Norwich Western Link

Environmental Statement

Chapter 3: Description of the Proposed Scheme

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Glossary

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

Term	Definition
'the Applicant'	Norfolk County Council as the promoter of the Proposed Scheme.
'the 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).
A1270 Broadland Northway	Road name terminology, referring to the 'Northern Distributor Road' project. The A1270 is a dual carriageway all-purpose strategic distributor road, linking the A1067 Fakenham Road, near Attlebridge, to the A47 Trunk Road at Postwick. The route runs 19.5km (12 miles) around the north of Norwich.
A47 North Tuddenham to Easton Development Consent Order	Refers to National Highways A47 Development Consent Order (DCO) for the works to the A47 that National Highways has been authorised to carry out under the A47 North Tuddenham to Easton Development Consent Order 2022.
Area for temporary use during construction	Temporary construction and storage areas. Areas for temporary use during construction such as works compounds, storage sites, welfare facilities as illustrated in Environmental Statement - Chapter 3: Description of the Scheme, Appendix 3, Figure 3.1 (Document Reference 3.03.03).
Bridleway	A highway over which the public has a right of way on foot, horseback, leading a horse, or on a pedal cycle. There may also be a right to drive animals along a bridleway.

Term	Definition
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.
Drainage basin	The drainage ponds that have been designed as part of the Proposed Scheme.
Environmental barrier	The barrier constructed on the external edges of the viaduct to mitigate noise impacts to sensitive receptors.
environmental enhancement (enhancement)	The general betterment of a habitat / area of land through, planting and / or management.
Environmental Impact Assessment	The term 'Environmental Impact Assessment' describes a procedure that must be followed, when required, for certain types of projects before they can be given development consent or application approval. The procedure is a means of drawing together, in a systematic way, an assessment of a project's likely significant environmental effects.
Essential Environmental Mitigation	Areas of environmental mitigation, outside the Site Boundary, as part of the overall package of environmental mitigation as part of the Proposed Scheme, as shown on the 'Essential Environmental Mitigation' plan (Document reference: 2.11.00)
Footpath	A highway that is intended for use by pedestrians, on foot only.

Term	Definition
Foxburrow Plantation green bridge	(GB2). Drawing Structure Reference. A bridge structure which carries native hedgerow planting either side of a central track for private agricultural use, over the Proposed Scheme, as shown on the 'Foxburrow Plantation green bridge GB2 Drawings Sheet 1 and 2' (Document reference: 2.06.06).
landscape proposals / landscaping planting	Proposed planting types, within the Site Boundary, as proposed in the 'Landscaping Plans' (Document reference: 2.07.00)
Morton green bridge	(GB4). Drawing Structure Reference. A bridge structure which carries native hedgerow planting either side of a central track for non-motorised users and private agricultural use, over the Proposed Scheme, as shown on the 'Morton green bridge GB4 Drawings Sheet 1 and 2' (Document reference: 2.06.07).
Non-Motorised Users	A specific group of road users including walkers, cyclists or horse riders.
No Work Zones	Areas of existing habitat, within the Red Line Boundary, within which no construction works shall take place.
Norfolk County Council as the County Planning Authority	Norfolk County Council is the County Planning Authority who will consider the Planning Application and decide whether to grant planning permission.

Term	Definition
Nursery Woodland green bridge	(GB5). Drawing Structure Reference. A bridge structure which carries native hedgerow planting over the Proposed Scheme, as shown on the 'Nursery woodland green bridge GB5 Drawings Sheet 1 and 2' (Document reference: 2.06.08).
Principal Contractor	The contractor who will deliver the Proposed Scheme.
Proposed northbound police observation platform	A vantage point where police patrol vehicles can stop clear of the carriageway and hard-shoulder, in the northbound direction.
Proposed southbound police observation platform	A vantage point where police patrol vehicles can stop clear of the carriageway and hard-shoulder, in the southbound direction.
Public Right of Way	A public right of way is a route by which the public can pass along prescribed routes over land, at all times.
Red Line Boundary	The Red Line Boundary incorporates the Site Boundary, the Essential Environmental Mitigation, and No Work Zones not within the Site Boundary, as shown on the 'Red Line Boundary Plan' (Document reference: 2.02.00).
Restricted byway	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.
Ringland Lane bridge	(BR2). Drawing Structure Reference. A bridge which carries Ringland Lane under the Proposed Scheme, as shown on the 'Ringland Lane Overbridge General Arrangement Drawings Sheet 1 and 2' (Document reference: 2.06.02).

Term	Definition
Riparian Drain	Shallow, dry, and terrestrialised length of ditch in the Wensum floodplain within the Site Boundary.
Riparian Watercourse	Any flow of water in a natural or artificial channel along the bank of a watercourse.
River Wensum Viaduct	(BR1). Drawing Structure Reference. Viaduct crossing the River Wensum Special Area of Conservation and floodplain (approximately 490m long). The ten-span bridge design includes piled piers within the floodplain.
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.
Temporary Works Platform	The temporary platform across the floodplain used to construct the viaduct. It will cross the River Wensum by means of a temporary bailey bridge.
The Broadway green bridge	(GB1). Drawing Structure Reference. A bridge structure which carries native hedgerow planting either side of a central track for non-motorised users and private agricultural use, over the Proposed Scheme, as shown on the 'The Broadway green bridge GB1 General Arrangement Drawings Sheet 1 and 2' (Document reference: 2.06.05).
Tud tributary culvert / Bat underpass	(CU2). Drawing Structure Reference. An underpass culvert which allows a minor watercourse tributary of the River Tud, under the Proposed Scheme, as shown on the 'Tud Tributary Bat Underpass Culvert Drawing' (Document reference: 2.06.03).

3 Description of the Proposed Scheme

3.1 Introduction

3.1.1 This chapter provides a description of the Norwich Western Link ('the Proposed Scheme'), including how the Proposed Scheme would be constructed, and the assumptions used for the basis of assessment where this information is subject to confirmation. This description aligns with the proposals for which planning consent is sought, together with the supporting plans. This is what the technical assessments undertaken as part of the Environmental Statement have been based upon.

3.2 Overview of the Scheme

3.2.1 Development of up to 6km of the Norwich Western Link Road connecting the A1067 (Fakenham Road) with the new A47 North Tuddenham to Easton scheme (being developed by National Highways), including the construction of a new roundabout junction with the A1067 Fakenham Road, improvements to the A1067 Fakenham Road and the roundabout junction with the A1270 Broadland Northway. Structures include a new viaduct carrying the Proposed Scheme over the River Wensum, a new bridge over Ringland Lane, the provision of a green bridge carrying the Broadway over the Proposed Scheme, three further green bridges, wildlife crossings, and culverting of a tributary to the River Tud. Related works include the stopping up, diversion, bunds, improvement and provision of side roads, new walking cycling and horse-riding provision, the stopping up, replacement and provision of new private means of access, and ancillary landscaping, ecological mitigation, surface water drainage system, flood compensation, bunds, other environmental mitigation, diversion and protection of apparatus and temporary works to facilitate construction, and other ancillary works. As part of the Proposed Scheme, the following structures are proposed:

- Viaduct crossing the River Wensum Special Area of Conservation and floodplain (approximately 490 metres long). The ten-span bridge design includes piled piers within the floodplain;
- A culvert crossing of a minor watercourse in the floodplain where it is intersected by a maintenance access track;
- Wildlife crossings structures, including underpasses and green bridges;
- Overbridges where required to maintain routes across the scheme for local landowner vehicles, non-motorised users (pedestrians, cyclists and horse riders) and/or wildlife; and
- Culvert structure for a tributary of the River Tud.

3.2.2 The Proposed Scheme design includes sloped earth embankments and cuttings to manage the topography, earth bunds, landscape planting, environmental mitigation measures, drainage basins, and maintenance access tracks.

3.2.3 As part of a separate planned scheme, National Highways proposes to realign and dual the A47 between North Tuddenham and Easton. This scheme's Development Consent Order (DCO) was granted by the Secretary of State for Transport in August 2022. As part of this scheme, National Highways will construct the Honingham grade-separated junction, and the Norwich Western Link will connect to the north-eastern side of that junction.

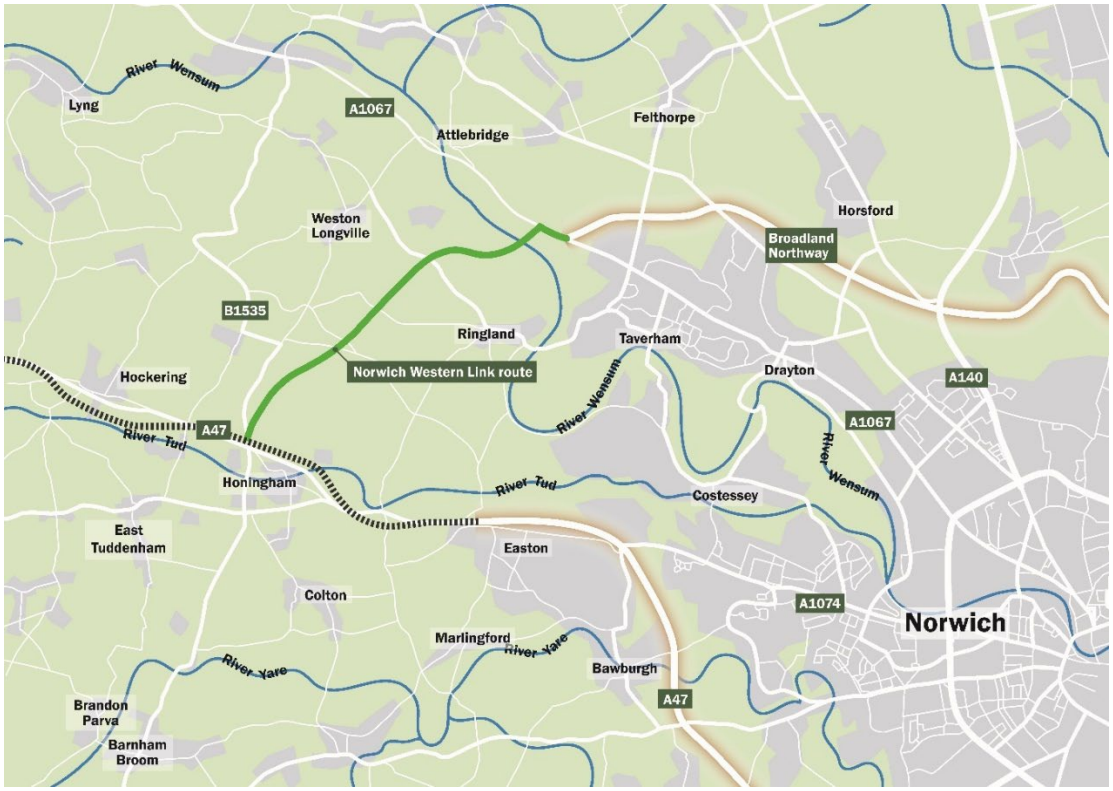
3.2.4 The Rochdale Envelope approach to assessment has been applied where there is the need for design flexibility and further refinement in detailed design. The areas of design flexibility are outlined later in this chapter, in section 3.4.

Proposed Scheme Location

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

3.2.6 The Proposed Scheme consists of the construction of a new road linking the A1270 Broadland Northway from its junction with the A1067 Fakenham Road to the A47 trunk road near Honingham. The road would pass through predominantly farmland lined with hedgerows and trees and areas of woodland. The alignment of the Proposed Scheme is illustrated in **Plate 3-1 Overview of the Proposed Scheme**.

Plate 3-1 Overview of the Proposed Scheme



Aims of the Scheme

3.2.7 The objectives of the Proposed Scheme are set out in detail in the **Planning Statement** (Document Reference 1.01.00) and are in summary:

High-level objectives

- Support sustainable economic growth;
- Improve the quality of life for local communities;
- Promote an improved environment; and
- Improve strategic connectivity with the national road network.

Specific objectives

- Improve connectivity and journey times on key routes in Greater Norwich;
- Reduce the impacts of traffic on people and places within the western area of Greater Norwich;
- Encourage and support walking, cycling and public transport use;
- Improve safety on and near the road network, especially for pedestrians and cyclists;
- Protect the natural and built environment, including the integrity of the River Wensum Special Area of Conservation; and
- Improve accessibility to key sites in Greater Norwich.

3.3 Proposed Scheme Description

Documents and Drawings

3.3.1 The Proposed Scheme is illustrated by a series of drawings produced to support and submitted with the planning application, which are listed below:

- Route Plan (Document Reference 2.01.00);
- Red Line Boundary Plans (Document Reference 2.02.00);

- General Arrangement Plans (Document Reference 2.03.00);
- Cross Sections Drawings (Document Reference 2.04.00);
- Long sections Drawings (Document Reference 2.05.00;
- Structures Design Drawings (Document Reference 2.06.01 to 2.06.09);
- Landscaping Design Plans (Document Reference 2.07.00);
- Drainage Design Plans (Document Reference 2.08.00 to 2.8.05);
- Drainage Strategy (Document Reference 4.04.00);
- Topographical Survey Plans (Document Reference 2.10.00);
- Lighting Design Plan (Document Reference 2.09.00); and
- Essential Environmental Mitigation Plan (Document Reference 2.11.00).

Planning Application Boundary

3.3.2 All areas of land required temporarily or permanently for the construction and operational activities of the Proposed Scheme are contained within the Red Line Boundary as illustrated in **Figure 3.1** (**Appendix 3.3: Figures** Document Reference 3.03.03). The Environmental Impact Assessment (EIA) is based upon this Red Line Boundary. The Red Line Boundary includes:

- Site Boundary: The areas within which the main engineering works (structures, carriageway, drainage, earthworks etc) will be undertaken as outlined in this chapter. This Site Boundary includes areas for temporary use during construction, including works compounds, storage sites, welfare facilities;
- The remaining areas within the Red Line Boundary and beyond the Site Boundary. Examples include, though not limited to, areas identified on the Essential Environmental Mitigation Plan (Document Reference 2.11.0) and Marl Hill Cycleway and Honingham Lane Closure (Document Reference 2.03.00); and

- There are areas within the Red Line Boundary that have been identified as No Work Zones. These No Work Zones are designated to protect areas of habitat within them from direct disturbance. These are illustrated on the General Arrangement Plans (Document Reference: 2.03.00).

The Proposed Scheme Description

3.3.3 This section provides a description of the Proposed Scheme from north to south. The chapter then goes on to describe key elements (such as structures, drainage etc.) in further detail.

3.3.4 The Proposed Scheme is illustrated on General Arrangement (GA) Plans (Document Reference 2.03.00).

3.3.5 An existing roundabout on the A1270 Broadland Northway will be upgraded and form the northern extent of the Proposed Scheme. In addition, approximately 340m of the A1067 Fakenham Road will be upgraded to dual carriageway standard and a new roundabout junction constructed on the A1067 from which the start of the new dual carriageway standard road. A shared pedestrian and cycle route is proposed alongside the A1067, between the A1270 roundabout and Attlebridge Restricted Byway 4 to the west.

3.3.6 Moving south from the A1067, the Proposed Scheme will be a dual carriageway standard of new road that will cross the River Wensum and its flood plain by means of a viaduct. The viaduct will span the River Wensum, a Special Area of Conservation, with the piers being sited at least 9m away from the top of the River Wensum riverbank. The design of the viaduct structure would be a ten-span single-deck bridge with a reinforced concrete deck slab. The viaduct is approximately 490 metres in length and varies in height from approximately 6 – 13 metres from existing ground level to the underside of the deck. The viaduct will be constructed using a Temporary Works Platform in the construction phase. The Temporary Works Platform is described in **Section 3.5**.

3.3.7 A maintenance access track will run adjacent to the viaduct in the floodplain, to allow maintenance access to the viaduct structure once the Proposed Scheme is operational. A floodplain ditch will be culverted under the maintenance access track. The maintenance access track continues south in parallel to the new carriageway and joins Ringland Lane. The maintenance access track north of the river is accessed from the Proposed Scheme/A1067 roundabout for maintenance vehicles only.

3.3.8 In the floodplain to the west of the viaduct there will be essential environmental mitigation such as ditch improvement for water vole and improvements to the floodplain ditch network and River Wensum as part of the Water Framework Directive (WFD) requirement to improve the natural process of the water environment.

3.3.9 South of the viaduct, the north and southbound carriageways pass through the northern woodland (the northern woodlands are a complex of woodland areas that will be severed by the road) with a slight separation of the carriageways in this section. The carriageway will be in cutting at this location with a retaining wall in proximity to the Primrose Grove Ancient Woodland. An overbridge (the Nursery Woodland green bridge) will span the Proposed Scheme as it passes through the northern woodland to maintain wildlife connectivity between the woodland. The Nursery Woodland green bridge is located to be aligned to existing bat flightlines.

3.3.10 The existing single lane width side road Ringland Lane crosses below the Proposed Scheme via an underpass. This allows continued use during operation and provides an underpass feature for bats, tying into landscape planting.

3.3.11 There will be a second green bridge between Ringland Lane and Church Hill Lane (known locally as Weston Road). This green bridge (known as the Morton green bridge) includes a Public Right of Way (PRoW) (a new Bridleway) and landowner vehicular access provision across the Proposed Scheme. Weston Road is to be severed at the point at which it is crossed by

the Proposed Scheme, with turning heads provided to accommodate U-turns. Vehicular access will be maintained for existing properties, businesses, and agricultural land, with access restrictions at either end. Non-Motorised Users (NMUs) would be diverted across the Morton green ridge. The surface treatments for the NMU provision are outlined in the paragraph 6.2.27 of the **Sustainable Transport Strategy** (Document Reference: 4.02.00).

3.3.12 Moving south along the route as the Proposed Scheme crosses Breck Road (also known as Breck Lane) and The Broadway, these roads will be intersected by the Proposed Scheme. The Broadway and Breck Road will be closed to through traffic and NMUs will be diverted to a new green bridge (the Broadway green bridge) carrying a public bridleway crossing over the Proposed Scheme. Vehicular access will be provided to adjacent private land.

3.3.13 Further south the Proposed Scheme passes through Foxburrow Plantation where the fourth overbridge spans the Proposed Scheme (the Foxburrow Plantation green bridge). Adjacent to this, the Foxburrow stream (a tributary of the River Tud) will pass under the Proposed Scheme via a culvert. The Tributary of the Tud Culvert also serves as a bat underpass. The Proposed Scheme then connects to the new junction of the A47 dualling scheme being delivered by National Highways. The Proposed Scheme includes construction of the spur and connection to the A47 roundabout. The remainder of the junction is being constructed by National Highways under its A47 North Tuddenham to Easton DCO.

3.4 Key Scheme Components

3.4.1 The Proposed Scheme would involve the construction of an approximately 6 km dual carriageway conveying traffic in two lanes in each direction. Associated with the new carriageway, the Proposed Scheme would require the upgrade of an existing roundabout (the A1067/A1270 roundabout), one new roundabout at the Proposed Scheme's connection with the A1067, and a connection to the future A47 junction (being delivered by National Highways).

3.4.2 Additionally, the proposed structures along the Proposed Scheme include one viaduct, four overbridges (serving as green bridges), Ringland Lane bridge and two culverts.

3.4.3 The key components of the Proposed Scheme are outlined in **Table 3-1.** below. Paragraphs 3.4.48 to 3.4.64 discuss the design flexibility considered as part of the Planning Application is outlined where flexibility to refine the design, within parameters, is required. This is in line with the Rochdale Envelope approach used in the Environmental Impact Assessment.

Table 3-1 Key Components of the Proposed Scheme

Key Component	Type	Grid Reference Easting	Grid Reference Northing	Details
A1067 Fakenham Road/A1270 Broadland Northway Roundabout	Existing	614716	315421	Upgrade of the existing 4-arm roundabout that joins the A1067 and the A1270 to increase capacity. One arm will include a connection to a proposed drainage basin for maintenance.
A1067 Fakenham Road/NWL Roundabout	New	614330	315599	Construction of a new roundabout which connects the Proposed Scheme to the A1067. This is a 4-arm roundabout with one arm for a maintenance access only track.
Viaduct across the River Wensum floodplain	New	613886	315355	The design of the viaduct structure comprises a ten-span single-deck bridge with a reinforced concrete deck slab. The viaduct is approximately 490m in length and approximately 6-13m from ground level to the underside of the deck. At each of the nine pier locations, are three piled piers made of reinforced concrete with bearing connections to the deck structure, see Structure Drawings (Document Reference 2.06.01). An Environmental Barrier, designed for acoustic performance, will be approximately 1.2m height and run the length of the viaduct on the outer edge of the parapets. A maintenance access track will be built for the viaduct. This access track will cross a wet ditch in the floodplain via a culvert.
Nursery Woodland green bridge	New	613328	315224	The Nursery Woodland green bridge (GB5) will be approximately 30m wide and be positioned on existing bat flight lines to maintain habitat connectivity. The structure has been designed to allow for landscape planting, to include as a minimum, hedgerow planting across the entire length of the structure and connections to retained vegetation either side of the structure. There will be no public access across this bridge with access for maintenance by foot only.
Ringland Lane bridge (Chainage 1700 – 1800)	New	612203	315273	Ringland Lane will be kept open to traffic as part of the Proposed Scheme; the existing road will pass below the Proposed Scheme alignment. The structure is designed to facilitate bat passage through the bridge and includes connective planting either side.

Key Component	Type	Grid Reference Easting	Grid Reference Northing	Details
Morton green bridge	New	611989	314623	The Morton green bridge (GB4) will be a minimum 14.5m width and be positioned on existing bat flight lines to maintain habitat connectivity. The structures have been designed to allow for landscape planting, to include as a minimum, hedgerow planting across the entire length of the structure and connects to retained vegetation either side of the structure. NMU access for users of Church Hill Lane and Blackbreck Lane will be diverted over this bridge when the Proposed Scheme opens.
The Broadway green bridge	New	611085	313743	The Broadway green bridge (GB1) will be a minimum 14.5m width and be positioned on existing bat flight lines to maintain habitat connectivity. The structures have been designed to allow for landscape planting, to include as a minimum, hedgerow planting across the entire length of the structure and connections to retained vegetation either side of the structure. NMU access for users of the Broadway and Breck Lane will be diverted over this bridge. Broadway will be closed to general traffic, though vehicular access will be provided for adjacent landowners.
Foxburrow Plantation green bridge	New	610613	313394	There will be no access across this overbridge except for maintenance and landowner access. The Foxburrow green bridge (GB2) will be a minimum 14.5m width and be positioned on existing bat flight lines to maintain habitat connectivity. The structures have been designed to allow for landscape planting, to include as a minimum, hedgerow planting across the entire length of the structure and connects to retained vegetation either side of the structure.
Tud tributary culvert / Bat underpass	New	610523	313323	The culvert is approximately 70m in length and internal dimensions of 4m wide and 4.5m high (headroom of 4m above the bed level). The culvert has reinforced concrete wingwalls at both ends and scour protection and is aligned to the current alignment of the watercourse. The dimensions of the culvert has been designed to allow for the structure to provide an underpass feature for bat connectivity.
A47 Roundabout	National Highways to construct	609749	312452	This roundabout forms part of the National Highways A47 North Tuddenham to Easton DCO scheme. The Proposed Scheme will connect to this roundabout. This will be a conversion of the existing 4-arm roundabout to a 5-arm roundabout with the addition of an entry and exit to/from the Proposed Scheme and any necessary tie-in works.

3.4.4 Illustrative images of the viaduct and typical overbridge green bridge design are included in **Plate 3-2** and **Plate 3-3** below.

Plate 3-2 Typical Viaduct Cross Section

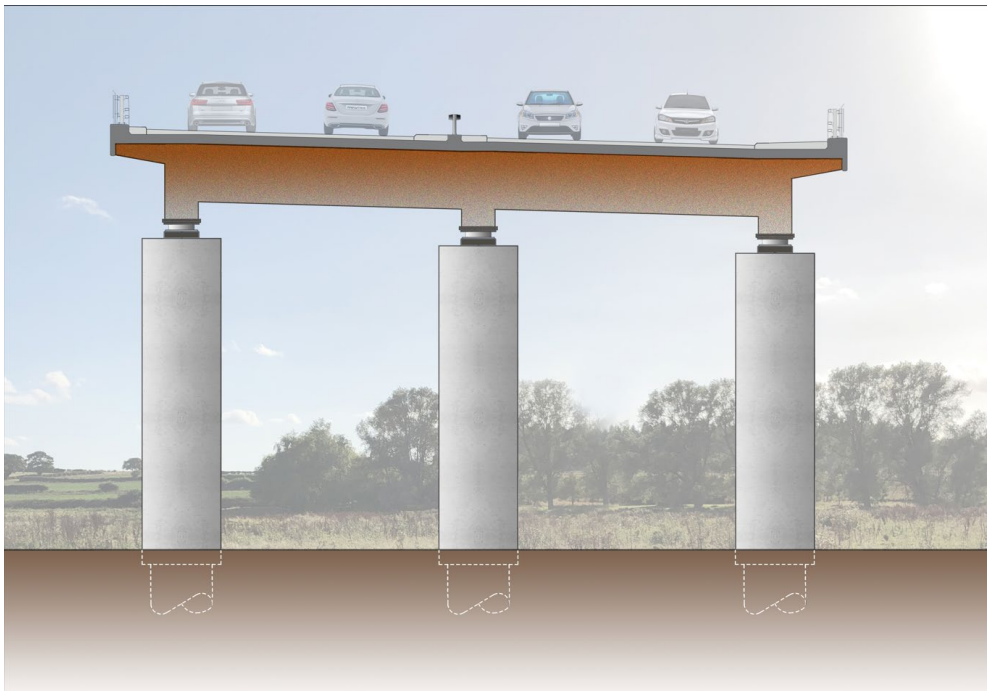


Plate 3-3 Typical Green Bridge Design Cross Section (where NMU access is provided)

3.4.5 A retaining wall is proposed where the road is in cutting to minimise the footprint of the Proposed Scheme as it passes Primrose Grove ancient woodland. This retaining wall is approximately 125 metres long and 10 metres high and aligned at least 15 metres away from the Primrose Grove ancient woodland to protect the woodland trees from physical impacts.

Proposed Earthworks

3.4.6 Typical earthworks slopes vary depending on the section of the Proposed Scheme. These are outlined in the Design Flexibility section of this chapter and are defined by 'fill' for a raised earthwork and 'cut' for a section in cutting.

3.4.7 To maximise the environmental and engineering benefit, the Proposed Scheme earthworks will look to achieve an on-site cut and fill balance as far as practicable. This balance will need to consider the function of the earthwork design in terms of its key function as landscape integration, screening function and performance and adapting to site constraints (i.e. localised steeper slopes to avoid constraints such as veteran trees).

3.4.8 The typical cross sections are illustrated on the Cross Section Drawings (Document Reference 2.04.00).

Proposed Highway Drainage

3.4.9 A **Drainage Strategy** (Document Reference 4.04.00) and the drainage design plans (Document Reference 2.08.00 to 2.08.05) have been developed. This strategy will collect surface water from the carriageway where the Proposed Scheme intersects natural catchment. The road will be built so drainage water flows into channels and pipes which enter sedimentary forebay. This ensures water is suitably treated before it enters a final drainage basin where the treated water is discharged.

Existing Catchments

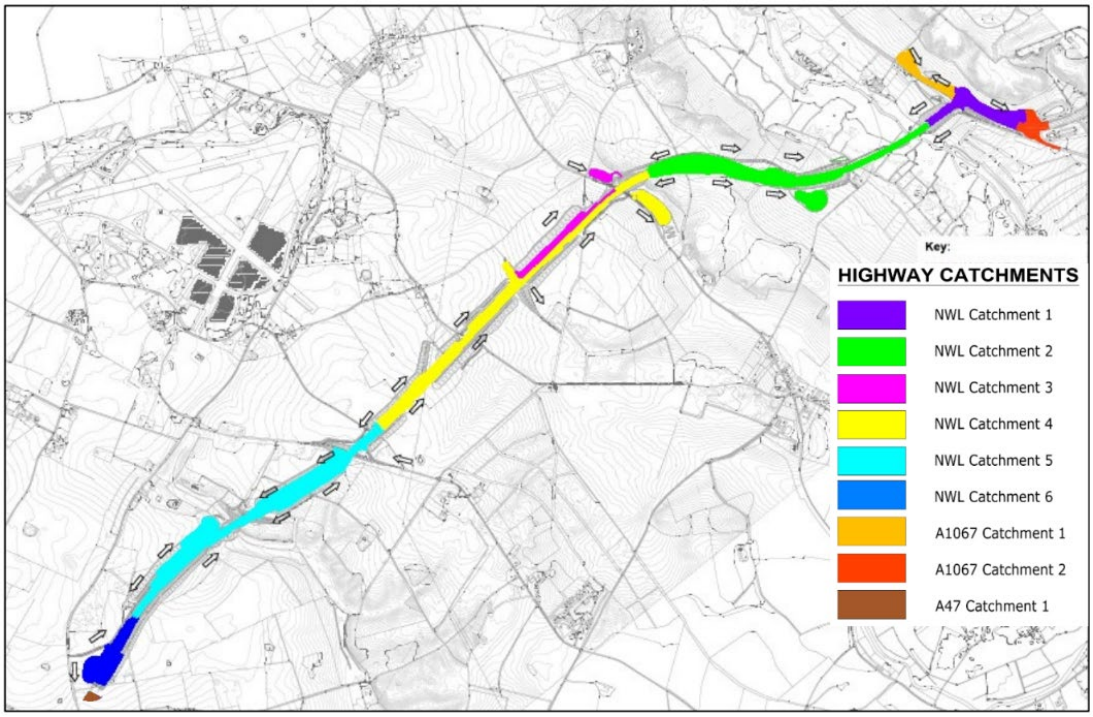
3.4.10 Where the earthworks of the Proposed Scheme intersect a natural catchment, pre-earthwork drainage (PED), ditches and culverts are proposed to intercept natural runoff and convey it away from the external highway earthworks and towards adjacent watercourses and infiltration features where a suitable watercourse outfall is unavailable.

3.4.11 Filter drains or ditches will be laid at the base of embankments and cuttings and to provide a positive drainage to slopes. Filter drains will be laid in the base of swales where longitudinal gradients are low.

Drainage Catchments

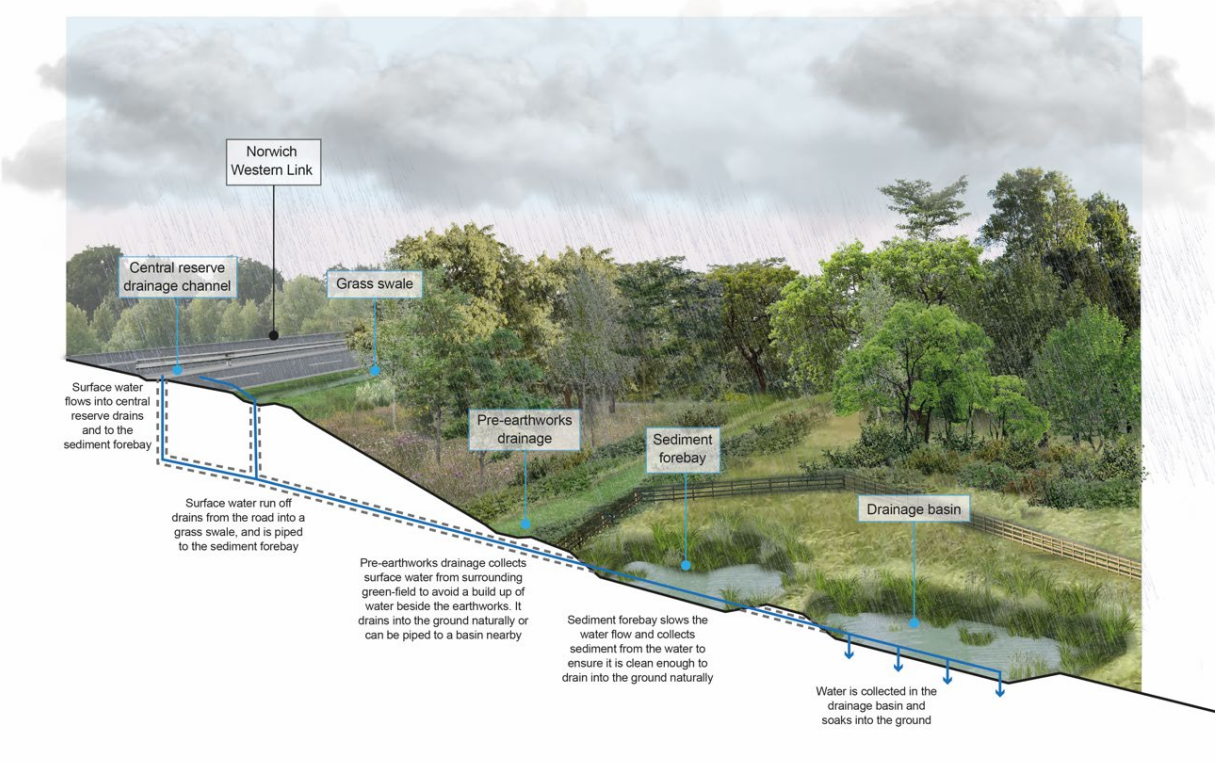
3.4.12 The surface water drainage for the Proposed Scheme has been divided into nine individual sub-catchments as illustrated in **Plate 3-4** below. These are presented in the **Drainage Strategy** (Document Reference 4.04.00).

Plate 3-4 Proposed Scheme Drainage Catchments



3.4.13 Each catchment will discharge to either a shallow infiltration basins or attenuation basins. An Illustrative basin train layout is illustrated in **Plate 3-5** below.

Plate 3-5 Illustrative Drainage Treatment



3.4.14 Basin overflows will be provided to each forebay and attenuation of infiltration basin. This is to prevent the overtopping of any basin.

3.4.15 For environmental pollution control, measures such as swales, catchpits and deep-pot gullies will intercept siltation at the edge of the carriageway and forebays before entering each basin and will provide a second level of treatment of highway run-off. Wet areas are provided in the forebays to each basin to allow capture of sediment and an area for planting for tertiary treatment of water prior to disposal. A pollution control valve will be provided for spillage control.

Proposed Non-Motorised User Provision

3.4.16 The Proposed Scheme includes routes for Non-Motorised Users (NMU). The Proposed Scheme includes local diversions to a small number of existing PRoWs to allow continued use, and sections of new routes to added to the local PRoW network to enhance and connect existing provision. In some instances, private vehicular access will be permitted over PRoWs created or

diverted as a result of the Proposed Scheme. The Proposed Scheme's Non-Motorised User Provision is illustrated in the **Transport Assessment Appendix 1.1 Non-Motorised User Provision Plan** (Document Reference 4.01.01) and described in more detail in the Sustainable Transport Strategy (Document Reference 4.02.00).

3.4.17 The NMU provision focuses on joining up the existing fragmented and sparse public rights of way network in the immediate vicinity of the Proposed Scheme. Non-Motorised User routes will be dedicated over two Green Bridges crossing the Proposed Scheme alignment in order to resolve localised issues of severance, aiming to offer a coherent network around the scheme which not only mitigates the severance but enhances the amenity for pedestrians, cyclists and equestrians. With the Proposed Scheme in place there will be increased opportunities for active travel and recreational movement.

3.4.18 Also included in the Proposed Scheme is a new segregated NMU link from Weston Longville to Morton on the Hill parallel with the proposed viaduct, with onward connections to Attlebridge and the Marriott's Way, plus a new A1067 crossing facility and cycle priority measures on Ringland Lane. The Non-Motorised User provision is an integral part of the Proposed Scheme.

Complementary Sustainable Transport Measures (CSTM)

3.4.19 The **Sustainable Transport Strategy (STS)** (Document Reference 4.02.00) includes additional enhancement measures referred to as 'Complementary Sustainable Transport Measures (CSTM)'. These are supplementary measures beyond the Red Line Boundary that are proposed to further improve walking, cycling and public transport use to the west of Norwich. With the Proposed Scheme in place, there is predicted to be traffic reduction on existing roads making them safer and more attractive for Non-Motorised Users especially cyclists. The CSTM comprises Cycle-Friendly Routes and Bus Improvement Measures within the public highway, which would be carried out by the Local Highway Authority separately from the Proposed Scheme under its existing powers. These additional CSTM elements do not form part

of this planning application but are considered within the cumulative assessment.

3.4.20 The Cycle Friendly Routes consist of cycle priority measures, speed calming, signage and revisions to road markings to increase driver awareness and encourage lower speed traffic movement on existing rural roads that will have relatively low traffic flows, with the Proposed Scheme in place. At Weston Road, additional passing places will be provided to enable cars to overtake cyclists safely. These will predominantly be formalisation of informal passing places which have been eroded within the highway verge. At Dereham Road, Easton reallocation of road space within the village would offer priority to cycles. Improved NMU crossing facilities could also be installed where New Road meets Chapel Break Road and at A1067 Drayton High Road junction with Costessey Lane and Taverham Lane.

3.4.21 The Bus Improvement Measures focus on enhancing opportunities for bus travel in the western urban fringe of Norwich and offering more direct links from Taverham, Costessey and Drayton to key employment sites on the west side of Norwich, including Norfolk and Norwich University Hospital (NNUH), Norwich Research Park, Norwich Airport and University of East Anglia. There are also opportunities to enhance bus service connectivity to Queens Hills and Longwater retail park as well as supporting and enhancing the accessibility of proposed major housing growth sites at Taverham. A new bus route has been identified which would serve these catchments and offer a more direct route on the western edge of Norwich, avoiding the need to change buses in the city centre. Bus stop improvements have also been identified on the proposed route.

Traffic Mitigation Scheme North of A1067

3.4.22 Strategic traffic modelling indicates that without additional mitigation measures, there is expected to be an increase in traffic through the area south of A47 between Honingham and Wymondham, as traffic with origins and destinations in Wymondham is likely to re-route to access the Proposed Scheme more directly through the minor road network.

3.4.23 Mitigation measures to deter through traffic are proposed through the villages of Felthorpe and Horsford. Measures include speed limit reductions at The Street and Taverham Road in Felthorpe and Holt Road in Horsford. This would be made to be self-enforcing with supporting measures such as improved Non-Motorised User crossing facilities and priority give way features.

3.4.24 Turning restrictions are also to be considered at the junction of B1149 with Shortthorn Road in the event that post opening traffic monitoring shows this to be required in the event that agreed limits are observed to be exceeded.

3.4.25 Within the village of Attlebridge, access only restrictions are being considered to accompany the Proposed Scheme in order eliminate strategic through traffic. This would be subject to a monitor and manage regime and implemented only when observed traffic data shows this to be necessary.

Traffic Mitigation Scheme South of A47

3.4.26 In order to minimise the extent to which through traffic is drawn through Barnham Broom village with the Proposed Scheme in place, additional interventions within the extents of public highway are to be developed to protect residential amenity for residents south of A47. The measures include speed limit reductions through Barnham Broom village, Carleton Forehoe, Kimberley and the north of Wymondham, with HGV restrictions through Barnham Broom.

3.4.27 Strategic traffic modelling indicates that without additional mitigation measures, there is expected to be an increase in traffic through the area south of A47 between Honingham and Wymondham, as traffic with origins and destinations in Wymondham is likely to re-route to access the Proposed Scheme more directly through the minor road network.

Honingham Lane Closure Option

3.4.28 The Traffic Mitigation proposals include the option of permanently closing Honingham Lane, Ringland at a point approximately 100 metres south of its junction with Weston Road. National Highways DCO (Development Consent

Order) application for the A47 North Tuddenham to Easton dualling scheme authorises a temporary closure in this location in order to protect Ringland village from through traffic prior to the opening of the Proposed Scheme. With the Proposed Scheme in place, the option to make this situation permanent would help to minimise traffic on the Cycle Friendly Route from Ringland to Easton which would enhance opportunities for travel by active modes and maintain a low traffic environment through Ringland village. Monitoring of traffic patterns will be carried out as a follow up measure once the Proposed Scheme opens to traffic to determine whether it is appropriate to retain this closure on a permanent basis. Monitoring within Weston Longville and Ringland will help to determine the effectiveness of this measure.

3.4.29 The Proposed Scheme includes provision for improvements on Honingham Lane, including the provision of an agricultural bypass, to allow for continued private vehicular access to land should it prove necessary to close Honingham Lane to traffic. **Monitor and Manage Approach to Traffic Mitigation.**

3.4.30 As set out within the **Transport Assessment** (Document Reference 4.01.00), the Applicant will commit to the monitoring of traffic on a number of roads to determine the impact of actual traffic volumes following opening of the Proposed Scheme. The Applicant will produce a monitoring plan ahead of the opening of the Proposed Scheme which details the locations and timescales for monitoring.

3.4.31 The outcome of the monitoring together with consultation with communities will inform the decision whether to proceed with the implementation of the prohibited right turns at the Holt Road/Shortthorn Road junction and access restrictions through Attlebridge. This ‘monitor and manage’ approach would not preclude the Applicant bringing forward elements of the traffic mitigation proposals before the opening of the Proposed Scheme if conditions on the network indicate they are needed.

3.4.32 Locations proposed for a monitor and managed approach to mitigation include:

- Station Road and Felthorpe Road, Attlebridge;
- Shortthorn Road, Felthorpe; and
- Other villages north of A1067 and south of A47 (indicative locations are traffic data points as shown in **Figures 9-3, 9-4** and **9-5** of the Transport Assessment).

3.4.33 In some locations, traffic modelling shows differing junction capacity results depending on the extent to which traffic mitigation is delivered. As set out in Section 8 of the **Transport Assessment**, it is proposed that the following junctions would also be subject to a monitor and manage regime post opening of the Classified Road.

- J17 Fir Covert Road/A1270;
- J20 – A1067/Costessey Lane/School Road;
- J21 Broadland Northway / Drayton Lane (further details provided in section 9.12 below); and
- J22a and J22b (A140/A1270 interchange).

3.4.34 The outcome of the monitoring and further requirements for mitigation at these junctions will be discussed and agreed with the Local Highway Authority in accordance with the Monitoring Plan.

Landscape and Essential Environmental Mitigation

3.4.35 A **Landscaping Design** (Landscaping Design Plans Document Reference 2.07.00) has been developed to integrate the Proposed Scheme into the landscape and includes environmental objectives such as connectivity to existing woodland/planting, habitat creation and visual screening.

3.4.36 Complementing the Landscaping Design along the Proposed Scheme are additional areas of habitat creation, and habitat enhancement, to meet the scheme requirements and objectives in relation to Biodiversity Net Gain

(BNG), protected species mitigation, tree loss compensation and Water Framework Directive (WFD) mitigation. These areas are identified on the **Essential Environmental Mitigation Plan** (Document Reference 2.11.00). The **Air Quality Compensation Strategy** (Document Reference 6.01.00) outlines additional measures that form part of the Proposed Scheme to address adverse air quality impacts and these are illustrated on the **Essential Environmental Mitigation Plan** (Document Reference 2.11.00).

3.4.37 Within the identified Essential Environmental Mitigation Areas identified on the Essential Environmental Mitigation Plan, the location of the areas has been informed by mitigation requirements/function and landowner discussions. For protected species such as barn owl, this mitigation takes the form of grassland creation and enhancements. These areas of grassland have been located away from the Proposed Scheme alignment in line with good practice. For bats the measures include the creation and enhancement of woodland, scrub and hedgerows. In addition, existing woodland areas have been identified to locate bat boxes. For water vole there are ditch enhancement and improvements in the River Wensum floodplain.

3.4.38 For tree compensation areas of new woodland creation have been included and the area defined by the compensation calculation requirements outlined in **Appendix 10.35 Arboricultural Impact Assessment** (Document Reference 3.10.35). Areas to be used for tree compensation are illustrated on the Landscaping Design Plans (Document Reference 2.07.00) and Essential Environmental Mitigation Plan (Document Reference 2.11.00).

3.4.39 The WFD mitigation measures are focussed on the River Wensum floodplain and the Tributary of the Tud (Foxburrow Stream). Concept drawings have been presented in **Appendix 12.3**: **Water Framework Directive Assessment Sub Appendix D - River Condition Indicators and Enhancement Concepts** (Document Reference: 3.12.03d) and these measures will be further refined in detailed design in liaison with landowners and stakeholders. These measures are improvements to the condition of these watercourses. Measures along the Tributary of the Tud will include

measures to improve the condition such as bank reprofiling, exclusion fencing and wood dams.

3.4.40 The River Wensum improvements and naturalisation are likely to include:

- Exploring the opportunity to reconnect a historic meander of the River Wensum;
- Introduce gravel features (riffles and bars) to replenish riverbed substrate;
- Increase river diversity by planting a mix of native tree species in the river corridor;
- Some exclusion fencing to prevent stock poaching the river banks; and
- Bank reprofiling.

3.4.41 The improvements to the Wensum floodplain watercourse/ditches are likely to include:

- Native tree planting near ditches;
- Planting of aquatic plants;
- Installation of fencing to protect vegetation growth and minimise grazing/erosion; and
- Refinement of the ditch maintenance regime.

3.4.42 Further detail on the purpose of these creation areas can be found in;

- **Chapter 10: Biodiversity** (Document Reference 3.10.00), **Ecological Mitigation Strategy** (Appendix 10.32) (Document Reference: 3.10.32), Chapter 11: Bats (Document Reference 3.11.00), and **Outline Bat Mitigation Strategy** (Appendix 11.6) (Document Reference: 3.11.06) for habitat creation mitigation measures for protected species including bats, water vole and barn owl; **Biodiversity Net Gain Report** (Appendix 10.33) (Document Reference: 3.10.33) for BNG measures;

- Tree loss compensation requirements as outlined in the Arboriculture Report (**Appendix 10.35**) (Document Reference: 3.10.35); and
- Water Framework Mitigation in line with the Water Framework Directive Assessment (**Appendix 12.3**) (Document Reference: 3.12.03).

3.4.43 The measures outlined above will involve the production of a Landscape and Ecological Management Plan (LEMP) and Detailed CEMP(s) for approval by the CPA, consistent with these strategies, secured by Planning Condition. Where related to European protected species, the relevant mitigation strategy to be consistent with the relevant outline mitigation strategy as part of the EPSML application to be approved by Natural England.

3.4.44 **Appendix 3.4: Mitigation Route Map** (Document Reference: 3.03.04) outlines the proposed mitigation, monitoring or other measures to prevent, offset and/or minimise the effects of the Proposed Scheme and map out the respective management plans that will be implemented.

Lighting

3.4.45 No new lighting is proposed along the corridor of the Proposed Scheme or on any of the structures. The only lighting will be on the approach to the A47 where a short section will be lit to the required lighting level from the give way line on the new A47 roundabout. Lighting columns will be up to 10 metres high. Lighting design will include associated cabling ducts and feeder pillars as required. The lighting proposals are illustrated on the **Lighting Design Plans** (Document Reference 2.07.00) and refined at detailed design.

3.4.46 The road signage included on the A1067 Fakenham Road/Proposed Scheme Roundabout and A1067 Fakenham Road/A1270 Broadland Northway Roundabouts will be illuminated.

Finishing and Associated Works

3.4.47 In addition to the components outlined above, other finishing and associated works include:

- Vehicle Restraints system in the central reserve and verge edge, where applicable;
- Police observation platforms. These are safe locations for police vehicles to park up and the design will be agreed with the police service at detailed design;
- An area to provide flood compensation to compensate for infrastructure within the floodplain, see **General Arrangement Drawing** (Document Reference 2.03.00); and
- A Lay-by for road users on each the north and southbound carriageways between The Broadway and Ringland Lane, see **General Arrangement Drawing** (Document Reference 2.03.00).

Residential Properties

3.4.48 There will be a change of use of Low Farm, as part of the Planning Application, from residential Use Class E to enable use as a site office during the construction phase of the Proposed Scheme.

Embedded Mitigation

3.4.49 **Table 3-2** below describes the proposed 'embedded' (environmental design) mitigation measures that are considered to be an inherent part of the Proposed Scheme i.e. the project design principles adopted to avoid or prevent adverse environmental effects. These embedded mitigation measures should not be confused with additional mitigation proposed in order to avoid, prevent or reduce and, if possible, offset likely significant adverse effects on the environment, which are described within each technical chapter.

Table 3-2 Embedded (Environmental Design) Mitigation Measures

Environmental Topic which the Embedded (Environmental Design) Mitigation Measure Relates	Embedded (Environmental Design) Mitigation Measure and Associated Benefit
Biodiversity	The alignment of the Proposed Scheme is designed to avoid ecological features, where practicable. Overbridges are proposed to provide multi-functional connections east to west, across the Proposed Scheme. The overbridges have been designed in response to their setting, to replicate as so far as is practicable, the conditions which enable use/navigation by wildlife such as linear vegetation and 'dark' corridors, to ensure continued use of these routes. The alignment of the Proposed Scheme is designed to avoid important ecological features where possible, most notably the River Wensum SAC/SSSI and ancient woodland. **Landscape planting as part of the Scheme design.** The provision of a viaduct over the River Wensum providing a considered architectural design for the viaduct. The design of the viaduct structure comprises a ten-span single-deck bridge with a reinforced concrete deck slab. The span arrangement responds well to the constraints of the site by minimising the number of piers within the floodplain. Additionally, a 1.2m environmental barrier proposed for the entire length of both carriageways of the River Wensum Viaduct will provide noise mitigation for ecological features. Drainage systems designed to intercept and divert run-off away from watercourses and floodplains, most notably the River Wensum. A **Drainage Strategy** (Document Reference 4.04.00) and **Drainage Design Plans** (Document Reference: 2.08.00) have been developed as part of the Proposed Scheme to collect surface water from the carriageway. The road will be built so water flows into grassed swales, catchpits and roadside drainage ditches with attenuation to intercept silt and sediment at the edge of the carriageway. This ensures water is suitably treated before it enters a final drainage basin where the treated water either infiltrates into the ground, discharges into the Foxburrow Stream (Basin 5) or to the A47 surface water drainage system (Basin 6). Sediment forebays will have suitably wetted areas for planting. A pollution control valve will be incorporated into the design of each basin for spillage control. Where culverts are required, wherever feasible these will be designed to consider the passage of Otter, Water Vole, fish and aquatic invertebrates. The provision of earth bunds within the design, which will provide screening from noise. The Proposed Scheme is generally to remain unlit during the operational period, and this will be restricted to minimal lighting to specific elements. These include a minimal number of lighting columns at the southern extent of the Proposed Scheme, leading to the junction with the re-aligned A47. It is also proposed that signage lighting will be required at junctions.

Environmental Topic which the Embedded (Environmental Design) Mitigation Measure Relates	Embedded (Environmental Design) Mitigation Measure and Associated Benefit
Bats	Further to the measures outlined for biodiversity above which also support bats there are a suite of embedded mitigation measures outlined in Section 9 of **Chapter 11: Bats** (Document reference 3.11.00) The design of the Proposed Scheme, where possible, has included Embedded Mitigation to avoid potential adverse effects to bats. The alignment of the Proposed Scheme is designed to avoid important ecological features where possible, notably the ancient woodland; and to avoid / minimise loss of identified roosts, foraging and commuting habitats. In addition, the Embedded Mitigation includes: • Designing the River Wensum Viaduct to maximise landscape permeability, allowing continued bat movement beneath the Proposed Scheme along the river corridor. The design comprises a ten-span single-deck bridge with a reinforced concrete deck slab, minimising the number of piers within the floodplain. Additionally, a 1.2 metre high environmental barrier, designed for acoustic performance, would run along the entire length of both carriageways to minimise disturbance from noise on adjacent habitats; • Providing green bridges and underpasses as multi-functional connections east to west, across the Proposed Scheme. Each has been designed for its setting to maintain, as far as is practicable, existing flight paths (linear vegetation and dark corridors) to facilitate continued use; • Including an additional underpass, located at Ringland Lane (chainage 1700 – 1800). This feature takes advantage of the need for continued road access (the primary purpose of the underpass). Designed to accommodate bat movement, it provides additional landscape connectivity; • Landscape planting to provide foraging and commuting habitats as part of the Proposed Scheme design; • Including additional landscape treatments where the road is in cutting. These are where the Proposed Scheme passes through woodland blocks where the alignment cannot accommodate green bridge / underpass designs, and where no specific bat flight lines were identified. Their purpose is to encourage safe movement (above the traffic corridor) should bats continue to cross between woodland parcels. Dense scrub and / or fencing is incorporated into the design to encourage safe flight above traffic height; • Drainage systems designed to intercept and divert run-off away from watercourses and floodplains, most notably the River Wensum which is a foraging area for a number of species recorded within the Site Boundary; and • Adopting a 'low noise' road surface, to be used throughout the mainline of the Proposed Scheme to reduce operational noise levels (see **Chapter 7: Noise and Vibratio**n (Document Reference: 3.07.00)).

Environmental Topic which the Embedded (Environmental Design) Mitigation Measure Relates	Embedded (Environmental Design) Mitigation Measure and Associated Benefit
Landscape and Visual	The design of the Scheme includes primary mitigation embedded into the Proposed Scheme design to avoid potential adverse landscape and visual effects. These primary mitigation measures are detailed in the **Landscaping Design Plans** (Document Reference 2.07.00) and include: • Providing a considered architectural design for the viaduct with a sinuous and simplistic appearance which complements its rural landscape setting. The span arrangement responds well to the constraints of the site by minimising the number of piers within the floodplain, whilst ensuring visual continuity in their spacing. The span arrangement also allows for the opportunity to limit the depth of bridge deck. The shallow and flat nature of the Wensum Valley informed a preference for shallow construction forms and constant depth to avoid being overbearing visually in the landscape; • Closing of lanes crossed by the Proposed Scheme and the introduction of Green Bridges will create an area that is not crossed by local traffic. Away from the immediate proximity of NWL should be more tranquil because of road closures which, in combination with greater connectivity along PRoW, should provide an improved environment for walking, cycling, and horse riding, and be a local and distinct asset; • Ringland Lane bridge has been designed in line with those used on the Broadland Northway (formally the known as the Northern Distributor Road) for visual continuity and consistency of maintenance operations. Detailing of this structure ensures it complements the rural setting; and • Overbridges are proposed to provide multi-functional connections east to west, across the scheme. The Overbridges have been designed in response to their setting, to replicate as so far as is practicable, the conditions which enable use/navigation by wildlife such as linear vegetation and 'dark' corridors, to ensure continued use of these routes. As illustrated on the **Landscaping Design Plans** (Reference 2.07.00), a robust landscape-led approach to the Proposed Scheme will ensure that it is appropriately integrated into the landscape. The key features of the proposed primary landscape mitigation planting measures include: • Existing trees and established areas of existing vegetation are proposed to be retained and enhanced where appropriate including existing woodland and Fakenham Road Roadside Nature Reserve; • New specimen tree planting to provide instant visual screening at several locations; • New woodland and scrub planting to enhance visual amenity of the Proposed Scheme and respond positively to the local character; • Areas of species rich seeding to enhance visual amenity; • New understory planting to create habitat for wildlife and provide visual containment; • Instant hedge, native hedge, and native hedge with trees; and • Meadow grass for wet soils and wetland scrub.

Environmental Topic which the Embedded (Environmental Design) Mitigation Measure Relates	Embedded (Environmental Design) Mitigation Measure and Associated Benefit
Noise & Vibration	The Proposed Scheme alignment considered minimising the works passing close to residential receptors where practicable and this is demonstrated by the small number of receptors within the detailed calculation area. Extensive earthworks have been included for the Proposed Scheme, either constructing the road in cutting or earth bunds parallel to the route which will visually screen the road from nearby receptors and provide noise benefits to receptors. The pavement surface type can impact on the noise levels produced by vehicles. For the entire mainline of the Proposed Scheme, a low noise surface will be used. For context, at speeds above 75 Kilometres per hour (kph), a low noise road surface will be 3 decibels quieter than a standard hot rolled asphalt surface type (based on the road surface corrections provided in Design Manual of Roads and Bridges LA 111). Finally, an approximately 1.2m tall acoustic barrier is proposed for the entire length of both carriageways of the River Wensum Viaduct.
Road Drainage and Water Environment	Areas for temporary use during construction which include the construction compounds are generally located away from watercourses or identified overland flow routes. In overview the assessment takes into account a temporary works design consisting of the following: • A raised working platform extending across the full width of the River Wensum floodplain constructed to a height sufficiently high to avoid overtopping in modelled potential flood events; • A culvert to provide continued connectivity for WC5; • Flood relief culverts within the River Wensum floodplain beneath the Temporary Works Platform to reduce the risk of flooding upstream; and • A bailey bridge to provide connectivity between the Temporary Works Platform on either side of the River Wensum. The following forms of embedded mitigation have been considered within the operation phase assessment: • River Wensum Viaduct, culvert (MA1) which will carry the southern maintenance track across WC5 and a culvert across Foxburrow Stream; • Mitigation measures outlined in Environmental Enhancements of the Proposed Scheme Overview (Document Reference: 3.12.02m); and • Drainage Strategy (Document Reference: 4.04.00) including management of overland flows and treatment measures of surface water runoff.

Environmental Topic which the Embedded (Environmental Design) Mitigation Measure Relates	Embedded (Environmental Design) Mitigation Measure and Associated Benefit
Climate Resilience	Measures have been included in the development of the design to ensure the Proposed Scheme is resilient to projected climate change in relation to precipitation, temperature, wind, water quality, and soils. These measures include (but are not limited to): • Scheme components designed to accommodate increases in precipitation and storm events. For example, the drainage system is designed to attenuate/infiltrate highway drainage from the 1 in 2-year event to the 1 in 100-year rainfall event with a 45% allowance for climate change; • Scheme components designed to accommodate extremes of temperature. For example, proprietary bearings and expansion joints are proposed to accommodate thermal movements on the Wensum Viaduct; • Scheme components design to accommodate wind events. For example, compliance with appropriate structure design standards and setting back of tree planting from the carriageway edge; and • An earthwork and planting design that accounts for projected climatic changes such as choice of planting stock.
Geology and Soils	The Proposed Scheme would introduce hardstanding at the road surface which would provide betterment and reduce infiltration of rainwater into the ground where it is present and therefore limit the mobilisation of existing potential contaminants.

Design Flexibility

3.4.50 This section of the chapter outlines the design flexibility being sought in the Planning Application and which has been assessed as part of this ES under a 'Rochdale Envelope' approach. This includes areas of the design that will be further refined within the parameters outlined.

Earth Bund / Cross Sections

3.4.51 A series of earth bunds have been developed along the alignment to integrate the Proposed Scheme into the landscape, provide screening and incorporate site won materials into the Proposed Scheme. These will range between 2-5m high. For the purposes of the Environmental Statement assessments, a 3-dimensional (3D) model (as a Computer Aided Design CAD file format (.DWG)) of the carriageway and associated earthworks was developed. This has been used for developing the subsequent noise model and setting the landscape assessment's Zone of Theoretical Visibility where the relationship of the carriageway and earthworks and surrounding areas are integral to the assessment. To allow refinement of earthworks at detailed design, the 3D model covered a 'worst case scenario' for the ES assessment where earth bunds are included, they are designed to the minimum proposed height. A minimum height bund provides the least potential mitigation effect in terms of noise and visual screening. Therefore, the environmental impacts reported in the ES are precautionary. In detailed design the height of the earthworks can be increased within the limits above and also the depth refined and slope gradients adjusted to respond to other design refinements and the desire to balance the overall cut-fill balance. The bund design must also comply with the key function of landscape integration in its scale and profiling and the worst-case for materials and waste outlined in the **Chapter 14: Materials and Waste** (Document Reference 3.14.00).

3.4.52 The **Cross-section Drawings** (Reference 2.04.00) provide representative locations across the scheme reflected in the 3D model.

Green Bridges

3.4.53 Green bridges were designed to fit with the available location, with the aim to reduce woodland / tree loss where practicable and align with existing commuting routes for bats. Green bridges will be planted with at least two rows of hedgerow including 'instant' native hedgerow (with a minimum initial target height of 1.8 to 2 metres) to provide immediate vegetation connectivity on installation.

3.4.54 The Nursery Woodland green bridge is a minimum 30 metres in width parapet to parapet. The Morton green bridge, The Broadway green bridge and Foxburrow Plantation green bridge are a minimum 15 metres in width (14.5 metres parapet to parapet). The widths are illustrated in Structures Design Plans (Document Reference 2.06.05 to 2.06.08).

Underpasses

3.4.55 Underpasses will be a minimum of 4 metres height x 4 metres width (once topsoil and surfacing have been accounted for).

3.4.56 As detailed in the **Outline Bat Mitigation Strategy** (Document Reference 3.11.06), underpasses will not be artificially lit and vegetation planting along the edges of the road above, as well as closed parapets (of at least 1.4 metres high) along the edges of the underpass and behind the wing walls, will deflect light spill from the road, and ensure that the route maintains a dark corridor.

Drainage Basins

3.4.57 The drainage design will be refined within the limits of the Site Boundary achieving the requirements outlined in the **Drainage Strategy** (Document Reference 4.04.00). Any refinement will also be limited by environmental constraints including the root protection areas of retained trees and mitigation areas and requirements of the River Wensum and Foxburrow Stream (Tributary or River Tud).

Vertical Carriageway Alignment

3.4.58 In terms of design flexibility for the carriageway vertical alignment of the carriageway, the relevant ES assessments have allowed for a maximum 500mm of flexibility for the Principal Contractor, provided the contractor only lower the road compared to the current design reflecting in the 3D model provided. The vertical alignment is illustrated in the Cross Section Drawings (Document Reference 2.04.00). It does not allow for the carriageway to be raised higher than assessed. The design flexibility is on the condition that the associate bunds and earthworks maintain the screening requirements and that the materials and waste generated do not exceed the volumes assessed in **Chapter 14: Materials and Waste** (Document Reference 3.14.00). Earthwork Design.

3.4.59 The earthwork slopes are expressed in approximate V:H ratios (Vertical : Horizontal) and the slope flexibility is outlined below:

- Mainline earthworks: standard 1V:3H in fill & 1V:2H in cut. (fill can vary from 1in2 to 1in3) (cut can vary from 1in2 to 1in3);
- Earthworks along the A1067: approximately 1V:3H in fill & 1V:3H in cut;
- The Broadway green bridge: approximately 1V:3H in fill & 1V:3H in cut. (fill can vary from 1in1 to 1in3);
- Foxburrow Plantation green bridge: approximately 1V:2H in fill & 1V:2H in cut;
- Morton green bridge: approximately 1V:3H in fill & 1V:3H in cut; and
- Nursery Woodland green bridge: approximately 1V:3H in fill & 1V:3H in cut.

Landscape Design

3.4.60 The **Landscaping Design Plans** (Document Reference 2.07.00) has been developed to integrate the Proposed Scheme into the landscape and include environmental objectives such as connectivity for wildlife, habitat creation and visual screening. Sloped earth bunds between 2-5m high are included either side of the scheme where appropriate to contribute to landscape integration and visual screening of the scheme from local receptors, these will feature landscape planting.

3.4.61 The landscape planting is illustrated on the **Landscaping Design Plans** (Document Reference 2.07.00) and includes new:

- Road verge grass;
- Species rich grass;
- Woodland (native);
- Scrub;
- Native hedgerow;
- Native hedgerow with trees;
- Instant hedges;
- Reedbeds;
- Meadow grass for wet soils; and
- Wetland scrub.

3.4.62 At detailed design any refinements to the landscape design will be presented in a Landscape and Ecological Management Plan (LEMP) and adhere to the requirements for:

- Landscape Integration;
- Visual Screening; and
- the ecological outcomes set out on the **Landscaping Design Plans** (Document Reference 2.07.00) which, alongside the off-site measures provided for on the Essential Environmental Mitigation Plan, will enable alignment with:
    - the Ecological Mitigation Strategy (**Appendix 10.32: Ecological Mitigation Strategy** Document Reference: 3.10.32);
    - the Outline Bat Mitigation Strategy (**Appendix 11.6: Outline Bat Mitigation Strategy** Document Reference: 3.11.06);
    - the compensation requirements outlined in the **Appendix 10.33: Biodiversity Net Gain Technical Report** (Document Reference: 3.10.33) and **Appendix 10.35 Arboricultural Impact Assessment** (Document Reference: 3.10.35); and
    - the **Air Quality Compensation Strategy** (Document Reference 6.01.00).

3.4.63 New planting will include a 3 year establishment period to ensure the planting is successfully established. After this period, management and maintenance of the planting will be undertaken by others (the Applicant and/or other agreed parties), to ensure the mitigation requirements and commitments are met. Details of this will be set out in the LEMP.

3.4.64 The LEMP will provide a strategy for the preparation, management, maintenance and monitoring procedures for the landscaping and ecological mitigation and enhancement measures for the Proposed Scheme. The report will:

- Set out the landscape context and ecological background;
- Establish the aims and objectives including design objectives, relationship to landscape and visual effects, and protection of biodiversity;
- Outline the regulatory framework including landscape policy and nature conservation policy and legislation that has informed the landscape design;
- Outline the management objectives for landscape and ecological elements including their intended function;
- Establish the aftercare and maintenance programme for ongoing maintenance;
- Outline the landscape and biodiversity monitoring and reviews that would be undertaken to monitor the establishment of the planting;
- Outline any special requirements for the different types of habitats; and
- Set out the outcomes proposed to be delivered (drawing from the EMS) particularly in terms of bats.

3.4.65 The key objectives of the LEMP will be to:

- ensure the continued health and vigour of any retained existing vegetation within the Red Line Boundary;
- ensure the successful establishment and continued healthy growth through to maturity of all proposed vegetation; and
- ensure the continued existence of natural habitat for existing species and sustain the ecological environment wherever possible.

Temporary Works Platform

3.4.66 As outlined below, a Temporary Works Platform will be used to construct the viaduct as illustrated in **Appendix 3.2: Plans** (Document Reference 3.03.02). **Appendix 3.2** shows the maximum extent of the Temporary Works Platform footprint and the ultimate design will be refined within these limits at detailed design. The culvert design for the Temporary Works platform will be refined at detailed design but will achieve, as the minimum, the performance outcome of the **Appendix 12.2 Flood Risk Assessment** (Document Reference 3.12.02).

3.5 Construction Proposals

Construction Programme and Proposed Key Construction Activities

3.5.1 It is expected that if planning permission is granted for the Proposed Scheme the construction work is expected to commence in 2026 and continue until the road opening in 2029. The key construction activities are summarised below (although there is likely to be some overlap between each stage / individual processes):

- **Enabling Works**. This will focus on logistics including compound set up, establishing haul roads, fence removal, advanced ecological mitigation, and installation of temporary fencing. Temporary fencing will be installed to secure the work areas from unauthorised access. Additional zones may require specific fencing, for example ecologically sensitive areas;
- **Site Clearance.** This will entail removal of existing fencing, vegetation clearance and topsoil stripping;
- **Earthworks.** Pre-earthwork drainage installation, bulk earthworks, stockpile maintenance and logistics;
- **Structures (viaduct, bridges, retaining walls and culverts).** Area preparation and Temporary Works Platform installation, piling, steel and concrete works, structural fills and beams and deck installation;

- **Drainage and** Ancillary **Works.** Installation of longitudinal drainage (carrier drains, filter drains, swales), constructing infiltration basins, service lighting ducts in line with the drainage strategy;
- **Pavement.** Capping and subbase construction, base, binder and surface course;
- **Finishing Works.** Installing vehicle restraints system, signage, lighting, road markings and boundary fencing;
- **Landscaping.** Topsoil laying, seeding and tree, scrub and hedgerow planting;
- **Stockpile and Material Management**; and
- **Viaduct Construction**.

Construction Access

Haul Roads

3.5.2 A haul road will provide a safe and efficient means of transporting materials and equipment internally through the construction corridor. It is designed to withstand heavy loads and frequent use, while minimising the impact on the surrounding environment by reducing the number of vehicles on the public road network and protecting the soil from uncontrolled trafficking.

3.5.3 Haul roads will extend from the A1067 to the A47 broadly following, but adjacent to, the mainline of the Proposed Scheme. When this is not possible it will still be preferably located within land required permanently for the Proposed Scheme to minimise the disturbance to soils intended to be returned to agricultural use.

3.5.4 The haul road will be connected to the public road network by direct access points to be built off the A1067, Marl Hill Road junction with Ringland Lane, Paddy's Lane and Wood Lane. Additional access tracks will be required to connect these access points to the internal haul road at Ringland Lane,

Paddy's Lane and Wood Lane. The haul road requirements will be kept under review by the Principal Contractor.

Welfare Facilities

3.5.5 The main purpose of welfare facilities is to ensure the health, safety, and well-being of the workforce during the construction activities. Their location is influenced by internal connectivity and distances between the different construction sections.

3.5.6 There will be three main welfare and car park areas to remain in place for most of the construction programme:

- The Secondary Compound at the North Abutment of the viaduct. Required for works north of the river Wensum whilst the viaduct is being constructed;
- The Secondary Compound at Ringland Lane. Required for works south of the river Wensum and north of Ringland Lane, especially whilst there is no connectivity over the River Wensum; and
- The Main Compound at the Broadway (accessed from Paddy's Lane).

3.5.7 Additionally, four satellite welfare areas will be set up at intermediate locations to reduce travelling distances and keep construction vehicles outside the public roads. These will be required during the construction of specific activities, such as the green bridges or earthworks at the very south end by the A47. These satellite welfare areas will be dismantled when no longer needed. The location and requirement for welfare facilities (including additional) will be kept under review by the Principal Contractor.

Material Storage and Delivery

3.5.8 Purpose-built storage areas are required to keep the materials and equipment safe and secure during construction. The design and layout of storage areas will comply with any requirements, where applicable, of the **Outline Bat Mitigation Strategy** (Document Reference 3.11.06). They must be located close to the working areas to ensure efficient handling of the materials and

reduce haulage distances. They are usually located near welfare facilities for security reasons and near delivery zones for efficiency purposes.

3.5.9 High volumes of materials and heavy plant will be delivered to site especially for the construction of the viaduct and the associated Temporary Works Platform across the floodplain.

3.5.10 Therefore, the delivery zones are strategically located to accommodate deliveries directly from:

- The A1067 for the construction of the Viaduct's North Abutment;
- Ringland Lane (via A1067) for the installation of the Temporary Works Platform across the floodplain, the construction of the viaduct's south abutments and the nursery woodland green bridge and retaining features near the ancient woodland; and
- Paddy's Lane (via A47) for distribution to the central and south sections. It is supported by a satellite delivery area at the very south end by the A47.

3.5.11 Most of the deliveries will be received at Ringland Lane or the Main compound at Paddy's Lane hence why these two delivery areas are larger. Material storage and stockpiling requirements will be kept under review by the Principal Contractor.

Soil Stockpiles

3.5.12 The remainder of the land allocated for temporary works that is not to be used for the setup of welfare, storage or delivery areas will be used for soil stockpiling. These designated areas are used to store excavated soil and other materials that are removed from the construction site during earthworks activities.

3.5.13 The stockpiles and their management must comply with the **Outline Soil Management Plan** (Document Reference 3.03.01a) for the protection of soils which, among other requirements, dictates the maximum height of the stockpiles.

Viaduct Construction

3.5.14 A Temporary Works Platform will be built across the River Wensum Floodplain from which the viaduct will be constructed. From the Temporary Works Platform piling will be undertaken, viaduct piers constructed, and the viaduct deck lifted and poured (concreting the viaduct stitches from the platform) into place.

3.5.15 To ensure a stable platform, the construction of the Temporary Works Platform is anticipated to involve the foundation excavation within the footprint of the Temporary Works Platform and a buffer area for slope stability. The excavated area is to be backfilled with engineered fill back to the original ground level to form a stable base. The engineered fill would be placed in accordance with Highways Agency's (now known as National Highways) Series 600. The anticipated construction methodology would include:

- Excavation of topsoil and subgrade to design bottom level as per a cut/fill assessment – expected to be no deeper than approximately 2.2 metres;
- The excavated materials are to be a manged through a soil management plan (see **Outline Soils Management Plan** Document Reference 3.03.01a) and material management plan (see **Outline Materials Management Plan** Document Reference 3.03.01c) (this will confirm the suitability of the excavated material for reuse);
- The excavation will be backfilled with engineered fill, back to the original level; and
- The Temporary Works Platform would then be built on top of the engineered fill base. The Temporary Works Platform will be made of granular material.

3.5.16 In places, temporary sheet pile retaining walls may be required for the Temporary Works Platform. In order to avoid groundwater raising and accumulating behind the sheet piles, a drainage system at the back of the wall

will be installed. A perforated pipe surrounded by gravel and wrapped up in geotextile (or similar system that complies with the same function) will be installed along the length of the wall with openings through the wall as frequent as deemed necessary during detailed design analysis in order to avoid excessive water level build up. The openings in the sheetpiled wall will be protected by flap vales that will enable the water at the back of the wall to go through but will avoid water from the outside to flood the back of the wall infill.

3.5.17 At the end of construction phase the removal of the Temporary Works Platform will involve:

- The piling platform will be removed to the top level of the engineered fill;
- the engineered fill will be excavated to the pre-construction topsoil bottom level;
- topsoil will be reinstated back on top of the engineered fill to pre-construction ground level; and
- vegetation seeding will be undertaken.

3.5.18 The viaduct methodology involves the piling and construction of the viaduct piers and the lifting of the ladder beam steel girders and pre-cast concrete full depth slab section from working platforms. Atop the Temporary Works Platform there will be a haul road and piling mat and lifting platforms as illustrated in **Appendix 3-2 Plans,** Norwich Western Link Temporary Works Platform Overview (Document Reference 3.03.02). This overview is for illustrative purposes and the design of the Temporary Works Platform will be refined in detailed design. Through the Temporary Works Platform there will be flood relief culverts/pipes to allow flows to continue.

3.5.19 The Temporary Works Platform will use a temporary crossing structure (a bailey bridge) over the River Wensum, which will include bunded protection against spillages. The size of this temporary crossing is optimised to allow

access for the steel beam girder sections, pre-cast concrete deck and sporadic plant, reducing the use of Ringland Lane.

3.5.20 Once the piles and columns for the viaduct are complete, most of the activity entails erection of the steelwork and concrete planks and installing the viaduct drainage. Once those are concluded, the remaining activities will be performed from above the deck while the temporary working mats are removed and the area reinstated.

3.5.21 A new access haul road will be installed replicating the same layout as required for the permanent access maintenance track. It will be approximately 2 – 3 metres wider and 300-500mm higher than the maintenance track, therefore the surplus material will be removed at the end of the construction works, and the area reinstated leaving the completed maintenance track.

3.5.22 The hoses for bentonite (or any other piling support fluid) and water treatment will be set up along the haul road with double bunded pumps in place, in protected areas, to ensure bentonite flow to each piling location. Pipe crossings will be buried within the temporary haul road to avoid potential strikes, adding another protection layer against spillages.

3.5.23 A compound at the North Abutment of the proposed viaduct is proposed close to the southern approach near the A1067, next to the bentonite and water treatment plants and outside the flood plain. This will concentrate the management and activities required for the viaduct construction, reducing the area required at the river floodplain.

3.5.24 The footprint of the Temporary Works Platform will be reinstated on completion of the works, with the exception of the maintenance access track that will allow access to the viaduct in operation for inspection.

Outline Construction Environmental Management Plan (OCEMP)

3.5.25 Construction works would be undertaken in accordance with the UK's 'Considerate Constructors Scheme' to help ensure that the Principal Contractor carry out their operations in a safe and considerate manner, and

actively reduce environmental risks. In addition, all construction works would be undertaken with suitable temporary drainage and pollution prevention measures in place in accordance with best practice.

3.5.26 An OCEMP has been prepared for the Proposed Scheme and has been submitted as part of the planning application (**Appendix 3-1** Document Reference: 3.03.01). This OCEMP specifies the overarching construction management measures the Principal Contractor would implement in order to avoid and/or reduce the potential environmental impacts during the construction phase of the Proposed Scheme. The Principal Contractor will adopt the OCEMP and produce the detailed CEMP(s) (as there may be more than one CEMP to account for different parts of the Proposed Scheme) for implementation at the construction phase.

3.5.27 The CEMP is a live document and should be maintained by the Principal Contractor and reviewed and updated on a regular basis throughout the construction phase as new environmental construction measures are identified and implemented.

Inspection and Maintenance

3.5.28 The new landscape planting will be subject to a 3-year establishment maintenance period to ensure that the planting successfully establishes and other measures to be set out in the relevant LEMP.

3.5.29 The viaduct will undergo inspections in accordance with the Norfolk County Council's highway structure maintenance regimes and it is expected that inspections will occur every 6 years and require all elements of the bridge to be inspected within touching distance. The inspections will require access to all surfaces using access platforms. To undertake these inspections temporary bog matting around each pier will be required to allow the access platforms.

3.5.30 Maintenance will become a responsibility of Norfolk County Council Highways Authority.

Decommissioning

3.5.31 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).

3.6 References

- Reference 3.1: Town and Country Planning (Use Classes) (England) Order 1987 (as amended) – Statutory Instrument 2015 No. 597 – Accessed via https://www.legislation.gov.uk/uksi/1987/764/contents/made.
- Reference 3.2: IEMA Environmental Impact Assessment Guide to Climate Change Resilience and Adaptation. [Online] accessed via https://www.iema.net/resources/reading-room/2020/06/26/iema-eia-guide-to-climate-change-resilience-and-adaptation-2020.
- Reference 3.3: BS5228 Accessed via https://www.warrington.gov.uk/sites/default/files/2020-08/cf53_bs_5228_pt1-2009a1-2014.pdf.