Norwich Western Link

Environmental Statement

Chapter 10: Biodiversity

Appendix 10.32: Ecological Mitigation Strategy

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Contents

Tables

Glossary of Abbreviations and Defined Terms

The definition of key terms used in this report are provided below. These definitions have been developed by reference to the definitions used in EU and UK legislation and relevant guidance, as well as professional judgement based on knowledge and experience of similar schemes in the context of the Proposed Scheme.

Term	Definition
Additional Mitigation	For the purposes of this document, the term 'Additional Mitigation' refers to avoidance, mitigation, and compensation measures beyond those considered as Embedded Mitigation.
Ancient Semi-Natural Woodland	An area of ancient woodland where the vegetation is made up of trees and shrubs native to the site and which have predominately arisen from natural regeneration.
Ancient Tree	A tree that has passed beyond maturity and is old, or aged, in comparison with trees of the same species. Characterised by biological, cultural, or aesthetic features of interest.
Ancient Woodland	Any wooded area that has been continuously wooded since 1600 AD
Arboricultural Method Statement	A methodology for the implementation of any aspect of development which is within the root protection area, or has the capacity to adversely affect, any retained tree.
Arboriculturist	A person who has, through relevant education, training, or experience, gained expertise in the field of trees in relation to construction.

Term	Definition
Area for temporary use during construction	Temporary construction 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).
Biodiversity	Abbreviated form of 'biological diversity' referring to variability among living organisms from all sources including, terrestrial, marine, and other aquatic ecosystems and the ecological complexes of which they are part.
British Standard BS 5837:2012	Provides guidance and recommendations for the integration of trees and development. To be interpreted by appropriately qualified and experienced persons.
British Trust for Ornithology (BTO)	A UK charity that focuses on understanding birds and, in particular, how, and why bird populations are changing.
Chartered Institute for Ecology and Environmental Management (CIEEM)	The professional membership body representing and supporting Ecologists and Environmental professionals in the UK, Ireland and abroad. Previously known as Institute of Ecology and Environmental Management (IEEM).
Conservation Area	An area of special architectural or historic interest identified by the Local / County Planning Authority.
Construction Environmental Management Plan (CEMP)	Document setting out methods to avoid, minimise and mitigate environmental impacts on the environment and surrounding area. The protocols to be followed in implementing these measures in accordance with environmental commitments during construction.

Term	Definition
Construction Exclusion Zone	An area within which all site clearance and construction activities, access and storage of materials are prohibited.
Design Manual for Roads and Bridges (DMRB)	A series of 15 volumes that provide standards, advice notes and other documents relating to the design, assessment, and operation of trunk roads, including motorways in the United Kingdom.
ECoW (Ecological Clerk of Works)	Provides advice about ecological and environmental and issues during the construction of a development. Typical issues include protected species, pollution, surface water management, material management, air quality and noise
Embedded Mitigation	Mitigation measures incorporated into the scheme design.
Environmental Enhancement and Essential Mitigation Areas	Locations for ecological enhancement and mitigation measures.
European Commission	The executive body of the European Union responsible for proposing legislation, enforcing European law, setting objectives and priorities for action, negotiating trade agreements, and managing implementing European Union policies and the budget.
Floodplain	Valley floor adjacent to a river that is (or was historically) inundated periodically by flood waters and is formed of sediments deposited by the river.

Term	Definition
Fragmentation	A decrease in some or all types of natural habitats in a landscape, and the dividing of the landscape into smaller and more isolated pieces.
Habitat	The environment in which populations or individual species live or grow.
Habitats of Principal Importance (HPI)	These are all the habitats in England that were identified as requiring action in the UK Biodiversity Action Plan (UK BAP) and continue to be regarded as conservation priorities in the subsequent UK Post-2010 Biodiversity Framework. Section 41 (41) of the Natural Environment and Rural Communities (NERC) Act (which came into force on 1st October 2006) requires the Secretary of State to publish a list of habitats and species which are of principal importance for the conservation of biodiversity in England. This list is used to guide decision-makers such as public bodies, including local and regional authorities, in implementing their duty under section 40 of the NERC Act, to have regard to the conservation of biodiversity in England when carrying out their normal functions. There are 56 habitats of principal importance (previously called UKBAP priority habitats) included on the S41 list.
Habitats Sites	Collective term for National Site Network sites and listed or proposed Ramsar sites.
Hydrology	The study of the properties, distribution, and effects of water on the earth's surface, in the soil and underlying rocks.

Term	Definition
INNS (Invasive Non-Native Species)	Species which have been introduced into areas outside their natural range through human actions and are posing a threat to native wildlife.
Institute of Environmental Management and Assessment (IEMA)	The Institute of Environmental Management and Assessment is the largest professional body for environmental practitioners in the United Kingdom and worldwide.
Joint Nature Conservation Committee	A public body that advises the UK Government and devolved administrations on UK-wide and international nature conservation.
Likely Significant Effect	Any effect that may reasonably be predicted as a consequence of the plan or project that may affect the conservation objectives of the features for which a site was designated.
Local Nature Reserve (LNR)	A site of importance for wildlife, geology, education, or public enjoyment. Some are also nationally important Sites of Special Scientific Interest. Local Nature Reserves must be controlled by the local authority through ownership, lease, or agreement with the owner.
National Site Network	Statutory designated sites of importance to nature conservation that are protected by the Conservation of Habitats and Species Regulations 2017. This includes existing SACs and SPAs, and new SACs and SPAs designated under these Regulations. Statutory designated sites of importance to nature conservation that are protected by the Conservation of Habitats and Species Regulations 2017

Term	Definition
National Vegetation Classification (NVC)	A system of classifying natural habitat types in Great Britain according to the vegetation they contain.
Notable Tree	A tree that is very large but might not qualify as ancient or veteran.
Plantation on Ancient Woodland Site	An area of ancient woodland where the former native tree cover has been felled and replaced by planted trees, usually of species not native to the site.
Ramsar Site	Wetlands of international importance, designated under the Convention on Wetlands of International Importance Especially as Waterfowl Habitat adopted 1971 (known as the Ramsar Convention).
Recolonisation	The repopulation of a habitat by a previously colonising species.
Red Line Boundary	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 Environmental Statement – **Chapter 3: Description of the Scheme**, Appendix 3, Figure 3.1 (Document Reference 3.03.03). The Red Line Boundary includes; • Site Boundary; • Areas for Environmental Enhancement and Essential Mitigation; and • Areas identified as No Work Zones.

Term	Definition
Riparian Zone	Transitional, semi-terrestrial area of land adjoining a river channel (including the river bank) that is regularly inundated and influenced by fresh water and can influence the condition of the aquatic ecosystem (e.g. by shading and leaf litter input and through biogeochemical exchanges).
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.
Root Protection Area	Layout design tool indicating the minimum area around a tree deemed to contain sufficient roots and rooting volume to maintain the tree's vitality.
Sett (Badger)	Sett is the habitat of a badger usually consists of a system of interconnected tunnels and chambers.
Site Boundary	The areas within which the main engineering works (structures, carriageway, drainage, earthworks etc) would be undertaken as outlined in this chapter, including areas for temporary use during construction such as works compounds, storage sites, welfare facilities.

Term	Definition
Site of Special Scientific Interest (SSSI)	A Site of Special Scientific Interest (SSSI) in Great Britain or an Area of Special Scientific Interest (ASSI) in the Isle of Man and Northern Ireland is a conservation designation denoting a protected area in the United Kingdom and Isle of Man. A SSSI (or ASSI) usually describes an area of particular interest to science due to the rare species of fauna or flora it contains - or even important geological or physiological features that may lie in its boundaries.
Special Area of Conservation (SAC)	A Special Areas of Conservation (SACs) is a strictly protected site designated under the EC Habitats Directive.
Special Protection Area (SPA)	A Special Protection Areas (SPAs) is a strictly protected site classified in accordance with Article 4 of the EC Birds Directive, which came into force in April 1979. SPAs are classified for rare and vulnerable birds (as listed on Annex I of the Directive), and for regularly occurring migratory species.
Temporary Works Platform	The term to refers to the temporary platform across the floodplain use to construct the viaduct. It would cross the River Wensum by means of a temporary bailey bridge.

Term	Definition
Proposed Scheme	The proposed Norwich Western Link (NWL) 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). This is described further in Environmental Statement - **Chapter 3: Description of the Scheme** (Document Reference: 3.03.00). All works associated with the proposed development of the Site.
Tree Preservation Order	An order made by the Local / County Planning Authority to protect specific trees, groups of trees or woodlands in the interests of amenity.
Veteran Tree	A tree that has the biological or aesthetic characteristics of an ancient tree but is not ancient in years compared with others of the same species.
Water Framework Directive (WFD)	European Union directive which commits member states to achieve good qualitative status of all water bodies. The purpose of the Water Framework Directive is to establish a framework for the protection of inland surface waters, estuaries, coastal waters, and groundwater.
Wildlife and Countryside Rights of Way Act 1981 (as amended)	The principal piece of UK legislation relating to the protection of wildlife.

1 Introduction

1.1 Project background

1.1.1 The Proposed Scheme consists of the construction, operation, and maintenance of an approximately 6 kilometre (km) long dual-carriageway road connecting the A1067 Fakenham Road and the A47, with a dualled section of the A1067 to the existing A1270 roundabout. There are interactions with other side roads which are detailed below.

1.1.2 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.

1.1.3 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.

1.1.4 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.

1.1.5 The Proposed Scheme extent is shown in **Chapter 3: Description of Scheme** (3.03.00) and the Red Line Boundary Plans (Document reference: 2.02.00).

1.2 Scope of report

1.2.1 WSP was commissioned by Norfolk County Council (NCC) to support the planning application with the production of an Ecological Mitigation Strategy (EMS). The purpose of the EMS is to outline the mitigation strategy for all protected and notable species and habitats to:

- Supplement (and be appended to) the Environmental Statement for the Proposed Scheme;
- Inform the production of draft and full licence applications;
- Inform the production of the Outline Construction Environmental Management Plan (OCEMP) (Document reference: 3.03.01);
- Inform the detailed design of Environmental Enhancement and Essential Mitigation Areas; and
- Inform the production of a Landscape and Ecological Management Plan (LEMP) for the Proposed Scheme.

1.2.2 This document intends to:

- Provide an overview of the baseline ecological information for the Proposed Scheme and surrounding area;

- Present the mitigation strategy for each protected or notable species or habitat to be implemented during construction and operation. This includes licence requirements, details on appropriate timings of works, appropriate methods of habitat clearance, and the requirement for Ecological Clerk of Works; and
- Enable compliance with relevant nature conservation legislation and planning policy and to avoid the killing / injury of notable and protected species.

1.2.3 The EMS does not include mitigation embedded within the scheme design or impacts to biodiversity features that would be mitigated by these embedded mitigation measures. See Environmental Statement **Chapter 10: Biodiversity** (Document reference: 3.10.00) for this information.

1.2.4 The EMS does not include the mitigation strategy for bat species. This information is included within the Outline Bat Mitigation Strategy (Document Reference: 3.11.06) for the Proposed Scheme.

1.2.5 The EMS does not include habitat compensation measures for air quality impacts during the operation phase of the Proposed Scheme. These measures are presented in the Outline Air Quality Compensation Strategy (Document reference: 6.01.01).

1.2.6 The OCEMP includes the recommended monitoring of ecological mitigation measures during the construction of the Proposed Scheme.

1.2.7 Information concerning the creation, management and maintenance of ecological habitats and features will be detailed in separate Landscape and Ecological Management Plans (LEMP) for the Proposed Scheme. This will include the monitoring of features beyond the construction stage. While it is subject to change and refinement, this EMS includes information that will inform the production of the separate LEMP that will be produced at Detailed Design stage. The LEMP will be produced in order to ensure the establishment of landscape and ecological commitments set out within the

Landscaping Design Plans (Document reference: 2.07.00) and the commitments stated within the OCEMP (Document reference: 3.03.01). The LEMP intends to guide those responsible for the protection and management of the landscape and ecology elements in the design of the Proposed Scheme. The document sets out site-specific procedures and processes for management for ensuring that habitats are created / enhanced according to programme and are establishing as expected, building on the principles set out in section 10.48 of **Chapter 10: Biodiversity** of the ES. The LEMP will be produced at the Detailed Design stage and maintained through the operational period. 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.

1.2.8 The EMS has been compiled with reference to the relevant nature conservation legislation and planning policy from which the protection of sites, habitats and species is derived in England. The relevant legislation is included within the Environmental Statement for the Proposed Scheme and summarised in **Table 2.1** below.

2 Ecological background

2.1 Overview

2.1.1 **Table 2.1** provides details of the ecological receptors considered within this document. Information included within **Table 2.1** is derived from the following documents produced to inform the Proposed Scheme:

- Phase 1 Habitat Survey Report 2018 (**Appendix 10.1**) (Document Reference: 3.10.01)

- Ecological Desk Study 2018 (**Appendix 10.2**) (Document Reference: 3.10.02)
- Otter and Water Vole Survey Report 2020 (**Appendix 10.3**) (Document Reference: 3.10.03)
- River Wensum Fish Report 2020 (**Appendix 10.4**) (Document Reference: 3.10.04)
- Interim Reptile Survey Report 2020 (**Appendix 10.5**) (Document Reference: 3.10.05)
- Interim Desmoulin's Whorl Snail Survey Report 2020 (**Appendix 10.6**) (Document Reference: 3.10.06)
- River Wensum Crayfish Report 2020 (**Appendix 10.7**) (Document Reference: 3.10.07)
- Interim River Wensum Macrophyte Report 2020 (**Appendix 10.8**) (Document Reference: 3.10.08)
- Phase 1 Habitat Survey Report 2021 (**Appendix 10.9**) (Document Reference: 3.10.09)
- Hedgerow Report 2021 (**Appendix 10.10**) (Document Reference: 3.10.10)
- Aquatic Ecology Survey Report 2021 (**Appendix 10.11**) (Document Reference: 3.10.11)
- Aquatic Ecology Survey Report 2022 (**Appendix 10.12**) (Document Reference: 3.10.12)
- Breeding Bird Report 2021 (**Appendix 10.13**) (Document Reference: 3.10.13)
- Desmoulin's Whorl Snail Report 2021 (**Appendix 10.14**) (Document Reference: 3.10.14)

- Fungal Survey Report 2021 (**Appendix 10.15**) (Document Reference: 3.10.15)
- Great Crested Newt Report 2021 (**Appendix 10.16**) (Document Reference: 3.10.16)
- Lichen Survey Report 2021 (**Appendix 10.17**) (Document Reference: 3.10.17)
- National Vegetation Classification Survey Report 2021 (**Appendix 10.18**) (Document Reference: 3.10.18)
- Otter and Water Vole Survey Report 2021 (**Appendix 10.19**) (Document Reference: 3.10.19)
- Species of Principal Importance Report 2021 (**Appendix 10.20**) (Document Reference: 3.10.20)
- Terrestrial Invertebrate Survey Report 2021 (**Appendix 10.21**) (Document Reference: 3.10.21)
- Aquatic Macroinvertebrate Report 2021 (**Appendix 10.22**) (Document Reference: 3.10.22)
- Great Crested Newt eDNA Survey Report 2021 (**Appendix 10.23**) (Document Reference: 3.10.23)
- Macrophyte Survey Report 2021 (**Appendix 10.24**) (Document Reference: 3.10.24)
- Reptile Survey Report 2021 (**Appendix 10.25**) (Document Reference: 3.10.25)
- River Habitat Survey Baseline Report 2021 (**Appendix 10.26**) (Document Reference: 3.10.26)
- Wintering Bird Survey Report 2021 (**Appendix 10.27**) (Document Reference: 3.10.27)

- Barn Owl Survey Report 2021 (**Confidential Appendix 10.28**) (Document Reference: 3.10.28)
- Badger Report 2021 (**Confidential Appendix 10.29**) (Document Reference: 3.10.29)
- Badger Report 2022 (**Confidential Appendix 10.30**) (Document Reference: 3.10.30)
- UKHab Report 2022 (**Appendix 10.31**) (Document Reference: 3.10.31)
- Biodiversity Net Gain Technical Report (**Appendix 10.33**) (Document Reference: 3.10.33)
- Air Quality Ecological Impact Assessment (**Appendix 10.34**) (Document Reference: 3.10.34)
- Arboricultural Impact Assessment (**Appendix 10.35**) (Document Reference: 3.10.35)
- Cumulative impacts from nearby committed developments (**Appendix 10.36**) (Document Reference: 3.10.36)
- Solar Exposure Analysis (**Appendix 10.37**) (Document Reference: 3.10.37)
- Environmental Statement Chapter 10: Biodiversity – Figures (**Appendix 10.38**) (Document Reference: 3.10.38)
- Desmoulin Whorl Snail Report 2021 (**Appendix 10.39**) (Document Reference: 3.10.39)
- Interim Badger Survey Report 2020 (**Confidential Appendix 10.40**) (Document Reference: 3.10.40)

2.1.2 The Environmental Statement **Chapter 10: Biodiversity** (Document Reference 3.10.00) should be consulted for full details of the ecological baseline of the Proposed Scheme.

2.1.3 Two Statutory Designated Sites are present within the Study Area of the Proposed Scheme (as defined within the Document Reference 3.10.00) and would potentially be impacted in the absence of additional mitigation.

2.1.4 Nine Non-Statutory Designated Sites present within the Study Area of the Proposed Scheme (as defined within the Environmental Statement) would potentially be impacted in the absence of additional mitigation.

2.1.5 Habitats within the Proposed Scheme are variable in their importance and range from low to high ecological value and include hedgerows, grasslands, woodland, and scrub. After completion of specific ecological surveys, the following habitats or habitat features are considered to be present to varying degrees within or near the Proposed Scheme and would potentially be impacted in the absence of additional mitigation:

- Ancient woodland (comprising Primrose Grove and Mouse Wood);
- Purple Moor Grass and Rush Pasture Habitat of Principal Importance (HPI):
- Lowland Mixed Deciduous Woodland HPI;
- Coastal and Floodplain Grazing Marsh HPI;
- Hedgerow HPI;
- Watercourses; and,
- Notable, veteran, and ancient trees.

2.1.6 Habitats within the Proposed Scheme and surrounding area are known to support a number of notable and protected species. After completion of specific ecological surveys, the following species / species groups have been identified to be present or considered likely to be present within or near the Proposed Scheme and would potentially be impacted in the absence of additional mitigation:

- Badger (*Meles meles*);

- Otter (*Lutra lutra*);
- Water Vole (*Arvicola amphibius*);
- Breeding birds;
- Wintering birds;
- Barn Owl (*Tyto alba*);
- Reptiles (specifically Common Lizard (*Zootoca vivipara*), Grass Snake (*Natrix natrix*) and Slow Worm (*Anguis fragilis*));
- Great Crested Newt (*Triturus cristatus*);
- Fish;
- Aquatic macroinvertebrates;
- Terrestrial Invertebrates;
- Desmoulin's Whorl Snail (*Vertigo moulinsiana*);
- Aquatic macrophytes; and
- Additional Species of Principal Importance.

2.1.7 In the absence of additional mitigation, the Proposed Scheme has the potential to give rise to the following effects:

- Mortality and / or injury of protected and notable species;
- Disturbance of protected and notable species;
- Permanent and temporary removal of habitats;
- Permanent and temporary degradation of habitats; and
- Introduction of Invasive and Non-Native Species (INNS) in the terrestrial and aquatic environments.

Table 2.1 Ecological baseline

Ecological Receptor	Ecological Feature	Detail	Relevant Legislation and Policy
Designated Sites	Statutory Designated Sites	The River Wensum SAC / SSSI and the Norfolk Valley Fens SAC – Potter & Scarning Fens, East Dereham SSSI fall within 10km of the Proposed Scheme. Norfolk Valley Fens SAC comprises a number of geographically separated areas united under one site designation. Both the River Wensum SAC and the Norfolk Valley Fens SAC are of International importance. A portion of the River Wensum SSSI is within the Proposed Scheme boundary.	The Conservation of Habitats and Species Regulations 2017 (as amended) ("Habitats Regulations") provide strict protection to sites of international importance. This includes requiring projects or plans to be screened for likely significant effects upon Special Protected Area (SPA), Special Area of Conservation (SAC) and candidate SACs (cSACs). Guidance also requires potential SPAs (pSPAs) and Ramsars are subject to the same assessment. SSSIs are subject to strict protection under the Wildlife and Countryside Act 1981 (as amended). This requires landowners to maintain these sites in favourable condition and works within these sites are managed by the appropriate national statutory body via the consent process. Certain operations within SSSIs require consent; these are specific to each SSSI.
Designated Sites	Non-Statutory Designated Sites	The following Non-Statutory Designated Sites are present within the Study Area of the Proposed Scheme (as defined within the Environmental Statement) and potentially be impacted in the absence of additional mitigation: • River Wensum Pastures, Ringland Estates CWS • Attlebridge Hills CWS • Broom & Spring Hills CWS • Wensum Pastures at Morton Hall CWS • Primrose Grove CWS • Land adjoining Foxburrow Plantation CWS • Old Covert, Wood Lane CWS • Mouse Wood CWS • Fakenham Road RNR	County Wildlife Sites are designated through local planning policy, by the Local Planning Authority (LPA). LPAs may designate certain areas as being of local conservation interest. The criteria for inclusion, and the level of protection provided, will vary between areas. The LPA will take regard of these sites during assessment of a development's effects.

Ecological Receptor	Ecological Feature	Detail	Relevant Legislation and Policy
Habitats	Ancient woodland	Primrose Grove (central grid reference TG13061491) abuts the Proposed Scheme. Mouse Wood located approximately 7m to the west of the Proposed Scheme, separated by Wood Lane (B1535) which provides an access route to the Proposed Scheme. Ancient woodland is of National value.	The National Planning Policy Framework (NPPF) includes relevant guidance in chapter 15: Conserving and Enhancing the Natural Environment. Guidance provided includes: i) Paragraph 180(b) recognises the economic and other benefits that trees and woodlands provide and the fact that they should be considered as part of a planning decision; and ii) Paragraph 186(c) identifies the principle that 'development resulting in the loss or deterioration of irreplaceable habitats (such as ancient woodland and ancient or veteran trees) should be refused unless there are wholly exceptional reasons and a suitable compensation strategy exists'. The Forestry Commission and Natural England have published information for the protection of ancient woodland, ancient trees, and veteran trees from development (Ref 1.1). The guidance advises on the use of semi-natural buffer zones as a means of protection. Measures need to be proportionate to the development and the potential arboricultural impacts.
Habitats	Habitats of Principal Importance	The desk study identified the following Habitats of Principal Importance (HPI) within 200m of the Proposed Scheme: • Purple Moor Grass and Rush Pasture Habitat of Principal Importance (HPI): • Lowland Mixed Deciduous Woodland HPI; • Coastal and Floodplain Grazing Marsh HPI; and • Hedgerow HPI. HPI are of County value.	HPI are identified in accordance with Section 41 of the NERC Act 2006 (as amended). Section 40 of this legislation places a general duty upon public bodies (including planning authorities) 'to the purpose of conservation and enhancement of biological diversity in the exercise of their functions.'
Habitats	Hedgerows	Hedgerow surveys identified a total of 22 hedgerows totalling 8.27 km within or partially within the Proposed Scheme. All of the hedgerows qualified as HPI. A total of eighteen hedgerows totalling 7.33 km that were within or partially within the Proposed Scheme qualified as Important (as defined under the Hedgerows Regulations 1997 (Her Majesty's Stationary Office (HMSO), 1997)), however none of the hedgerows were found to contain ancient or veteran features. Species-rich / important hedgerows are of County importance; all other hedges are of Local importance.	The Hedgerows Regulations (1997) make provision for the protection of important hedgerows in England and Wales. The regulations affect hedgerows which are 20 m or more in length or connected at both ends to another hedgerow of any length. They relate to hedgerows which are on, or adjoining land used for agriculture and / or conservation purposes. They do not include hedges that are attached to or marking the boundaries of a private dwelling.

Ecological Receptor	Ecological Feature	Detail	Relevant Legislation and Policy
Habitats	Watercourses	Sections of both the River Wensum and a tributary of the River Tud (Foxburrow stream) have been identified within the Proposed Scheme boundary. All rivers qualify as HPI under the Natural Environment and Rural Communities Act (NERC) 2006 (as amended) (Her Majesty's Stationary Office (HMSO), 2006). Watercourses are of County importance.	The River Wensum SAC and SSSI is a Statutory Designated site. Relevant legislation and policy as per Statutory Designated Sites above apply. The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (SI 407) – These regulations, which are transposed from the European Union's Water Framework Directive (2000/60/EC), set out requirements and processes for waterbodies to achieve good ecological and chemical status and the management of river basins more generally. As with all other HPI, rivers are identified in accordance with Section 41 of the NERC Act 2006 (as amended). Section 40 of this legislation places a general duty upon public bodies (including planning authorities) 'to the purpose of conservation and enhancement of biological diversity in the exercise of their functions.'
Habitats	Notable, veteran, and ancient trees	The Arboricultural Impact Assessment (Document reference: 3.10.35) identified 104 notable (including 'A1'), veteran and ancient trees, and seventeen groups and linear group of trees which possessed the physical characteristics and attributes of an ancient and veteran tree. A detailed assessment of the Potential Effects, Mitigation and Residual Effects of Moderate, Low and Very Low category trees is provided in the Arboricultural Impact Assessment (Document reference: 3.10.35). Veteran and ancient trees are of National importance. Notable trees are of County importance.	The National Planning Policy Framework (NPPF) includes relevant guidance in chapter 15: Conserving and Enhancing the Natural Environment. Guidance provided includes: i) Paragraph 180(b) recognises the economic and other benefits that trees and woodlands provide and the fact that they should be considered as part of a planning decision; and ii) Paragraph 186(c) identifies the principle that 'development resulting in the loss or deterioration of irreplaceable habitats (such as ancient woodland and ancient or veteran trees) should be refused unless there are wholly exceptional reasons and a suitable compensation strategy exists'. The Forestry Commission and Natural England have published information for the protection of ancient woodland, ancient trees, and veteran trees from development (Ref 1.1). The guidance advises on the use of semi-natural buffer zones as a means of protection. Measures need to be proportionate to the development and the potential arboricultural impacts.

Ecological Receptor	Ecological Feature	Detail	Relevant Legislation and Policy
Protected and Notable species	Badger	The Badger surveys undertaken between 2019 and 2023 identified 88 distinct badger setts. In 2022, 73 setts were identified, including four main setts, four annex, nine subsidiary and 56 outlier setts. 18 setts were searched for but were not found during the 2022 update survey but were previously recorded across the Proposed Scheme. An additional active single entrance sett (S93) was incidentally identified near Primrose Grove CWS during a site visit in May 2023. Badgers are of Local importance.	The Protection of Badgers Act 1992 makes it illegal to wilfully kill, injure or take any badger, or attempt to do so. It also makes it an offence to intentionally or recklessly damage, destroy or obstruct access to any part of a badger sett. Activities that would otherwise constitute an offence under this legislation may be licensed by Natural England for certain purposes.
Protected and Notable species	Otter	Surveys confirmed the presence of Otter within the River Wensum, with field signs including spraints, footprints, and direct sightings. No holts were identified at the time of the surveys. No evidence of Otter was recorded in Foxburrow stream. Otters are of Local importance.	Otters are protected from killing, injury and disturbance and their places of rest or shelter (occupied habitat) protected from damage or destruction under the Habitats Regulations. Protection is also afforded under the Wildlife and Countryside Act 1981 (as amended) with respect to disturbance of individuals occupying places of rest or shelter and obstruction of access to these. Activities that would otherwise constitute an offence under this legislation may be licensed by Natural England for certain purposes, however it is anticipated than no licence would be needed for the Proposed Scheme, given that no holts were identified on Site. Otter are also listed as SPI in accordance with Section 41 of the NERC Act 2006 (as amended). Public bodies have an obligation under Section 40 to have regard for these species when carrying out their functions.
Protected and Notable species	Water Vole	Surveys confirmed the presence of Water Voles in the River Wensum, as well as an adjoining ditch (WC7) and floodplain stream (WC5 (IDB reference: DRN112G0102)). Latrine counts from the surveys indicated the presence of a medium population in the River Wensum, with low populations in WC5 (IDB reference: DRN112G0102) and WC7. No evidence of Water Voles was recorded in Foxburrow Stream. Water Voles are of County importance.	Water Vole are protected from killing, injury and disturbance and their places of rest or shelter (occupied habitat) protected from damage or destruction under the Wildlife and Countryside Act 1981. Activities that would otherwise constitute an offence under this legislation may be licensed by Natural England for certain purposes. Water Vole are also listed as SPI in accordance with Section 41 of the NERC Act 2006 (as amended). Public bodies have an obligation under Section 40 to have regard for these species when carrying out their functions.

Ecological Receptor	Ecological Feature	Detail	Relevant Legislation and Policy
Protected and Notable species	Breeding birds	A breeding bird survey identified 66 species on or over the Site, of which 33 were known to either breed or probably breed on Site. Of the 66 species recorded, 33 were of conservation concern through listing on either Red or Amber Birds of Conservation Concern (BoCC), Schedule 1 of the Wildlife and Countryside Act 1981 (as amended) or as a Species of Principal Importance (SPI). Thirteen of these species were considered to either breed or probably breed on the Site. A kingfisher was also recorded incidentally on other survey visits, and therefore six species protected under Schedule 1 of the Wildlife and Countryside Act 1981 (as amended) were identified. These comprised Barn Owl (considered separately below), Brambling *Fringilla montifringilla*, Fieldfare *Turdus pilaris*, Hobby *Falco subbuteo*, Kingfisher *Alcedo atthis* and Red Kite *Milvus milvus*. None of these species were confirmed to be breeding (Brambling and Fieldfare are wintering species only in Norfolk), although Red Kite was categorised as 'probably breeding.' The breeding bird assemblage at the Proposed Scheme is of Local importance.	The Habitat Regulations 2017 Part 1 Regulation 10(2) & (3) state that local authorities '*must take such steps in the exercise of their functions as they consider appropriate to contribute to…the preservation, maintenance and re-establishment of a sufficient diversity and area of habitat for wild birds in the UK including by means of the upkeep, management and creation of such habitat…*'. The legislation continues to state that economic and recreation requirements must be taken into consideration in considering which measures are appropriate. Under the WCA all wild birds are protected from killing and injury, and their nests and eggs protected from taking, damage and destruction whilst in use. Additional protection is extended to species listed under Schedule 1 of the Act, meaning it is also an offence to disturb these species at or near the nest, or whilst they have dependent young. Some bird species are also listed as SPI in accordance with Section 41 of the NERC Act 2006 (as amended). Public bodies have an obligation under Section 40 to have regard for these species when carrying out their functions.
Protected and Notable species	Wintering birds	A total of 74 species were recorded on or over the Survey Area during the wintering bird survey. This included 44 species which are legally protected or species of conservation concern. The species assemblage included: • Eight species listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended); • Eleven species listed as SPI in accordance with Section 41 of the NERC Act 2006 (as amended) (also UKBAP species); and • Fourteen BoCC Red List species. Red List and / or SPI included Greenfinch *Carduelis chloris*, Grey Wagtail *Motacilla cinerea*, Herring Gull *Larus argentatus*, Lapwing *Vanellus vanellus*, Linnet *Carduelis cannabina*, Marsh Tit *Poecile palustris*, Mistle Thrush *Turdus viscivorus*, Lesser Redpoll *Acanthis cabaret*, Song Thrush *Turdus philomelos*, Starling *Sturnus vulgaris*, Woodcock *Scolopax rusticola* and Yellowhammer *Emberiza citrinella*. The wintering bird assemblage at the Proposed Scheme of Local importance.	The Habitat Regulations 2017 Part 1 Regulation 10(2) & (3) state that local authorities '*must take such steps in the exercise of their functions as they consider appropriate to contribute to…the preservation, maintenance and re-establishment of a sufficient diversity and area of habitat for wild birds in the UK including by means of the upkeep, management and creation of such habitat…*'. The legislation continues to state that economic and recreation requirements must be taken into consideration in considering which measures are appropriate. Some bird species are also listed as SPI in accordance with Section 41 of the NERC Act 2006 (as amended). Public bodies have an obligation under Section 40 to have regard for these species when carrying out their functions.

Ecological Receptor	Ecological Feature	Detail	Relevant Legislation and Policy
Protected and Notable species	Barn Owl	Several Barn Owls were observed during the field surveys, with a total of eight individuals recorded, indicating a high prevalence across the Survey Area. Barn Owl surveys identified a total of three Occupied Breeding Sites (OBS) and thirteen Potential Nest Sites (PNS). Barn Owls are of Local importance.	Under the WCA all wild birds are protected from killing and injury, and their nests and eggs protected from taking, damage and destruction whilst in use. Additional protection is extended to species listed under Schedule 1of the Act, including Barn Owl, meaning it is also an offence to disturb these species at or near the nest, or whilst they have dependent young.
Protected and Notable species	Reptiles	Surveys identified three species of reptile on Site: Common Lizard, Grass Snake and Slow Worm. The majority of results were recorded to the south of the Site in arable field margins, woodland edge habitats and hedgerows. Reptiles are of Local importance.	Native widespread reptile species (Common Lizard, Adder, Grass Snake and Slow Worm) are partially protected under Schedule 5 of the Wildlife and Countryside Act 1981 (as amended). This includes protection from killing and injury. All reptile species are also listed as SPI in accordance with Section 41 of the NERC Act 2006. Public bodies have an obligation under Section 40 to have regard for these species when carrying out their functions.
Protected and Notable species	Great Crested Newt	Suitable habitat for Great Crested Newt comprising waterbodies for aquatic breeding lifecycle phase and woodland, hedgerow, rough grassland for terrestrial phase was present across the Site. A suite of Great Crested Newt surveys was undertaken in 2020 and 2021. These concluded that great crested newts were likely absent from all but one waterbody present within 500m to the southwest of the Scheme (Water Body 15 as defined in the Great Crested Newt eDNA Survey Report 2021 (Document reference: 3.10.23)). Great Crested Newts are of Local importance.	Great Crested Newts are protected from killing, injury and disturbance and their places of rest or shelter (occupied habitat) protected from damage or destruction under the Habitats Regulations. Protection is also afforded under the Wildlife and Countryside Act 1981 (as amended) with respect to disturbance of individuals occupying places of rest or shelter and obstruction of access to these. Activities that would otherwise constitute an offence under this legislation may be licensed by Natural England for certain purposes. The Great Crested Newts is also listed as a SPI in accordance with Section 41 of the NERC Act 2006 (as amended). Public bodies have an obligation under Section 40 to have regard for these species when carrying out their functions.

Ecological Receptor	Ecological Feature	Detail	Relevant Legislation and Policy
Protected and Notable species	Fish	Ecologists conducted a 40-minute timed, catch per unit effort (CPUE) electric fishing survey over a 150m stretch of the River Wensum in August 2022. A total of nine species were caught during the survey. The species captured included Dace *Leuciscus leuciscus*, Pike, Chub, Perch *Perca fluviatalis*, Roach *Rutilus rutilus*, Rudd *Scardinius erythrophthalmus*, Stone Loach *Barbatula barbatula*, Three-spined Stickleback *Gasterosteus aculeatus*, and Minnow *Phoxinus phoxinus*. No species of conservation importance were captured. A qualitative (presence / likely absence) electric fishing survey of the ditch network was also conducted in August 2022. A total of three species were caught during the survey, including Brook / River Lamprey *Lampetra* spp., Minnow, and Three-spined Stickleback. No fish were caught during the quantitative one-run electric fishing survey of Foxburrow Stream carried out in August 2022. Fish populations are of International importance as Bullhead *Cottus gobio* and Brook Lamprey *Lampetra planeri* are both qualifying features of the River Wensum SAC.	The Salmon and Freshwater Fisheries Act (1975) covers regulation of fisheries in England and Wales and includes legislation that covers the introduction of polluting effluents, the obstruction of fish passage (screens, dams, weirs, culverts etc) illegal means of fishing, permitted times of legal fishing and fishing licencing (which covers electric fishing). Under this Act any person who causes or knowingly permits to flow, or puts or knowingly permits to be put, into any waters containing fish or into any tributaries of waters containing fish, any liquid or solid matter to such an extent as to cause the waters to be poisonous or injurious to fish or the spawning grounds, spawn, or food of fish, shall be guilty of an offence. The Act also requires that fish passes are installed on new and rebuilt barriers that affect waters frequented by salmon or migratory trout. The Eels (England and Wales) Regulations (2009) implement Council Regulation (EC) No 1100/2007 of the Council of the European Union, which required Member States to establish measures for the recovery of the stock of European eel. The regulations apply to England and Wales. The Regulations give powers to the regulators (the Environment Agency and Natural Resources Wales) to implement recovery measures in all freshwater and estuarine waters in England and Wales. The aim of the regulations is to achieve 40 per cent escapement of adult eels relative to escapement levels under pristine conditions. The measures, as set out in the legislation, by which this is to be achieved is to reduce fishing pressures, improve access and habitat quality and reduce the impact of impingement and entrainment. Under the Regulations, the regulators can serve notice to companies detailing their legal obligation to screen intakes and outfalls for European Eel *Anguilla anguilla* and/or to remove or modify obstructions to eel migration. However, it is possible for companies to be granted with exemptions if the costs of works greatly exceeds the benefits. In such a situation it is likely the regulator would seek a package of more cost-effective, “alternative measures.” Brook Lamprey and Bullhead are protected from killing, injury and disturbance and their places of rest or shelter (occupied habitat) protected from damage or destruction under the Habitats Regulations. SAC, SSSI, and Natural England consents would be required as part of the planning permission and must be obtained before mitigation is carried out. Works which do not require planning permission must still adhere to Natural England consents. Brown / Sea trout and Eel are listed as SPI in accordance with Section 41 of the NERC Act 2006 (as amended). Public bodies have an obligation under Section 40 to have regard for these species when carrying out their functions.

Ecological Receptor	Ecological Feature	Detail	Relevant Legislation and Policy
Protected and Notable species	Aquatic macroinvertebrates	Surveys undertaken in 2019 confirmed likely absence of white-clawed crayfish *Austropotamobius pallipes* within the River Wensum due to the presence of the non-native American Signal Crayfish (*Pacifastacus leniusculus)*. Signal Crayfish out-compete the white-clawed crayfish through competition for refuges, reproduction interference and predation, and the introduction of a microsporidial pathogen (known as the crayfish plague) for which the white-clawed crayfish has no immunity (Peay, 2002a; 2002b; 2003) Recolonisation is now considered very unlikely due to the establishment of an American Signal Crayfish population. Aquatic macroinvertebrate surveys were carried out on the River Wensum, the ditch network, and Foxburrow Stream in spring and autumn 2022. Survey locations are shown in **Figure 3-1** of the Aquatic Ecology Survey Report 2022 (Document reference: 3.10.12). The aquatic macroinvertebrate communities observed classified the River Wensum and WC5 (IDB reference: DRN112G0102) as having Low conservation value in spring 2022. Ditch B was classified in spring 2022 as having Fairly High conservation value. In autumn 2022 Ditch B was classified as having an aquatic macroinvertebrate community of Low conservation value, with the River Wensum having Moderate conservation value. WC5 (IDB reference: DRN112G0102) was classified in autumn 2022 as having Fairly High conservation value. Foxburrow Stream was classified as having an aquatic macroinvertebrate community of Moderate conservation value in both spring and autumn 2022. Three species of note under Community Conservation Index scoring, Red-legged Moss Beetle *Hydraena rufipes*, Grannom Caddisfly *Brachycentrus subnubilus*, and Pale Evening Dun Mayfly *Procloeon bifidum*, were identified in the samples. One individual of the red- Red-legged Moss Beetle was recorded in the Ditch B spring sample, with another individual recorded in the WC5 (IDB reference: DRN112G0102) autumn sample. Three individuals of the Grannom Caddisfly were recorded in the River Wensum upstream autumn sample, with another individual recorded in the River Wensum downstream autumn sample. One individual of the Pale Evening Dun Mayfly was recorded in the River Wensum upstream autumn sample, with another individual recorded in the WC5 (IDB reference: DRN112G0102) autumn sample. Due to the presence of regionally Notable species, aquatic macroinvertebrates are of County importance.	White-clawed crayfish are protected from killing, injury and disturbance and their places of rest or shelter (occupied habitat) protected from damage or destruction under the Habitats Regulations. White-clawed crayfish are listed as SPI in accordance with Section 41 of the NERC Act 2006 (as amended). Public bodies have an obligation under Section 40 to have regard for these species when carrying out their functions. Schedule 5 of the Wildlife and Countryside Act 1981 (as amended) (WCA) affords specific protection to a small number of aquatic macroinvertebrate species and their habitat.

Ecological Receptor	Ecological Feature	Detail	Relevant Legislation and Policy
Protected and Notable species	Terrestrial Invertebrates	Surveys identified a diverse invertebrate fauna, which includes forty-three species currently regarded as Nationally Rare, Scarce, Data Deficient or Section 41 Species of Principal Importance. The following habitats within the Scheme were considered to be of particular importance for invertebrates: The roadside verge habitat either side of Fakenham Road (at least County Importance), woodland habitat in the north of the Site (County Importance) and the hedgerows north of Weston Road (Local to County Importance). The terrestrial invertebrate population is of County importance.	Some invertebrate species are listed as SPI in accordance with Section 41 of the NERC Act 2006 (as amended). Public bodies have an obligation under Section 40 to have regard for these species when carrying out their functions.
Protected and Notable species	Desmoulin's whorl snail	Survey work indicated the presence of Desmoulin's Whorl Snail in three floodplain ditches (WC1, WC3 and WC4) within the Survey Area, as well as a large, scattered population within the Wensum floodplain approximately 1 km to the southeast. Desmoulin's Whorl Snail were not recorded during sampling along the section of Foxburrow Stream in 2020, indicating likely absence from this area. The Desmoulin's whorl snail is of International importance as it is a qualifying feature of the River Wensum SAC.	The Desmoulin's whorl snail is listed in Annex II a of the European Union Habitats and Species Directive (92/43/EEC) and is a NERC Section 41 'Species of Principal Importance in England' (replacing the UK BAP priority species in 2006). Public bodies have an obligation under Section 40 to have regard for these species when carrying out their functions.

Ecological Receptor	Ecological Feature	Detail	Relevant Legislation and Policy
Protected and Notable species	Macrophytes	Macrophyte surveys were carried out on the River Wensum, the ditch network, and Foxburrow Stream in summer 2022. A total of 25 macrophyte taxa were recorded in the 2022 macrophyte survey of the River Wensum, 12 of which are LEAFPACS2 scoring taxa. Clasping-leaved pondweed was the most dominant species, accounting for an estimated 60% of the Survey Area's total macrophyte cover. No invasive non-native species were recorded in the survey. Stream water-crowfoot, a species characteristic of the River Wensum SAC, was the only species of water-crowfoot observed. A further, six species or groups associated with *Ranunculus* spp. in 'watercourses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation' were sampled; water starwort *Callitriche* sp., common water moss *Fontinalis antipyrectica*, clasping-leaved pondweed *Potamogeton perfoliatus*, curled pondweed *Potamogeton crispus*, and spiked water milfoil *Myriophyllum spicatum*. Macrophyte surveys were also conducted on the ditch network. One species of note was recorded in Ditch A. Small patches of frogbit *Hydrocharis morsus-ranae* were recorded. The species is classified as Vulnerable on the Vascular Plant Red List for Great Britain (Cheffings & Farrell, 2005). A total of eight macrophyte taxa were recorded in the 2022 macrophyte survey of Foxburrow Stream, two of which are LEAFPACS2 scoring taxa. Fool's watercress was the most dominant species, accounting for 50% of the total macrophyte cover. No invasive non-native species were recorded in the survey. Due to the presence of species listed as members of the Annex I habitat 3260 community, a qualifying feature of the River Wensum SAC, aquatic macrophytes are of International importance.	Schedule 8 of the Wildlife and Countryside Act 1981 (as amended) (WCA) provides protection to a named species of aquatic flora. Some macrophytes are also listed as SPI in accordance with Section 41 of the NERC Act 2006 (as amended). Public bodies have an obligation under Section 40 to have regard for these species when carrying out their functions.

Ecological Receptor	Ecological Feature	Detail	Relevant Legislation and Policy
Protected and Notable species	Additional Species of Principal Importance	**Brown hare** The Scheme supports suitable habitats for Brown Hare *Lepus europaeus* comprising rough grassland, arable land, hedgerows, and woodland edge within and up to 2km from the Scheme boundary. A total of nine incidental record of brown hare were recorded within or in close proximity to the Scheme Boundary. **Harvest Mouse** The Scheme supports some suitable habitat for harvest mouse *Micromys minutus*, comprising tall grassland, arable land, and hedgerows within and up to 2km from the Scheme boundary. No incidentals of harvest mouse were recorded during other surveys within the Scheme, however, given the cryptic nature of this species, it is likely possible that they are present within the Scheme. **Western European hedgehog** The Scheme supports suitable habitat for western European hedgehog *Erinaceus europaeus*, comprising rough grassland, hedgerows, and woodland edges within and up to 2km from the Scheme boundary. No incidental recordings were made for western European hedgehog, however, the desk study returned nine records of western European hedgehog within 2km of the Scheme. **Polecat** The Scheme supports suitable habitat for polecat *Mustela putorius*, comprising arable field margins, rough grassland, hedgerows, woodland edges, and riverbanks within and up to 2km from the Scheme boundary. No incidental recordings were made for polecat, however, the desk study returned two records of polecat within 2km of the Scheme. **Common Toad** Suitable habitat for common toad *Bufo bufo* comprising waterbodies for aquatic breeding lifecycle phase and woodland, hedgerow, rough grassland for terrestrial phase is present across the Site. Incidental records of common toad were recorded across the Scheme, most notably in the rough grassland along the southern edge of Ringland Lane, Rose Carr woodland and in the rough grassland along the southern edge of the A1067.	Brown hare, harvest mouse, western European hedgehog, polecat, and common toad are listed as SPI in accordance with Section 41 of the NERC Act 2006 (as amended). Public bodies have an obligation under Section 40 to have regard for these species when carrying out their functions.

Ecological Receptor	Ecological Feature	Detail	Relevant Legislation and Policy
Invasive Non-Native Species	Invasive Non-Native Species	The following invasive non-native species listed on Schedule 9 of the WCA were identified during ecological surveys undertaken between 2018 – 2022: ▪ Himalayan Balsam *Impatiens glandulifera* was identified along the River Wensum and within the Field Survey Area **(**Document reference: 3.10.01**)** in 2018, however no records of this species were made within 2km of the Site Boundary. ▪ Rhododendron *Rhododendron* sp. was recorded in Foxburrow Plantation and Variegated Yellow Archangel *Lamium galeobdolon* was recorded in Broadway woodland during the 2022 UK Habitat Classification survey (Document reference: 3.10.31). Variegated Yellow Archangel was also recorded in woodland along the Broadway during the 2021 NVC survey (Document reference: 3.10.18). ▪ Surveys undertaken in 2019 confirmed the presence of the non-native American Signal Crayfish within the River Wensum (Document reference: 3.10.07). ▪ Surveys undertaken in 2020 recorded the presence of the non-native American Mink at WC5 (IDB reference: DRN112G0102) (Document reference: 3.10.03). The management of INNS to stop their spread has been considered in developing the mitigation measures for the Proposed Scheme.	Invasive non-native plant species are included under Schedule 9 of the Wildlife and Countryside Act 1981 (as amended). Under Schedule 9 it is an offence for any person to plant or otherwise cause growth in the wild any plant included in Part 2 of Schedule 9 of the Wildlife and Countryside Act. This would include spreading the species to new areas through cross contamination.

3 Ecological mitigation strategy

3.1 Overview

3.1.1 Ecological mitigation measures are required to avoid and reduce potential effects that could occur during the operation and construction phases of the Proposed Scheme. The Proposed Scheme would integrate a landscape strategy to mitigate effects upon protected species and achieve a minimum of 10% Biodiversity Net Gain (BNG), a drainage strategy that promotes habitat diversity, and a lighting strategy that is sensitive to ecological features.

3.1.2 Further measures are also outlined to ensure the protection of retained habitats, the protection of notable species, and the avoidance of habitat degradation during the construction phase.

3.1.3 This strategy is supported by the following figures presented in Sub Appendix A (Document reference 3.10.32a):

- **Figure 1:** Statutory Sites;
- **Figure 2:** Non-Statutory Sites;
- **Figure 3:** Habitat (UKHab) map; and,
- **Figure 4:** Habitats of Principal Importance and Ancient Woodland.

3.1.4 This strategy was informed by the Essential Environmental Mitigation areas as shown on the **'Essential Environmental Mitigation' plan** (Document reference: 2.11.00).

3.2 Design measures

3.2.1 The design of the Proposed Scheme, where possible, has included for embedded mitigation to avoid potential adverse effects to biodiversity. The Embedded Mitigation includes:

- Landscape planting as part of the Proposed 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 weathering steel trapezoidal box girder 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 acoustic barrier proposed for the entire length of both carriageways of the River Wensum viaduct would provide noise mitigation for ecological features.
- Greenbridges are proposed to provide multi-functional connections east to west, across the Proposed Scheme. The greenbridges have been designed in response to their setting, to replicate as 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.
- Drainage systems designed to intercept and divert run-off away from watercourses and floodplains, most notably the River Wensum.
- Where culverts are required, these would be 'oversized' culverts wherever feasible to encourage the passage of otter, water vole, fish, aquatic invertebrates, and plants.
- The provision of earth bunds within the design, which would provide screening from noise.

3.3 Avoidance measures

3.3.1 The Scheme designs will ensure retention and protection of woodland and hedgerows as far as possible to minimise effects upon a range of protected species (badgers, other mammals, breeding birds, reptiles, and invertebrates). This includes the retention and maintenance of HPIs for their intrinsic value.

3.3.2 The proposed alignment of the Proposed Scheme is designed to avoid important ecological features where possible, most notably the River Wensum SAC / SSSI and ancient woodland.

3.3.3 Where habitat loss is unavoidable, compensation would be required in line with local and national policy as discussed below in the landscape strategy.

3.4 Landscape strategy

3.4.1 To compensate for the loss of habitat during construction of the Proposed Scheme, proposed primary landscape mitigations and enhancement measures have been designed, as detailed within **Chapter 9: Landscape and Visual** (Document reference: 3.09.00). The indicative layout of habitats is shown in the Landscaping Design Plans (Document reference 2.07.00).

3.4.2 The landscape strategy creates new habitat and enhances habitats within the Proposed Scheme to provide greater opportunities for protected and notable species such as badgers, birds, amphibians, and invertebrates. The key features of the proposed landscape mitigation include:

- New woodland planting to provide green visual containment in addition to creating habitat for wildlife.
- New specimen tree planting to enhance visual appeal and integrate the Proposed Scheme into the surrounding landscape.
- New hedgerow planting to enhance visual amenity of the Proposed Scheme, respond positively to the local character and screen the nearby residents from the proposed noise barrier.
- Areas of wildflower grassland and bulb planting to enhance biodiversity and visual appeal.
- Established areas of existing vegetation are proposed to be retained and enhanced where possible.

3.4.3 The landscape strategy proposes to create nine habitat types, broadly categorised as below:

- Road verge grass;
- species-rich grass;
- wet grassland;
- reedbeds;
- scattered specimen trees;
- woodland;
- scrub;
- hedgerows (and hedgerow trees); and,
- wetland scrub.

3.4.4 These habitats would provide suitable foraging opportunities for a variety of species including terrestrial mammals (such as badger), birds, reptiles, common amphibians, and invertebrates. Woodland and scrub creation would provide nesting opportunities for birds as well as refuge for mammals, amphibians, and invertebrates.

3.4.5 The landscape strategy would utilise a native and species-rich mix of plants for all habitat types, mirroring surrounding retained semi-natural habitats including species-rich grassland and broadleaved woodland. Utilising native species, flowering species and berry bearing shrubs would benefit a range of wildlife, providing food source throughout the year.

3.4.6 In line with local and national policy, the Proposed Scheme aims to achieve at least a 10% gain in biodiversity post-development, as supported by a BNG assessment (Document reference: 3.10.33). The final figures and results of the assessment are detailed in the BNG report.

3.5 Landscape management and maintenance

3.5.1 Specific detail of habitat management (e.g. grassland mowing regime etc.) will be provided in a LEMP, to be produced at Detailed Design stage. Appropriate

landscape planting recommendations should be provided within the LEMP to ensure:

- Correct planting / sowing seasons;
- Correct soil conditions are created for specific species / habitats;
- Sufficient spacing is provided between standard trees to prevent future oversharing; and
- Viability of trees, bulbs, and grassland mixes.

3.5.2 New and retained landscaped areas should be subject to low-intensity management regimes. This should include:

- Sensitively timed grass cutting, as to avoid the peak flowering season and retain a species-rich sward.
- Grass cuttings/arisings should be left in situ for a few days to drop seeds as appropriate, prior to removal. Arisings should be removed to prevent an increase in soil fertility and retain the species-rich grasslands.
- No more than one cut/prune of hedgerow and standard trees per year. This should also be undertaken only once specimens have fruited in order to maximise food availability for a range of wildlife.

3.6 Lighting strategy

3.6.1 Night works should be avoided where practicable to reduce the lighting of sensitive habitats and potential disturbance to species. Lighting levels would be kept to the minimum necessary for security and safety.

3.6.2 A Construction Lighting Management Plan (CLMP) will be included in the Construction Environment Management Plan for approval by the County Planning Authority. This plan will detail the mitigation measures that are to be implemented to reduce adverse effects from lighting within the Site Boundary.

3.7 Drainage strategy

3.7.1 A sensitive drainage strategy will be implemented for the operation of the Proposed Scheme. Details of the drainage strategy are set out within **Chapter 12: Road Drainage and the Water Environment** (Document reference: 3.12.00).

3.7.2 A combination of Sustainable Drainage Systems (SuDS) features will be designed into the Proposed Scheme to provide mitigation for the potential effect of increases in physical contamination (i.e. sedimentation) of surface water bodies. Whilst the drainage strategies will primarily aim to mitigate the potential impacts upon groundwater and surface water, a number of these features would also create valuable wetland habitats for notable and protected species.

3.7.3 The SuDS features would be appropriately enhanced to increase their ecological value and subsequently benefit wildlife.

3.7.4 Standing water to be incorporated within the SuDs features would provide a permanent source of water for species such as badger, hedgehog, birds, amphibians, and invertebrates, where drainage conditions allow. This would incorporate varying depths and slopes within the standing water to provide varying water depths and conditions. A suitable planting regime would also be used, comprising a native species rich mix of submerged, emergent, and marginal vegetation to promote aquatic floristic diversity. The swales / species-rich wet grassland would be planted with an appropriate mix of native marshy grassland species.

4 Construction information

4.1 Overview

4.1.1 Full details regarding the construction programme and approach are stated in Environmental Statement **Chapter 3: Description of Scheme** (Document reference: 3.03.00). A summary of relevant aspects is provided below.

4.2 Construction programme and proposed key construction activities

4.2.1 It is expected that if planning permission is granted for the Proposed Scheme the construction work is expected to commence in late 2025 and be completed in 2029. The key construction activities are summarised sequentially below (although there is likely to be some overlap between each stage / individual processes):

- Enabling Works. This would focus on logistics including compound set up, establishing haul roads, fence removal, advanced ecological mitigation, and installation of temporary fencing. Temporary fencing would be installed to secure the work areas from unauthorised access. Additional zones may require specific fencing, for example ecologically sensitive areas.
- Site Clearance. This would entail removal of existing fencing, vegetation clearance and topsoil stripping.
- Earthworks. Pre-earthwork drainage installation, bulk earthworks, stockpile maintenance and logistics
- Structures (viaduct, underbridges, overbridges, 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.
- Viaduct Construction.

4.3 Construction access

4.3.1 The anticipated access to site would be from the A1067, Ringland Lane, Paddy's Lane, Wood Lane and the A47 when direct access is available.

4.4 Construction compounds

4.4.1 The main construction compound and material storage area is intended to be located directly south of Breck Lane at the Broadway Over Bridge location to the centre of the Site. The Principal Contractor may refine these arrangements within the limits of the Site Boundary.

4.5 Viaduct construction

4.5.1 A temporary works platform would be built across the River Wensum Floodplain from which the viaduct would be constructed. From this temporary works platform piling would be undertaken, viaduct piers constructed, and the viaduct deck lifted and poured (concreting the viaduct stitches from the platform) into place. In places temporary sheet pile retaining walls would be required for the Temporary Works Platform.

4.5.2 At the end of construction phase the removal of the temporary works platform would involve:

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

4.5.3 The temporary works platform would use a temporary crossing of River Wensum using a bailey bridge, which would include bunded protection against spillages.

4.5.4 The footprint of the temporary works platform would be reinstated on completion of the works, with the exception of the maintenance access track that would allow access to the viaduct in operation for inspection.

4.5.5 The new landscape planting would be subject to a 3-year establishment maintenance period to ensure that the planting successfully establishes.

5 Construction mitigation measures

5.1 Approaches to mitigation measures during construction

5.1.1 An Outline Construction Environmental Management Plan (OCEMP) has been produced for the Proposed Scheme, alongside this Ecological Mitigation Strategy. The OCEMP includes the following considerations that are relevant to all biodiversity features:

- INNS management;
- Dust suppression and dampening down during demolition and construction activities, to include haul routes;
- Noise and vibration suppression to reduce noise and vibration from construction to negligible levels;

- Air quality controls – e.g. switching off engines and avoid excessive revving of vehicles;
- Pollution prevention measures;
- Transport, storage and disposal of hazardous waste and oils;
- Low level and directional lighting close to ecological features;
- Fish translocation prior to dewatering activities;
- Covering or adapting excavations to avoid mammal entrapment;
- Displacement techniques prior to habitat clearance;
- Ecologically sensitive construction measures, including biosecurity measures; and
- Protection of trees.

5.1.2 Mitigation in relation to dust emissions includes the following relevant mitigation as set out in the OCEMP:

- Dust management measures during preparation and maintenance of the Site;
- Regular inspections, including for evidence of dust soiling and dust deposition;
- Measures to minimise dust generation from operating vehicles and machinery;
- Measures to minimise and / or supress dust generation from demolition, fabrication, and construction activities; and
- Specific measures to address dust generation from earthworks impacts.

5.1.3 Biosecurity measures should be implemented during the construction phase to prevent the spread of INNS. Biosecurity is defined as a set of precautions

that aim to minimise the risk of moving non-native species, parasites, and diseases. Measures are likely to include:

- The briefing and training of workers on good biosecurity practices appropriate to their role;
- Equipping workers with the necessary equipment, Personal Protective Equipment (PPE) and substances to implement biosecurity control measures, including effective hygiene and sanitation practices. This would most frequently comprise Virkon S disinfectant tablets, sprayers, and brushes to clean and disinfect equipment and PPE prior to leaving site;
- Ensure that Defra's "Check, Clean, Dry" principles are followed and ensure that all PPE and survey equipment is clean and dry (and if necessary, disinfected) prior to going to and from site; and,
- Where possible, workers should park vehicles on hard standing areas and check / clean tyres prior to leaving site.

5.1.4 An Ecological Clerk of Works (EcoW) would be appointed during the construction phase to ensure all ecological method statements are followed correctly, and that works are avoiding and / or minimising risk to biodiversity features.

5.1.5 To avoid potential adverse effects upon protected species, their breeding and movement would be considered through specific mitigation measures. For example, the timing of construction works should consider key fish migration periods in consultation with Environment Agency Fisheries Officer to agree appropriate measures to avoid the obstruction of passage or disturbance to fish moving to upstream reaches for spawning. Vegetation and site clearance will take place between September and February inclusive, i.e., outside the main bird breeding season, wherever practicable. Should it be deemed necessary to remove habitats suitable for breeding birds during the breeding season, these would be subject to a pre-clearance watching brief by a

Suitably Qualified Ecologist (SQE) who is an appropriately experienced ornithologist.

5.1.6 The OCEMP will be used to produce a Construction Environmental Management Plan (CEMP). The CEMP will be produced by the Principal Contractor prior to the commencement of works on site. All measures to protected biodiversity features during the construction phase will be incorporated within the CEMP.

5.1.7 Specific measures relating to compensation and enhancement works for protected / notable habitats and species, involving habitat creation and enhancement will be incorporated within a LEMP.

5.1.8 All relevant Environmental Permits, Best Practice Guidance and Regulations, British Standards, and monitoring in respect of air quality, noise and vibration, hydrology and protection of ecological features would be adhered to. This would include the Guidance for Pollution Prevention (GPP) series, with specific reference to GPP5: Works and maintenance in or near water (Natural Resources Wales, 2018).

5.1.9 Industry standard methods and procedures to ensure air quality impacts are minimised throughout all phases of the project would be implemented.

5.1.10 The following general measures are recommended during the construction phase of the Proposed Scheme to ensure the avoidance and reduction of killing / injury of notable and protected species as well as the protection of retained habitats and designated sites.

5.2 General site management

5.2.1 General environmental protection measures must be implemented during the construction phase of the Proposed Scheme. Such measures include best environmental practice guidance outlined in the Government's Pollution prevention for businesses (DEFRA, 2019) and those outlined by the Construction Industry Research and Information Association guidance (CIRIA,

2015). The following minimum standards must be adhered to prevent negative ecological effects beyond the Proposed Scheme boundary:

- Measures must be taken to prevent dust and other emissions from construction affecting the retained habitats and land beyond the Proposed Scheme.
- Chemicals and fuels must be stored in secure containers located away from watercourses or water bodies. Spill kits must be available.
- Implementation of appropriate drainage arrangements to intercept, capture, and attenuate surface water runoff.
- Retained trees and hedgerow must be protected in accordance with British Standard BS5837:2012 Trees in Relation to Construction.
- Appropriate measures would be used to ensure excavations are covered or securely fenced, or that suitable methods of egress are provided when the construction site is closed (e.g., overnight) to prevent the entrapment of animals.
- Noise and vibration must be controlled and kept to the minimum necessary.
- Where practicable construction compounds and working areas should be sited away from sensitive features such as watercourses and running water habitats to avoid / minimise the risk of disturbance and polluted run-off / wastewater entering these habitats from the compounds.
- Safeguards during construction would be implemented prior to the start of work and would remain in place until the end of the construction period.
- Fencing would be installed around all construction works to protect the surrounding retained habitats. This may include the surrounding of

construction compounds by hoardings to reduce visual effects due to the presence of construction traffic, plant, and equipment.

5.3 Construction Lighting Management Plan

5.3.1 Night works should be avoided where practicable to reduce the lighting of sensitive habitats and potential disturbance to species. Lighting levels would be kept to the minimum necessary for security and safety.

5.3.2 Where this cannot be avoided, any temporary lighting during construction would adhere to a CLMP, which would detail the mitigation measures that are to be implemented to reduce adverse effects from lighting.

5.3.3 This strategy would primarily be produced for bats and would follow guidance produced by the Institution of Lighting Professionals (ILP) in conjunction with the Bat Conservation Trust (BCT). The lighting strategy would also include measures for other nocturnal species such as badger, crepuscular birds, and invertebrates. The lighting strategy may include the following recommended measures:

- Temporary lighting used for construction would be switched-off when not in use;
- Avoid, light spill onto known roosts, trees, woodland edge, and hedgerows, and temporary flightlines;
- physical shields installed where necessary, and maintain dark corridors along retained areas of retained woodland and hedgerows, to ensure continued connectivity;
- Creation of a ‘buffer zone’ of very low illuminance (if any) adjacent to established or proposed key habitats, such as adjacent to treelines;
- Landscaping measures in the form of shrubs and tree planting to further act as secondary mitigation to screen and soften the effects of installed artificial light sources;

- Use the minimum light levels necessary for the relevant task / function, this may equate to reducing light intensity, and / or using the minimum number or light sources or minimum column height;
- Use hoods, louvres, or other luminaire design features to avoid light spill onto retained and newly created areas of vegetation;
- Use narrow spectrum light sources where possible to lower the range of species affected by lighting, specifically avoiding shorter wavelength blue light, using instead warm / neutral colour temperature lighting; and,
- Use light sources that emit minimal ultra-violet light to avoid attracting night-flying invertebrate species.

5.4 Designated sites

5.4.1 See 'General Construction Measures' above and 'Aquatic Ecology' and 'Invasive non-native species' below.

5.4.2 Mitigation against increased flood risk is stated in the Outline Construction Environmental Management Plan (OCEMP) (Document reference: 3.03.01).

5.5 River Wensum SAC

5.5.1 Measures to protect riparian and aquatic habitats from disturbance or degradation, outlined in the OCEMP. Measures include:

- A 3m construction exclusion zone from the SAC boundary of the River Wensum.
- Noise, vibration, lighting, and biosecurity measures employed during construction to avoid negative impacts on the River Wensum.
- Sediment, pollution, and surface water run off controls in proximity to the River Wensum and any hydrologically connected watercourses.

5.5.2 Measures that would avoid sediment and chemical run-off into the River Wensum have been mandated by their inclusion in the Proposed Scheme

OCEMP. These measures are described in **Chapter 12: Road Drainage and the Water Environment** (Document reference: 3.12.00) and would reduce the risk of sediment and chemical run-off to negligible levels. Measures include:

- Chemicals and fuels must be stored in secure containers located away from watercourses or water bodies;
- Spill kits must be available;
- Implementation of a construction-phase drainage strategy to intercept, capture, and attenuate surface water runoff.

5.5.3 River Condition Assessments of existing watercourse and enhancement watercourses would be carried out in years 1, 3, 5, 10, 20 and 30 (in accordance with Biodiversity Net Gain guidance) following the completion of the construction phase. This would assess the success of aquatic habitat mitigation measures and enhancements.

5.6 Habitats

5.6.1 See 'General Construction Measures' above and 'Aquatic Ecology' and 'Invasive non-native species' below.

5.6.2 Retained trees and hedgerows must be protected in accordance with British Standard BS5837:2012 Trees in Relation to Construction, including the erection of protective fencing (or similar) encompassing or demarcating root protection areas - see the Outline Construction Environmental Management Plan (OCEMP) (Document reference: 3.03.01) and Outline Arboricultural Method Statement (OAMS) (Document reference 3.03.01d).

5.6.3 The OAMS describes the arboricultural protection measures identified as necessary for the protection of retained trees as part of the Proposed Scheme. It presents in principle the arboricultural protection and monitoring measures which would be applied during construction. Measures include:

- Arboricultural monitoring;

- Removal of Arboricultural features, including veteran trees
- Tree canopy management and pruning;
- Tree Protection Fencing;
- Ground protection; and
- Special engineering and other relevant construction details.

5.6.4 A survey of landscape and habitat creation areas including reinstated, created, and enhanced habitats would be completed in years 1, 3, 5, 10, 20 and 30 following the completion of the construction phase.

5.7 Ancient woodland, and notable, veteran, and ancient trees

5.7.1 The Outline Arboricultural Method Statement (Document reference 3.03.01d) includes detail on actions around individual trees and groups of trees to outline approaches to removal and protection including the establishment of construction exclusion zones. Retained trees and hedgerow must be protected in accordance with British Standard BS5837:2012 Trees in Relation to Construction, including the erection of appropriate demarcation fencing encompassing root protection areas.

5.7.2 Retained trees and hedgerow must be protected in accordance with British Standard BS5837:2012 Trees in Relation to Construction, including the erection of appropriate demarcation fencing encompassing root protection areas.

5.7.3 Ancient and veteran trees provide an irreplaceable habitat, and their direct loss cannot be mitigated. The loss of high value arboricultural features also cannot be mitigated in the short-term. The Arboricultural Impact Assessment (**Appendix 10.35**) (Document Reference: 3.10.35) includes mitigation measures, and an outline of a compensation strategy that identifies measures to compensate for this direct loss.

5.8 Badger

5.8.1 A draft licence for Badger was submitted to Natural England in 2022 for their review with the intention of receiving a Letter of No Impediment (LONI) with respect to Badgers.

5.8.2 A full licence would be sought from Natural England and a summary of the mitigation measures to be included in the licence provided below.

5.8.3 The draft Badger Licence lists the setts that would require closure under the final Natural England licence. Those setts that fall within the 30m of bored pile locations would need to be closed prior to piling activities within this exclusion zone.

5.8.4 Artificial sett(s) are usually required prior to the planned closure or destruction of a main sett. Required artificial setts would be constructed prior to the closure of setts near Ringland Lane and Long Plantation, in accordance with the methodology included in the Badger Licence. The artificial sett would be protected throughout construction and remain protected in-situ post construction.

5.8.5 Vegetation clearance works are planned to take place prior to some active setts being excluded. The Badger Licence would also include measures to minimise the risk of damage or disturbance to retained setts, methods to close setts that are not currently in use, and best practice protocols.

5.8.6 The following measures have also been identified to mitigate any potential impacts on Badger populations located within and adjacent to the Site which would be impacted by the Proposed Scheme, and would be included in the Badger Licence:

- As the use of the Site by badgers would likely change over time, with some setts likely to become inactive and new setts likely to be created, a walkover survey would be undertaken prior to the commencement of works, and the licence application being submitted. A pre-construction badger survey would be carried out at least three months in advance of

site clearance in areas of potential badger habitat commencing to ensure any new information is obtained.

- A further survey would be completed within one week prior to site clearance commencing. These surveys would reconfirm levels of badger activity in advance of site clearance commencing. This would allow identification of any additional mitigation required, in the unlikely event levels of activity had increased or locations had changed in the three months prior to site work commencing.
- Where Badger setts are to be retained and construction works are required nearby, a buffer zone would be established around setts. Requirements for buffer zones and the restrictions of works within buffer zones would be identified and enforced on Site by the Named Ecologist on the development licence.
- All vegetation clearance works within 30m of known Badger setts would be completed under the direct supervision of a suitably experienced ecological clerk of works, unless otherwise directed by the ECoW (and the Named Ecologist named on the Badger Licence, where required). Prior to the start of vegetation clearance, an area within a minimum distance of 10m of any Badger sett entrance that displays signs of current use by a Badger must be clearly marked using coloured tape, string, paint, or other markers. Any further setts which are discovered during vegetation clearance must be similarly marked as soon as their presence becomes known.
- Badgers use the wider area for foraging and commuting purposes and therefore measures need to be put in place during the construction phase to minimise effects upon badger movement and foraging activity. These measures will be set out in the final CEMP(s) used to inform the Badger Licence, and should be read in conjunction with the measure stated in the ‘Noise and Vibration’ section of the OCEMP (Document reference: 3.03.01), and include the following:

- Fencing off or covering dangerous areas of the construction site (e.g., deep excavations) with Badger proof fencing; or providing a means of egress from shallow excavations, such as animal ladders;
- Avoidance of storage of plant and materials on areas of potential foraging habitat (e.g., retained grassland);
- Enforcements of appropriate speed limits for on Site traffic to minimise the risk of collisions with Badgers;
- Avoidance of night works where practicable, unless specifically required, to avoid disturbance by artificial lighting; and
- Where required use of lighting hoods, cowls or shields to avoid light spill onto setts or Badger paths.

- If any potential Badger setts are identified these should be checked by an ecologist prior to any clearance works to confirm their status. The ecologist named on the development licence should be consulted should an active sett be identified to determine whether an amendment to the licence is required.

5.8.7 Pre-construction Badger surveys and continued monitoring throughout the construction stage would be necessary to ensure legal compliance and to overcome any survey limitations.

5.8.8 Badgers would also be surveyed during the operation period to ensure all licence conditions are met.

5.9 Otter

5.9.1 In addition to the measures stated in sections 5.1 – 5.3, the following measures would be completed specifically in relation to Otter and set out in the final CEMP(s):

- Pre-construction surveys to reconfirm the status of Otter habitat usage of the Site and surrounding watercourses up to 250 m from the Proposed Scheme;

- Avoidance of any obstructions to established Otter paths and access to open water; and
- The marking of, and adherence to, 30m exclusion zones around any holts and shelters identified as a result of updated survey prior to site clearance and construction activities occurring. If Otters are known or suspected to be breeding, the exclusion zone could be extended to a 200 m radius. However, it could be reduced to 100 m depending on the nature of the works, topography, and natural screening. This would require judgement from a SQE.

5.9.2 If breeding was confirmed and exclusion zones of the size set out above were not possible, works would be undertaken in accordance with a European Protected Species (EPS) Mitigation Licence (EPSML) to derogate the legislation protecting otter (except during periods of active breeding). As part of the licence, appropriate compensation would be provided to ensure that alternative habitat is provided in advance of the impact occurring.

5.10 Water Vole

5.10.1 A Natural England licence would be required to conserve individuals for the duration of construction.

Water vole mitigation during piling activities

5.10.2 Piling activities in proximity of the River Wensum during the construction period have the potential to temporarily impact water voles indirectly (i.e. via noise and vibration). It is not known if the piling works would result in a level of disturbance that would cause Water Voles to disperse, however it is estimated that there is the potential for indirect impacts to this species within 100m of piling works. This radius will be refined as part of the CEMP and ecologist named on the Water Vole licence following the completion of the detailed design and confirmation of the works specifications and duration.

5.10.3 The risk of piling activities temporarily impacting water voles indirectly is considered to be low. Water Voles are highly territorial and show high fidelity

to breeding territories, and it is highly likely that breeding female Water Voles would remain in burrows during the piling works. Male Water Voles have wider ranges and are more likely to disperse successfully. Wider mitigation measures include the enhancement and creation of Water Vole habitat and the protection of retained areas of habitat across the River Wensum floodplain. As any disturbance would temporary, if any individual Water Voles were affected the re-colonisation of the original burrows would be expected soon after the piling works. Water Voles are also known to inhabit and thrive in noisy urban environments.

5.10.4 In addition to the 'General Construction Measures' above, precautionary working methods would be implemented during piling activities in proximity to the River Wensum floodplain. This approach to mitigate against any potential indirect impacts on water voles due to piling works is considered appropriate as it is likely that individuals would remain due to the tolerance of this species to indirect disturbance and high fidelity to home ranges. The precautionary methods below would avoid the requirement for the physical exclusion or displacement of water voles, which would require much greater levels of disturbance involving the temporary degradation of habitats through the cutting back of vegetation, removal of cover, and reduction in the availability of food. In this instance alternative habitat is accessible and available and would be protected via clearly demarcated exclusion zones.

5.10.5 The methods to be in the final CEMP(s) and Water Vole licence application will include:

- An update water vole population assessment to be undertaken at least 12 months prior to piling activities (this would ideally comprise a survey in mid-April – June and a second survey in July – September). The section of the River Wensum proposed for WFD diversion and re-meandering works would be surveyed for water vole as part of the update water vole survey undertaken across the Proposed Scheme ahead of construction works. Any additional water vole mitigation that

would be required will be included in the CEMP, and the full water vole licence application if required;

- A period of monitoring of water vole burrows identified during the update water vole population assessment using trail cameras immediately prior to piling works to confirm water vole presence or likely absence;
- The protection of any water vole habitat via the use of clearly demarcated exclusion zones using Heras fencing (or similar), to be installed between the works area and water vole habitat and be a minimum of 3m from the edge of each watercourse but 5m where practicable, (to be positioned under the supervision of the Named Ecologist named on the Water Vole licence); and,
- Water vole burrow monitoring by a SQE during the piling works.

5.10.6 Should the SQE identify any evidence of disturbance to water voles then works must cease and Named Ecologist on the Water Vole licence contacted to review the methodology.

5.10.7 Any temporary fencing to protect water vole habitat would be installed with clear signage to state the function of the fence. Fencing would be used to demarcate a construction exclusion zone. These protection measures would remain in place until the completion of piling activities.

5.10.8 As per the Water Vole licence, targeted Water Vole surveys of watercourses and waterbodies within the Proposed Scheme would be completed for three years post-construction. The first survey would look to confirm establishment of good quality habitat for Water Vole and search for signs of Water Voles in the enhanced habitats of the connected watercourses to confirm use of the new culvert. Subsequent surveys would monitor habitat condition and connectivity through the new culvert and search for signs of Water Vole in all watercourses, which would include carrying out latrine counts to assess relative population density.

5.11 Wintering birds

5.11.1 Best practicable means (BPM) stated in the OCEMP (Document reference: 3.03.01) would be employed to minimise the effects of noise pollution, dust and air pollution and visual intrusion during construction.

5.12 Breeding birds

5.12.1 If carried out during the breeding season (considered to be from March to August inclusive), vegetation and site clearance could cause the destruction or damage of active nests and any eggs or live young present. The following measures would therefore be implemented to ensure compliance with the Wildlife and Countryside Act (1981, as amended):

- Vegetation and site clearance would take place between September and February inclusive, i.e., outside the main bird breeding season, wherever practicable. Should it be deemed necessary to remove habitats suitable for breeding birds during the breeding season, these would be subject to a pre-clearance watching brief by a SQE who is an appropriately experienced ornithologist. The watching brief would be undertaken a maximum of 48 hours prior to the vegetation removal taking place (unless otherwise stated by the SQE who is an appropriately experienced ornithologist); and
- In the event any active nests are found or suspected, clearance works would be halted within a minimum distance of 5m from the nest. This buffer distance would be varied on the advice of the ornithologist SQE, dependent on the nature of affected habitats and the species of bird involved. Clearance works would not recommence until any young had fledged and left the nest, with a re-inspection by the SQE who is an appropriately experienced ornithologist, is required to confirm the absence of active nests.

5.12.2 Surveys identified Red Kite, listed on Schedule 1 on Wildlife and Countryside Act (1981), as possibly breeding on Site although no active nest was located.

Red Kites usually nest in the canopy of tall trees. Should tree clearance be undertaken during nesting bird season, then pre-clearance checks would be undertaken as described above. If Red Kite, or any other Schedule 1 bird species is identified during the pre-clearance checks, then works should cease and the SQE who is an appropriately experienced ornithologist contacted to determine an appropriate course of action. Monitoring of any nest of a Schedule 1 species would require a specific licence. If any active nests are recorded, to avoid the risk of intentional or reckless disturbance the SQE who is an appropriately experienced ornithologist would determine an appropriately sized buffer around the active nest.

5.12.3 Piling activities (regarding the construction of the River Wensum Crossing) would be timed to avoid the dawn chorus during the nesting season in accordance with guidance provided by the SQE who is an appropriately experienced ornithologist. Mitigation detailed in the Noise and Vibration section of the (OCEMP) (Document reference: 3.03.01) would be adhered to.

5.13 Barn Owl Occupied Breeding Sites

5.13.1 Previous surveys did not identify any confirmed Occupied Breeding Site (OBS) within the Proposed Scheme boundary.

5.13.2 The final CEMP(s) will provide the following measures. All active OBS identified within 150m of the Proposed Scheme boundary would be capped or removed to prevent barn owls from accessing them to ensure that this Schedule 1 bird is not disturbed while nesting and that construction works are compliant with legislation. Exclusion measures would be undertaken at these OBS during September to February inclusive (outside of the typical nesting season). This may involve removing and relocating the nest box to an appropriate location away from construction works outside the breeding season and in advance of works. Otherwise, compensatory nest sites should be in place prior to exclusion measures and at least 30 days prior to the commencement of construction works. It is best practice for any OBS exclusion measures undertaken outside of the breeding season to be

undertaken by a SQE who holds a barn owl licence. OBS identified during previous surveys are presented in **Table 5.1** (see the confidential appendix Document Reference 3.10.28 for full location information):

Table 5.1 Barn owl occupied breeding sites identified during previous surveys

Feature number	Feature
Tree number 15	Barn owl box
Tree number 2	Tree
Building number 6	Agricultural buildings

5.13.3 Should a new OBS be identified during clearance works outside of the barn owl breeding season, then a suitably experienced and licenced ecologist would be contacted to undertake nest exclusion measures at the OBS, and an alternative nesting box should be provided.

5.13.4 If a new OBS is identified during clearance works within the barn owl breeding season, the following guidelines should be followed:

- A Protection Zone should be defined based on the potential for disturbance due to works to be undertaken;
- Should it not be possible to implement the required Protection Zone distance, a verification survey should be carried out to confirm the current status of the OBS;
- The presence of an OBS will require a Protection Zone until such a time that the young birds have fledged and is independent of the nest. A secondary verification survey, following the end of the breeding season, should be undertaken by the SQE who holds a barn owl licence to confirm the status of the OBS;
- Inactive OBS should only be marked for closure during the breeding season if no other alternative mitigation options are possible and leaving it open would likely result in the disturbance of nesting barn

owls. A compensatory box should be provided prior to closure of the OBS under the guidance of a SQE who holds a barn owl licence; and

- Best practice guidelines, as described in Shawyer (2011) should be followed. Close inspection of occupied nest sites requires a SQE who holds a barn owl licence and should be avoided during the months of March, April, and May when barn owls are typically in the process of selecting nest sites or beginning to lay eggs. There is an increased risk of permanent nest abandonment during this period.

5.14 Barn Owl Potential Nest Sites

5.14.1 Potential Nest Sites (PNS) identified during previous surveys are presented in **Table 5.2**.

Table 5.2 Barn owl potential nest sites identified during previous surveys

Feature	Feature
Tree number 13	Tree
10	Agricultural buildings
Tree number 20	Barn Owl Box
Tree number 16	Tree
Tree number 3	Tree
Tree number 19	Tree
Tree number 5	Tree
Tree number 14	Tree
Tree number 1	Tree
Building number 13	Agricultural buildings
Tree number 9	Tree
Tree number 10	Tree
Tree number 6	Tree

5.14.2 Prior to any construction works commencing, a pre-works check for nesting Barn Owls would also be carried out on PNS within the Proposed Scheme by a SQE who holds a barn owl licence, prior to the felling of these trees. The

SQE who holds a barn owl licence would determine areas where additional survey is required at this time.

5.14.3 All potential barn owl nest sites identified within 150m of the Proposed Scheme would be capped, netted, or relocated to ensure nesting barn owls are not disturbed during construction. To prevent barn owls from accessing the PNS and ensure that works are compliant with legislation and that this ecological constraint avoided, a SQE who holds a barn owl licence would undertake nest exclusion measures. This may involve removing and relocating the nest box to an appropriate location away from construction works, or capping the PNS, outside the breeding season and in advance of works. This work should take place September to February inclusive (outside of the typical nesting season). Compensatory nest sites should be in place at least 30 days in advance of the commencement of works, where practicable. Temporary mitigation measures such as capping or netting should remain in place for the duration of the construction period and removed (subject to landowner agreement) in the winter prior to commencement of the operational phase of the proposed Scheme.

5.14.4 Should a new PNS be identified within 150m of the Proposed Scheme during clearance works outside of the barn owl breeding season, then a SQE who holds a barn owl licence should be contacted to undertake nest exclusion measures and an alternative nesting box should be provided. Compensatory nest sites should be in place at least 30 days in advance of the commencement of works, where practicable.

5.14.5 If a new PNS is identified during clearance works within the barn owl breeding season, or if any identified PNS are unable to be capped, netted, or relocated prior to the commencement of works, then the following guidelines should be followed:

- A SQE who holds a barn owl licence should be consulted prior to the commencement of works to survey the PNS for evidence of Barn Owl breeding activity;

- Should the PNS be identified as an OBS, then a Protection Zone should be defined based on the potential for disturbance due to works to be undertaken, to be determined by the SQE who holds a barn owl licence;
- Should it not be possible to implement the required Protection Zone distance, a verification survey should be carried out to confirm the current status of the OBS;
- The presence of an OBS will require a Protection Zone until such a time that the young birds have fledged and is independent of the nest. A secondary verification survey, following the end of the breeding season, should be undertaken by the SQE who holds a barn owl licence to confirm the status of the OBS;
- Best practice guidelines, as described in Shawyer (2011) should be followed. Close inspection of occupied nest sites requires a SQE who holds a barn owl licence and should be avoided during the months of March, April, and May when barn owls are typically in the process of selecting nest sites or beginning to lay eggs. There is an increased risk of permanent nest abandonment during this period.

5.14.6 Where the set approach cannot be followed, a suitable alternative that avoids the risk of disturbance to Barn Owls would be determined by the SQE who holds a barn owl licence and followed (e.g. Shawyer, 2011).

5.14.7 Barn Owl surveys of existing nesting sites and newly installed barn owl boxes should be undertaken in years 1, 3 and 5 following the completion of construction mitigation works.

5.15 Reptiles

5.15.1 Vegetation clearance in areas that may support reptiles would be carried out under a Precautionary Method of Working (PMoW), to minimise the risk of individual reptiles being killed or injured. These measures are secured via the CEMP.

5.15.2 Prior to construction activities, reptiles would be persuaded to migrate into retained habitat through a two-stage vegetation clearance. Vegetation would be cut outwards from any suitable habitat to the extent of the retained habitat, down 150mm on one day followed by down to ground level on the following day. Any potential existing refugia on Site (e.g. log piles) would be dismantled by hand and relocated to the retained area. Works would be temporarily halted if individual animals are encountered to allow the animal to disperse from the work site. This activity would be supervised by an ecologist to minimise the risk of killing or injury to reptiles, who would search vegetation for reptiles prior to clearance each day.

5.15.3 Vegetation clearance of suitable reptile habitat would be completed within the reptile active season (indicatively March to September / October inclusive, depending on weather conditions) to ensure reptiles are mobile and able to migrate away from the works area into retained suitable habitat.

5.16 Great Crested Newt

5.16.1 Pond 15 (as defined in Document reference: 3.10.23), to the south-west of the site boundary was found to contain a low population (max count of 1) of Great Crested Newt.

5.16.2 The following measures have been identified and will be included in the CEMP(s) to mitigate any potential impacts on amphibian populations located within and adjacent to the Site which will be impacted by the Proposed Scheme:

- The clearance of suitable terrestrial habitat within 500m of Water Body 15 would proceed under a non-licenced Method Statement;
- Such Method Statement would likely suggest a two-stage vegetation clearance. Vegetation would be cut outwards from any suitable habitat to the extent of the retained habitat, down 150mm on one day followed by down to ground level on the following day. Any potential existing refugia on Site (e.g., log piles) would be dismantled by hand and

relocated to the retained area. Works would be temporarily halted, within the immediate vicinity, if individual animals are encountered to allow the animal to disperse from the work site. This activity would be supervised by an ecologist to minimise the risk of killing or injury to amphibians, who would hand search vegetation for Great Crested Newt and other amphibians prior to clearance each day; and

- Vegetation clearance of 0.75ha of terrestrial habitat within 500m of Water Body 15 would be completed outside of Great Crested Newt breeding season (indicatively July to September / October inclusive, depending on weather conditions) to ensure Great Crested Newt are mobile and able to migrate away from the works area into retained suitable habitat.

5.17 Aquatic ecology

5.17.1 All site-based staff should be made aware of the need to protect watercourses from contamination, including EA and CIRIA guidance and legal obligations.

5.17.2 Appropriate measures to protect the water environment should be implemented during the construction phase of the Proposed Scheme in order to eliminate or minimise risk to aquatic flora and fauna. These measures are detailed in full within OCEMP (Document reference: 3.03.01) and those specific to aquatic ecology summarised below:

- Sediment management and water quality monitoring should be implemented during any construction works with the potential to affect any watercourse, and a plan for appropriate remediation measures to ameliorate any adverse effects should they occur should be prepared;
- When construction activities, including stock piling and plant and vehicle washing, occur near a watercourse they should be separated from the watercourse with barriers (e.g. sediment fences) to prevent surface runoff from these sites entering the watercourse. Construction activities should be as far from the bank top of a watercourse and / or

connected hydrological pathways where practicable. Works within 8m require an environmental permit from the Environment Agency (or relevant authority), which would be obtained prior to commencement of works;

- The extent of vegetation clearance should be limited as far as practicable near to watercourses. Where possible, any vegetation removed should be managed carefully to limit the extent of bare soil on site at any given time, to limit the potential for sediment run-off during wet weather;
- Impacts to vegetation within the riparian zone during the enabling works and construction phase should be monitored for recovery and suitably reinstated, along with delivery of the target BNG net gain enhancements (Document reference: 3.10.33), these enhancements will be detailed in the LEMP for the Proposed Scheme;
- Works should avoid being carried out on soft riverbanks where feasible to avoid compaction, erosion, and sediment release. Where temporary crossings or permanent structures are being constructed on watercourses, these works should remain localised within close proximity to the structure;
- Activities such as concrete pouring would be carried out in line with industry best practise, such as concrete washout points to avoid lorries and pumps runoff contamination and temporary works procedures to avoid spillages;
- Timing of construction works around the River Wensum should consider key fish migration periods in consultation with Environment Agency Fisheries Officer to agree appropriate measures to avoid the obstruction of passage or disturbance to fish moving to upstream reaches for spawning;

- Sensitivity (to noise and vibration) of those fish species present should be considered to ensure that appropriate construction methods can be implemented to minimise and avoid disturbance. Construction would comply with measures set out in Section 5.8 Noise and Vibration. Soft-start piling method would be implemented for sheet piling in close proximity to watercourses. Timing of piling works near watercourses should allow for fish dispersion and be of a short duration to allow migratory fish a window to move upstream;
- A 3m construction exclusion zone from the water's edge of the River Wensum would be enforced to reduce potential impacts to the SAC and SSSI watercourse. The exception is the temporary bailey bridge that spans the River Wensum, though the bridge abutments would be at least 3m away from the river;
- Should any part of a watercourse need to be impounded during the works, then a fish translocation should be carried out to remove fish from the impoundment. Fish translocation operations would require a permit from the EA in order to use electric fishing and ancillary equipment (such as hand nets). It can take as long as 20 days to obtain a permit, so this would need to be planned in advance. Any such operation would need careful co-ordination with the Principal Contractor to set-up and drain any coffer dam or impounded area;
- Culverting of WC5 would require temporary dewatering and diversion of a section of the existing watercourse. This would require a licence from the Environment Agency, and authorisation to allow fish removal by a trained ecologist to avoid fish entrapment as described above. As an IDB managed drain and given its proximity to the Wensum SSSI / SAC, it would also require IDB consent and engagement with NE.
- Culverts should be placed so that the invert level is below the existing bed level, to prevent impedance of fish movement;

- Any floodplain areas modified or created should be designed to allow fish passage back into watercourses following flood events, avoiding fish entrapment;
- Following removal of temporary culverts on WC5, banks would be reprofiled and allowed to return to their previous condition and recovery monitored;
- The temporary bailey bridge over the River Wensum would be removed upon completion of the construction phase. Following removal, it is expected that vegetation would recover naturally, however this recovery would be monitored and any deterioration or loss of vegetation as a result of shading from the temporary crossing within the riparian zone would be returned to its previous state; and
- The Construction Lighting Management Plan would provide that lighting used for construction must be switched-off when not in use and, where possible, positioned so as not to spill on to watercourses. A dark corridor should always be maintained within the watercourse to allow fish passage.

5.18 Terrestrial invertebrates

5.18.1 Should the removal of any rubble, brash or log piles be required as part of the Scheme then a PMoW should be employed. Mitigation would entail the careful clearance of suitable habitat. Where any deadwood habitat is removed, this would be retained and incorporated within the areas of proposed landscaping for the Proposed Scheme.

5.19 Desmoulin's Whorl Snail

5.19.1 Precautionary measures would be included in the OCEMP for the Proposed Scheme and would include measures to protect retained habitats and avoid or minimise potential pollution impacts. Pollution prevention guidelines that would be included within the OCEMP would also prevent water-borne pollution impacts to suitable aquatic habitat during construction.

5.19.2 PMoW would be implemented during construction activities in proximity to the River Wensum floodplain to mitigate against any potential impacts on Desmoulin's whorl snail. These measures would include the protection of bankside habitat via the use of Heras fencing (or similar), to be installed a minimum of 3m from the watercourse, and a distance of 5m where practicable (to be positioned under the supervision of a SQE).

5.19.3 Desmoulin's Whorl Snail were identified within watercourse 1 (WC1), WC3 and WC4 during previous surveys. Mitigation for this species is focussed on ensuring no net loss in supporting habitat, as well as providing habitat enhancements for the populations present to ensure their favourable conservation status is maintained in the long-term. The enhancement and creation of new habitat across the Wensum floodplain would create a larger area suitable to support this species. This will be detailed in the LEMP for the Proposed Scheme in line with what is shown in the Landscaping Plan.

5.19.4 A SQE would supervise any enhancement works to these watercourses to ensure that habitat conditions remain of a standard that provides the necessary conditions to support Desmoulin's Whorl Snail. The SQE would also deliver a toolbox talk regarding this species to all Site Based Staff. The integrity of the population of Desmoulin's Whorl Snail across the floodplain would be maintained by taking measures, including habitat creation, to safeguard this species in this area.

5.19.5 A minimum of five years' monitoring post-construction of newly created or enhanced ditch habitat to assess the success of habitat mitigation measures and enhancements.

5.20 Additional Species of Principal Importance

5.20.1 In addition to the 'General Construction Measures' above, mitigation for Additional Species of Principal Importance such as Harvest Mouse (Micromys minutus), Brown Hare (Lepus europaeus), Hedgehog (Erinaceus europaeus) and Common Toad (Bufo bufo) would comprise the following measures, to be set out in the final CEMP(s):

- Clearance works would avoid the hibernation period (indicatively November-February inclusive, but weather dependent);
- Ecological supervision would be required during animal burrow excavations and vegetation clearance activities;
- Animal burrows on site would be inspected by the supervising SQE to confirm the likely absence of protected species or habitat, and then carefully excavated in a manner that allows animals to safely escape before works commence;
- Any holes that are excavated on site would be covered overnight to prevent animals from falling in. Open pits, open pipes and other excavations would need to be covered at the end to prevent mammals from being trapped. If this is not possible, a broad plank can be placed in excavations to allow animals to escape. Excavations should be checked first thing each morning, prior to the start of works that day. Any animals found within excavations should be allowed to escape and move off, or carefully removed and placed within suitable habitat cover before site works commence.
- Any potential existing refugia on Site (e.g. log piles) would be dismantled by hand and relocated to the retained area.
- Works, within the immediate vicinity, would be temporarily halted if individual animals are encountered to allow the animal to disperse from the work site. If toads do not disperse from the work site they can be carefully moved by hand by either the SQE or an appointed Contractor representative, taking care to any avoid injury, and relocated in a suitable area in close proximity.
- This activity would be supervised by a SQE to minimise the risk of killing or injury to Species of Principal Importance, who would hand search vegetation for these species prior to clearance each day.

5.21 Invasive non-native species

5.21.1 Construction activities within the Proposed Scheme could potentially result in the spread of invasive non-native species into areas they do not currently occupy.

5.21.2 To address the risk of spreading invasive non-native plant and animal species an invasive species strategy would be produced by the Principal Contractor. This strategy should include the following measures:

- A pre-construction ecological survey would be completed in the active growing season (approximately April to August inclusive) prior to vegetation and site clearance commencing in any part of the Site.
- Measures to present the spread of any invasive species across and beyond the Site. Exclusions zones around identified areas of invasive species where no works are to take place would be implemented to ensure these species are not disturbed by works. The invasive species removal would be carried out by a specialist contractor.
- Briefing and training of workers on good biosecurity practices appropriate to their role.
- Equipping workers with the necessary equipment, Personal Protective Equipment (PPE) and substances to implement biosecurity control measures, including effective hygiene and sanitation practices. This would most frequently comprise disinfectant tablets, sprayers, and brushes to clean and disinfect equipment and PPE prior to leaving site.
- Ensure that Defra's "Check, Clean, Dry" principles are followed and ensure that all PPE and survey equipment is clean and dry (and if necessary, disinfected) prior to going to and from site.

6 Operation mitigation measures

6.1 Approaches to mitigation and compensation measures during operation

6.1.1 Mitigation and compensation measures would depend on the target species, species group or habitat. The general approaches that are listed under this section are applicable to all biodiversity features.

- Habitat creation – Habitat creation would be undertaken to replace areas lost to the Proposed Scheme, including the creation of new areas of woodland, wetland, and grassland. Newly created habitats would be either planted, sown, or left to re-colonise naturally. It is considered that on reaching maturity, newly created habitats would be effective in the long-term at achieving compensation for the habitats lost and the species they support.
- Habitat enhancement – Areas of habitat (such as watercourses and ditch networks) within and adjacent to the Proposed Scheme would be managed to improve their condition.
- Translocation or displacement – Features would be moved or displaced from an area affected by the Proposed Scheme (the donor site) to a new area (a receptor site) that would be managed for wildlife.
- The creation of features to provide replacement (or additional) breeding, sheltering and hibernating opportunities.
- The creation of new (or the enhancement of existing) structures or features to provide replacement (or additional) connective habitat.

6.1.2 The following operational phase mitigation measures are proposed:

- Implementation of a Landscape Ecological Management Plan (or similar) to ensure that habitats and ecological features within the Red Line Boundary reach their target condition;

- Implementation of an Air Quality Compensation Strategy to compensate against changes in air quality due to operational impacts; and,
- Wildlife fencing to direct animals to designated crossings structures to minimise road mortality.

6.1.3 All new habitat creation, re-instatement, or enhancement, would be subject to a long term (30 year) management and maintenance plan. The management plan would prescribe the maintenance regimes for all different landscape / habitats considering the aims, objectives, and functions of each area of planting / habitat. The management plan would also set out proposals for monitoring the condition of landscape and habitat creation areas, to assess how these develop post-construction.

6.1.4 In the long term the use of specific areas for ecological mitigation and enhancement would increase its suitability for, and use by, numerous species.

6.1.5 Works would be timed to avoid sensitive seasons for protected species where possible, however, should protected species be discovered during works then all works would cease in that area and an ECoW would be consulted for an appropriate course of action. No works would re-commence until mitigation identified by the ECoW have been implemented as appropriate and to the satisfaction of the ECoW.

6.2 River Wensum SAC / River Wensum SSSI

6.2.1 No permanent structures (such as viaduct supporting structures) would remain in the exclusion zone from the River Wensum SAC boundary.

6.2.2 Additional enhancements to Wensum / Wensum floodplain are proposed (such as in-channel features, vegetation planting and bank reprofiling) within the areas labelled as ‘Water Framework Directive Mitigation’ in the Essential Environmental Mitigation areas as shown on the **‘Essential Environmental Mitigation’ plan** (Document reference: 2.11.00). These enhancements would result in a net improvement to aquatic habitats for the benefit of all Qualifying

Features of the River Wensum SAC. The LEMP will set out the refined WFD measures at the Detailed Design stage.

6.2.3 Additional enhancements to Wensum / Wensum floodplain (such as reconnecting floodplains, planting, and bank reprofiling) would result in a net improvement to aquatic habitats.

6.2.4 A series of measures to address potential impacts on water quality during operation have been identified. These are detailed in **Chapter 12: Road Drainage and the Water Environment** (Document reference: 3.12.00). Drainage basins and other features are detailed in 'Fine sediment management – OM-RDWE-01' of **Chapter 12: Road Drainage and the Water Environment** (Document reference: 3.12.00).

6.3 Sites non-statutorily designated for biodiversity value

6.3.1 General mitigation measures detailed in section 6.1 are also relevant to sites non-statutorily designated for biodiversity value.

6.3.2 The design of Environmental Enhancement and Essential Mitigation Areas would include hoary mullein within the 0.031ha of Fakenham Road RNR that is to be retained and enhanced to mitigate the loss of this notable plant species at Fakenham Road RNR, see the **'Essential Environmental Mitigation' plan** [Document reference: 2.11.00]).

6.4 Habitats

6.4.1 Within the Environmental Enhancement and Essential Mitigation Areas, habitats such as arable land are to be lost in favour of better quality and higher condition habitats as part of habitat mitigation, creation, and enhancement proposals.

6.4.2 The location and proposals for compensatory habitats and enhancement measures have also been informed by use of the Natural England Biodiversity Metric as part of a Biodiversity Net Gain assessment. This metric assigns relative values to habitats depending on a range of factors such as

distinctiveness, condition, and scarcity. The metric then combines these factors with the area of each habitat impacted, to provide a score for the number of Biodiversity Units lost. The results of the Biodiversity Net Gain Assessment are provided in a separate report (Document reference: 3.10.33).

Grassland

6.4.3 Areas for species rich grassland are likely to require deep-ploughing where the site was previously under agricultural use to ensure the lower-nutrient soil horizon is on the ground surface. Seeding should be sown in autumn, and the contractor would secure seeds in accordance with required provenance for each location. Supplementary seeding on / overseeding of existing grassland would be undertaken where appropriate.

6.4.4 In the first year of establishment the grassland shall be cut to maintain a sward height of 100 to 150mm (but not less than 50mm). After the first year, mowing shall be carried out at least once a year, ideally in late summer / early autumn, after the flowering plants have set seed.

6.4.5 Wherever possible mowing should be done in a wildlife friendly way by starting from the inside of the field and working towards the outside in a weaving or closing fashion to leave a small-scale mosaic of cut and uncut patches. Mowing and collecting of the cuttings can be made into compost heaps such as the egg-laying heaps on the site.

6.4.6 Where grazing would be impractical, mowing, collecting, and removing the arisings shall be used to maintain structural diversity. Mowing shall be carried out at least once a year, ideally in late summer / early autumn, after the flowering plants have set seed.

Woodland

6.4.7 Mitigation proposals would include tree planting that ultimately would increase canopy cover. Planting would use transplants. Bare root or root ball planting is best undertaken in autumn / early winter. Photodegradable rabbit and deer guards would be installed around each transplant to minimise damage to the

woodland planting during establishment. Contractors shall secure plants in accordance with required provenance for each location.

6.4.8 Initial maintenance activities would include keeping a circle of 1m diameter clear of vegetation around the base of trees and re-firming trees and stakes. Plant replacement inspections shall be made on an annual basis after planting to identify dead, diseased, or dying tree stock. Replacement trees would be planted annually between the start of November and end of December. The coppicing of suitable species, once established, should be carried out in areas on a rotation of between 7 to 10 years.

6.4.9 Removal of nurse species, where planted to shelter the ultimate canopy tree species, shall be necessary where they have outgrown their intended use. This is likely to be 7 to 10 years after planting depending on species and establishment. A phased approach to the removal of nurse species is recommended (i.e. no more than a third of total nurse species removed in any one year).

6.4.10 Thinning and felling of selected woodland trees shall remove the less healthy or less desirable trees and give the remaining trees more space to develop. Prolific colonisers shall be removed to favour desired species to establish or to maintain designated open areas. Where a shrub edge to the woodland has been planted, management of the shrub edge species shall be implemented on a rotational cycle after the five-year establishment period. A gradient of differential age structure and vegetation between the woodland and its surroundings shall be established and maintained.

6.5 Ancient woodland, and notable, veteran, and ancient trees

6.5.1 There would be a long-term increase in the quantity of trees by number and area. Woodland enhancement would provide further benefits for species such as birds, badgers, invertebrates, and amphibians.

6.6 Habitats of principal importance

6.6.1 Proposals for habitat compensation have been designed with regard to the impacts on HPI, as shown in the **'Essential Environmental Mitigation' plan** (Document reference: 2.11.00). These habitats would be managed in the long term pursuant to the LEMP. Mitigation measures include the enhancement of woodland, the creation of woodland and scrub, and the creation or enhancement of grassland.

6.6.2 Coastal and floodplain grazing marsh HPI comprises an integrated network of wetland habitats including other HPI types (e.g. purple moor grass and rush pasture HPI). The loss of coastal and floodplain grazing marsh HPI and purple moor grass and rush pasture HPI would be compensated by the creation of purple moor grass and rush pasture HPI within existing areas of low / medium distinctiveness grassland habitats in the areas of coastal and floodplain grazing marsh HPI. This would be considered both the enhancement of existing coastal and floodplain grazing marsh and the creation of new purple moor grass and rush pasture.

6.7 Hedgerows

6.7.1 Proposals for habitat compensation have been designed with regard to the impacts on hedgerows, as shown in the **'Essential Environmental Mitigation' plan** (Document reference: 2.11.00). These hedgerows would be managed in the long term pursuant to the LEMP. Mitigation measures include the creation or enhancement of 16km of hedgerow habitat (see Figure 10.5 and Biodiversity Net Gain Technical Report 2023 (Document reference: 3.10.33)).

6.7.2 Hedge re-laying shall be carried out generally between 8 and 15 years, depending on soil and climatic conditions, until the hedgerows are considered fully established and can be managed by cutting only.

6.7.3 Existing hedgerows shall be cut in the dormant period from November to February on a two or three-year rotation. Adjacent lengths of hedge shall be

cut in different years leaving short sections of shrubs untrimmed. Hedgerow trees shall not be cut. The same length of hedge should not be cut every year because this would reduce the amount of food provided for wildlife.

6.8 Watercourses

6.8.1 Measures to protect riparian and aquatic habitats from disturbance or degradation, outlined in the OCEMP.

6.8.2 The enhancement of ditches and restoration of watercourses totalling approximately 1.67km in length, and the enhancement of bankside terrestrial habitat along these sections, would be provided at the Environmental Enhancement and Essential Mitigation Areas, within the areas labelled as 'Water Framework Directive Mitigation' in **the 'Essential Environmental Mitigation' plan** (Document reference: 2.11.00). These habitats would be managed in the long term pursuant to the LEMP.

6.8.3 Additional enhancements to Wensum / Wensum floodplain and Foxburrow stream (such as fencing, reconnecting floodplains, planting, and bank reprofiling) would result in a net improvement to aquatic habitats in both the Wensum and Tud catchments.

6.8.4 Ditches shall be managed to prevent silting up and choking with vegetation. Clearance works shall be once vegetation has already begun to naturally die back, in preparation for increased winter flows. A rotational plan for management of ditch margins shall be implemented to ensure continuity of habitat and a good source for natural re-colonisation of managed ditches is maintained. Mowing of banks around ditches should be minimised during the spawning season March to mid-July. It is recommended to cut only up to just above the water level on one side leaving the waterside fringe of the bank uncut. Arisings shall be collected and removed to prevent contamination of the watercourse or causing blockages downstream.

6.9 Badger

6.9.1 Proposed woodland, hedgerow, scrub and grassland habitat creation or enhancement, as shown in the **'Essential Environmental Mitigation' plan** (Document reference: 2.11.00), would also benefit badgers by providing additional foraging and commuting habitat. These habitats would be managed in the long term pursuant to the LEMP.

6.10 Water vole

6.10.1 The enhancement of ditches and restoration of former watercourses as part of the Environmental Enhancement and Essential Mitigation Areas (in addition to the Water Vole receptor areas stated above) totals approximately 850m in length (see the **'Essential Environmental Mitigation' plan** [Document reference: 2.11.00]). Wetland habitat creation measures, and measures to translocate Water Vole, which would be subject to licensing and involvement from Natural England, are anticipated to be successful at providing replacement habitat for this species. These habitats would be managed in the long term pursuant to the LEMP.

6.11 Otter

6.11.1 The enhancement of watercourses in the River Wensum floodplain designed principally for Water Vole habitat, as shown in the **'Essential Environmental Mitigation' plan** (Document reference: 2.11.00)**,** would also provide additional habitat for Otter foraging and commuting. These habitats would be managed in the long term pursuant to the LEMP.

6.12 Reptiles

6.12.1 The proposals for reinstatement, enhancement and compensatory habitat would provide replacement habitat for local reptile populations, which would include the creation of species rich grassland, woodland, scrub and a waterbody within the Environmental Enhancement and Essential Mitigation Areas, as shown in the **'Essential Environmental Mitigation' plan**

(Document reference: 2.11.00). These habitats would be managed in the long term in pursuant to the LEMP.

6.12.2 To mitigate for the loss of reptile refuge across the Proposed Scheme, reptile refugia would be installed in suitable locations within Environmental Enhancement and Essential Mitigation Areas. Refugia piles should be installed within retained grasslands on the edge of scrub habitat. They should be built in line with the Reptile Habitat Management Handbook (Edgar, Foster, and Baker 2010), and include brash and log piles to create cover, provide additional structure to existing habitat and enhance prey availability.

6.12.3 It is recommended that at least one of the refugia piles also functions as a hibernaculum. This hibernaculum should also be built in line with the Reptile Habitat Management Handbook (Edgar, Foster, and Baker 2010), to provide hibernation opportunities throughout the winter season.

6.12.4 Compost heaps would also be constructed for the purpose of reptile egg-laying. Compost heaps should be at least 1m^2 and located near scrub or woodland edge to provide cover for reptiles. Compost heaps would include materials such as grass clippings, manure, compost, sawdust, garden waste or cut reeds, and where possible the re-use of vegetation clearance material should be used.

6.12.5 Reptile basking banks and hibernacula are to be micro-sited by the ecologist prior to construction. This should take account of assumed future shading, waterlogging, and maintenance requirements. Basking banks would measure approximately 30m x 2m x 1m in dimension, and would be constructed similarly to the hibernacula.

6.12.6 Reptile basking banks shall be maintained to 1m height, ensuring 100% grass cover of grassland on top and holes for access around the base are retained. Remediation works shall be reactive to the annual monitoring for the first five years to ensure use of egg-laying heap and hibernacula to ensure suitable for use is maintained.

6.13 Great crested newt

6.13.1 No specific habitat compensation for GCN is proposed given that the Proposed Scheme would only result in the temporary loss of 0.75ha of arable land, considered of negligible value to GCN, within 500m of Water Body 15. The creation of new habitat within proximity to existing populations would provide an enhancement in habitat for Great Crested Newts, as shown in the **'Essential Environmental Mitigation' plan** (Document reference: 2.11.00). These habitats would be managed in the long term in pursuant to the LEMP.

6.13.2 Hibernacula would be created with compost heaps, brash piles, and logs, and micro-sited by the ecologist prior to construction. This should take account of assumed future shading, waterlogging, and maintenance requirements.

6.14 Breeding and wintering birds

6.14.1 The proposals for reinstatement, enhancement and compensatory habitat would provide habitat for breeding and wintering birds, as shown in the **'Essential Environmental Mitigation' plan** (Document reference: 2.11.00). These habitats would be managed in the long term in pursuant to the LEMP. This would include the following habitat creation and enhancement opportunities:

- Woodland, hedgerow, scrub and grassland creation habitat creation or enhancement proposed in relation to bats and Barn Owls would also benefit birds by providing additional foraging and nesting habitat.
- To enhance potential nesting opportunities across the Site, bird boxes could be installed in suitable locations within the Red Line Boundary. Bird box designs should reflect the nesting requirements for species known to be present within the local area and that are local conservation priorities, as well as common and widespread farmland and woodland species. These enhancements would be detailed in the LEMP for the Proposed Scheme.

- In general, boxes should be installed on mature trees 2-4m high and placed to avoid strong sunlight and the wettest winds (usually north to east, depending on the shade level), and the entrance should face slightly downwards to protect from the rain. Boxes should have a clear flight path on the approach and be relatively undisturbed. Bird boxes should not require regular maintenance, however annual checks of the bird boxes are recommended. The checks would assess the boxes condition and identify where remedial action may be required.

6.14.2 Indicative designs to be included in the mitigation include:

- 1B Schwegler Nest Box – cavity nest box;
- 2H Schwegler Robin Box – open fronted box;
- CedarPlus Triple Sparrow House– for sparrow species; and
- 3S Schwegler Starling Nest Box– for use by starling and other cavity nesters.

6.14.3 Installed bird boxes would be checked to ensure clear flight paths. In the event that obstructions are identified steps would be taken to remove these obstructions. This is to ensure that no birds are harmed, and no active nests or dependent young are at risk.

6.15 Barn owl

6.15.1 Mitigation is also focused on avoiding a net loss in suitable foraging habitat, through providing compensatory grassland habitat. The loss of habitats during works would be offset by extensive enhancement areas of habitat that would be suitable for Barn Owl, as shown in the **'Essential Environmental Mitigation' plan** (Document reference: 2.11.00). These habitats would be managed in the long term in pursuant to the LEMP. The proposals for enhancement and compensatory habitat include:

- Grassland creation and enhancement; and
- Provision of nest boxes.

6.15.2 Compensatory habitat creation and enhancement for Barn Owls is also focussed >1km from the Proposed Scheme to encourage Barn Owls to commute away from the traffic corridor.

6.15.3 Barn Owl boxes would be positioned in the wider area within the Red Line Boundary, at sufficient distance to avoid road traffic collision mortality.

6.15.4 Measures to reduce collision risk such as regular management of verges and appropriate screening (using a combination of bunding, planting and close board fencing) would be included along the new highway to encourage Barn Owls to fly at height over the road.

6.16 Fish

6.16.1 The temporary culvert on the diverted section of WC5 would be removed upon completion of the construction phase and the ditch realigned to its previous course.

6.16.2 Enhancements to Wensum, Wensum floodplain and Foxburrow stream (such as fencing, reconnecting floodplains, planting, and bank reprofiling), as shown in the **'Essential Environmental Mitigation' plan** (Document reference: 2.11.00), would result in a net improvement to aquatic habitats for the benefit of fish in both the Wensum and Tud catchments. These habitats would be managed in the long term pursuant to the LEMP.

6.17 Aquatic macroinvertebrates

6.17.1 Additional mitigation and enhancement measures in relation to aquatic macroinvertebrates are as outlined within the mitigation and measures highlighted for fish.

6.18 Terrestrial invertebrates

6.18.1 Habitat creation in the Environmental Enhancement and Essential Mitigation Areas would include suitable habitat features for a range of terrestrial invertebrate species, as shown in the **'Essential Environmental Mitigation'**

plan (Document reference: 2.11.00). These habitats would be managed in the long term in pursuant to the LEMP.

6.18.2 Log piles created as reptile refugia would also serve as invertebrate habitat. These would be placed in grassland and scrub habitats, within sunny positions to benefit invertebrate species.

6.18.3 Purpose built invertebrate "hotels" could be installed in landscaped areas to provide refuge for specific taxonomic groups, i.e. provision of nesting boxes for solitary bees. This would be detailed in the LEMP for the Proposed Scheme.

6.19 Desmoulin's whorl snail

6.19.1 Mitigation for Desmoulin's Whorl Snail is focussed on ensuring no net loss in supporting habitat, as well as providing habitat enhancements for the populations present to ensure their favourable conservation status is maintained in the long-term. The enhancement and creation of new habitat across the Wensum floodplain would create a larger area suitable to support this species, as shown in the **'Essential Environmental Mitigation' plan** (Document reference: 2.11.00). The habitat would be managed in the long term pursuant to the LEMP.

6.19.2 The following habitat creation and enhancement measures are proposed for Desmoulin's Whorl Snail to increase the abundance and supporting habitat of this species:

- Enhancement of ditches to include widening and reprofiling to provide more edge habitat, and fencing to protect ditch margins from cattle. The widening of ditches creates hover margins for the vegetation to rise and fall with changing water levels.
- Once ditches have been widened (without removing any sedge floating mats present, where practicable) floating mats of species such as sedges or reed sweet-grass can be installed, as detailed in the

'Essential Environmental Mitigation' plan (Document reference: 2.11.00).

6.20 Macrophytes

6.20.1 Additional mitigation and enhancement measures in relation to macrophytes are as outlined within the mitigation and measures highlighted for fish.

6.20.2 Additionally, the reinstatement of riparian vegetation following construction are included as part of the OCEMP to mitigate potential effects on macrophytes.

6.21 Additional species of principal importance

6.21.1 The proposals for reinstatement, enhancement and compensatory habitat would provide replacement habitat for local Species of Principal Importance populations, which would include the creation of species rich grassland, woodland and scrub, and pond habitat as shown in the **'Essential Environmental Mitigation' plan** (Document reference: 2.11.00). These habitats would be managed in the long term in pursuant to the LEMP.

6.21.2 Habitat, brash or rubble piles installed in landscaped areas in order to provide refuge and hibernation opportunities small mammals such as hedgehog.

Ponds

6.21.3 Pond design (including size, depth, area, bank profile, immediately adjacent habitat, and planting program for vegetation cover) shall be based on the following guidance: Section 8.3.1 of Great Crested Newt Mitigation Guidelines (English Nature, 2001).

6.21.4 Pond creation should precede any planting or seeding on site. The planting of marginal plants should be undertaken in late May or June. A minimum six-month establishment period is required to allow establishment of vegetation.

6.21.5 Two or more winters may be necessary to reach the desired water level, depending on weather conditions. This would depend on climatic conditions and seasonal weather variations. This would need to be assessed during monitoring and maintenance activities.

6.21.6 Marginal and aquatic vegetation would be managed to ensure it does not become invasive and to ensure adequate vegetation cover for amphibians. Water surface shading would be managed to ensure ponds do not become too shaded. If clearance is required, only one-third or less of marginal areas would be cleared annually on a rotational basis, leaving sections of unaffected habitat surrounding the water body. Clearance would be undertaken between September and January (ideally September to November). Arisings would remain in-situ until they have naturally dried and would be searched for any amphibians before they are removed and disposed of appropriately. Supplementary planting would be required if the original planting has not succeeded (or colonisation has not occurred). Barley straw bales shall be used to control filamentous algae growth as required.

6.21.7 Aquatic planting shall be maintained including an annual autumn harvesting of a proportion of the above water vegetation. One third of the pond surface area shall remain uncut to provide habitat areas for wildlife during the winter months. Depending on weather conditions within the year, September to November are likely to be the most suitable months to undertake this work. This shall take place every three years.

6.21.8 If detected, INNS plant species shall be removed from ponds as soon as possible after detection.

6.21.9 Remedial works to ponds would be undertaken outside of the GCN breeding season of February – October inclusive.

6.21.10 Leaf litter shall be collected during the autumn each year up to year 15 to prevent build-up of decaying material clogging the pond and increasing nutrient levels.

6.21.11 Pond life quality and water regimes shall be monitored annually during the first five years, and then every three years. The parameters to be analysed include vegetation coverage, water levels, evidence of pollution and silt accumulation.

7 References

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