2.4.85. These would also have a minimum of 300mm freeboard above the designed water level.

### *Drainage system*

- 2.4.86. The new drainage system would meet design criteria of no surcharging of the pavement layers for a one in five-year event plus an additional 20% to allow for climate change. In the case of roads that shall be adopted and maintained by Norfolk County Council, the design criteria for the drainage system has been confirmed following consultation.

### *Structure drainage*

- 2.4.87. At structures, deck drainage and back of wall drainage systems would be provided and would outfall to a suitable drainage system.

### *Road drainage*

- 2.4.88. The new mainline carriageway would drain to filter drains and discharge to a SuDS system located at low points along the route or where necessary for constraints such as structures or river crossings. The drainage system would provide treatment of the surface water run-off and maintain greenfield discharge rates to receiving watercourses or groundwater.
- 2.4.89. Additional spillage containment would be provided where required at discharge points.
- 2.4.90. Outline proposed drainage systems include:
- The mainline would be drained by a combined carrier filter or carrier drains located in the verge or central reserve.
  - Combined drains would be provided at the toe of any cuttings along the mainline. The combined drains would drain the cuttings and collect surface run-off from the carriageway.
  - Central reserve drainage would be provided where the road is in super-elevation. Combined drains would collect surface runoff and convey it to a basin.

- 2.4.91. Toe drains, where required, draining embankments greater than 1.5m in height, would drain via ditches to soakaways or along existing surface water pathways.
- 2.4.92. Side road links would be drained using over the edge treatment where the alignment allows, with surface runoff draining straight from the carriageway down adjacent embankments, matching the existing situation. Where over the edge drainage cannot be provided combined drains or a carrier drain with gulley's would be used to collect runoff and convey it to a basin.
- 2.4.93. At side road tie-ins existing drainage would be used where possible subject to surveys of the existing drainage system.
- 2.4.94. Natural overland flow and existing ditches / streams would be intercepted by new ditches and conveyed along natural drainage paths as far as possible. This would involve pipe crossings of the proposed new mainline and side roads.

#### *Infiltration rates*

- 2.4.95. Infiltration rates have been collected from testing undertaken during the ground investigation.
- 2.4.96. Infiltration basins would be considered in the detailed design stage, instead of detention basins, if suitable rates are available to allow. Any such infiltration basin would receive surface water discharges from the new road and would maintain existing greenfield discharge rates.
- 2.4.97. Treatment in the form of filter drains and separate spillage containment would also form part of such a drainage system.

#### **Landscaping and environmental design**

- 2.4.98. Landscape features are described in more detail in Chapter 7 (Landscape and visual effects) (**TR010038/APP/6.1**) and illustrated on the Environmental Masterplan (**TR010038/APP/6.8**) submitted as a part of this Development Consent Order (DCO) application.
- 2.4.99. Appropriate landscape planting would be provided within the DCO boundary to replace lost features, protect and enhance visual amenity and provide visual screening where possible to the Proposed Scheme. The nature and type of planting is outlined on the Environmental Masterplan.

## 2.5. Baseline scenario

### Existing baseline scenario

- 2.5.1. The existing baseline scenario refers to the conditions that currently exist, as surveyed in 2019 and 2020, in the area within which the Proposed Scheme would be implemented.
- 2.5.2. The A47 Corridor is ranked second nationally for fatalities on A roads and the accident severity ratio is above average. The existing road is a single carriageway.
- 2.5.3. The section of the A47 between North Tuddenham and Easton currently has a significantly lower morning peak average speed compared to the daily average speed along this section of the A47. This is an indicator of congestion and affects journey times and journey time reliability on the road.
- 2.5.4. These indicators show that the section of the A47 North Tuddenham and Easton is already over capacity.
- 2.5.5. The resilience of this section of the A road is an issue as there are no alternative routes.
- 2.5.6. The existing conditions within the Proposed Scheme boundary and surrounding area relevant to each of the chapter topics, is reported in Chapters 5 to 14 (**TR010038/APP/6.1**) under 'Baseline Conditions'. A brief summary of the baseline is provided below, and the environmental constraints are illustrated in Figure 2.1 (**TR010038/APP/6.2**).
- 2.5.7. There are currently no Air Quality Management Areas (AQMAs) declared within the Broadland District Council, Breckland Council or South Norfolk Council boundaries. The nearest AQMA to the Proposed Scheme is the Central Norwich AQMA approximately 9km east declared by Norwich City Council.
- 2.5.8. The heritage assets located in the vicinity of the Proposed Scheme are a combination of ancient, post medieval and modern in origin with historic features ranging from prehistoric flint tools and flakes, Roman cropmarks, early medieval tweezers, medieval settlement, post-medieval rural land and modern industrial activities. There are no scheduled monuments, conservation areas, registered parks and gardens or historic battlefields within the cultural heritage study area (as defined in Chapter 6 (Cultural heritage) (**TR010038/APP/6.1**)). There are a number of listed buildings within the cultural heritage study area. The listed buildings closest to the Proposed Scheme comprise:
  - grade I St Peter's Church located approximately 25m south of the existing A47

- grade II\* St Andrew's Church approximately 50m north of the current A47
- grade II Berry Hall grade II Barn at Church Farm approximately 140m north of the existing A47
- Church Farm House, approximately 100m north of the existing A47.

2.5.9. There are also some grade I and grade II buildings in the villages of Hockering and Honingham.

2.5.10. The Proposed Scheme extents (as defined in Chapter 7 (Landscape and visual effects) (**TR010038/APP/6.1**)) are predominately arable land enclosed by winding lanes and hedgerows, interspersed with pockets of ancient woodland and remnant heath cut through by pastoral river valleys. The broadly flat, rural landscape is an ancient countryside with a long-settled agricultural character. The eastern scheme extents are more gently undulating relative to the broadly flat landscape of the western extents. The western part of the Proposed Scheme extents lie within the Breckland Council's landscape character area. The eastern extents of the Proposed Scheme coincide with the coverage of Broadland District Council and South Norfolk Council landscape character areas.

2.5.11. There are valuable habitats and species of nature conservation importance within the biodiversity study areas (as defined in Chapter 8 (Biodiversity) (**TR010038/APP/6.1**)). Approximately 500m north of the Proposed Scheme, north west of Hockering, is Hockering Wood Site of Special Scientific Interest (SSSI); designated for being one of the largest blocks of ancient, semi-natural woodland in Norfolk. The River Wensum SSSI and Special Area of Conservation is located, at its closest, 1.6km north east of the eastern extents of the Proposed Scheme. Rosie Curston's Meadow SSSI is located 1.7km south west of the western extent of the Proposed Scheme.

2.5.12. There are 21 County Wildlife Sites (CWS) located within 1.9km of the DCO boundary, the closest being Fen West of East Tuddenham CWS, 0.2km south of the DCO boundary. A wide range of habitats have been identified within the biodiversity study areas which include but are not limited to:

- semi-improved natural grassland
- broadland semi-natural woodland
- hedgerows
- marshy grassland
- dense and scattered scrub

2.5.13. There are protected species and species of principal importance, including fungi, badger, bats, breeding birds, migratory birds, wintering birds, barn owl, Terrestrial

and aquatic invertebrates (including white-clawed crayfish), great crested newt, otter, water vole, reptiles and their habitats.

- 2.5.14. The land around the existing A47 is predominately agricultural, the majority of which is used for arable production. The agricultural land within the footprint of the Proposed Scheme contains:
- Grade 2 agricultural land (very good quality)
  - Grade 3a agricultural land (good quality)
  - Grade 3b agricultural land (moderate quality)
  - Grade 4 (poor quality) agricultural land
- 2.5.15. There are no sites that are designated for their geological or geomorphological importance within the geology and soils study area.
- 2.5.16. Sensitive receptors, such as residential properties, in proximity to the Proposed Scheme have been identified. Over 800 noise sensitive receptors have been identified within 600m to the north and south of the Proposed Scheme. Some of these receptors are located close to the existing A47 so are currently exposed to relatively high noise levels due to road traffic.
- 2.5.17. The existing A47 provides a connection for people, places, businesses and enables access to employment, healthcare, education and other community assets. Walking, cycling and horse-riding facilities are also located within the population and human health study area.
- 2.5.18. The main water features within the study area are within the River Tud catchment. The Proposed Scheme crosses the River Tud at one location to the east of Honingham and a tributary of the River Tud south east of Hockering. There are smaller drainage channels and isolated ponds within the road drainage and the water environment study area.
- 2.5.19. A small proportion of the Proposed Scheme is within both Flood Zone 2 (which is associated with medium risk of flooding from rivers) and Flood Zone 3 (which is associated with high risk of flooding from rivers). These locations are predominately along the River Tud corridor. Sources of flooding include the River Tud, Oak Farm watercourse and Hockering watercourse.
- 2.5.20. The groundwater conditions include the following aquifers:
- The chalk bedrock is a Principal aquifer
  - The superficial Sheringham Cliffs Formation, Lowestoft Formation – Sand, Happisburgh and Lowestoft (Undifferentiated), Alluvium, and River Terrace Deposits are classified as Secondary A aquifers



- The Lowestoft Formation - Diamicton is classified as a Secondary (undifferentiated) aquifer

## Future baseline scenarios

- 2.5.21. Existing baseline conditions which would change and evolve without the implementation of the Proposed Scheme are included as part of the environmental impact assessment (EIA), and are referred to as the future baseline. Changes to the existing baseline conditions may occur due to a combination of influences, for example climate, traffic flows and new developments.
- 2.5.22. Norwich, Cambridge and Peterborough are amongst the fastest growing cities in the country. Without improvement, the current congestion and journey time reliability problems experienced on local roads and in particular the existing A47 corridor are likely to increase.
- 2.5.23. The future baseline scenarios considered in the environmental assessment are defined in Chapter 4 (Environmental assessment methodology) (**TR010038/APP/6.1**) and a list of developments included as part of the future baseline is provided in Appendix 15.1 of this Environmental Statement (ES) (**TR010038/APP/6.3**).

## 2.6. Construction, operation and long-term management

- 2.6.1. The approach to construction described below is indicative but it is representative of the likely approach to be adopted. Further provisions in relation to construction of the Proposed Scheme are to be provided in the Environmental Management Plan (EMP) (**TR010038/APP/7.4**).

### Land required for the Proposed Scheme

- 2.6.2. The rights to compulsorily acquire land or rights required to deliver the Proposed Scheme are being sought by Highways England through the DCO application.
- 2.6.3. Landowner engagement has been a key part of the development of the Proposed Scheme. Land acquisition would initially be sought through negotiation. The compulsory acquirement process would be the last resort.
- 2.6.4. Temporary and permanent land requirements have been identified through a combination of the design development and environmental assessment, and through engagement with landowners that would be affected by the Proposed Scheme. The temporary and permanent land requirements are illustrated in the Land Plans (**TR010038/APP/2.3**).
- 2.6.5. Land take required for the Proposed Scheme is:

- 197.5ha total permanent land take required
- 66.9ha total temporary land take required
- 34.4ha total new rights land take required

## Construction programme

- 2.6.6. The construction activities for the Proposed Scheme have been identified through close working with the Principal Contractor. Inevitably, some aspects of detailed design cannot be known at this stage. Where this is the case, the design must not result in any additional environmental effects than those identified and assessed as part of the EIA process.
- 2.6.7. Construction is anticipated to take approximately 23 months. This would be carried out in construction phases, so not all sections of the Proposed Scheme would be under construction for the full period.
- 2.6.8. The proposed phases of construction are set out in Table 2.1 (Construction phasing programme). Enabling and site preparation work would be largely carried out during Phase 0, with the main works carried out during Phases 1 to 7 before final compound removal in Phase 8.

Table 2.1 Construction phasing programme

Phase	Traffic management stage	Approximate programme	Key Construction Activities
0	Compound construction and National Grid gas main diversion	One month (month 1)	Compound and welfare areas constructed for main works. Hardstanding areas will be constructed, topsoil stripped and sub-base installed. Areas for car parking will be surfaced as required.  Clearance of vegetation undertaken as required to enable the works.  National Grid to undertake high pressure gas main diversion before main works commence. Works are estimated to take up to 6 months, so therefore activity will also feature in Phase 1.
1	Offline construction, including overbridges, culverts, retaining walls	Eighteen months (month 1 - 18)	Construction of carriageway offline from existing A47. Activities including topsoil strip, cut / fill earthworks, drainage installation, carriageway construction including capping, sub-base and the bitumen bound layers.  Construction of offline structures including new overbridges and retaining walls. Sheet piling, bored piling and concrete works will be undertaken as part of the structure construction works.  Traffic management to side roads as required to enable offline A47 construction works.

Phase	Traffic management stage	Approximate programme	Key Construction Activities
2	Norwich Road junction - New A47 carriageway tie-in across existing A47  Traffic using new side roads to the south of the new Norwich Road junction before joining back into the existing A47	Two months (month 19 - 20)	Construction of 'tie-in' plug sections of the new A47 carriageway where it crosses over the existing A47 to join the newly constructed offline sections together.  Activities include excavation of existing carriageway, earthworks, drainage installation, carriageway construction including capping, subbase and the bitumen bound layers.
2A	Eastern tie-in - during Phase 2 – Traffic to use outside lanes only of existing Easton roundabout	One month (Month 19)	Works undertaken to construct carriageway through the existing Easton roundabout.  Activities include excavation of existing roundabout, earthworks, drainage installation, carriageway construction including capping, subbase and the bitumen bound layers.
2B	Eastern tie-in - during Phase 2 – traffic to travel through previous roundabout on new carriageway construction	One month (Month 19)	Works undertaken to remove existing outer lanes of roundabout and complete new through A47 carriageway construction.  Activities include excavation of existing roundabout, earthworks, drainage installation, carriageway construction including capping, subbase and the bitumen bound layers.
3	Wood Lane junction – new A47 carriageway tie-in across existing A47  Traffic using new A47 carriageways from Easton to Wood Lane junction, then the at Wood Lane junction on / off new slip road to use new side road that that ties into the existing A47 to the east of Hockering	One month (month 20 - 21)	Activities include excavation of existing carriageway, earthworks, drainage installation, carriageway construction including capping, subbase and the bitumen bound layers.
4	Western tie-in	One month (month 21 - 23)	Cross-overs will be constructed through the existing central reservation to enable phase 4a and 4b works.
4A	Western tie-in, traffic using existing alignment with contraflow to existing dual carriageway section	One month (month 21 - 22)	New eastbound alignment tied in. Activities include excavation of existing carriageway, earthworks, drainage installation, carriageway construction including capping, subbase and the bitumen bound layers.
4B	Western tie-in, traffic moved to use new carriageway	One month (month 22 - 23)	New westbound alignment tied in. Activities include excavation of existing carriageway, earthworks, drainage installation, carriageway construction including capping, subbase and the bitumen bound layers.
5	Compound removal	One month (month 23)	Compounds and site welfare will be removed. Hardstanding areas will be removed and the site

Phase	Traffic management stage	Approximate programme	Key Construction Activities
			re-topsoiled. Area will be re-landscaped as required.

## Construction compounds and site accesses

2.6.9. The main construction compound is proposed off the existing Honingham roundabout, with three satellite compounds. The construction compounds are presented in Figure 2.3 (**TR010038/APP/6.2**). Each compound would include temporary site offices, parking, and welfare facilities. Table 2.2 indicates indicative timings of use and assumptions associated with each of the compound locations.

Table 2.2 Proposed compound details

Compound	Maximum area (m <sup>2</sup> )	Indicative use / duration	Compound assumptions
Compound 1 (Mattishall Lane)	25,000	Traffic management 23 months	Access would be derived from Low Road. However, oversized deliveries may be required from the existing A47. This compound is likely to require 24/7 access for TM/ recovery vehicles.  Visual screens to be provided to the eastern and northern boundary of the site to reduce the visual impact for properties at Mattishall Lane.
Compound 2 (west of Wood Lane junction)	33,700	Satellite compound to serve the Wood Lane junction works 23 months	Access to the site to be provided from existing A47 westbound (left in, left out only).  Screening provided along the eastern, south-eastern and western boundaries to provide a visual screen to residential properties to the south-west. No construction traffic would use the track through the woodland to the west.  Deliveries of large construction plant.  Material storage and/or stockpiles would be in compounds that may have temporary batching plants. Compound may require temporary cement bound granular material (CBGM) batching plant and/or asphalt batching plant.
Compound 3 (East of Honingham)	50,400	Main compound 23 months	Access to the compound would be derived off Norwich Road from the Honingham Roundabout located on the existing A47.  Main compound for the Proposed Scheme including site offices and storage and processing facilities for earthworks materials and aggregates. Deliveries of large construction plant.  Compound may require temporary CBGM batching plant and/or asphalt batching plant.  The compound also serves the construction of:  1. River Tud crossing

Compound	Maximum area (m <sup>2</sup> )	Indicative use / duration	Compound assumptions
			2. Norwich Road junction and underbridge 3. Honingham church underpass and associated WCH route
Compound 4 (West of Easton)	17,600	Satellite compound 23 months	Access to the compound would be provided off Church Lane, north of the A47 from Easton roundabout on the existing A47.  Satellite compound to serve the construction of the Easton footbridge, including delivery and assembly of structural steel members for the bridge approach ramps and main span. Deliveries of large construction plant.  Compound may require temporary CBGM batching plant and/or asphalt batching plant.

- 2.6.10. Access to the construction compounds is outlined in Table 2.2 above. Where access is to be derived from the existing A47, traffic management measures would be in place on the existing A47 and local roads.
- 2.6.11. All compounds would ensure existing trees and hedgerows surrounding the proposed compound site would be retained. Compound layouts, fencing and material storage would be located to avoid loss of, or damage to, roots of hedgerows and trees. Access to residential properties would be maintained throughout the construction period.
- 2.6.12. It is assumed that cabins would be no more than two storey and would be white, where practicable. Topsoil storage bunds would be a maximum height of 3m and positioned to provide visual screening for receptors, such as residential properties and PRoW users. Outside of core working hours during periods of darkness, lighting would be limited to low level and localised for security purposes. During core working hours during periods of darkness it is assumed the site would be fully floodlit.

### Material storage and stockpiles

- 2.6.13. The mainline highways works for the Proposed Scheme will involve a significant proportion of earthworks associated with the construction and development of the designed alignment through excavation (cuttings) and filling (embankments). In addition, there are earthworks relating to necessary and ancillary construction works including structures (culverts, bridges, etc), drainage works, utilities and services placement and diversions, and various accommodation works which are required to support, enable and facilitate the mainline construction.
- 2.6.14. Topsoil (and potentially subsoil) would need to be removed from the proposed mainline alignment and then temporarily stockpiled until needed for re-use.

- 2.6.15. Stockpiling would also be required for imported general fill and aggregates for use in the permanent works.
- 2.6.16. Topsoil and subsoil stockpiles would generally be located at the perimeter of working areas, maximum 2m to 3m in height (in accordance with British Standard BS3882: 2015), so that they would also screen the works from the public. Specific material storage and stockpile areas are presented in Figure 2.3 (**TR010038/APP/6.2**).
- 2.6.17. Soils removed from areas identified as being of designated archaeological importance would be subject to specific procedures, defined in the Environmental Management Plan (**TR010038/APP/7.4**).

### Excavated materials

- 2.6.18. Construction of the Proposed Scheme would require excavation in places to form cuttings for the highway and this material would then be used to form embankments. The design aims to balance these 'cut and fill' requirements as far as practicable. This is considered in greater detail in Chapter 10 (Material assets and waste) (**TR010038/APP/6.1**).
- 2.6.19. A combination of imported and site won earthworks materials would be used for the construction of the permanent works, including general fill, structural fills and aggregates. The use of site won materials would be determined by site ground conditions and engineering assessments to inform the suitability for re-use. Site processing would be implemented, as required, to ensure that site won materials can be re-used in the permanent works. Materials which cannot be sourced from site would be imported from a variety of sources, including nearby third party developments, supply chain partners and other A47 Regional Delivery Partnership or Highways England schemes. These imports would be on an 'as required' basis to meet the needs of the construction programmes and the scheme permanent works designs.

### Construction traffic

- 2.6.20. The haul routes would be located within the construction corridor, likely to be located off-line of the footprint of the Proposed Scheme mainline, as well as the use of the wider existing road network (mainly the existing A47).
- 2.6.21. Construction traffic arriving from off site would consist of vehicles delivering the products required for the construction of the Proposed Scheme, including concrete, bitumen, aggregates and pipes.

- 2.6.22. All materials would arrive onto site along the existing A47. It is predicted that there would be a 50/50 split between materials coming from the east and west along the existing A47.
- 2.6.23. Some deliveries would arrive as abnormal loads, such as large construction plant and bridge beams. Regular abnormal load deliveries would be required throughout the construction works such as bridge beam delivery, earthworks plant delivery and removal.
- 2.6.24. It is assumed that over the course of works 50 to 150 heavy goods vehicles would access the site each day.
- 2.6.25. The outline traffic management plan (**TR010038/APP/7.5**) defines the measures used to reduce the impacts from construction traffic, including measures to reduce worker vehicle movements and to reduce HGV movements, particularly at peak periods. This would be implemented by the Principal Contractor.

### Existing A47 during construction

- 2.6.26. The Proposed Scheme is predominantly offline with crossings of the A47 at locations and at the tie-ins.
- 2.6.27. Appropriate traffic management measures would be put in place to ensure that traffic flows on the existing A47 and other local roads are maintained, whilst allowing safe working at the interface between the existing road network and the Proposed Scheme.
- 2.6.28. The tie-ins to the existing A47 would require overnight road closures and contraflow traffic management measures.

### Construction methods

- 2.6.29. The construction of the Proposed Scheme would use typical construction techniques associated with major infrastructure projects. Typical construction techniques would include rotary piling, cut to fill earthworks using large excavators, dozers, rollers and articulated dump trucks, reinforced concrete construction associated with new structures, road foundation and pavement construction using pavers and rollers, street furniture installation, drainage installation, service diversions using open cut and directional drilling techniques.

### *Indicative construction working hours*

- 2.6.30. It is expected that the majority of construction works would normally take place between 07.00 – 19.00 Monday to Friday and 07.00 – 19.00 on Saturday. There may be exceptions to these hours for oversized deliveries, and junction tie-ins. There are likely to be extended working hours in the summer months to take

advantage of the daylight or weather. Any works undertaken outwith the hours stated above will be agreed with the local planning authority.

### *Plant and equipment*

- 2.6.31. Construction of the Proposed Scheme would require a large quantity of plant and equipment. The volume of earth to be moved would require large excavators, dump trucks, bulldozers, compactors, graders, bowsers and stabilising plant.
- 2.6.32. Plant numbers and usage would be determined by the chosen construction methodology although for the purposes of assessment, preliminary plant lists have been used to consider construction impacts in Chapter 11 (Noise and vibration) (**TR010038/APP/6.1**).
- 2.6.33. Piling would likely be required to construct overbridges and possibly elsewhere for the retained cuttings. Major bridge structures would be likely to be built using combinations of 'cast-in-situ' elements and imported 'off-site' pre-cast elements craned into place.
- 2.6.34. Earthworks, including cuttings and embankments, would be required to create the route alignment. The cuttings and embankments would be constructed using a 'cut-and-fill' approach, using the alignment to move materials along the route corridor. The formation of the road surface would use standard techniques, including construction of capping, sub-base and pavement layers. The use of cement bound and hydraulically bound materials in the road pavement and foundations, would be used as required.

### *River Tud Crossing construction methodology*

- 2.6.35. The construction of the River Tud crossing would be undertaken in line with the following construction sequencing:
- Pre-works - Access routes would be formed from the existing A47 on either side of the River Tud
  - Stage 1 – A working platform would be constructed on the alignment of the Proposed Scheme either side of the River Tud
  - Stage 2 – Controlled Modulus Columns (CMCs) (concrete columns which are placed in a network adapted to loads and setting criteria combined with granular bed to distribute to applied load between the ground and CMC) would be installed
  - Stage 3 – Installation of permanent load transfer platform
  - Stage 4 – Working platforms for bridge construction
  - Stage 5 – Installation of box sheet piles
  - Stage 6 – Lower diaphragm construction



- Stage 7 – Deliver, assemble and place braced pairs
- Stage 8 – Install remaining permanent framework
- Stage 9 – Complete deck construction and capping beams to wingwalls
- Stage 10 – Back of wall drainage, structural backfill and fill to approach embankments
- Stage 11 – Highway construction

### *Walking, Cycling and Horse-Riding routes*

2.6.36. Alternative paths and diversions for any walking, cycling or horse-riding (WCH) routes directly affected by construction activities would be provided during construction. These diversions would be agreed with the Norfolk County Council, Broadland District Council, Breckland Council and South Norfolk Council. Any diversions would be safe for all WCHs. Temporary signage would be provided to inform members of the public of the diversions.

### **Utilities**

2.6.37. Construction of the Proposed Scheme would require the diversion, relocation or protection of existing utility assets.

2.6.38. The Proposed Scheme would require the diversion of BT Openreach, National Grid, Anglian Water, UKPN and other utility assets. Details of the individual utility diversion would be developed during detailed design. For the purpose of the preliminary design, utility corridors on the Works Plans (**TR010038/APP/2.4**) have been developed to provide spatial provision for utilities within the Proposed Scheme footprint.

### *National Grid gas diversion*

2.6.39. A high pressure gas main diversion is required as part of the Proposed Scheme to the east of the Wood Lane junction and shown in Figure 2.3 (**TR010038/APP/6.2**).

2.6.40. Two works areas would be required for the National Grid gas main diversion which are both located to the east of the proposed Wood Lane junction. The compounds would incorporate pipe storage. All works would be complete within a maximum of six months of starting and completed outside of winter months.

2.6.41. Works for the high pressure gas main diversion would include:

- Part open cut trenches with horizontal directional drilling

- Horizontal directional drilling would require 24/7 operations for the duration of drilling (likely to last 1-3 weeks)
- Bentonite collection pits would be required which would require regular HGV movements needed to bring and remove bentonite slurry
- The pipe would be strung together on the northern compound and pulled through to the southern compound location

## Demolition

- 2.6.42. Easton roundabout would be demolished as a result of the Proposed Scheme. As stated in Section 2.5, the Proposed Scheme would provide a through flow of traffic in this location.
- 2.6.43. The existing WCH route at Easton, connecting Ringland Road and Ringland Lane (known as Dog Lane), would be stopped up and demolished to prevent further unsafe crossings of the A47. The Easton footbridge would maintain safe north/south connectivity for walkers and cyclists.

## Environmental Management Plan

- 2.6.44. An Environmental Management Plan (EMP) (**TR010038/APP/7.4**) has been prepared to include construction, operational and maintenance mitigation measures which have been defined in part by the requirements which arise from the assessments presented in this ES.
- 2.6.45. In line with guidance set out in DMRB LA 120 (Environmental Management Plan), the EMP establishes a suitable mechanism to link assessment assumptions and DCO requirements. The EMP is a live document that is revised as more information becomes available throughout the lifetime of the Proposed Scheme.

## Operation and long-term management

- 2.6.46. Once the Proposed Scheme is open, it would form part of the A47 trunk road and the wider strategic road network.
- 2.6.47. The new road would be managed on a day to day basis using the monitoring and control systems in accordance with the relevant design standards.
- 2.6.48. Maintenance is defined as actions needed to inspect, repair, adjust, alter, remove, replace or reconstruct all aspects that relate to the Proposed Scheme.
- 2.6.49. Long-term maintenance and repairs would be undertaken as required to maintain the appropriate standards for the strategic road network.

- 2.6.50. The de-trunked A47 and new side roads would become the responsibility of Norfolk County Council.

### Limits of Deviation

- 2.6.51. The design has been developed to a level of detail that is sufficient to provide confidence during examination of an application for a DCO, with due consideration given to aspects of the design that have not yet been fixed in the light of Planning Inspectorate Advice Note 9 'Using the Rochdale Envelope'. The assessment is based on a preliminary Proposed Scheme design of November 2020. The assessments included within this ES are based on the design of the Proposed Scheme described within this chapter and presented in the general arrangement plans (**TR010038/APP/2.2**).
- 2.6.52. Where necessary, limits of deviation have been incorporated within the Order limits to allow modifications to be made to the Proposed Scheme during the detailed design and construction stages. Such flexibility is required, for example, to enable the Principal Contractor to alter their working procedures or make minor adjustments to the position of certain infrastructure in response to unforeseen conditions identified on site. This complies with the Rochdale Envelope approach.
- 2.6.53. The limits of deviation have been determined based on the design and construction factors and have been taken into consideration as part of the environmental assessment.
- 2.6.54. The vertical limits of deviation are referenced against the vertical profile levels indicated on the Engineering Section Plans (**TR010038/APP/2.7**).
- 2.6.55. The vertical limit of deviation for the Proposed Scheme is 1m up and 1m down.
- 2.6.56. The new carriageway would not deviate past the horizontal limits of deviation shown on the Works Plans (**TR010038/APP/2.4**). In no case would the Proposed Scheme extend beyond the defined Order limits.

### Decommissioning

- 2.6.57. It is considered highly unlikely that the Proposed Scheme would be demolished before the end of its design life of 60 years as the road would have become an integral part of the Strategic Road Network. Further detail will be provided in Chapter 10 (Material assets and waste), and Chapter 14 (Climate) (**TR010038/APP/6.1**).

2.6.58. In the event of the Proposed Scheme needing to be demolished, this would conform to the statutory process at that time, including EIA if required. Demolition of the Proposed Scheme is not therefore considered further in this ES.

## 2.7. Embedded environmental mitigation

2.7.1. The EIA team have worked closely with the design team to ensure a joined up approach throughout the assessment process. This method ensured that the majority of environmental mitigation measures were raised at an early stage as constraints and opportunities were identified and incorporated into the design. Embedded environmental mitigation measures included as part of the design entail:

- WCH provision: enhancing connectivity providing an active travel route along the A47, upgrade and provision of WCH paths, provision of Honingham Church underpass and Easton footbridge to maintain connectivity for walkers and cyclists
- Ecological measures: reducing habitat fragmentation through mammal ledges/tunnels and the provision of mammal fencing in suitable locations
- Noise barriers: provision of noise barriers to reduce noise effects at receptors
- Remeandering and additional riparian planting along the Oak Farm tributary and Hockering tributary
- SuDS design: wetland habitat creation
- Landscaping: sensitive landscaping, including wildflower planting

2.7.2. In addition to the above, the biodiversity assessment has concluded that bat boxes and badger underpasses would be provided.

2.7.3. Noise and visual screening bunds would be added to the following locations:

- Mattishall Lane - 2m high
- Church Lane - varies between 2m and 3m in height in different sections
- East of Wood Lane junction - 2m high