A428 Black Cat to Caxton Gibbet improvements

TR010044

Volume 6

6.1 Environmental Statement

Chapter 8: Biodiversity

Planning Act 2008

Regulation 5(2)(a)

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

26 February 2021

Infrastructure Planning

Planning Act 2008

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

A428 Black Cat to Caxton Gibbet improvements

Development Consent Order 202[ ]

Chapter 8: Biodiversity

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8 Biodiversity

8.1 Competent expert evidence

8.1.1 This chapter presents the results of an assessment of the likely significant effects of the Scheme on biodiversity, a process referred to as an Ecological Impact Assessment (EcIA).

8.1.2 The competent expert responsible for the assessment is a Technical Director within AECOM who holds the qualifications of BSc (Hons), PhD, and is a Fellow of the Chartered Institute for Ecology and Environmental Management (CIEEM).

8.1.3 He has 35 years of experience in ecological consultancy and contributes to, and manages EcIAs and projects relating to the protection and management of habitats and fauna, including nationally significant infrastructure projects. He possesses a detailed knowledge of EcIA and species licensing, including as applied to linear infrastructure, and has presented evidence at public inquiries.

8.2 Legislative and policy framework

8.2.1 The following legislation and planning policy are of direct relevance to the assessment of biodiversity and summarise the detailed policy and legislative context which has informed the assessment methodology.

8.2.2 Compliance with statute and policy relating to biodiversity is addressed within the Case for the Scheme **[TR010044/APP/7.1]**.

The Conservation of Habitats and Species Regulations 2017

8.2.3 *The Conservation of Habitats and Species Regulations 2017* (Ref 8-1) (the *Habitats Regulations*) transpose the requirements of The *Habitats Directive* (Ref 8-2) and *Birds Directive* (Ref 8-3) into UK law, and provide for the designation and protection of European Sites (and adapt planning and other controls for the protection of these sites). This includes Annex I (including habitats) and Annex II (including species) for which such sites can be designated.

8.2.4 The *Habitats Regulations* (Ref 8-1) also provide protection for certain European Protected Species (EPS) that are listed on Schedule 2 (plants) or Schedule 4 (animals). Provision is made for the granting of licences that permit certain acts as lawful, providing the appropriate authority is satisfied that there is no satisfactory alternative and the favourable conservation status of the species will be maintained.

8.2.5 The presence of European Sites (referred to in this document as designated sites of international importance) and their relationship to the Scheme have been considered in the Habitats Regulations Assessment: No Significant Effects Report **[TR010044/APP/6.7]** and are not dealt with in this chapter. The presence of Annex I habitats and Annex II species and any EPS has been considered within the assessment.

Ramsar Convention 1971

8.2.6 The *Ramsar Convention 1971* (Ref 8-4) is an international treaty which includes the designation of wetlands of international importance. Government policy extends the same level of protection to Ramsar wetlands as that afforded to sites that are designated under The *Habitats Directive* (Ref 8-2).

8.2.7 Consideration has been given in the assessment to the presence of any Ramsar wetlands.

Water Framework Directive 2000

8.2.8 Proposed developments or activities that have the potential to affect the water environment require a Water Framework Directive (WFD) Assessment (Ref 8-5). Compliance with the WFD means attainment of good ecological status, prevention of deterioration in status, and prevention of failure to achieve future attainment of good status where it is not already achieved within waterbodies. However, Article 4.7 provides legislation for exemption conditions that could allow implementation of schemes that cause deterioration in ecological status, for example for reasons of overriding public interest

Wildlife and Countryside Act 1981

8.2.9 The *Wildlife and Countryside Act 1981 (as amended)* (the Act) (Ref 8-6) is a primary piece of UK wildlife legislation, protecting birds, other animals and plants (including vascular plants, bryophytes, lichens and fungi) and allowing for the designation of protected areas including Sites of Special Scientific Interest (SSSIs). The *Act* (Ref 8-6) also defines a list of invasive non-native species, making it illegal to spread them in the wild.

8.2.10 Designated sites, protected flora and fauna and invasive species covered by the *Act* (Ref 8-6) that will be affected by the Scheme have been considered in the assessment.

Countryside and Rights of Way Act 2000

8.2.11 The *Countryside and Rights of Way Act 2000* (Ref 8-7) extends powers relating to the protection and management of SSSIs. This includes powers for entering management agreements, placing a duty on public bodies to further the conservation and enhancement of SSSIs, increasing penalties for conviction, and appeal processes for the notification, management and protection of SSSIs. It also introduced the offence of 'reckless' disturbance of threatened species.

8.2.12 The legislative provisions relating to designated sites and flora and fauna affected by the Scheme have been considered in the assessment.

Natural Environment and Rural Communities Act 2006

8.2.13 Section 40 of the *Natural Environment and Rural Communities Act 2006* (Ref 8-8) (NERC Act) places a duty on public authorities in England to conserve biodiversity, which includes restoring or enhancing species populations or habitat.

8.2.14 Section 41 of the *NERC Act* (Ref 8-8) requires the Secretary of State for Environment to publish and maintain a list of habitats and species that are of 'principal importance' for the purpose of conserving biodiversity, and are regarded as conservation priorities under the *UK Post-2010 Biodiversity Framework* (Ref 8-9).

8.2.15 The occurrence of habitats and Species of Principal Importance (SPI) has been identified in the assessment through a desk study and field surveys, and the design of the Scheme includes measures for their conservation and enhancement.

Protection of Badgers Act 1992

8.2.16 The *Protection of Badgers Act 1992* (Ref 8-10), provides specific legislation to protect Badgers (*Meles meles*) from cruelty. The protection of Badgers through best working practices, including the legal requirement for licences from Natural England (where required), has been considered as part of the assessment.

The Hedgerow Regulations 1997

8.2.17 *The Hedgerow Regulations 1997* (Ref 8-11) introduced protection for countryside hedgerows that are defined as 'important' because they meet specific archaeological, wildlife or landscape criteria. The assessment has evaluated hedgerows potentially affected by the Scheme by way of field survey, to determine whether any qualify as important under the ecological criteria. The archaeological importance of hedgerows is dealt with in **Chapter 6, Cultural heritage** of the Environmental Statement **[TR010044/APP/6.1]** and **Chapter 7, Landscape and visual effects** of the Environmental Statement **[TR010044/APP/6.1]**.

Salmon and Freshwater Fisheries Act 1975

8.2.18 The *Salmon and Freshwater Fisheries Act 1975* (Ref 8-12) (as amended) relates to the protection of freshwater fish, with a focus on salmon and trout species.

8.2.19 The assessment has considered the provisions of the *Salmon and Freshwater Fisheries Act 1975* (Ref 8-12) in relation to the risk of morality, migration barriers, pollution and the degradation of habitats potentially resulting from the Scheme.

Animal Welfare Act 2006

8.2.20 The *Animal Welfare Act 2006* (Ref 8-13) protects vertebrate animals from harm and extends to domesticated animals and those under the control of people.

8.2.21 The provisions of the *Animal Welfare Act 2006* (Ref 8-13) have been taken account of within the assessment by ensuring the welfare of any animals potentially affected by the Scheme are considered.

Wild Mammals (Protection) Act 1996

8.2.22 The *Wild Mammals (Protection) Act 1996* (Ref 8-14) makes it an offence to harm wild mammals with intent to inflict unnecessary suffering.

8.2.23 The assessment has considered the requirements of the *Wild Mammals (Protection) Act 1996* (Ref 8-14) and includes measures to ensure any risk of unnecessary suffering of wild animals is avoided.

National Policy Statement for National Networks

8.2.24 The *National Policy Statement for National Networks* (NPSNN) (Ref 8-15) sets out the matters that the Secretary of State for Transport should give due regard to when determining Development Consent Order (DCO) applications that will affect biodiversity and ecological conservation.

8.2.25 The requirements of paragraphs 4.22 and 4.25 of the *NPSNN* (Ref 8-15), in relation to identifying whether the Scheme would have a significant effect on the objectives of a European Site, have been addressed within the Habitats Regulations Assessment: No Significant Effects Report **[TR010044/APP/6.7]**.

8.2.26 The requirements of paragraphs 5.22, 5.26 and 5.32 to 5.35 of the *NPSNN* (Ref 8-15) in relation to the identification and assessment of the likely significant effects of the Scheme on sites of international, national and local importance, the conservation of biodiversity, and protected species and habitats, have been addressed through the assessment process, and are reported within this chapter.

8.2.27 Paragraph 5.23 provides guidance on the principles that should be applied in relation to avoiding adverse impacts on sites, species and habitats (set out within paragraph 5.22), providing appropriate mitigation as an integral part of the Scheme, and taking advantage of conservation and enhancement opportunities.

8.2.28 This guidance has informed the design-development process (refer to **Chapter 3, Assessment of alternatives** of the Environmental Statement **[TR010044/APP/6.1]**) in relation to the identification and incorporation of ecological mitigation and enhancement measures within the design of the Scheme (see **Chapter 2, The Scheme** of the Environmental Statement **[TR010044/APP/6.1]**).

Overarching National Policy Statement for Energy (EN-1)

8.2.29 The *Overarching National Policy Statement for Energy (EN-1)* (Ref 8-16) sets out the Government's policy on energy and infrastructure development.

8.2.30 In relation to biodiversity, *EN-1* (Ref 8-16) states that applicants should ensure that any effects on internationally, nationally and locally designated sites of ecological or geological conservation importance, on protected species and on habitats and other species identified as being of principal importance for the conservation of biodiversity, should be assessed. It also states that appropriate mitigation measures should form an integral part of a development.

8.2.31 The requirements of *EN-1* (Ref 8-16) in relation to identifying, assessing and mitigating the effects on biodiversity associated with the gas pipeline diversion within the Scheme have been accounted for in the assessment.

National Policy Statement for Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4)

8.2.32 The *National Policy Statement for Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4)* (Ref 8-17) relates to gas supply and gas and oil pipelines and sits under *EN-1* (Ref 8-16).

8.2.33 With regard to biodiversity, *EN-4* (Ref 8-17) identifies additional considerations relating to the potential impacts of pipelines on ecology, for example the removal of flora and effects on landscape elements that may have biodiversity value.

8.2.34 Where relevant to the gas pipeline diversion within the Scheme, these additional considerations have been accounted for.

National Planning Policy Framework

8.2.35 The *National Planning Policy Framework* (NPPF) (Ref 8-18) sets out the government's land use planning policy for England, and how it is expected to be applied by local planning authorities when developing locally prepared plans for housing and other developments.

8.2.36 A core principle of the *NPPF* (Ref 8-18) is that policies and decisions should contribute to, and enhance, the natural environment.

8.2.37 In relation to biodiversity, the *NPPF* (Ref 8-18) contains similar provisions to the *NPSNN* (Ref 8-15), although a key difference is the removal of references to "*avoiding net loss of biodiversity*" and the inclusion of "*minimising impacts and providing net gains for biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures*".

8.2.38 The assessment has taken account of the requirements of the *NPPF* (Ref 8-18) by establishing the importance of biodiversity features through desk study and field surveys, by implementing the mitigation hierarchy as an integral part of the Scheme design, and through identifying potential biodiversity gains.

Planning Practice Guidance

8.2.39 *Planning Practice Guidance* (PPG) for the *Natural Environment* (Ref 8-19) provides context to the *NPPF* (Ref 8-18) and advises on how the consideration of biodiversity can inform planning decisions.

8.2.40 The guidance has been considered by undertaking a desk study and field surveys to define important biodiversity features, evaluating how the Scheme may affect the status of these features with reference to conservation objectives, and by developing mitigation measures with relevant consultees.

Natural England and Department for Environment, Food and Rural Affairs (Defra) Standing Advice (protected species)

8.2.41 Standing advice from Natural England and Defra (Ref 8-9) provides guidance on protected and notable species and includes reference to the best practice approaches to survey, mitigation and compensation. Guidance is also provided on the procedure for obtaining protected species licences.

8.2.42 This advice has informed the planning of surveys and the approach to mitigating impacts upon protected species, including where necessary the requirement for Natural England mitigation licences.

UK Post-2010 Biodiversity Framework

8.2.43 The *UK Post-2010 Biodiversity Framework* (Ref 8-9) illustrates how the work of the four UK countries joins up to achieve international and European biodiversity targets.

8.2.44 The objectives of this *framework* (Ref 8-9) have been included in the assessment through consideration of habitats and SPIs.

Biodiversity 2020, A strategy for England's wildlife and ecosystem services

8.2.45 *Biodiversity 2020, A strategy for England's wildlife and ecosystem services* (Ref 8-20) which was published in 2011 sets out the strategic direction for biodiversity policy up to 2020.

8.2.46 In accordance with the objectives of the *strategy* (Ref 8-20), the assessment includes consideration of ecological networks and measures to reduce pressure upon, and enhance, the environment.

Highways England Road Investment Strategy

8.2.47 The *Road Investment Strategy (RIS2) 2020 to 2025* (Ref 8-21) of which was published on the 16 April 2020, sets an aspiration that the operation, maintenance, and enhancement of the strategic road network should move to a position that delivers no net loss of biodiversity and, by 2040, should deliver a net gain in biodiversity.

8.2.48 The potential for the Scheme to deliver biodiversity net gains has been considered as part of the design-development and assessment processes.

Highways England Biodiversity Plan 2015

8.2.49 *Our Plan to Protect and Increase Biodiversity* (2015) (Ref 8-22) sets out how the organisation will work with service providers to halt overall biodiversity loss, and to maintain and enhance habitats and ecological networks.

Chief Highway Engineer Memorandum 422/18. Highways England. 2018

8.2.50 The method used to calculate the biodiversity net gain for the Scheme is that published by Highways England in April 2018 within *Chief Highway Engineer Memorandum 422/18*, that is CPF metric 5.1b. Biodiversity units were determined using the metric calculation as in the CHE Memorandum **(Ref 8-23).**

8.2.51 The objectives of this plan (Ref 8-22) have been considered through the assessment of the Scheme's effects upon biodiversity and by identifying enhancements within the design of the Scheme and the calculation of biodiversity value (refer to **Appendix 8.19** of the Environmental Statement **[TR010044/APP/6.3]**).

8.3 Assessment methodology

Scope of the assessment

8.3.1 The legislation and planning policy described in Section 8.2 and within **Chapter 4**, **Environmental assessment methodology** of the Environmental Statement **[TR010044/APP/6.1]** have informed the assessment methods.

8.3.2 The outcomes of the scoping exercise were recorded in the Scoping Report (Ref 8-24), which was consulted upon as part of a formal request to the Planning Inspectorate (the Inspectorate) for a scoping opinion. The Scoping Report (Ref 8-24) included a summary of all assessment work undertaken as part of the design development of the Scheme up to the point of its publication.

8.3.3 The Inspectorate's Scoping Opinion **[TR010044/APP/6.5]** identified additional overarching Environmental Impact Assessment (EIA) and topic-specific matters that were subsequently brought into the scope of the assessment. These further considerations are detailed in **Appendix 4.3** of the Environmental Statement **[TR010044/APP/6.3]** and responses are provided to each of the points raised. The responses in **Appendix 4.3** of the Environmental Statement **[TR010044/APP/6.3]** also identify where the relevant information is presented.

8.3.4 In addition to the matters raised in the Scoping Opinion **[TR010044/APP/6.5]**, the final assessment scope has also been shaped by:

a. Design changes made to the Scheme in respect of its form and extent, and the area of land required for its construction, operation and maintenance.

b. The outcomes of consultation with statutory bodies, non-statutory organisations and other stakeholders with an interest in ecology and nature conservation.

c. The outcomes of further desk-based studies undertaken to establish the baseline conditions associated with the ecological environment, and to inform the identification of the likely significant effects of the Scheme.

8.3.5 Consideration has been given to the activities associated with the future maintenance and management of the Scheme, and whether these have the potential to result in significant effects in relation to biodiversity. Following a review of the maintenance activities presented in **Chapter 2, The Scheme** of the Environmental Statement **[TR010044/APP/6.1]**, the process concluded that there will be limited potential for such effects to occur, and that these activities are comparable with standard maintenance and management operations already being undertaken elsewhere on the strategic and local road networks. Accordingly, any effects associated with this phase of the Scheme were scoped out of the assessment and are not considered further.

8.3.6 As part of the desk surveys and field surveys undertaken to establish the baseline ecological conditions (refer to Section 8.6), it was concluded that the following biodiversity features could be scoped out of the assessment on the basis that they are of negligible ecological importance:

a. Improved grassland
b. Amenity grassland
c. Ephemeral- short-perennial habitat
d. Building and hardstanding

8.3.7 Biodiversity features that were likely to be absent within the adopted Study Areas (refer to Section 8.5) and therefore scoped out of the assessment comprised:

a. Hazel Dormouse (*Muscardinus avellanarius*)
b. Water Vole (*Arvicola amphibius*)
c. White-clawed Crayfish (*Austropotamobius pallipes*)

8.3.8 Further details regarding these biodiversity features, and the justification for not considering them further in the assessment, are presented within **Appendix 8.3**, **Appendix 8.8** and **Appendix 8.17** of the Environmental Statement **[TR010044/APP/6.3]**.

8.3.9 The Scoping Report (Ref 8-24) proposed a Study Area of 2 kilometres (1.2 miles) for the assessment of effects on sites which have been non-statutorily designated for their biodiversity value. Following a review of the characteristics of the Scheme and the extent of the Order Limits, it was concluded that only those sites located within 1 kilometre (0.6 miles) of the Order Limits would have any potential to be significantly impacted by the Scheme. Accordingly, the scope of the assessment was altered to only consider non-statutory designated sites within this distance.

8.3.10 The exception to this were those non-statutorily designated sites where there was the potential for air quality impacts to arise outside of the Order Limits as a result of different traffic flows.

8.3.11 Subsequent to receipt of the Scoping Opinion **[TR010044/APP/6.5]**, engagement was held with Natural England and the Environment Agency to inform them of the scoping of surveys and the development of mitigation measures, the full details of which are presented within the Consultation Report **[TR010044/APP/5.1]**.

Assessment standards and guidance

8.3.12 When valuing ecological features, and without compromise to the requirements of the *Design Manual for Roads and Bridges (DMRB) LA 108: Biodiversity* (Ref 8-26), consideration has been given to guidance contained within the *Guidelines for Ecological Impact Assessment in the UK and Ireland* published by Chartered Institute of Ecology and Environmental Management (CIEEM) in 2019 (Ref 8-25).

8.3.13 The assessment on potential biodiversity impacts associated with the construction and operation of the Scheme, was based upon the methodology set out in the DMRB (Highways England, 2019) (Ref 8-52), including the following parts:

a. LA 101 Introduction to environmental assessment
b. LA 102 Screening projects for Environmental Impact Assessment
c. LA 103 Scoping projects for environmental assessment
d. LA 104 Environmental assessment and monitoring
e. LA 108 Biodiversity
f. LD 118 Biodiversity Design

8.3.14 The method used draws upon specific species technical assessment guidance (where applicable and appropriately referenced), and professional judgement.

8.3.15 The following guidance has been used to inform the scope and content of the assessment, and to assist the identification and mitigation of likely significant effects. This builds upon the overarching EIA methodology and guidance presented in **Chapter 4, Environmental assessment methodology** of the Environmental Statement **[TR010044/APP/6.1]**.

Establishment of the baseline conditions

8.3.16 Establishment of the baseline environment involved reference to existing data sources, consultation with statutory bodies and other organisations, and fieldwork surveys.

Desk study

8.3.17 A desk study was undertaken to identify sites designated for their biodiversity value, and records of protected and notable habitats and species (biodiversity features) and invasive non-native species potentially relevant to the Scheme. The scope of the desk study was defined using a combination of *published guidance* (Ref 8-26) and professional judgement and the area covered is termed the Study Area. Refer to **Appendix 8.1** of the Environmental Statement **[TR010044/APP/6.3]**.

8.3.18 Organisations from which information and views concerning the Scheme were obtained included:

a. Natural England
b. Environment Agency
c. Bedfordshire and Luton Biodiversity Recording and Monitoring Centre
d. Cambridgeshire and Peterborough Environmental Records Centre

8.3.19 Data sourced from these organisations as part of the desk study were used to develop and refine the information gathered as part of the scoping exercise. This was supplemented by information obtained from web-based resources, aerial photography and assessments published by third parties, and other data and records relating to the following biodiversity features:

a. Statutory sites designated for their international, national, regional and local biodiversity importance

b. Protected and notable habitats and species

c. Scheduled invasive non-native plant and animal species

8.3.20 Relevant protected and notable habitats and species for which baseline data were gathered include:

a. Those listed under Schedules 1, 5 and 8 of the *Wildlife and Countryside Act 1981* (as amended) (Ref 8-6).

b. Those listed under Schedules 2 and 5 of the *Habitats Regulations* (Ref 8-1).

c. Species and Habitats of Principal Importance (HPI) for nature conservation in England listed under Section 41 of the *NERC Act 2006* (Ref 8-8).

d. Other species that are Nationally Rare, Nationally Scarce or listed in national or local *Red Data Lists* (Ref 8-27) and Biodiversity Action Plans.

8.3.21 Records of scheduled invasive non-native plant and animal species, as listed under Schedule 9 of the *Wildlife and Countryside Act 1981* (as amended) (Ref 8-6) and the *Invasive Alien Species (Enforcement and Prohibition) Order 2019* (Ref 8-28), were collated and taken into account as, whilst they are not relevant biodiversity features within EcIA, they have potential relevance to achieving legislative compliance, can contribute to the amplification of any adverse effects from the Scheme, have the potential to conflict with objectives for ecological mitigation, compensation and enhancement, and can have negative potential health, social and economic impacts.

8.3.22 Other information sources referenced as part of the baseline review included 1:25,000 and 1:10,000 scale Ordnance Survey mapping, 3-dimensional topographical data, and aerial photography available in the public domain.

8.3.23 The details of the information obtained as part of the desk study are presented within **Appendix 8.1** of the Environmental Statement **[TR010044/APP/6.3]** and in the individual appendices to this chapter.

Field surveys

8.3.24 Field surveys were undertaken by qualified and experienced ecologists in the period 2016 to 2020 (ending in November 2020). The purpose of the field surveys was to identify, record and map vegetation, habitats, protected species and scheduled invasive non-native species within the Survey Area as defined for a given field survey.

8.3.25 The scope of the following field surveys was established through the desk study and through consultation with Natural England and the Environment Agency:

a. Extended Phase 1 Habitat Survey and Phase 2 Habitat / National Vegetation Classification (NVC) surveys, arable flora survey, veteran trees and hedgerow survey – reported in **Appendix 8.20** of the Environmental Statement **[TR010044/APP/6.3]**.

b. Terrestrial habitat survey – reported in **Appendix 8.3** of the Environmental Statement **[TR010044/APP/6.3]**.

c. Aquatic habitat survey – reported in **Appendix 8.4** of the Environmental Statement **[TR010044/APP/6.3]**.

d. Bat survey – reported in **Appendix 8.5** of the Environmental Statement **[TR010044/APP/6.3]**.

e. Badger survey – reported in **Appendix 8.6** of the Environmental Statement **[TR010044/APP/6.3]** (CONFIDENTIAL).

f. Riparian mammals survey – reported in **Appendix 8.7** of the Environmental Statement **[TR010044/APP/6.3]**.

g. Other mammals including Hazel Dormouse (*Muscardinus avellanarius*) and invasive non-native mammal species – reported in **Appendix 8.8** of the Environmental Statement **[TR010044/APP/6.3]**.

h. Wintering bird survey – reported in **Appendix 8.9** of the Environmental Statement **[TR010044/APP/6.3]**.

i. Breeding bird survey – reported in **Appendix 8.10** of the Environmental Statement **[TR010044/APP/6.3]**.

j. Hobby (*Falco Subbuteo*) and Red Kite (*Milvus milvus*) surveys – reported in **Appendix 8.11** of the Environmental Statement **[TR010044/APP/6.3]** (CONFIDENTIAL).

k. Barn Owl (*Tyto alba*) survey – reported in **Appendix 8.12** of the Environmental Statement **[TR010044/APP/6.3]** CONFIDENTIAL.

l. Reptile survey – reported in **Appendix 8.13** of the Environmental Statement **[TR010044/APP/6.3]**.

m. Great Crested Newt (*Triturus cristatus*) – reported in **Appendix 8.14** of the Environmental Statement **[TR010044/APP/6.3]**.

n. Fish survey – reported in **Appendix 8.15** of the Environmental Statement **[TR010044/APP/6.3]**.

o. Terrestrial invertebrates survey (including invasive non-native species) – reported in **Appendix 8.16** of the Environmental Statement **[TR010044/APP/6.3]**.

p. Aquatic invertebrates survey (including invasive non-native species) – reported in **Appendix 8.17** of the Environmental Statement **[TR010044/APP/6.3]**.

q. Invasive non-native plants survey – reported in **Appendix 8.18** of the Environmental Statement **[TR010044/APP/6.3]**.

r. Biodiversity net gain assessment – reported in **Appendix 8.19** of the Environmental Statement **[TR010044/APP/6.3]**.

Biodiversity value

8.3.26 The importance (value) of biodiversity features (comprising designated sites, habitats, species assemblages and populations of species) has been assessed with reference to their:

a. Biodiversity status (which relates to rarity and threat status)

b. Conservation value (which relates to the need to conserve representative areas of different habitats and the genetic diversity of species populations)

c. Legal status (*i.e.* whether they are afforded protection under legislation)

8.3.27 Other characteristics contributing to the importance of biodiversity features included, but were not limited to:

a. Habitat diversity

b. Whether the species population size is notable in a wider context

c. Rich assemblages of plants and animals

d. Species on the edge of their range (particularly where their distribution is changing as a result of global trends such as climate change)

8.3.28 Importance was determined based on the following geographical contexts:

a. International and European

b. National (England)

c. Regional (East Anglia)

d. County (Bedfordshire, Cambridgeshire and Huntingdonshire)

e. Local (St Neots - Cambourne)

f. Negligible (at a parish scale or smaller)

8.3.29 The importance of ecological features does not necessarily equate directly to their sensitivity. For example, an ecological feature of high conservation importance may comprise a robust ecosystem which is resilient to effects caused by external factors and is therefore not highly sensitive. Conversely, an ecological feature may be highly sensitive to change but widespread or abundant at the geographic scale considered and therefore the population within the Study Area may not be important at that scale.

8.3.30 The criteria applied in the assessment to determine importance are presented in **Table 8-1** and have been developed from the criteria contained within *DMRB LA 108* (Ref 8-26), with additional criteria applied from the more recent *CIEEM guidelines* (Ref 8-25), where appropriate.

Table 8-1: Criteria for assessing features of importance

Importance	Criteria
International (European)	**Habitats**: Natura 2000 sites including Sites of Community Importance (SCIs); Special Protection Areas (SPAs); potential SPAs (pSPAs); Special Areas of Conservation (SACs); candidate or possible SACs (cSACs or pSACs); and Wetlands of International Importance (Ramsar sites). Biogenetic Reserves, World Heritage Sites and Biosphere Reserves. Areas that meet the published selection criteria for those sites listed above but which are not themselves designated as such. **Species**: Resident, or regularly occurring, populations of species that may be considered important at an international or European level where the loss of these populations would adversely affect the conservation status or distribution of the species at international geographic scale; or the population forms a critical part of a wider population at this geographic scale.
National (England)	**Habitats**: Designated sites including SSSIs and their associated Impact Risk Zones; Marine Protected Areas (MPA) including Marine Conservation Zones (MCZ); and National Nature Reserves (NNR). Areas that meet the published selection criteria for e.g. Joint Nature Conservation Committee selection criteria for SSSI (2013) (Ref 8-29) for those sites listed above but which are not themselves designated as such. Areas of key/priority habitats identified in the UK Biodiversity Action Plan (BAP) (Ref 8-30), including those published in accordance with Section 41 of the *NERC Act 2006* (Ref 8-8) and those considered to be of principal importance for the conservation of biodiversity (HPI). Areas of Ancient Woodland (e.g. woodland listed within the *Ancient Woodland Inventory* (Ref 8-31)). **Species**: Resident, or regularly occurring, populations of species that may be considered important at an International, European, UK or National level where: the loss of these populations would adversely affect the conservation status or distribution of the species at national scale; or the population forms a critical part of a wider population at national scale.
Regional (East Midlands)	**Habitats**: Areas of key and, or priority habitats identified within BAPs produced within the region (where available); areas of key and, or priority habitat identified as being of Regional value in the appropriate National Character Area that have been identified by regional plans or strategies as areas for restoration or re-creation of priority habitats. **Species**: Resident, or regularly occurring populations of species which may be considered important at an International, European, UK or National level and key and, or priority species listed within the region where: the loss of

Importance	Criteria
	these populations would adversely affect the conservation status or distribution of the species at regional scale; or the population forms a critical part of a wider population; or the species is at a critical phase of its life cycle at a regional scale.
County (Bedfordshire, Cambridgeshire (Huntingdonshire) or Unitary Authority Area or District	**Habitats**: Designated sites including: County Wildlife sites (CWSs) and Local Nature Reserves (LNRs) designated in the county context, a statutory designation made under Section 21 of the National Parks and Access to the Countryside Act 1949. Areas which meet the published selection criteria for those sites listed above but which are not themselves designated as such. Areas of key/priority habitats identified in the Local BAP; and areas of habitat identified in the appropriate National Character Area (or equivalent). **Species**: Resident or regularly occurring populations of species which may be considered important at an International, European, UK or National level where the loss of these populations would adversely affect the conservation status or distribution of the species across the county or the population forms a critical part of a wider population; or the species is at a critical phase of its life cycle.
Local (St Neots to Cambourne)	**Habitats**: Areas of habitat considered to appreciably enrich the habitat resource within the local context (such as veteran trees), including features of value for migration, dispersal or genetic exchange. This includes trees that are protected by Tree Preservation Orders. **Species**: Populations/communities of species considered to appreciably enrich the biodiversity resource within the local context.
Negligible (below local)	**Habitats**: Areas of heavily modified or managed vegetation of low species diversity, or of low value as habitat to species of importance for conservation at county or national scale that do not meet criteria for local or higher scale. **Species**: Common or widespread species.

8.3.31 The importance of biodiversity features identified within the assessment is evaluated and presented as part of the baseline conditions.

8.3.32 When describing potential impacts (and, where relevant, the resultant effects) consideration is given to the following characteristics likely to influence this:

a. Positive (beneficial) or negative (adverse) - *i.e.* is the change likely to be in accordance with nature conservation objectives and policy.

b. Positive (beneficial) - a change that improves the quality of the environment, or halts or slows an existing decline in quality *e.g*. increasing the extent of a habitat of conservation importance.

c. Negative (adverse) - a change that reduces the quality of the environment *e.g.* destruction of habitat or increased noise disturbance.

d. Magnitude - the 'size', 'amount' or 'intensity' of an impact - this is described on a quantitative basis where possible.

e. Extent - the spatial or geographical area or distance over which the impact/effect occurs.

f. Duration (*e.g*. permanent / temporary) - the time over which an impact is expected to last prior to recovery or replacement of the resource or feature. Consideration has been given to how this duration relates to the relevant biodiversity and geological characteristics, for example a species' lifecycle. However, it is not always appropriate to report the duration of impacts in these terms. The duration of an effect may be longer than the duration of an activity or impact.

g. Reversibility (*e.g*. irreversible / reversible) - *i.e*. a reversible impact is one from which recovery is possible, or for which effective mitigation is both possible and enforceable. An irreversible effect is one from which recovery is either not possible, or cannot be achieved within a reasonable timescale (in the context of the feature being assessed).

h. Frequency and timing - *i.e*. consideration of the point at which the impact occurs in relation to critical life-stages or seasons.

i. Complexity (direct, indirect, in-combination or cumulative).

8.3.33 In relation to the complexity of an impact:

a. A direct impact is considered to be a direct consequence of the Scheme, or a particular activity, including physical loss or gain of a habitat, or direct mortality of individuals or populations.

b. An indirect impact is considered to occur via an intermediary or as a result of an impact pathway, for example impacts on air quality or water leading to changes in habitats or the populations of species they support.

c. An in-combination impact occurs where different aspects of the Scheme, act together, to affect habitats and species populations, such as noise disturbance and habitat loss both impacting on a species.

d. A cumulative impact can arise where two or more development projects impact on a biodiversity feature simultaneously or in succession.

8.3.34 The magnitude of impact has been defined using the generic impact criteria and ratings presented in **Chapter 4, Environmental assessment methodology** of the Environmental Statement **[TR010044/APP/6.1]**.

8.3.35 Impacts on biodiversity arising from construction and operation of the Scheme are reported separately for each feature, *e.g*. a habitat type or a species or group of species. A further assessment is made, where relevant, in the design year (15 years after construction) to report the contribution that certain types of mitigation measure will have on these impacts once established and fulfilling their intended function, for example replacement hedgerows.

8.3.36 As the greatest impacts on ecological sites, habitats and species are generally attributed to those arising from construction, construction impacts and those associated with the long-term presence of the Scheme are presented together as part of the construction phase impacts within the assessment. The purpose of this is to avoid repetition within the chapter, and to reflect the fact that ecological habitats are lost during site clearance activities and that any new habitats (for example those proposed as mitigation) will not have been established in the construction period.

8.3.37 Impacts arising from the operational phase are those associated with the operation and use of the Scheme, e.g. the impacts of vehicle lighting, noise and air pollution arising from traffic travelling on new or improved sections of road within the Scheme, and those associated with any road lighting incorporated into the design of the Scheme.

8.3.38 The identification of impacts on biodiversity features during either construction or operation takes account of the relevant embedded and standard mitigation measures, and compensation measures, described in Section 8.8.

Identification of likely significant effects

8.3.39 The identification of the likely significant effects on biodiversity features has involved combining the importance (value) of a given ecological feature with the predicted magnitude of impact, using recognised standards and professional judgement (refer to **Table 4-4**). Magnitude is arrived at by taking the various factors into account, i.e. an overall level of magnitude.

8.3.40 The process of identification has been guided by the *CIEEM guidelines* (Ref 8-25), which state that: "*For the purpose of ecological impact assessment, a 'significant effect' is an effect that either supports or undermines biodiversity conservation objectives for 'important biodiversity features'…or for biodiversity in general. Conservation objectives may be specific (e.g. for a designated site) or broad (e.g. national/local nature conservation policy) or more wide-ranging (enhancement of biodiversity)*".

8.3.41 Effects have been reported in relation to the geographic scale at which they may occur i.e. from International to below Local level, as summarised within **Table 8-1**.

8.3.42 The categories of significance applied in the assessment have been adapted from those presented in *LA 108* (Ref 8-26), as follows:

a. Very large, representing impacts on features of International, European, UK or National value (only adverse effects are assigned this level of significance as they represent key factors in the decision-making process).

b. Large, representing impacts on features of Regional value (these effects are considered to be very important considerations and are likely to be material to the decision-making process).

c. Moderate, representing impacts on features of County or Unitary Authority Area value (these effects are important in informing the decision-making process).

d. Slight, representing impacts on features of Local value (these effects are unlikely to be critical in the decision-making process, but are important in enhancing the subsequent design of a project).

e. Neutral, representing no significant impacts on key nature conservation features (these comprise effects that are absent or those which are beneath levels of perception).

8.3.43 In relation to these categories, a significant effect in relation to *The Infrastructure Planning (Environmental Impact Assessment (EIA)) Regulations 2017* (Ref 8-32) is one which is identified as being of moderate or greater significance, these being considerations that are either important, material or key factors in the decision-making process.

8.4 Assessment assumptions and limitations

Scheme design and limits of deviation

8.4.1 The assessment has been based on the Scheme description detailed within **Chapter 2, The Scheme** of the Environmental Statement **[TR010044/APP/6.1]**. It has taken into account the lateral and vertical limits of deviation defined in the Development Consent Order in order to establish a realistic worst-case scenario for assessment.

8.4.2 This scenario has been used to identify and report the effects that any lateral and vertical deviation could realistically give rise to. For example, this has considered the potential for the Scheme to be brought into its closest possible proximity to biodiversity features, and thereby potentially result in a different effect.

8.4.3 Notwithstanding any potential deviation, all biodiversity mitigation measures will still be deliverable within the limits of deviation and will still fulfil their intended function.

8.4.4 A desk study was undertaken, the aim of which was to help characterise the baseline context of the Scheme and provide valuable background information that would not be captured by a single habitat or species survey alone. Information obtained during the course of the desk study was dependent upon people and organisations having made and submitted records for the area of interest. As such, a lack of records for a particular habitat or species does not necessarily mean that the habitat or species does not occur in the Study Area for any given habitat or species. Likewise, the presence of records for a particular habitat or species does not mean that it necessarily still occurs within the Study Area for that habitat or species. The desk study is therefore primarily used to guide the scope of further surveys, in addition to stakeholder discussions and the Phase 1 Habitat Survey.

8.4.5 None of these limitations have had significant implications for the results of this assessment of the potential effects of the Scheme on biodiversity. This is because of a particularly thorough search for background information and the survey team developing a very good understanding of the habitats and species present in the Study Area during the four-year period over which surveys have been undertaken.

Impact assessment and mitigation

8.4.6 The impact assessment has been based on the information obtained and evaluated at the time of reporting. As highlighted above, the assessment has assumed the maximum extents of land take required for the Scheme's construction and operation, taking account of the limits of deviation and Order Limits (refer to **Chapter 2, The Scheme** of the Environmental Statement **[TR010044/APP/6.1]**).

8.4.7 Where ecological survey data were unavailable or incomplete, a precautionary approach has been taken with respect to the potential importance of biodiversity features.

Habitat loss (permanent and temporary)

8.4.8 The assessment has assumed that all habitats within the limits of deviation surrounding the engineering components of the Scheme would be permanently lost within the footprint of the permanent works.

8.4.9 Within the remainder of the land outside of the limits of deviation but within the Order Limits, it has been assumed that there would be a temporary loss of habitat that coincides with areas identified to accommodate construction compounds and/ or ecological mitigation. The assessment has assumed that these temporary impacts would not result in the removal of trees and, except where construction access is required, that boundary features including hedgerows and ditches will be retained with a minimum stand-off distance of 5m and that any habitat lost will be replaced.

8.5 Study area

Study Areas: Desk study

8.5.2 **Table 8-2** presents the Study Areas applied in the desk study to identify sites designated for their biodiversity importance, protected and notable species, and scheduled invasive non-native plant and animal species.

8.5.3 The 30 kilometre (18.6 miles) distance applied for sites designated for their international biodiversity value is much greater in area than for other sites as this relates to the identification of any sites internationally designated to ensure that any impacts at this scale could be identified and assessed.

Table 8-2: Study Areas applied in the desk study

Biodiversity feature	Study Area (distance from the Order Limits in km)
Sites designated statutorily for their international biodiversity importance	30
Sites designated statutorily for their national biodiversity importance	2
Sites designated non-statutorily	1
Protected and notable species	2
Scheduled invasive non-native species	1

8.5.4 The 30 kilometre (18.6 miles) Study Area extent for internationally designated sites is defined in *LA 108* guidance (Ref 8-26), and the extents of the other Study Areas have been defined using professional judgement, further details of which are presented within **Appendix 8.2** of the Environmental Statement **[TR010044/APP/6.3]**.

Survey Areas: field surveys

8.5.5 A number of Survey Areas have been defined and applied in the assessment, based on the consideration of the likely zone of influence of the Scheme on a given biodiversity feature.

8.5.6 The definition of Survey Areas was developed using a combination of professional judgement and guidance contained within the *CIEEM guidelines* (Ref 8-25), which define the zone of influence as: "*…the area over which biodiversity features may be affected by biophysical changes as a result of the proposed project and associated activities*" and good practice guidance specific to given species surveys.

8.5.7 In defining individual Survey Areas, consideration was given to the geographic location, nature and scale of the Scheme. This referenced the areas of temporary and permanent land take and limits of deviation defined on the Works Plans **[TR010044/APP/2.3]**, the location and scale of construction compounds, and areas of land identified for environmental mitigation and compensation measures. The Survey Area for any given habitat or species was established in relation to the Order Limits, ensuring that all suitable habitat within the likely zone of influence of the Scheme was assessed.

8.5.8 **Table 8-3** presents the Survey Areas applied to field surveys.

8.5.9 Further details regarding the definition of these Survey Areas are presented in the associated survey reports within **Appendices 8.3** to **8.18** of the Environmental Statement **[TR010044/APP/6.3]**.

Table 8-3: Summary of habitat and species surveys – Survey Areas and timing

Field survey	Field Survey Areas and timings
Terrestrial habitats	Surveys were undertaken in 2018, 2019 and 2020 of those Priority Habitats identified in the Phase 1 Habitat Survey (**Appendix 8.20** of the Environmental Statement **[TR010044/APP/6.3]**): woodlands (with Phase 2 Habitat / National Vegetation Community (NVC) surveys where appropriate), veteran trees, arable fields (specifically the arable flora) and hedgerows. The surveys covered all accessible locations within 100m of the Order Limits, as illustrated on **Figure 1** in **Appendix 8.3** of the Environmental Statement **[TR010044/APP/6.3]**. Veteran tree surveys undertaken in 2018 and 2019 covered all relevant areas within, and 100 metres beyond the Order Limits. Arable flora surveys undertaken in 2018 and 2019 covered all relevant fields within, and 100 metres beyond the Order Limits. Hedgerow surveys were undertaken in 2018 and 2019, and, as a minimum, covered all accessible hedgerows located within, and 100 metres beyond the Order Limits, as illustrated on **Figure 1** in **Appendix 8.3** of the Environmental Statement **[TR010044/APP/6.3]**.
Aquatic habitats	A scoping survey of the watercourses crossed by the Scheme was undertaken in 2016 and 2017 and combined with information from the assessment of waterbodies for their suitability for Great Crested Newt to identify those watercourses and waterbodies within, and 500m beyond the Order Limits that required further investigation. The Survey Area for detailed surveys of aquatic habitats comprised those watercourses crossed by the Scheme and ponds and other waterbodies within the Order Limits or within 100m of them. This comprised Hen Brook and 20 ponds, which were all surveyed in 2018 and 2019. All other waterbodies were scoped out of requiring further assessment due to being dry at the time of the walkover habitat survey and Great Crested Newt survey within or beyond 100m of the Order Limits. Refer to **Appendix 8.4** of the Environmental Statement **[TR010044/APP/6.3]** for further information.

Field survey	Field Survey Areas and timings
Bats	Between 2018 and 2020 all accessible trees and structures within, and 100 metres beyond the Order Limits were assessed, where relevant, as a result of the preliminary roost appraisal survey undertaken to determine their suitability for roosting bats. Surveys included tree climbing, emergence and re-entry surveys, as appropriate. Bat activity surveys were undertaken within and up to 250 metres beyond the Order Limits in selected woodlands. Techniques consisted of walked transects and automated static detector surveys and Advanced Bat Survey Techniques (*e.g.* trapping and radio-tracking to roost) in 2018 and 2019, and bat crossing point surveys in 2019. Survey locations are illustrated on the figures contained within **Appendix 8.5** of the Environmental Statement **[TR010044/APP/6.3]**. Refer to **Appendix 8.5** of the Environmental Statement **[TR010044/APP/6.3]** for further information.
Badger	In accordance with published guidance (Ref 8-10), all Badger surveys were undertaken between November 2017 and October 2020, included accessible habitat within and up to 250 metres of the Order Limits. This was extended to 500 metres where appropriate (e.g. near woodland or other habitats especially those likely to be of interest to Badgers), as illustrated in **Appendix 8.6** of the Environmental Statement **[TR010044/APP/6.3]** (CONFIDENTIAL).
Riparian mammals (including invasive non-native species)	Where access was possible, watercourses crossed by the Scheme were surveyed in 2018, 2019 and 2020 for Water Vole, Otter (*Lutra lutra*) and Mink (*Neovison vison*) (the River Great Ouse and the tributaries flowing into it from the west (Begwary Brook and South Brook) and the east (Hen Brook and Stone Brook)), as were waterbodies within the Order Limits (one pond and the Caxton Gibbet attenuation pond). For Water Vole, watercourses were surveyed for 500 metres upstream and 500 metres downstream of the Order Limits. Spot checks for Water Vole were also undertaken in the wider area beyond 500 metres up and downstream of the Scheme. The same watercourses were surveyed for Otter within accessible land up to 500 metres up and downstream of the Order Limits, with both banks being surveyed if necessary. Spot checks were also conducted on bridges within 5 kilometres up and downstream of the Scheme, where accessible. Incidental sightings of Mink were recorded during Water Vole and Otter surveys, as well as from camera trap surveys. See **Appendix 8.7** of the Environmental Statement **[TR010044/APP/6.3]** for further information.

Field survey	Field Survey Areas and timings
Other mammals (including invasive non-native species)	A review was undertaken of other species of mammals within a Study Area of 1km from the Order Limits: species of principal importance (Hazel Dormouse, Hedgehog, Brown Hare, Harvest Mouse and Polecat which are not dealt with in any of the other appendices), and Rabbit and deer which could pose risks to the Scheme. The review consisted of a search for existing information including records of these species for the Study Area and consideration of the habitat availability for these mammals based on surveys that had been undertaken of habitats in the Study Area. Refer to **Appendix 8.8** of the Environmental Statement **[TR010044/APP/6.3]** for further information.
Wintering birds	All suitable habitats within and adjacent to the Order Limits (outward to a distance of 100m) were surveyed where access permitted, (**Figure 1** in **Appendix 8.9** of the Environmental Statement **[TR010044/APP/6.3]**). A reconnaissance survey was undertaken in October 2017 to identify potential survey access points along the Scheme, and to ground-truth the locations of individual habitat types within the Scheme that were identified during the desk study. The wintering bird surveys were undertaken between November 2017 and March 2018 using two survey methods: viewing points and walkover surveys, and between October 2019 and March 2020 using walkover surveys only. Refer to **Appendix 8.9** of the Environmental Statement **[TR010044/APP/6.3]** for further information.
Breeding birds	Walkover surveys for breeding birds were undertaken between March and June 2018 and in May 2020 and were based on a standard territory mapping method for surveying breeding birds. The Survey Areas for breeding birds included habitat within the Order Limits and a 100m zone beyond them, as illustrated on **Figure 1** (**Appendix 8.10** of the Environmental Statement **[TR010044/APP/6.3]**. Refer to **Appendix 8.10** of the Environmental Statement **[TR010044/APP/6.3]** for further information.
Hobby and Red Kite	The presence of Hobby and Red Kite was determined in the breeding birds survey of 2018. Surveys undertaken in 2019 focussed on known locations for both species, extended to a maximum of 500 metres beyond the Order Limits for any new territories of either species. Where features of interest to either species such as potential trees and, or woodland for nest sites, were found just outside of this zone, they were also recorded. The Survey Areas that were subject to surveys for nesting Hobby and Red Kite are shown on **Figure 1** in **Appendix 8.11** of the Environmental Statement **[TR010044/APP/6.3]** (CONFIDENTIAL). Refer to **Appendix 8.11** of the Environmental Statement **[TR010044/APP/6.3]** for further information.
Barn Owl	Scoping and inspection surveys were undertaken to define suitable features and habitat within and adjacent to the Order Limits (conducted within 250m for 2017 and 2018, extended to 1.5km in 2019), as illustrated on **Figure 1** in **Appendix**

Field survey	Field Survey Areas and timings
	8.12 of the Environmental Statement **[TR010044/APP/6.3]**. Inspection surveys were undertaken of 59 trees, six buildings and two nest boxes. Refer to **Appendix 8.12** of the Environmental Statement **[TR010044/APP/6.3]** (CONFIDENTIAL) for further information.
Reptiles	Accessible areas with suitable reptile habitat within, and 100m beyond the Order Limits were surveyed in 2018 for presence and, or likely absence as shown on **Figure 1** in **Appendix 8.13** of the Environmental Statement **[TR010044/APP/6.3]**. Refer to **Appendix 8.13** of the Environmental Statement **[TR010044/APP/6.3]** for further information.
Great Crested Newt	Surveys for Great Crested Newt were undertaken within, and 500m beyond the Order Limits between 2018 and 2019. A scoping survey carried out in February 2018 identified a total of 73 waterbodies within 500m of the Order Limit Fourteen of these could not be surveyed. The remaining 59 waterbodies were subject to a Habitat Suitability Index (HSI) assessment . Between 2018 and 2019, water samples from 28 of the 59 ponds were analysed for eDNA. Based on the results of the HSI assessment and eDNA analysis, 36 of these ponds were subject to standard survey techniques. Refer to **Appendix 8.14** of the Environmental Statement **[TR010044/APP/6.3]** for further information.
Fish	The Survey Area scoped for the need for detailed fish surveys comprised those watercourses crossed by the Scheme and ponds and other waterbodies within the Order Limits or within 100 metres of them. One watercourse was scoped in for a fish survey, Hen Brook, which was sampled in autumn 2018 using electric fishing over a 100 metres stretch downstream and upstream of where the existing A428 passes over Hen Brook. No other watercourses nor any of the ponds or other waterbodies warranted further investigation. Refer to **Appendix 8.15** of the Environmental Statement **[TR010044/APP/6.3]** for further information.
Terrestrial invertebrates: (including invasive non-native species)	Selected habitats within the Order Limits plus 100 metres, comprising woodlands, scrub, grassland, hedgerows and mature/veteran trees were identified as having suitable habitat for notable species. Where accessible, these were sampled in 2018 using a variety of field techniques including sweeping, beating and pitfall trapping. Refer to **Appendix 8.16** of the Environmental Statement **[TR010044/APP/6.3]** for further information.
Aquatic invertebrates (including invasive non-native species)	Scoping was undertaken of all watercourses crossed by the Scheme and combined with information from the assessment of waterbodies for suitability for Great Crested Newt (see above) to identify those watercourses and waterbodies that required further investigation with respect to their aquatic invertebrate fauna. The Survey Area for detailed surveys of aquatic habitats comprised those watercourses crossed by the Scheme and ponds and other waterbodies within

Field survey	Field Survey Areas and timings
	the Order Limits or within 100m of them. The watercourses and waterbodies identified for more detailed investigation were: a. Hen Brook, which was sampled in autumn 2018 and spring 2019 following standard Environment Agency methods; and b. 20 ponds were scoped for detailed surveys, of which nine ponds could not be surveyed for reasons such as: access to the ponds being deemed unsafe, access to the ponds was not granted and others because they were dry at the time of the survey. Eleven ponds were surveyed during 2018 and 2019 following the *National Pond Survey (NPS) (Pond Action, 1998) guidance* (Ref 8-41) or Predictive System for Multimetrics (PSYM) (Pond Action, 2002) guidance (Ref 8-42) as described in **Appendix 8.4** of the Environmental Statement **[TR010044/APP/6.3]**. Refer to **Appendix 8.17** of the Environmental Statement **[TR010044/APP/6.3]** for further information.
Plant species: invasive non-native	The terrestrial habitats survey undertaken in 2017 and updated in 2018 included observations of any invasive non-native plants (refer to **Appendix 8.3** of the Environmental Statement **[TR010044/APP/6.3])**. The Survey Area covered all accessible locations illustrated on **Figure 1** in **Appendix 8.18** of the Environmental Statement **[TR010044/APP/6.3]**. Further observations were made of invasive non-native plants during a number of the other surveys described above notably **Appendix 8.4, 8.7 and 8.17** of the Environmental Statement. **[TR010044/APP/6.3]**. Refer to **Appendix 8.18** of the Environmental Statement **[TR010044/APP/6.3]** for further information.
Biodiversity assessment	Data required to calculate the biodiversity net gain or net loss were collected in the extended Phase 1 Habitat Survey and subsequent surveys to ensure a comprehensive baseline of habitat data. These data were used to assess the biodiversity for the Scheme, comparing it pre- and post-works. The area used for the calculation, the Survey Area, comprised all land within the highways boundary, excluding the extents of the borrow pits as these will be returned to existing land use. Refer to **Appendix 8.19** of the Environmental Statement **[TR010044/APP/6.3]** for further information.

8.6 Baseline conditions

Sites designated for their biodiversity value

Statutorily designated sites of international biodiversity value

8.6.1 There are three sites within 30 kilometres (18.6 miles) of the Scheme that are designated for their international nature conservation value which have been scoped in for assessment. These are Eversden and Wimpole Woods SAC, Portholme SAC and Ouse Washes SAC, SPA and Ramsar site. The reasons for their designation are summarised in **Table 8-4**. The Upper Nene Valley Gravel Pits SPA (22.3 kilometres (13.9 miles)), Fenland SAC (21.9 kilometres (13.6 miles)) and Devils Dyke SAC) (29.6 kilometres (18.4 miles)) were scoped out of the assessment.

Table 8-4: Sites designated statutorily for their international biodiversity value within 30 kilometres (18.6 miles) of the Scheme and scoped in for assessment

Site	Reason(s) for designation	Importance (reasoning)	Relationship to the Scheme
Eversden and Wimpole Woods	A mixture of ancient coppice woodland (Eversden Wood) and high forest woods likely to be of more recent origin (Wimpole Woods). A colony of the Barbastelle bat (*Barbastella barbastellus*), the primary reason for designation, is associated with the trees in Wimpole Woods.	International: designated SAC	8.5km to the south-east
Portholme	A lowland hay meadow holding grassland communities of the alluvial flood meadow type, one of the largest areas of this grassland type in the country which continues to be managed on traditional lines as a 'lammas' meadow. Watercourses on the periphery of the site have populations of some uncommon invertebrates, including one dragonfly which is of a nationally restricted distribution.	International: designated SAC	8.9km to the north as the bird flies and 20km downstream
Ouse Washes	A flood storage area, often under water in the winter, designated as a SPA and Ramsar site due to their international significance for wintering and breeding wildfowl and waders. The site also has rich aquatic fauna and flora, and areas of unimproved grassland. The Ouse Washes is designated as a SAC on account of Spined Loach (*Cobitis taenia*) populations within the River Great Ouse catchment.	International: designated SAC, SPA and Ramsar site	16.1km to the north-east as the bird flies and 43.2km downstream

8.6.2 Full details of these three sites are presented in the Habitats Regulations Assessment: No Significant Effects Report **[TR010044/APP/6.7]**.

Statutorily designated sites of national biodiversity value

8.6.3 Sites with a national level statutory designation that are within 2 kilometres (1.2 miles) of the Scheme are summarised in **Table 8-5**; their locations are illustrated on **Figure 1** in **Appendix 8.2** of the Environmental Statement **[TR010044/APP/6.3]**.

Table 8-5: Sites designated statutorily for their national biodiversity value within 2 kilometres (1.2 miles) of the Scheme

Site	Reason(s) for designation	Designation	Relationship to the Scheme
Elsworth Wood	This site has three different uncommon types of woodland. It is mainly coppiced Field Maple (*Acer campestre*), with a varied shrub layer and the ground flora is mainly Dog's Mercury (*Mercurialis perennis*) and Bluebell (*Hyacinthoides non-scripta*) together with a considerable population of Nationally Scarce oxlip (*Primula elatior*). The invertebrate community includes several nationally uncommon beetles, such as a species of rove beetle (*Stichoglossa semirufa*).	SSSI	0.85km to the north-east
Papworth Wood	One of the oldest secondary woods in Cambridgeshire. Although originally a coppice-with-standards woodland of Ash (*Fraxinus excelsior*), Field Maple and Hazel (*Corylus avellana*) the site is now dominated by invasive Small-leaved Elm (*Ulmus minor*) and represents a woodland type scarce in Britain.	SSSI	1.14km to the north
St Neots Common	One of the nationally significant MG4 flood meadow community grasslands supported by the free draining alluvial soils along the Ouse Valley between St Neots and St Ives in Huntingdonshire.	SSSI	1km to the north-west
Little Paxton Wood	This ancient wood is wet Ash (*Fraxinus excelsior*) and Field Maple (*Acer campestre*) on heavy calcareous clay, with seasonally waterlogged soils. It has a diverse flora. A double bank and ditch with Wood Melick (*Melica uniflora*), Sweet Violet (*Viola odorata*) and the nationally restricted Spiked Star-of - Bethlehem (*Ornithogalum pyrenaicum*) contribute to a very diverse flora.	SSSI	1.8km to the north-west

Statutorily designated sites of local biodiversity value

8.6.4 There are no sites statutorily designated for their local biodiversity value, *i.e.* Local Nature Reserves within 5 kilometres (3.1 miles) of the Scheme.

Non-statutorily designated sites of local biodiversity value

8.6.5 Sites designated non-statutorily for their local biodiversity value within 1 kilometre (0.6 miles) of the Scheme identified during the desk study are summarised in **Table 8-6** and are illustrated on **Figure 1** in **Appendix 8.2** of the Environmental Statement **[TR010044/APP/6.3]**.

8.6.6 **Table 8-6** includes all non-statutorily designated sites. There were no sites that have been found to meet relevant criteria, but which are yet to be assessed and formally adopted.

Table 8-6: Non-statutory sites of biodiversity value within 1 kilometre (0.6 miles) of the Scheme

Site	Reason(s) for designation	Designation	Relationship to the Scheme
Begwary Brook Pits	Mosaic of freshwater and wetland habitats including riverside marshes, once a large marsh fed by the River Ouse, but in the 1960s gravel extraction created a small lake and a series of pools in the small area of marsh.	County: CWS and Wildlife Trust Nature Reserve	0.20km south
Birchfield Farm Meadows	Grassland habitats with moated farm site and associated fishponds.	County: CWS	0.6km to the north-west
Croxton Park	Parkland with groups of 5–19 veteran trees associated with other semi-natural habitat including woodland, species-rich grassland and open water. Also supports a population of Nationally Scarce oxlip and qualifies for habitat mosaic. Land is in Natural England's Higher Level Stewardship environmental scheme to help preserve important historical features as well as plant field margins and other areas with food and cover for wild birds and insects.	County: CWS	Immediately adjacent (the closest point to the main works is the southern tip of the Toseland Road Bridge earthworks, 150m to the north).
Elsworth (A428 to Common Farm)	Neutral/ calcareous grassland, presence of a local red data book species.	County: Protected Road Verge (PRV)	Immediately adjacent (to the east of the existing Caxton Gibbet roundabout)

Site	Reason(s) for designation	Designation	Relationship to the Scheme
Eltisley Wood	Ancient woodland over 75% replanted which supports more than 40 woodland species, and also supports a population of a Nationally Scarce vascular plant species.	County: CWS	0.9km to the south
Great Barford House Grassland	Neutral grassland on boulder clay and broad-leaved woodland at Great Barford House.	County: CWS	0.75km to south-west
Latch Pool and Ditch	Aquatic habitat, including ditch network	County: CWS	0.63km to the south
Little Barford	Mosaic of freshwater and wetland habitats including reed bed.	County: CWS	0.67km to the north
Palaceyard Wood	A moated ancient woodland site.	County: CWS	0.63km to the west
River Great Ouse	A major river not grossly modified by canalisation or poor water quality; supports >0.5 ha NVC S6 swamp; >0.5 ha S4 swamp; >0.05 ha MG13 grassland; a Nationally Scarce vascular plant Fringed Water-lily (*Nymphoides peltata*) and a breeding population of the Nationally Rare Scarce Chaser dragonfly (*Libellula fulva*).	County: CWS	Immediately adjacent to the Scheme (crosses the river)
Rivers Ivel and Hiz	The river system including adjacent habitats and features. There is a population of Water Vole	County: CWS	0.07 m south
Sir John's Wood CWS	Ancient semi-natural woodland (Site number 363)	County: CWS	0.2km to the east
Willow Pollards West of Sharp's Barn	A coppice of pollarded willows	County: CWS	0.7km to the west
Wyboston Pits	A complex of flooded gravel workings with associated floodplain grassland and river associated habitats	County: CWS	Adjacent
Zwetlots Pits	Open water and marshy grassland (floodplain grazing marsh) habitat and marsh habitat	County: CWS	0.2km to the south

Habitats

8.6.7 The Study Area is mainly agricultural, comprising mostly large arable fields, with a scatter of fields of improved grassland and a few semi-improved or unimproved neutral grasslands. It retains a remnant of the network of hedges with a scatter of mature trees. There are field ponds as well as brooks, which are tributaries of the River Great Ouse which is itself crossed by the Scheme and ditches. The area contains a few small blocks of woodland, five of which are directly impacted by the Scheme. The western edge of the Scheme is close to the edge of the town of St Neots.

8.6.8 The terrestrial and aquatic habitats present within the Study Area, as identified during the Phase 1 Habitat Surveys, are summarised in **Table 8-7**. The locations of these habitats are illustrated on **Figure 1** in **Appendix 8.3**, **Appendix 8.4** and **Appendix 8.20** of the Environmental Statement **[TR010044/APP/6.3]** respectively.

Table 8-7: Phase 1 Habitat types present within the Survey Area

Phase 1 Habitat type	Importance	Extent within Survey Area	Relationship to the Scheme
Woodland: Broad-leaved semi-natural woodland	County, District and Local	Mainly small woodland areas with a range of biodiversity value	Small area within Order Limits
Woodland: Broad-leaved plantation	Local	Species-poor plantation woodlands	Small areas within Order Limits
Woodland: Dense continuous scrub	Negligible	Only very small areas present within Order Limits	Very small areas within the Order Limits
Woodland: Scattered shrub	Local	Found within the surrounding area in small patches	Small areas within the Order Limits
Grassland: Amenity grassland	Negligible	Found in some locations within the surrounding area and typically subject to intensive management that limits its biodiversity value	Small areas within the Order Limits
Grassland: Semi-improved neutral grassland	Negligible	Limited areas and species-poor	Small areas within the Order Limits
Grassland: Poor semi-improved grassland	Negligible	A common species-poor habitat with no notable plants	Small areas within the Order Limits
Tall ruderal	Negligible	Small areas	Very small areas within the Order Limits

Phase 1 Habitat type	Importance	Extent within Survey Area	Relationship to the Scheme
Wetland: Standing water	Negligible to Local	Mainly field ponds, balancing ponds and one area of water-filled excavations	A number of field ponds within Order Limits
Quarry	Local	Small area near the existing Black Cat roundabout	Small area within the Order Limits
Arable	Negligible	Dominant species-poor habitat with few notable field margins or arable weeds.	Large areas within the Order Limits
Built Environment: Buildings/hardstanding	Negligible	Associated with A1 and edges of St Neots and Wyboston	Very small areas within the Order Limits
Built Environment: Buildings/hardstanding	Negligible	Associated with A1 and edges of St Neots and Wyboston	Small areas within the Order Limits
Built Environment: Gardens (lawn and planting)	Negligible	Associated with A1 and edges of St Neots and Wyboston	Very small areas within the Order Limits
Built Environment: Buildings/hardstanding	Negligible	Associated with A1 and edges of St Neots and Wyboston	Small areas within the Order Limits
Watercourses, mainly brooks	Local	Species-poor brooks with limited structural diversity	Brooks cross Order Limits
Ditches	Negligible	Mainly dry, relatively widespread, typical of agricultural habitats	Occasionally within Order Limits
Hedgerows	Local and up to County	A network of importance with some species-rich hedgerows present and assessed as of County importance and remaining hedgerows were species-poor and of District importance	Small lengths within Order Limits, adding up to a significant overall length

Terrestrial habitats

8.6.9 Full details of the terrestrial habitat surveys are presented in **Appendix 8.3 and Appendix 8.20** of the Environmental Statement **[TR010044/APP/6.3]**.

8.6.10 Terrestrial habitats were initially identified as part of the extended Phase 1 Habitats Survey carried out in July 2016 in accordance with the standard survey method (**Appendix 8.20** the Environmental Statement **[TR010044/APP/6.3]**).

8.6.11 Within the Survey Area, the terrestrial habitat surveys found one woodland of County importance, seven of District to County importance and five of Local importance.

8.6.12 Three arable fields were found to support arable plant assemblages of District importance based on established criteria. The species contributing to this were potentially present in the surrounding landscape, but in the absence of data to demonstrate this conclusively, professional judgement concluded that District importance is appropriate. Twenty-two fields were of Local importance for scarce arable flora.

8.6.13 The Survey Area contained a hedgerow network with eight hedgerows of which were of County importance although most of the hedgerows were species-poor and of District value. There were 14 hedgerows assessed as Important under the criteria of *The Hedgerow Regulations 1997* (Ref 8-11), and 30 hedgerows were found to be species rich.

8.6.14 The Survey Area contained one veteran tree of County importance.

Aquatic habitats

8.6.15 Full details of the aquatic habitat surveys are presented in **Appendix 8.4** and **Appendix 8.20** of the Environmental Statement **[TR010044/APP/6.3]**.

8.6.16 Aquatic habitats were initially identified as part of the extended Phase 1 Habitats Survey carried out in July 2016 in accordance with the standard survey method (**Appendix 8.20** of the Environmental Statement **[TR010044/APP/6.3]**). They were also identified through the desk study which included records of all identified ponds and watercourses within 1 kilometre (0.6 miles) of the Order Limits.

8.6.17 None of the watercourses within the Survey Area are designated as salmonid rivers by the Environment Agency. The River Great Ouse is designated as a CWS.

8.6.18 A stretch of the Hen Brook was surveyed using the River Habitat Survey (RHS) method. The survey indicated that the watercourse was largely modified throughout the stretch, although it is likely to support a range of aquatic species and is of Local importance. Further surveys of fish and aquatic invertebrates have been undertaken of this watercourse (refer to **Appendix 8.15** and **Appendix 8.17** of the Environmental Statement **[TR010044/APP/6.3])** which confirm this assessment.

8.6.19 In total, 20 ponds were identified for survey and detailed surveys were undertaken on 17 ponds, recording physical characteristics, macrophytes and aquatic invertebrates, using the PSYM and/or National Pond Survey method. Of these 20 ponds, there were two ponds that could not be surveyed due health and safety reasons and one pond where the access was not granted.

8.6.20 Three of these ponds were determined to be of good quality; two of these were rated as priority ponds of District importance and one was rated as being of County importance. A further four ponds were of Local importance, and the remaining ponds were dry or of poor/ very poor quality.

Protected and notable or scheduled species

8.6.21 The following protected and notable species have been identified through both desk study and field surveys.

Bats

8.6.22 The full details of the bat surveys are presented in **Appendix 8.5** of the Environmental Statement **[TR010044/APP/6.3]**.

8.6.23 The desk study identified records of breeding and non-breeding roosts within 3 kilometres (1.9 miles) of the Scheme located in St. Neots, Little Paxton and Eltisley. Species such as Common and Soprano Pipistrelle, Brown long-eared bat and Natterer's bat of local to regional importance were found at these locations.

8.6.24 The results of the bat field surveys suggest that there are likely to be other species roosting nearby, including Noctule, Daubenton's bat and Barbastelle. Whilst these bat roosts will not be directly impacted, bats associated with these roosts (and other potential roosts within or outside the Survey Area) are likely to forage or pass through the Order Limits.

8.6.25 Three species of bat were recorded roosting within the Survey Area; these were Common Pipistrelle, Soprano Pipistrelle and Brown long-eared bat. The survey results confirmed non-breeding bat roosts in three trees, two woodlands and three buildings. Two of these buildings were located in the same area comprising a metal barn and a small brick barn. Following update surveys in 2020 one tree was no longer classified as a roost as no bats were found and it will not provide suitable habitat in future for roosting bats due to the roosting feature suffering further decay and damage.

8.6.26 The roosts confirmed were all day roosts used by small numbers of relatively common and widespread species of bat and all are assessed to be of Local importance.

8.6.27 Whilst the roost presence/absence surveys did not find Barbastelle roosts within the Order Limits, a Barbastelle roost of County importance was found during the bat trapping surveys, using Advanced Licence Bat Survey Techniques (ALBST), within woodland located 150 metres from the Order Limits. In addition, the transect and static detector records of this species, indicate the potential for one or more roosts close to, or potentially present in the future within the Order Limits.

8.6.28 Other possible roosts close to the Scheme include a possible Daubenton's roost located in Sir John's Wood approximately 200 metres to the east of the Scheme. Bat activity observations of foraging and commuting bats across all surveys, indicate the likelihood of other nearby roosts of Noctule, Common and Soprano Pipistrelle and Brown long-eared bats outside the Study Area.

8.6.29 Based on transect, static data, crossing point and ABLST survey data up to 11 or 12 species* of bat were recorded using the Scheme for foraging and commuting at various levels across the Study Area (*includes Whiskered *Myotis mystacinus* and/or Brandt's *Myotis brandtii* bats, that are not possible to determine without capture and none were caught during trapping surveys).

8.6.30 Species recorded foraging and commuting, comprised Common Pipistrelle, Soprano Pipistrelle, Noctule, Myotis species (including Daubenton's bat, Natterer's bat and Whiskered/Brandt's bat), Brown Long-eared bat, Serotine, Leisler's bat, Barbastelle and Nathusius' Pipistrelle.

8.6.31 For the purpose of the assessment on foraging and commuting bat species these are grouped together as up to Regional Importance.

Badger

8.6.32 Due to the confidential nature of Badger sett information, the full details of the Badger survey and assessment data are presented in a confidential report within **Appendix 8.6** of the Environmental Statement **[TR010044/APP/6.3]** (CONFIDENTIAL).

8.6.33 A desk study with data from Bedfordshire and Luton Biodiversity Recording and Monitoring Centre and Cambridgeshire and Peterborough Environmental Records Centre (CPERC) showed the presence of Badgers in the local area, including a number of dead badger records from road collisions.

8.6.34 Badger surveys were undertaken at locations that had been identified as having suitable habitat for Badger, including areas of woodland, hedgerow and grassland edges and ditches. These habitats were searched for evidence of the presence of Badger such as latrines, hairs and footprints. Badger setts were searched for and, if found, classified based on their importance and function.

8.6.35 Where setts were identified a bait marking study was also undertaken to determine the relationship between setts potentially affected by the Scheme and those in the surrounding habitat. Bait marking is undertaken to show which clans cover what territory.

8.6.36 In summary, based upon the results of the badger surveys, it is concluded that there are at least five separate badger clans within the Study Area and a number of active main setts associated with these clans.

8.6.37 Badger is a common and widespread species, and the population present is of Local importance.

Riparian mammals

8.6.38 The full details of riparian mammal surveys are presented in **Appendix 8.7** of the Environmental Statement **[TR010044/APP/6.3]**.

8.6.39 Watercourses and waterbodies within the Survey Area were surveyed for Water Vole, Otter and Mink to inform the biodiversity assessment. The River Great Ouse, Begwary Brook CWS, Hen Brook, Stone Brook, South Brook and the attenuation pond at the Caxton Gibbet roundabout were identified as providing potentially suitable habitat for all three species and were surveyed.

8.6.40 There were no past records of Water Vole for any of the watercourses or waterbodies within the Study Area, i.e. a 2 kilometre (0.6 mile) radius of the of the Order Limits for the past 10 years, apart from the River Ivel immediately upstream of the Survey Area and watercourses 500-900 metres south-east of the existing Caxton Gibbet roundabout in 2009 and 2010 and surveys of Bourn Airfield in 2017-18, both of which are in a different catchment from the majority of the Survey Area. Surveys between July 2018 and May 2019 confirmed the likely absence of Water Voles within the Survey Area. Water Vole has been given a precautionary nature conservation value of Local importance.

8.6.41 Evidence of Otter was found along the River Great Ouse, Begwary Brook CWS, Hen Brook, Stone Brook and South Brook (Refer to **Appendix 8.7** of the Environmental Statement **[TR010044/APP/6.3]** Annex A: Table A1) this included spraints, footprints, slides and resting sites. A total of twelve resting sites were found, no confirmed holts were identified during the survey. Two of these resting sites are found within the Order Limits, the first was located on the River Great Ouse (Refer to **Appendix 8.7** of the Environmental Statement **[TR010044/APP/6.3]** Figure 1-O17), which suggests at least temporary use by Otters, and the second was identified on Hen Brook (Refer to **Appendix 8.7** of the Environmental Statement **[TR010044/APP/6.3]** Figure 1-O25) although no evidence of use could be confirmed. Camera trap monitoring was undertaken in one location on the River Great Ouse as a potential resting site was located 140 metres south of the proposed river crossing and at the location on Hen Brook which will also be crossed by the Scheme. Camera trap monitoring did not confirm that Otters use these potential holts. The nature conservation value for Otter is of Regional importance.

8.6.42 Mink, an invasive non-native species, was seen and evidence of its presence was found along the River Great Ouse. There were no signs or sightings along any of the tributary watercourses surveyed.

Other mammals

8.6.43 The full details of the other mammals are presented in **Appendix 8.8** of the Environmental Statement **[TR010044/APP/6.3]**.

8.6.44 Hazel Dormouse does not occur within the Study Area, and habitat suitable for the species is restricted with low connectivity. Whilst there is a need to future proof for the species should it ever reach this area, there is no need to consider this species further

8.6.45 Hedgehog, Brown Hare and Harvest Mouse are all recorded from the Study Area and their distribution is likely to follow the pattern in the county, i.e. Hedgehog and Brown Hare are common and widespread, whilst Harvest Mouse is scarce and widespread. These three species are assessed as being of Local importance. Although absent from the Study Area, it is predicted that Polecat will expand its distribution and a precautionary approach has been used in assessing this species as of Local importance, although this expansion is likely due to unauthorised releases of captive-bred specimens rather than natural spread.

8.6.46 Rabbit has been observed to be widespread across the Study Area with suitable habitat throughout and it can be expected that Rabbit will have an impact on the vegetation of the Scheme post-construction due to grazing.

8.6.47 Muntjac Deer and Roe Deer common within the Study Area pose a hazard to vehicles when they cross highways and potentially to drivers too although these are the smaller species of deer in the UK weighing 12-27 kilogrammes. The larger species of deer, Sika and Fallow Deer (40-80 kilogrammes) and Red Deer (225 kilogrammes) are almost completely absent from the Study Area and rare in both Bedfordshire and Cambridgeshire.

8.6.48 During the operation phase, the smaller species of deer pose a risk of vehicle collisions for the Scheme and could be a factor in establishing vegetation within the Scheme due to grazing.

Wintering birds

8.6.49 The full details of wintering bird surveys are presented in **Appendix 8.9** of the Environmental Statement **[TR010044/APP/6.3]**.

8.6.50 For the purposes of this assessment, wintering birds are those present during the non-breeding season often defined as the period of October to March and includes birds which migrate to the UK specifically to spend the autumn and winter looking for shelter and abundant food.

8.6.51 A reconnaissance survey was undertaken in October 2017 to identify potential survey access points along the Scheme, and to ground-truth the locations of individual habitat types within the Scheme that were identified during the desk study.

8.6.52 A total of 69 bird species were recorded during the wintering bird surveys undertaken between November 2017 and March 2018 and 74 bird species during the wintering bird surveys undertaken between October 2019 and March 2020. Of all these species, 40 of these species (including gulls and Greylag Goose) meet at least one of a range of criteria that confer a conservation status.

8.6.53 The species of conservation concern recorded within the Survey Area during wintering bird surveys included:

a. Three species (Little Egret, Red Kite and Golden Plover) listed on Annex I of *the Birds Directive* (2009) (Ref 8-3).

b. Fourteen UK priority species (listed on the UK Biodiversity Action Plan and included as Species of Principal Importance on the NERC list).

c. Seventeen Birds of Conservation Concern Red List species (Ref 8-33).

d. Seventeen Birds of Conservation Concern Amber list species (Ref 8-33).

e. Twelve species, listed as action plan species or additional species of interest in Cambridgeshire.

f. Bedford and Luton Red Data book: Birds, including 10 red list species and 18 amber list species).

8.6.54 No counts of wintering bird species recorded across the Survey Area approached the 1% level of the national wintering population estimates, which would constitute a nationally significant wintering bird population, as detailed in Woodward et al. (2020) (Ref 8-34).

8.6.55 In that part of the Survey Areas located in Cambridgeshire, Fieldfare was present in a number exceeding 1% of the county level, when compared to the wintering population estimates for the county (Ref 8-51). A count of 819 Fieldfare recorded in 2017 and 2018 within the Survey Area represents a significant number, approaching importance at County level in Cambridgeshire. It is likely that these birds were attracted into the Survey Area by the availability of food *e.g*. Hawthorn berries. Fieldfare is a transient species of thrush; Fieldfare flock together and migrate across Europe in response to food availability. Local distribution is influenced by the availability of fruit (notably Hawthorn berries in the context of the Survey Area) and large numbers may be recorded for very limited periods. Therefore, the birds recorded within the Survey Area are likely to be representative of the population present within the wider local area which, given that similar habitat occurs, will also provide sufficient foraging opportunities for this species.

8.6.56 The peak count of Golden Plover, which was recorded in the Survey Area in 2017 / 2018 only, was 263 birds. Golden Plover did not form a significant proportion of the Cambridgeshire population, which often exceeds 3,000 birds during winter and with counts of 500 birds at many sites, such as the Ouse Washes and Nene Washes (Cambridgeshire Bird Club, Cambridgeshire Bird Report 2017) (Ref 8-53). Given the nomadic nature of Golden Plover flocks, the species is assessed to be of Local importance.

8.6.57 No other species recorded in the Survey Area were recorded in numbers approaching 1% of the county wintering population estimates in Bedfordshire or Cambridgeshire. Therefore, species populations across the Survey Area are of no more than Local importance for wintering birds.

8.6.58 If species numbers alone were the only factor considered by the CWS criteria, then the Bedfordshire part of the Survey Area would qualify as a CWS. However, there are other criteria at play such that only two of the four thresholds for inclusion are met. However, using professional judgement, the number of species occurring within the Survey Area in Bedfordshire is approaching County importance.

8.6.59 The number of species present in the Study Area did not meet the criteria for selection of a CWS in Cambridgeshire. Therefore, the species diversity of the Survey Area is of Local importance only.

8.6.60 A total of 14 priority species listed on the UK Biodiversity Action Plan and included as Species of Principal Importance on the NERC list (Ref 8-8) and a further 12 species included on the *Birds of Conservation Concern Amber List* (Ref 8-33) were recorded within the Study Area.

Breeding birds

8.6.61 Full details of the breeding bird surveys undertaken are presented in **Appendix 8.10** of the Environmental Statement **[TR010044/APP/6.3]**.

8.6.62 Records of a total of 89 protected or notable species were returned from data requests made to the Cambridgeshire and Peterborough Environmental Records Centre and Bedfordshire and Luton Biodiversity Recording & Monitoring Centre.

8.6.63 A total of 93 bird species were recorded during surveys for breeding birds, undertaken in 2018 and 2020. For the purposes of these field surveys the Study Area was split into five sub-areas and within these areas there were confirmed territories of 51 breeding bird species. A further 12 species were probably or possibly on breeding territories within the Survey Area. Assuming they were, this would mean a total breeding bird assemblage of 63 species would have been present in the Survey Area.

8.6.64 From the breeding assemblage of 63 species:

a. One species is included on Annex 1 of the *Birds Directive* (Ref 8-3).

b. Four species are included on Schedule 1 of the *Wildlife and Countryside Act 1981* (as amended) (Ref 8-6).

c. Fourteen species are listed as a priority species in the UK Biodiversity Action Plan and as a species of principal importance under Section 41 of the *NERC Act 2006* (Ref 8-8).

d. Thirteen species are included on the Birds of Conservation Concern Red list.

e. Ten species are included on the Birds of Conservation Concern Amber list.

f. Ten species are included as a priority species or additional species of interest in Cambridgeshire.

g. Twenty-two species are included as a species of concern (Red, Amber or Local) in Bedfordshire, listed on the Bedfordshire and Luton Red Data Book: Birds.

8.6.65 No species were present within the Survey Area in numbers that were nationally significant, *i.e*. 1% or more of the UK population, when compared to national population estimates given in Woodward *et. al.* (2020) (Ref 8-34).

8.6.66 Goodall *et al*. (2015) (Ref 8-35) list rare breeding species (defined as more than 25 pairs or occupying more than 38 sites / tetrads) in Bedfordshire and of these (with the number of territories recorded during field surveys, included in paretheses): Egyptian Goose (*Alopochen aegyptiaca*) (1 breeding territory), Shelduck (*Tadorna tadorna*) (1), Tufted Duck (*Aythya fuligula*) (1), Little Ringed Plover (*Charadrius dubius)* (2), Ringed Plover (*Charadrius dubius)* (1), Oystercatcher (*Haematopus ostralegus)* (1) and Sand Martin (*Riparia riparia*) (minimum of 20 burrows), were all confirmed as having breeding territories, or probable / possible breeding territories, around Black Cat Quarry.

8.6.67 Little Ringed Plover numbers recorded within the Survey Area, when evaluated against the number of breeding pairs in Bedfordshire (5) derived from the most recently available report (Hollings *et., al., Rare Breeding Birds in the UK in 2017* (Ref 8-36)) would represent 40% of the county population, meaning these breeding pairs are also important at a County level. However, Little Ringed Plover is an opportunistic breeder on wetland margins and shingle, often breeding in inaccessible areas (such as quarries) and therefore it is likely that the true population in Bedfordshire is under-recorded and greater than that reported by Hollings *et al*, in the *Rare Breeding Birds in the UK in 2017* (Ref 8-36).

8.6.68 Nightingale was recorded as possibly breeding within the Cambridgeshire part of the Survey Area. The breeding population of Nightingale for the county is estimated at between 100-200 singing males. On this basis, the single Nightingale represented 0.5-1% of the singing male populations within Cambridgeshire, i.e. important at a County level.

8.6.69 The numbers of breeding territories for each of the remaining species recorded in the Survey Area were all relatively low and below 1% of the national or county populations in Cambridgeshire or Bedfordshire. To measure species diversity, the breeding assemblages recorded were evaluated against the criteria developed by Fuller (Ref 8-37), as detailed in **Appendix 8.10** of the Environmental Statement **[TR010044/APP/6.3]**. The breeding assemblage score was 63 species, which suggests the value of the Survey Area as a whole is of County importance for breeding birds.

8.6.70 Considering the assemblages in each of the two counties that the Scheme crosses, the species assemblages in Cambridgeshire (39 species) is of Local importance, and the assemblage in Bedfordshire (53 species) is of County importance.

8.6.71 Although widely used, it is important to note that *Fuller's criteria* (Ref 8-37) were developed in the 1970s and since then, species diversity has declined significantly. As a result, Fuller's thresholds are, in most circumstances, considered to be too high for today's breeding bird populations. However, even taking a precautionary approach, this would not alter the above conclusions.

8.6.72 *The Joint Nature Conservation Committee Guidelines 'Biological Sites of Special Scientific Interest'* (Ref 8-38) provide a scoring system for the selection of SSSIs. A threshold value is given for SSSI selection based on the total score of species that are characteristic of habitats, using the values within the selection criteria. These guidelines can therefore be used as an indicator of the relative importance of habitat within a site, or area, for the breeding assemblage that it supports.

8.6.73 All assemblage scores are below those required for selection as a SSSI and, in Cambridgeshire, support the evaluation that the habitats present support associated breeding assemblages of no more than Local importance. In Bedfordshire, whilst lowland water habitats are below the threshold expected of nationally important sites, *e.g.* SSSIs, they are approaching that of County importance, again in line with the evaluation above.

Hobby and Red Kite

8.6.74 Full details of the Hobby and Red Kite surveys are presented in **Appendix 8.11** of the Environmental Statement **[TR010044/APP/6.3]** CONFIDENTIAL.

8.6.75 The desk study identified that both Hobby and Red Kite were present within the Survey Area in 2018.

8.6.76 Aerial photography and 1:2,500 Ordnance Survey mapping were examined to appraise habitat information and potential connectivity *e.g.* where woodland within the Survey Area is connected, via hedgerows, to habitat outside of the Order Limits. The evaluation of aerial photography was used to determine the quality of the habitat within the Zone of Influence and to identify potential nesting habitat within the Survey Area, which included areas of woodland for Red Kite and areas of woodland and mature hedgerows for Hobby.

Hobby

8.6.77 Two Hobby nesting sites were confirmed within the Survey Area in 2019, with two territories recorded in 2020. One nest was recorded in a mature hedge in Survey Area A (Black Cat to south of Potton Road), and another nest was recorded along a farm track in Survey Area C (B1428 to Croxton Road).

8.6.78 The baseline for Hobby in the vicinity of the Scheme is of County importance for biodiversity conservation.

Red Kite

8.6.79 During the field survey undertaken on the 25 March 2019 a single Red Kite was observed flying low over Survey Area B (Cambridgeshire). No signs of breeding, or potential breeding, such as calling, landing in trees, display or interactions with other birds were recorded in 2019. However, in 2020 a recently fledged young Red Kite was recorded in Survey Area A (Black Cat to south of Potton Road) indicating confirmed nesting, in Alington Hill Wood. Therefore, it is concluded that Red Kite is breeding close to, or possibly within the Survey Area in 2020.

8.6.80 The summed peak of Red Kite across the Survey Area was a count of six birds in 2017 / 2018 and seven birds in 2019 / 2020, with a peak count of five birds in Cambridgeshire in 2017 / 2018 and five birds in Bedfordshire in 2019 / 2020. The highest count of Red Kite in Cambridgeshire is 110 birds as of 2017 (Cambridgeshire Bird Club, Cambridgeshire Bird Report 2017) (Ref 8-53). Therefore, a count of five birds is at a figure approaching 5% of the county wintering population as a whole. Wintering population estimates in Bedfordshire could not be found, however, as this species has been recorded to be breeding within the Survey Area, five birds are of Local importance.

8.6.81 Overall, the baseline for Red Kite in the vicinity of the Scheme is of Local importance for biodiversity conservation.

Barn Owl

8.6.82 The full details of the Barn Owl surveys are presented in **Appendix 8.12** of the Environmental Statement **[TR010044/APP/6.3]** CONFIDENTIAL.

8.6.83 The desk study returned a total of 309 Barn Owl records from the record centres within, and 5 kilometres (3.1 miles) beyond the Order Limits between 2008-2018.

8.6.84 Based on best practice guidance (Shawyer et al, 2011), surveys were carried out in three stages between July 2017 and August 2019, within 1.5 kilometres (0.9 miles) of the Order Limits:

a. Stage 1 Scoping: a walkover of the Survey Area during daylight hours to broadly record features of potential value to Barn Owl, such as built structures, mature trees and other habitats that could offer potential roosting or nesting sites for Barn Owl.

b. Stage 2 Investigative Field Survey: This involved a walkover of the Survey Area, focussing on features of interest to Barn Owl that were identified during the Stage 1 survey.

c. Stage 3 Nest Site Verification: Where a potential nest site or active roost site was identified during the Stage 2 surveys, a Stage 3 survey was undertaken on those features to confirm the presence of an occupied nest site.

8.6.85 A total of 59 trees, six buildings and two nest boxes were surveyed over the three stages from July 2017 and August 2019 to determine presence or absence of Barn Owl across the Survey Area during the scoping survey (Stage 1).

8.6.86 A total of 26 trees, two buildings and two nest boxes were surveyed during the field surveys (Stage 2) from February 2018 and May 2019.

8.6.87 A total of four trees were identified as potential nest site during Stage 2. These trees were surveyed between June 2018 and August 2019.

8.6.88 In Stage 3, three occupied nest sites were found, seven active roosts and three temporary roost sites between July 2017 and August 2019.

8.6.89 The baseline for Barn Owl in the vicinity of the Scheme is of Local importance for biodiversity conservation.

Reptiles

8.6.90 The full details of the reptile surveys are presented in **Appendix 8.13** of the Environmental Statement **[TR010044/APP/6.3]**.

8.6.91 Two individual records for Grass Snake (*Natrix natrix*) were returned by the Bedfordshire & Luton Biodiversity Recording & Monitoring Centre, both of which were located to the north-west of the existing Black Cat roundabout and separated from the Order Limits by housing, minor roads and agricultural land, all of which pose a significant barrier to movement for reptiles.

8.6.92 A single Grass Snake was also recorded within the Order Limits during the preliminary ecological appraisal in 2016 (**Appendix 8.20** of the Environmental Statement **[TR010044/APP/6.3]**).

8.6.93 Suitable reptile habitat identified during the 2016 Phase 1 Habitat Survey included all habitats with broadleaved woodland edges, unmanaged grassland areas, scrub and where tall ruderals were present.

8.6.94 A range of factors were taken into consideration in assessing the suitability of habitat within the Survey Area to support reptiles, and to select discrete areas, reptile assessment areas (RAAs) in which fifteen Survey Areas were selected for survey in 2018, details of which are included in **Appendix 8.13** of the Environmental Statement **[TR010044/APP/6.3]**.

8.6.95 A total of 29 Common Lizards (*Zootoca vivipara*) were recorded across the Survey Area between 10 September and 9 October 2018. Out of 19 Survey Areas, only six were found to have reptiles present. The highest peak count for common lizard on any single survey day was four individuals, which occurred on three occasions in the same Survey Area. Four other Survey Areas that recorded the presence of reptiles had a peak count of one individual, the sixth one had a peak count of two.

8.6.96 A single adult Grass Snake was recorded. No other reptile species were recorded during the surveys.

8.6.97 The baseline for reptiles in the vicinity of the Order Limits is of Local importance for biodiversity conservation.

Great Crested Newt

8.6.98 The full details of the Great Crested Newt surveys are presented in **Appendix 8.14** of the Environmental Statement **[TR010044/APP/6.3]**.

8.6.99 Great Crested Newt is widespread in lowland England. The desk study returned 28 records of Great Crested Newt within the Study Area and within the last ten years at the time of the data search.

8.6.100 Of the ponds identified within the Survey Area, i.e. within, and 500m beyond the Order Limits, 59 were accessed to undertake surveys for Great crested Newt. All 59 ponds were subject to a HSI survey and further surveys were undertaken either through the eDNA sampling technique or through field survey to identify the presence or likely absence of Great Crested Newt.

8.6.101 A total of 24 ponds were identified as having Great Crested Newt, which was broken down into:

a. Twenty-two ponds were identified through traditional survey technique, which included those identified as eDNA positive and required further survey for population size class estimate.

b. Two ponds were identified as eDNA positive but no Great Crested Newts were found during field surveys (refer to **Appendix 8.14** of the Environmental Statement **[TR010044/APP/6.3]**).

8.6.102 Of the remaining ponds within the Survey Area, 14 were identified which could support Great Crested Newt and were within the Order Limits or within 250 m of them but these ponds could not be surveyed, e.g. access was not allowed or there were health and safety risks in gaining access.

8.6.103 The 14 ponds which could not be accessed, if feasible, should be surveyed in order to identify presence or absence of Great Crested Newt. Also, the two ponds identified as eDNA positive but no GCN found using traditional surveys over six visits, should be re-sampled so that eDNA analysis can be repeated. If this is not feasible, on a precautionary basis, the ponds should be assumed to contain Great Crested Newt until shown otherwise.

8.6.104 The baseline for Great Crested Newt in the vicinity of the Order Limits is of County importance for biodiversity conservation.

Fish

8.6.105 Full details of the fish surveys are presented in **Appendix 8.15** of the Environmental Statement **[TR010044/APP/6.3]**.

8.6.106 The desk study includes analysis of the information returned from the Environment Agency and a review of previous survey reports undertaken of the Survey Area in 2016 (*i.e*. extended Phase 1 Habitat Survey report, Jacobs 2016) (Ref 8-39).

8.6.107 The ecology data received from the Environment Agency was very limited and included only Hen Brook near to St Neots and a section of the River Great Ouse more than 1 kilometre (0.6 miles) from the Order Limits. Information collated in **Appendix 8.1** of the Environmental Statement **[TR010044/APP/6.3]** identified that the fish fauna of the section of the river Great Ouse crossed by the Scheme could support Spined Loach (Cobitis taenia) which is listed under Annex II of the EC Directive on the Conservation of Natural Habitats and Flora and Fauna (*The Habitats Directive* (Ref 8-2)) . On a precautionary basis the River Great Ouse was deemed to be of County importance for biodiversity conservation

8.6.108 Historical fish data provided by the Environment Agency for Hen Brook showed the presence of eight fish species, all of which were common coarse species. The species recorded are ubiquitous and have a preference or tolerance for moderate to low energy lowland watercourses. None of the fish species present were rare or protected, and no migratory salmonids were recorded.

8.6.109 The Survey Area to determine the value of the watercourses for fish included watercourses that are hydrologically connected to and within 100m of the Order Limits. The Survey Area has been reviewed against the current Scheme and no additional watercourses, in addition to Hen Brook, have been identified.

8.6.110 Hen Brook was sampled on 11 October 2018 using an electric fishing backpack (Electracatch WFC911) over a 100m stretch starting downstream at NGR TL 19852 58794 (at a culverted section where the existing A428 passes over the brook) up to the upstream point at NGR TL 19919 58716. The survey was carried out in line with standard *Environment Agency methodology* (Ref 8-40).

8.6.111 A total of 45 individual fish were caught over the 100m stretch. No invasive non-native fish species or protected fish species were caught during this survey.

8.6.112 The fish assemblage found at Hen Brook is typical of a lowland tributary, with all species caught having been found in Hen Brook previously during Environment Agency fish surveys.

8.6.113 Based on the available data the fish species of Hen Brook are deemed to be of Local importance for biodiversity conservation.

8.6.114 Other watercourses that will be crossed by the Scheme were found to be dry or with just occasional pools of water.

Terrestrial invertebrates

8.6.115 Full details of the terrestrial invertebrate surveys are presented in **Appendix 8.16** of the Environmental Statement **[TR010044/APP/6.3]**.

8.6.116 The desk study included an analysis of the records of notable and/or protected terrestrial invertebrate species returned by the record centres; data were requested for all areas within, and 1 kilometre beyond the Order Limits. Due to the typically low levels of terrestrial invertebrate recording effort, the reporting of records has not been limited to those from the past ten years.

8.6.117 The Cambridgeshire and Peterborough Environmental Records Centre (CPERC) provided 117 records representing 46 species. These records included 29 species that are included on Section 41 of the *NERC Act 2006.*

8.6.118 The Bedfordshire and Luton Biodiversity Recording and Monitoring Centre (BRMC) provided 137 records representing 14 species. These records included seven species that are included on Section 41 of the *NERC Act 2006*, five species that have National significance designations and two species have Local significance.

8.6.119 An extended Phase 1 Habitat Survey was undertaken between 27 June and 22 July 2016 in accordance with the standard survey method to identify habitats within 1.2 kilometres (0.7 miles) of the Order Limits to identify habitats of potential value for terrestrial invertebrates.

8.6.120 Terrestrial invertebrate surveys were undertaken in 2018 of habitats with potential value for terrestrial invertebrates. These habitats were all within 100m of the Order Limits.

8.6.121 This further work was undertaken over the course of six visits during May, June, July and August 2018.

8.6.122 A total of 661 invertebrate species were recorded during the surveys. Thirty-eight of the species recorded are designated as Nationally Scarce (Notable, NS) in terms of their British rarity (Ref 8-27).

8.6.123 Seven species of Red Data Book status (considered to be Nationally Rare) were recorded; these were the flea weevil (*Isochnus sequensi*), the Rusty Red Click Beetle (*Elater ferrugineus*), the rove beetle (*Tachinus flavolimbatus*), the Tachinid fly (*Cistogaster globose*), the true bug (*Anthocoris amplicollis*), the leafhopper (*Ribautodelphax imitans*) and the White-spotted Pinion moth (*Cosmia diffinis*).

8.6.124 Three NERC Section 41 species were recorded; these were the White-spotted Pinion, Cinnabar moth (*Tyria jacobaeae*) and Small Heath butterfly (*Coenonympha pamphilus*). The White-spotted Pinion moth is a species of BAP Priority conservation significance, but the latter two species are of BAP Priority (Research Only) status. The Small Heath butterfly has Near Threatened IUCN status but has no British rarity status, and the Cinnabar moth has no IUCN or British Rarity status.

8.6.125 No legally protected species were found during the survey.

8.6.126 In terms of conservation value, hedgerows in two areas of the Survey Area (hedgerow group H5, H6 and H7 and group H22, H23, H24 and H25) were found to be of above County value to below Regional value in terms of the dead wood habitat and associated invertebrate assemblages present.

8.6.127 The majority of the other hedgerows surveyed were evaluated as being of County value for their dead wood habitat and associated saproxylic invertebrate fauna.

8.6.128 Two closely associated small areas of rabbit-grazed short sward grassland were evaluated as being of above Local to County value for invertebrates of open habitats.

8.6.129 Overall, the terrestrial invertebrate fauna was assessed as being of County importance for biodiversity conservation.

Aquatic invertebrates

8.6.130 Full details of the aquatic invertebrate surveys are presented in **Appendix 8.17** of the Environmental Statement **[TR010044/APP/6.3]**.

8.6.131 The desk study included the analysis of aquatic invertebrate records returned from environmental biological record centres in 2018 from whom records were sought for all areas within, and 1 kilometre (0.6 miles) beyond the Order Limits. It also included information gathered during a review of previous survey reports undertaken for the Survey Area in 2016 (Ref 8-39).

8.6.132 This location of waterbodies and watercourses included a review of Ordnance Survey maps and other online sources, Phase 1 Habitat Survey mapping, aquatic habitat walkover surveys, and subsequent surveys (notably amphibian surveys).

8.6.133 Historic aquatic ecology data, including aquatic invertebrates, were requested from the Environment Agency; however, the data provided were very limited and only available for Hen Brook near to St Neots; no data were available for any of the other watercourses or ponds within the Study Area.

8.6.134 Aquatic invertebrate surveys were undertaken of waterbodies within, and 100m beyond the Order Limits, which had some potential value for aquatic invertebrates. These consisted of 20 ponds, as well as Hen Brook. Waterbodies outside of 100m or deemed to be of very low value were not surveyed.

8.6.135 The aquatic surveys were undertaken during autumn 2018 and summer 2019. Ponds were surveyed following the respective *NPS method* (Pond Action, 1998) (Ref 8-41) or *Predictive SYstem for Multimetrics (PSYM)* (Pond Action, 2002) guidance (Ref 8-42). Both methods collect aquatic invertebrate data (as well as macrophyte, chemical and physical data), but the NPS protocol is the most detailed, comprising three separate visits and collection of more detailed information; aquatic invertebrates are also identified to species level for most groups, while PSYM requires only a single visit and family level aquatic invertebrate identification.

8.6.136 In total, 20 ponds were identified for survey including sampling of aquatic invertebrates. Of the 20 ponds scoped for detailed survey, there were nine ponds that could not be surveyed for different reasons, such as: access to the ponds was deemed unsafe, access to the ponds was not granted and others because they were dry to the time of the survey.

8.6.137 Eleven ponds were surveyed following the *National Pond Survey (NPS) (*Pond Action, 1998) guidance (Ref 8-41) or *Predictive System for Multimetrics (PSYM) (*Pond Action, 2002*)* guidance (Ref 8-42) as described in **Appendix 8.4** of the Environmental Statement **[TR010044/APP/6.3]**.

8.6.138 Aquatic invertebrates were collected from six ponds using the PSYM method and five ponds were surveyed using the more detailed NPS method, as was Hen Brook.

8.6.139 For Hen Brook and the five ponds in which invertebrates were identified to species level and appraised using the NPS method, the conservation value of the ponds was assessed using the Community Conservation Index (CCI) (Ref 8-44).

8.6.140 Although most of the communities are considered as being of Site or Local importance only. The aquatic invertebrate community of Pond 9, Pond 11, Pond 83 and Pond 84, have been considered as District importance based on the diversity of families recorded by the PSYM analysis; with communities potentially sensitive to impacts from the Scheme.

8.6.141 Locations of the ponds are given in **Appendix 8.17** of the Environmental Statement **[TR010044/APP/6.3]**.

8.6.142 Other ponds within the Survey Area were ephemeral and, or over-shaded, lacking features of botanical or structural diversity. These ponds are of no more than Local importance for aquatic invertebrates.

8.6.143 Overall, the aquatic invertebrate fauna was assessed as being of District importance for biodiversity conservation.

Invasive non-native plants

8.6.144 Invasive non-native plants are those that normally have a high capacity to spread through the environment and are of concern due to the high risk of negative impact, *e.g.* displacing native species, impeding drainage or creating a health hazard.

8.6.145 The desk study (**Appendix 8.1** of the Environmental Statement **[TR010044/APP/6.3]**) and the extended Phase 1 Habitat Survey (**Appendix 8.20** of the Environmental Statement **[TR010044/APP/6.3]**) included recording the presence of invasive non-native plant species. This data was added from observations made during other surveys, *e.g*. aquatic habitats, riparian mammals and amphibians which were carried out for the Scheme. Further information on invasive non-native plant species is also provided in **Appendix 8.18** of the Environmental Statement **[TR010044/APP/6.3]**.

8.6.146 A total of 11 species were either found during the surveys or identified through records reported in the desk study; these consisted of six aquatic and five terrestrial species.

Future baseline

8.6.147 Professional judgement has been used to predict the natural and human influences that are likely to change the baseline conditions as set out in the previous section, prior to the construction period (2022 to 2026).

8.6.148 The majority of the baseline conditions recorded between 2017 and 2020 are unlikely to change markedly by 2026. Furthermore, it is not anticipated that any large-scale changes in agricultural policies and practices will occur and be implemented by that time.

8.6.149 There are two exceptions: firstly, the Black Cat Quarry will be restored post-closure of the quarry site. The quarry site is likely to be in a stage of disturbance as the works are undertaken to implement the restoration plan; and secondly, the construction of the Wintringham estate on the western margin of St Neots, which will affect habitats within this area albeit outside the Order Limits.

8.6.150 It is acknowledged that climate change can lead to changes in the distribution and abundance of some biodiversity features at the local level; however, any such changes are likely to occur over a relatively long period of time. It is unlikely that there would be any significant changes to biodiversity features by 2026 as a result of climate change.

8.6.151 Should there be any large-scale changes in agricultural policies and practices by 2026, these may result in changes to the land use within and surrounding the Order Limits, which could possibly result in some changes in the extent of the agricultural land. Notwithstanding this, any such changes are unlikely to alter the importance of the biodiversity features recorded between 2017 and 2020, given that planning policy will likely continue to minimise the loss of biodiversity features and seek no net loss.

8.6.152 **Chapter 15, Assessment of cumulative effects** of the Environmental Statement **[TR010044/APP/6.1]** presents details of the future planned developments that may influence the baseline conditions prior to the construction of the Scheme. The cumulative effects of these developments have been taken account of as part of the cumulative assessment.

8.7 Potential impacts

8.7.1 The construction and operation of the Scheme could potentially result in the following impacts and effects.

Construction

8.7.2 Impacts on biodiversity features during construction of the Scheme are likely to include:

a. Habitat loss or gain – direct impacts associated with changes in land use resulting from the Scheme, for example temporary works associated with site clearance, and permanent land-take associated with the installation of drainage infrastructure and earthworks.

b. Fragmentation of populations or habitats – indirect impacts due to the Scheme dividing a habitat, group of related habitats, site or ecological network, or the creation of partial or complete barriers to the movement of species, with a consequent impairment of ecological function.

c. Disturbance – indirect impacts resulting from a change in normal conditions (light, noise, vibration, human activity) that result in individuals or populations of species changing behaviour or range.

d. Habitat degradation – direct or indirect impacts resulting in the reduction in the condition of a habitat and its suitability for some or all of the species it supports, for example changes in chemical water quality or changes in surface flow or groundwater.

e. Species mortality – direct impacts on species populations associated with mortalities due to construction activities, for example site clearance.

Operation

8.7.3 Impacts on biodiversity features during the operational phase of the Scheme are likely to include:

a. Species mortality – direct impacts on species populations associated with mortalities from collisions with vehicles, and potentially from pollution incidents or management practices.

b. Habitat degradation – indirect impacts associated with the operation of new road lighting and vehicles using new and/or improved sections of road, for example increased light, noise and emissions leading to a reduction of habitat quality on identified biodiversity features.

c. Disturbance – indirect impacts arising from changes in human activity, including use of public rights of way that could lead to changes in animal behaviour, for example changes in roosting behaviour or nesting success.

8.8 Design, mitigation and enhancement measures

8.8.1 The Scheme has been designed to avoid and reduce impacts and effects on biodiversity features through the process of design-development (refer to **Chapter 2, The Scheme** and **Chapter 3, Assessment of alternatives** of the Environmental Statement **[TR010044/APP/6.1]**), and by embedding measures into the design of the Scheme.

8.8.2 A number of biodiversity features were avoided through changes to the design of the Scheme, primarily through changes in the alignment of the carriageway. These changes included moving the carriageway north away from Croxton Park CWS (along with other factors); avoiding direct impact on a number of woodlands including Pillar Plantation; realigning the carriageway to avoid damaging a veteran elm tree; minor measures to avoid three badger setts and four field ponds; and the incorporation of two waterbodies with Great Crested Newt into the drainage strategy to sustain them as waterbodies.

8.8.3 A number of essential mitigation measures have also been identified that will be implemented by the Principal Contractor, in order to reduce the impacts and effects that construction of the Scheme will have on biodiversity features.

8.8.4 Biodiversity enhancement opportunities have also been identified through the design-development process.

8.8.5 The Environmental Masterplan for the Scheme shows all committed biodiversity mitigation, compensation and enhancement measures as well as other environmental measures identified for landscape, visual and drainage. The Environmental Masterplan is illustrated in **Figure 2.4** of the Environmental Statement **[TR010044/APP/6.2**].

8.8.6 Some of the measures relating to the protection of designated sites, habitats and fauna, including essential details on methods and/or expected outcomes are described in this section.

Embedded mitigation

Habitat avoidance, creation and replacement

8.8.7 The Scheme has been designed so that impacts upon important habitats (comprising woodland, grassland, hedgerow and ponds) have been avoided or reduced, where reasonably practicable, and are mitigated for where avoidance was not feasible, through the retention of existing habitat and the creation or replacement of habitat.

8.8.8 The landscape planting measures developed as part of the landscape and visual effects assessment reported in **Chapter 7, Landscape and visual effects** of the Environmental Statement **[TR010044/APP/6.1]** have been informed by the outcomes of the biodiversity assessment. A key objective being to identify measures that, wherever possible, provide a combined function of landscape integration and/or screening, and habitat creation and replacement, to mitigate effects on biodiversity interests.

8.8.9 Habitat creation and replacement measures incorporated into the Scheme have accordingly focused on:

a. The use of planting along the carriageway to minimise the risk of mortality to Barn Owl from traffic collisions.

b. The creation of grassland habitats on earthwork slopes and within severed or redundant land parcels within the Order Limits, to mitigate for the loss of habitat to the Scheme.

c. Mitigating effects on existing ecological networks and habitats through the planting of hedgerows, trees and scrub, woodland and grassland, and creation of ponds and wetland at locations across the Scheme.

d. Restoration of lengths of watercourses including brooks.

e. The use of planting along the carriageway to minimise the risk of mortality to Barn Owl from traffic collisions.

8.8.10 The locations of the habitat creation and replacement measures are illustrated on the Environmental Masterplan in **Figure 2.4** of the Environmental Statement **[TR010044/APP/6.2].**

8.8.11 As described in **Chapter 3, Assessment of alternatives** of the Environmental Statement **[TR010044/APP/6.1]** the lighting of new and improved sections of roads within the Scheme has been confined to locations where road safety is a priority, in order to minimise the potential for light spill into adjacent habitats. Where lighting is essential, it conforms to best practice guidelines with respect to minimising disturbance to bats and other species.

Drainage

8.8.12 The drainage strategy for the Scheme (refer to **Appendix 13.3** of the Environmental Statement **[TR010044/APP/6.3]**) has been developed to manage surface water runoff in accordance with current highway design standards. The strategy includes treatment measures to mitigate pollution to likely higher standards than exist at present on adjacent roads, which will assist in mitigating any effects on aquatic and riparian species and habitats including the River Great Ouse and those brooks which are tributaries of the River Great Ouse (**Appendix 8.4** of the Environmental Statement **[TR010044/APP/6.3]**).

Protected and notable species

8.8.13 The following measures have been incorporated into the design of the Scheme to mitigate impacts and effects on protected and, or notable species, some of which have a direct relationship to the essential mitigation measures for protected species that will be implemented prior to, or during construction. The locations of these measures for protected and, or notable species are illustrated on the Environmental Masterplan on **Figure 2.4** of the Environmental Statement **[TR010044/APP/6.2]**.

8.8.14 Mammal underpasses (and associated guide fencing) will be installed to facilitate crossing of the road by bats, other mammals and other animals, to mitigate the risks of collisions with vehicles and the risks to both animals and drivers/vehicles.

8.8.15 Bat boxes will be sited on retained trees to provide alternative roosting opportunities for the local bat population and where like-for-like roost replacement will be provided.

8.8.16 Some areas of breeding and wintering bird habitat, including hedgerows, scrub, grassland and arable land, will be lost to the Scheme. This loss will be mitigated through habitat creation and replacement measures, which comprise hedgerows, scrub and grassland habitat that have been incorporated into the design of the Scheme. There will be a net loss of arable habitat which will be replaced by the grassland, woodland and scrub, achieving a better habitat balance within the landscape and, along with woodland habitat creation, contributing to a net gain in biodiversity.

8.8.17 Mitigation for terrestrial invertebrates in relation to the loss of hedgerow, scrub and grassland comprises a combination of the establishment of new woodland, hedgerow, scrub and grassland along with the retention of deadwood habitat.

8.8.18 Some field ponds will be lost and the sections of watercourses over which the Scheme will be built will degrade due to the lack of light and change in temperature regime. The loss and damage of these aquatic and wetland habitats and their associated invertebrate fauna will be mitigated by provision of a network of wetland habitats associated with the drainage scheme, including ponds, ephemeral wetland habitat, reedbeds and wet grassland which will improve those sections of watercourses that are within the Order Limits.

Essential mitigation

8.8.19 Best practice mitigation measures have been identified which would be implemented by the Principal Contractor to reduce the impacts and effects that construction of the Scheme is likely to have on biodiversity.

8.8.20 The First Iteration EMP **[TR010044/APP/6.8]** details the best practice measures that will be implemented during construction of the Scheme to mitigate construction-related effects on biodiversity associated with dust deposition, air pollution, pollution incidents, water quality, light, noise and vibration.

8.8.21 Pre-construction surveys will be undertaken to validate and, where necessary, update the baseline survey findings, the purpose being to ensure that mitigation during the construction phase is based on the latest protected species information. This may also be required for protected species licensing. These surveys will include, but not be limited to, habitat assessment, bats, Badger, Otter, Barn Owl, Red Kite and Hobby.

8.8.22 Pre-construction surveys will also be undertaken to check the location of all invasive species, the findings of which will inform the implementation of measures to prevent their spread in the wild.

8.8.23 The following measures will be implemented during construction to protect retained vegetation, designated sites, protected species and other areas of biodiversity value from disturbance, damage and accidental pollution:

a. The development and implementation of environmental constraints plans and construction working methods.

b. The retention of all mature trees and boundary features within the Order Limits that are outside the limits of the permanent works of the Environmental Statement except where loss is required for the safe construction of the Scheme, including temporary works.

c. The use of fencing, where necessary, to prevent access to retained important habitat, protect habitat, avoid accidental damage, and avoid species mortality (including areas to which species have been temporarily displaced).

d. The implementation of the protective measures for existing vegetation in line with the standards set out in BS5837:2012 (Ref 8-46).

e. Not locating construction compounds and access tracks within woodland, grassland and existing water habitats.

f. Works near watercourses, including the River Great Ouse CWS and those tributaries crossed by the Scheme that are tributaries of the River Great Ouse, will be undertaken in accordance with Construction Industry Research and Information Association (CIRIA) guidance documents C532 (Ref 8-47), C741 (Ref 8-48) and C648 (Ref 8-49).

g. Designing and positioning construction lighting to minimise light spill onto adjacent habitats, including where there are potential bat roosts and important foraging or commuting habitat that is regularly used by local bat populations.

h. The supervision of construction works by an Ecological Clerk of Works (ECoW) or a suitably qualified person, where these works have the potential to impact on protected species, designated sites or other important biodiversity features. The ECoW will also ensure that all standard measures and methods detailed within the Principal Contractor's Construction Environmental Management Plan, including monitoring surveys are implemented.

i. Implementation of measures to avoid animals being injured or killed within construction working areas, through excluding them from such areas and preventing them falling into and becoming trapped in excavations.

j. Avoiding disturbance to breeding birds by not undertaking vegetation clearance and structure demolitions during the bird breeding season (March to August inclusive). Where this is not possible measures necessary to avoid harm to birds and their nests will be implemented under the supervision of the ECoW, with checks regularly carried out prior to and during construction to identify any active nests of Schedule 1 (of the *Wildlife and Countryside Act 1981*) (Ref 8-6) breeding bird species that may be at risk of disturbance.

k. Deterring birds from nesting in construction working areas, where appropriate, through either physical means to prevent establishment of nests (such as prior coppicing or pruning of vegetation) or other legal means of disturbance. These measures will be implemented under the advice and supervision of a suitably experienced ecologist, and will not be used where there is a risk of disturbance to the active nests of Schedule 1 (of the *Wildlife and Countryside Act 1981*) bird species (Ref 8-6).

l. Communicating the requirements of the protected species licences, and the associated working practices, to construction staff.

m. Maintaining wildlife dispersal corridors during construction (for example mammal tunnels, planting, retained habitat and dark corridors around the boundaries of the Scheme).

Biodiversity Management Plan

6.1.1 A detailed Biodiversity Management Plan (BMP) within Annex D of the First Iteration EMP **[TR010044/APP/6.8]** has been produced for the Scheme, the purpose of which will be to provide management prescriptions aimed at ensuring the Scheme delivers biodiversity benefits over the long term.

8.8.24 The BMP will focus on the biodiversity-led management of retained semi-natural habitats, for example grassland and hedgerows, and also any newly created habitats (for example woodland, hedgerows, grassland and wetland habitats). The BMP will include monitoring measures aimed at reviewing the successful establishment of habitats and the use of mitigation measures by fauna, for example, mammal underpasses. The results of monitoring will be used to refine the prescriptions of the BMP.

8.8.25 The Principal Contractor will be responsible for undertaking the management of habitats and other features within the contract period, in accordance with the BMP, after which the longer-term maintenance and management responsibilities will transfer to Highways England.

Enhancement measures

8.8.26 A number of enhancement measures have been incorporated into the design of the Scheme, which focus principally on the creation of areas of habitat in excess of those required to mitigate losses due to the Scheme. These include hedgerow, grassland and scrub habitat as well as new areas of woodland.

8.8.27 Aquatic and wetland habitats will also be created, including ponds, ephemeral wetland habitat, reedbeds and wet grassland. The areas created will be in excess of those needed to mitigate for the loss of ponds. Watercourses affected by the Scheme will be restored to a better condition than when assessed in baseline surveys to the extent that they will more than mitigate for the damage to these watercourses under the Scheme.

8.8.28 The locations of the habitat creation and other enhancement measures are illustrated on the Environmental Masterplan in **Figure 2.4** of the Environmental Statement **[TR010044/APP/6.2]**.

8.8.29 The number of bat and bird boxes that will be installed on selected retained trees within the Order Limits will exceed that required for mitigation purposes.

8.9 Assessment of significant effects

8.9.1 In accordance with LA 104, the prediction of impacts and the assessment of effects (and their significance) on biodiversity associated with construction and operation of the Scheme has taken account of the effectiveness of both the embedded and essential mitigation measures summarised in Section 8.8.

8.9.2 Impacts and effects on biodiversity are reported for both the construction and operational phases of the Scheme. Under each of these main headings, consideration is given first to statutory and non-statutory designated sites (international, national and other), then habitats, and finally species. The effects of each impact are considered individually at first and then collectively for each of the biodiversity features assessed.

Construction

8.9.3 This section considers the effects upon designated sites, habitats and species that could occur during the construction phase of the Scheme.

8.9.4 **Table 8-8** summarises the magnitude of impact and significance of effect during construction for sites designated for their biodiversity value, habitats and protected species.

Table 8-8: Magnitude of impact and significance of effect during construction

Receptor	Environmental value (sensitivity) (habitats to be lost or damaged)	Description of impact	Magnitude of impact	Significance of effect
Designated sites				
International	Very high	Negligible	No change	Neutral
National	High	Negligible	No change	Neutral
County	Medium	Temporary loss of connectivity for one CWS	Minor (adverse)	Slight (adverse)
Habitats				
Woodland (parts of)	Low	Temporary loss of small areas of woodland	Minor (adverse)	Slight (adverse)
Grassland	Low	Temporary loss of small areas of grassland	Minor (adverse)	Neutral

Receptor	Environmental value (sensitivity) (habitats to be lost or damaged)	Description of impact	Magnitude of impact	Significance of effect
Arable fields with arable weeds	Low	Loss of arable weed habitat	Minor (adverse)	Slight (adverse)
Hedgerow	Medium	Temporary loss of hedgerows	Minor (adverse)	Slight (adverse)
Ancient and veteran trees	Medium	Avoided by alteration in design	Negligible	Neutral
Brooks and other watercourses	Low	Reduction in habitat quality	Minor (adverse)	Slight (adverse)
Ponds and other waterbodies	Medium	Temporary loss of ponds	Minor (adverse)	Slight (adverse)
Wetland	Medium	Temporary loss of wetland habitat	Minor (adverse)	Slight (adverse)
Species				
Mammals				
Bats	Medium	Temporary loss of potential roost sites and temporary disruption to connectivity	Minor (adverse)	Slight (adverse)
Roosting bats (common species)	Low	Possible temporary loss of bat roosts (Direct) and new roost provision (Direct).	Negligible (adverse) in the short term to Minor (beneficial) in the medium to long term	Neutral/Slight (beneficial)
Roosting bats	Medium	Bat roost disturbance (Indirect)	Negligible (adverse) in the short to long term	Neutral and Not Significant
Foraging and commuting bats	Medium	Loss of habitat used by foraging and commuting bats (Indirect)	Negligible (adverse) in the short to medium term Minor (beneficial) in the long term	Neutral/Slight (adverse) to Slight (beneficial)

Receptor	Environmental value (sensitivity) (habitats to be lost or damaged)	Description of impact	Magnitude of impact	Significance of effect
Foraging and commuting bats	Medium	Disturbance to foraging and commuting bats (Indirect)	Minor (adverse) in the short to long-term	Slight (adverse)
Badger	Low	Closure of sets, loss of foraging and connectivity	Minor (adverse)	Neutral
Otter	Medium	Temporary loss of connectivity	Minor (adverse)	Slight (adverse)
Birds				
Wintering birds	Medium	Temporary loss of habitat	Minor (adverse)	Slight (adverse)
Breeding birds	Medium	Temporary loss of habitat	Minor (adverse)	Slight (adverse)
Hobby	Medium	Temporary loss of habitat for nesting and disturbance	Minor (adverse)	Slight (adverse)
Red Kite	Low	Temporary loss of habitat for nesting and disturbance	Negligible	Neutral
Barn Owl	Low	Temporary loss of habitat for nesting and disturbance	Minor (adverse)	Slight (adverse)
Reptiles				
Common Lizard	Low	Temporary loss of habitat	Negligible	Neutral
Amphibians				
Great Crested Newt	Medium	Temporary loss of breeding ponds and terrestrial habitat	Minor (adverse)	Slight (adverse)
Fish	Medium	Reduction in habitat quality (except for the River Great Ouse)	Negligible	Neutral
Invertebrates				

Receptor	Environmental value (sensitivity) (habitats to be lost or damaged)	Description of impact	Magnitude of impact	Significance of effect
Terrestrial	Medium	Temporary loss of habitat	Minor (adverse)	Slight (adverse)
Aquatic	Medium	Reduction in habitat quality (watercourses) and temporary loss of habitat (ponds)	Minor (adverse)	Slight (adverse)

Designated sites of international importance

8.9.5 Details regarding the relationship between the Scheme and designated sites of international importance are provided in the Habitats Regulations Assessment: No Significant Effects Report **[TR010044/APP/6.7]**.

8.9.6 Due to the distance (over 8 kilometres) (5 miles) separating the Scheme from the identified designated sites of international importance (see **Table 8-4**), the assessment has concluded that there will be no impact pathways during the construction phase works to the sites. Accordingly, there is a magnitude of impact of No change arising from construction of the Scheme upon these sites, and therefore a Neutral significance applies (**Table 8-8**).

Designated sites of national importance

8.9.7 Baseline information is provided in **Appendix 8.2** of the Environmental Statement **[TR010044/APP/6.3].**

8.9.8 There are four designated sites of national importance within 2 kilometres (1.2 miles) of the Scheme. The nearest is Elsworth Wood, which is 0.85 kilometres (0.5 miles) (from the Order Limits. The evaluation appraisal is provided in **Appendix 8.2** of the Environmental Statement **[TR010044/APP/6.3]** and includes an appraisal of hydrological effects from Scheme. The outcome from the evaluation for Elsworth Wood SSSI is that there will be no significant effects from the Scheme. Accordingly, there is a magnitude of impact of No change arising from construction of the Scheme upon this site, and therefore a Neutral significance applies (**Table 8-8**).

8.9.9 The three other sites Papworth Wood SSSI, Little Paxton Wood SSSI and St Neots Common SSSI are 1.14 kilometres (0.7 miles) north, 1.8 kilometres (1.1 miles) north-west and 1 kilometre (0.6 miles) east of the Order Limits respectively. Due to the distance from the Scheme, the designating features of each SSSI (woodland flora for Papworth Wood SSSI, Little Paxton Wood SSSI and flood meadow grasslands for St Neots Common SSSI will not be impacted directly, for example through fragmentation, or temporary or permanent loss of habitat. Indirect impacts such as oil or chemical spills and air pollution from dust, and silt, which could result in the loss of plants through uptake of contaminants will be mitigated through the adoption of best practice for the Scheme. As part of this mitigation and with respect to St Neots Common SSSI, the drainage system will be designed and constructed in accordance with water quality standards as set using the Highways England Water Risk Assessment Tool (HEWRAT). This

includes passing the drainage through an attenuation pond. Therefore, there will be no adverse hydraulic or water quality impact on the River Great Ouse which is hydrologically linked to St Neots Common SSSI. Indirect impacts such as oil or chemical spills and air pollution from dust, and silt will be mitigated through the adoption of best practice for the Scheme implemented via the First Iteration EMP **[TR010044/APP/6.8]**.

8.9.10 The outcome from this assessment is that there will be a magnitude of impact of No change arising from construction of the Scheme upon Papworth Wood SSSI, Little Paxton Wood SSSI and St Neots Common SSSI, and therefore a Neutral significance applies (**Table 8-8**).

Non-statutorily designated sites

8.9.11 There are 15 non-statutorily designated sites (three of which are also ancient woodland) within 1 kilometre (0.6 miles) of the Order Limits, four of which are adjacent to the Order Limits: Croxton Park CWS, Elsworth Protected Road Verge, River Ouse CWS and Wyboston Pits CWS. These are discussed below:

Croxton Park County Wildlife Site (CWS)

8.9.12 The part of the Scheme which is immediately adjacent to Croxton Park CWS is a section of the de-trunked A428 which will have no construction works associated with it. The closest point to the main works is the southern tip of the Toseland Road Bridge earth works, 150m to the north, The construction of this section will not result in any direct impact or indirect effect on Croxton Park CWS.

Elsworth Protected Road Verge (PRV)

8.9.13 Elsworth PRV is in a location, although adjacent to the Order Limits, which will not be directly impacted by construction.

8.9.14 Indirect impacts such as oil or chemical spills and air pollution from dust, and silt, which could result in the impact on the habitats and designated features for the non-statutorily designated sites through uptake of contaminants, will be mitigated through the adoption of best practice for the Scheme, through the application of the First Iteration EMP and best working practice (e.g. mitigation of potential pollution impacts through adherence to standard best practice and guidelines).

River Great Ouse CWS and Wyboston Pits (CWS)

8.9.15 Although the River Ouse CWS and Wyboston Pits CWS are adjacent to the Scheme, the extents of works are on the existing road infrastructure, therefore there will be no direct impacts that will result in the temporary or permanent loss of habitat within these non-statutory sites.

8.9.16 Indirect pollution and siltation effects will be mitigated through the adoption of best practice with regards to activities such as storage of fuel/substances and refuelling, and through construction drainage, which will include temporary SuDS ponds and silt management. These measures will be implemented via the First Iteration EMP **[TR010044/APP/6.8]** which will reduce any effects from pollution and silt and will ensure no indirect impacts on these non-statutory sites.

8.9.17 With respect to the River Great Ouse specifically, dewatering of the borrow pits and cuttings adjacent to the River Great Ouse will intercept groundwater in the river terrace deposits which provide baseflow discharge to the river. The intercepted water will be discharged to the River Great Ouse and its tributaries and hence there will be no reduction in the groundwater contribution to the river flow. Prior to discharge, the water will be settled to reduce the suspended solids content to an acceptable level. Accordingly, there will be no impact on the water quality of the river.

8.9.18 The outcome from this assessment is that there will be a magnitude of impact of No change arising from construction of the Scheme upon Croxton Park CWS, Elsworth PRV, River Great Ouse CWS and Wyboston Pits CWS, and therefore a Neutral significance applies.

Other non-statutorily designated sites

8.9.19 The River Ivel and Hiz CWS, Sir John's Wood CWS, Zwetsloots Pits CWS and Begwary Brook Pits CWS are within 0.5 kilometres (0.3 miles) of the Order Limits.

8.9.20 There will be no direct impacts on these sites as a result of construction including temporary or permanent loss of habitat as a result of the Scheme. Indirect pollution and siltation effects will be mitigated through the adoption of best practice for the Scheme, through the application of the First Iteration EMP **[TR010044/APP/6.8]** (e.g. mitigation of potential pollution impacts through adherence to standard best practice and guidelines).

8.9.21 The drainage system for the Scheme will be designed and constructed in accordance with water quality standards as set using the HEWRAT method. This includes passing the outfall through an attenuation pond compliant with HEWRAT pollution control, therefore there will be no adverse hydraulic or water quality impact on the River Great Ouse CWS or the River Ivel and Hiz CWS. The outcome from this assessment is that there will be a magnitude of impact of No change arising from construction of the Scheme upon County Wildlife sites, and therefore a Neutral significance applies (**Table 8-8**).

8.9.22 Sir John's Wood CWS and ancient woodland (0.25 kilometres (0.16 miles) from the Order Limits) is connected by hedgerows to Boys Wood, and Alington Hill Wood is close by and the Scheme presents a potential barrier to movement between Sir John's Wood and these two woodlands which will be on the other side of the Scheme.

8.9.23 The Scheme design includes a mammal tunnel linking Sir John's Wood with the two woodlands, which will maintain the ecological connectivity between these woodland patches post construction. The outcome from this assessment is that there will be a magnitude of short term impact during construction on this site of Medium environmental value until the tunnel is constructed and functional, that is a magnitude of impact of Minor (adverse) and therefore the significance of effect will be Slight (**Table 8-8**).

8.9.24 Baseline information is provided in **Appendix 8.2** of the Environmental Statement **[TR010044/APP/6.3].**

Habitats

8.9.25 This section reports the construction impacts on habitats considered to be important biodiversity features, namely terrestrial habitats (woodland, hedgerow, arable flora and ancient and veteran trees) and aquatic habitats (ponds and other waterbodies, brooks and other watercourses and wetlands).

8.9.26 The risk of disturbance to all retained habitats as a result of accidental damage during construction will be mitigated through the implementation of appropriate measures, for example for trees, within BS5837:2012 (Ref 8-46) and clearly marking the boundaries of working areas including appropriate stand-off distances from biodiversity features. These retained habitats are assessed to be of up to Medium environmental value and the magnitude of impact of disturbance from accidental damage to all retained habitats will be Negligible (adverse). This leads to a significance of Neutral.

8.9.27 The implementation of essential mitigation measures relating to the control and management of dust will reduce, as far as practicable, impacts to the sensitive vegetation of retained habitats. Given the Medium environmental value of these retained habitats and that the magnitude of impact of disturbance from dust is Negligible (adverse), this leads to a significance of Neutral.

8.9.28 Essential mitigation measures (refer to Section 8.8) applied during construction will avoid potential impacts on retained habitats from any changes in the rate, amount or quality of surface water runoff. These retained habitats are assumed to be of Given the Medium environmental value of these retained habitats and the magnitude of impact of disturbance from dust will be Negligible (adverse), this leads to a significance of Neutral.

Terrestrial habitats

8.9.29 The losses for woodland, hedgerow and arable habitat are summarised in **Table 8-9**. There will also be a loss of grassland habitat (**Table 8-9**) although this habitat was not assessed to be a priority habitat in this instance (**Appendix 8.3** of the Environmental Statement **[TR010044/APP/6.3]**).

Table 8-9: Habitat losses and gains within the Order Limits

Phase 1 Habitat Survey category	Area before works (ha)	Area after works (ha)	Percentage change
A1.1.1 Woodland- Broadleaved- Semi-natural	2.69	0	-100
A1.1.2 Woodland - Broadleaved - Plantation	0.93	60.60	6,416
A1.2.2 Woodland - Coniferous - Plantation	0.20	0	-100
A1.3.2 Woodland - Mixed - Plantation	0.60	1.82	203
B2.2 Neutral grassland - Semi-improved	5.41	139.34	2,476
B4 Improved grassland	24.16	38.13	58

Phase 1 Habitat Survey category	Area before works (ha)	Area after works (ha)	Percentage change
B5 Marsh/ marshy grassland	0.00	2.90	N/A
B6 Poor Semi-improved grassland	10.42	0.57	-95
J1 Cultivated/ disturbed land	276.52	8.85	97
J2.1 Boundaries - Hedges - Intact	0.41	2.24	446
J2.1 Boundaries - Hedges - Intact	0.86	0	-100
J2.2 Boundaries - Hedges - Defunct	0.89	0	-100
J2.3 Boundaries - Hedges - With trees	0.21	0	-100
J2.3 Boundaries - Hedges - With trees	0.69	0	-100
Total	349.89	293.59	

8.9.30 The construction of the Scheme will result in the loss of eight patches of woodland (**Table 8-9**), in six cases these are parts of woodland which fall within the Order Limits (0.05 ha to 0.45 ha), the other two being copses complexly within the Order Limits (0.14 ha and 0.48 ha). Overall, these woodland patches are assessed as being of Low environmental value and the magnitude of impact of the temporary loss of woodland habitat during construction will be Minor (adverse) leading to a significance of Slight (**Table 8-8**).

8.9.31 Some patches of arable land will be lost to construction which support scarce arable weeds, the latter being assessed as being of Low environmental value. The magnitude of impact will be Minor (adverse) resulting in a significance of Slight (**Table 8-8**).

8.9.32 The Scheme will result in the loss or partial loss of 87 of the 93 hedgerows found in the survey of terrestrial habitats (**Table 8-9**), some of which were of County value. This will be a partial loss as the hedgerow planting measures developed as part of the landscape and visual effects assessment reported in **Chapter 7, Landscape and visual effects** of the Environmental Statement **[TR010044/APP/6.1]** have included the replacement of hedgerows across the Scheme. The magnitude of impact of the temporary loss of hedgerow habitat during construction will be Minor (adverse) leading to a significance of Slight (**Table 8-8**).

8.9.33 The design of the Scheme was amended such that the one veteran tree found in the Scheme was avoided to ensure that the tree was not impacted including its root protection zone, *i.e.* a magnitude of impact of Negligible. The tree was assessed as being of Medium environmental value, hence a significance of Neutral (**Table 8-8**).

Aquatic habitats

8.9.34 The Scheme will result in the temporary loss of approximately seven ponds during construction, the locations of which are illustrated on **Figure 1** in **Appendix 8.14** of the Environmental Statement **[TR010044/APP/6.3]**. These ponds are generally species-poor and ephemeral but do form part of a wider 'pondscape' in the surrounding area and one was assessed as being of County value. Eighteen ephemeral wetland and reed bed features, similar to the existing ponds, have been incorporated into the design of the Scheme forming part of the Scheme's sustainable drainage system. The magnitude of impact of loss of pond habitat during construction will be Minor (adverse) leading to a significance of Slight (**Table 8-8**).

8.9.35 The Scheme crosses a number of brooks and other watercourses the condition of which will be impacted for those sections that are overshadowed and subject to an altered temperature regime as they pass under the Scheme. Those sections of these watercourses upstream and downstream of the culverted section have been assessed as being in poor ecological condition and are of Low environmental value. These sections will be subject to restoration as indicated in the Environmental Masterplan shown on **Figure 2.4** of the Environmental Statement **[TR010044/APP/6.2]**. There will be an impact on part of the wetland which is due to be established as part of the Black Cat Quarry restoration scheme assessed as being of Medium environmental value. There will be a loss of wetland habitat due to the Scheme which will have a negative impact through loss of feeding and roosting resource for waterfowl. This loss will be temporary as it will be mitigated by converting the reinstated agricultural fields to, for example, species rich grassland to provide waterfowl with replacement food and roosting resources.

8.9.36 The magnitude of impact of loss of wetland habitat during construction will be Minor (adverse) leading to a significance of Slight (**Table 8-8**).

Species

Bats

8.9.37 Roads can have negative impacts on bats with landscape scale reductions in bat activity and diversity, reduced reproductive success and mortality from a barrier effect, habitat loss, reduced habitat quality and mortality through collisions with traffic. Effects on bats are considered in the short, medium and long term; 'short term' for bats is in the region of 1 to 2 years; 'medium term' >2 to 5 years; and 'long term' >5 years.

8.9.38 Three species of bat were recorded roosting within the Survey Area; these were Common Pipistrelle, Soprano Pipistrelle and Brown long-eared bat. The survey results confirmed non-breeding bat roosts in three trees, two woodlands and three buildings. Two of these buildings are located in the same area and comprise a metal barn and a small brick barn; the other building is a sheet metal farm building.

8.9.39 These confirmed roosts were all day roosts used by small numbers of relatively common and widespread species of bat and all are assessed to be of Local importance. There are potential indirect impacts to bat roosts within one tree, and two woodlands of local importance as a result of the Scheme. Other roosts are located at least 50m from the Scheme and are unlikely to be impacted either directly or indirectly. Mitigation for any indirect impacts are considered in the Biodiversity Management Plan under a non-licensed method statement for bats.

8.9.40 Bats make transitory use of suitable tree roost sites and as such there is a risk that trees supporting features that are suitable for bats, but where no current evidence was found, may become occupied in the future.

8.9.41 Therefore, surveys will be carried out prior to felling of any trees with potential to support roosting bats to be lost to construction works.

8.9.42 These surveys will consist of an aerial inspection and/or a dusk/dawn activity survey in advance of felling. Providing that no bats are present the tree will be section felled by experienced arborists under the supervision of an appropriately licensed bat worker. If bats are confirmed to be present at any time, then works in that location will be halted until an appropriate Natural England EPS derogation licence is granted. These measures will be sufficient to ensure that, should bats be present, the Favourable Conservation Status of local bat populations is not altered.

8.9.43 The provision of replacement roosts, including where necessary under Natural England licence, will result in a magnitude of impact of Negligible (adverse), leading to a significance of Neutral upon roosting bats during the construction period based on the availability of existing potential replacement roost sites (**Table 8-8**).

8.9.44 Baseline bat activity associated with habitats within the Order Limits was low and typical of the habitats present. Construction will result in the loss of habitats that are associated with the lower levels of bat activity.

8.9.45 The direct losses of foraging and commuting habitat where higher levels of activity were recorded are localised. The Environmental Masterplan illustrated on **Figure 2.4** of the Environmental Statement **[TR010044/APP/6.2]** includes the re-establishment of areas of hedgerow, grassland and scrub. To make them accessible to bats, these habitats will be linked to existing areas of habitat that are known to be used by the local bat population. Once this replacement habitat has established the magnitude of impact of habitat loss and gain during construction will be negligible adverse in the design year, leading to a neutral effect.

8.9.46 Construction activities resulting in increased levels of noise, vibration or light can lead to bats abandoning roosts or displacing them from foraging and commuting habitat. Bats are susceptible to disturbance impacts, particularly during the sensitive hibernation and maternity period.

8.9.47 There is no evidence of hibernation or maternity roosts within the Order Limits.

8.9.48 Standard construction working measures detailed in the First Iteration EMP **[TR010044/APP/6.8]** will reduce any disturbance impacts as a result of construction activity.

8.9.49 This also includes measures to avoid light-spill upon retained boundary habitats that may be used for foraging or commuting. The magnitude of impact relating to possible disturbance impacts will be Negligible (adverse) during the construction period, leading to a significance of Neutral (**Table 8-8**).

8.9.50 The loss of hedgerow habitat will lead to the fragmentation of interconnected habitats used by the local bat population. Levels of bat activity are generally low across the habitats that are contained within the Order Limits.

8.9.51 Indirect impacts can occur due to fragmentation of a habitat, ecosystem, or land-use type into smaller parcels, or the creation of partial or complete barriers to the movement of species, with a consequent impairment of ecological function.

8.9.52 Connectivity around the margins of the Scheme and into the wider landscape will be maintained, for example, by the wider hedgerow network, watercourses and the corridor of the East Coast railway line.

8.9.53 As illustrated on the Environmental Masterplan on **Figure 2.4** of the Environmental Statement **[TR010044/APP/6.2]**, the mix of hedgerows, grassland, scrub and wetland created as part of the Scheme will provide corridors of connecting habitat running in a north-south direction through the Scheme. These will maintain and, in some instances, improve upon the linkages to the retained areas of habitat, including those known to be regularly used by bats, and will therefore further reduce the impact of fragmentation impacts upon the local bat population.

8.9.54 The temporary habitat loss will result in the fragmentation of habitats, which represents a magnitude of impact of Minor (adverse), leading to a significance of Slight (adverse) effect during the construction period. The establishment of habitats that link to adjacent features used by bats will, by the design year, have established and will reduce the magnitude of impact to Negligible (adverse0 and a significance of neutral (**Table 8-8**).

Badger

8.9.55 Badger is a widespread species within the Survey Area and the population present is of Local importance. One main sett will be lost as part of the Scheme, along with two outlier setts and a single subsidiary sett. Any Badger sett closures will be completed under a Natural England licence. An artificial sett to replace the main sett loss will be constructed as part of the sett closure programme to provide alternative habitat in order to retain the local badger population within its current range. The location of the proposed artificial sett construction is in close proximity to the well-used badger paths and active latrines on this area (where the main sett is originally located) and offers good foraging opportunities in the surrounding well-established badger territory within the woodland.

8.9.56 The Scheme will result in the loss of habitat that is used by the local Badger population for foraging and commuting and is likely to result in the displacement of Badgers from the affected areas. However, the majority of territory occupied by local Badger clans will be retained along with associated connectivity and therefore the habitat losses are unlikely to undermine the local conservation status of this species.

8.9.57 Construction activities may result in the direct mortality or injury to Badgers or the indirect disturbance whilst occupying a sett. To avoid this, the standard working practice detailed within the First Iteration EMP **[TR010044/APP/6.8]** and the confidential Badger appendix (**Appendix 8.6** CONFIDENTIAL of the Environmental Statement **[TR010044/APP/6.3]**) will be implemented in proximity to retained setts to prevent injury or disturbance to Badgers during construction, details on badger sett closure are also provided within this document.

8.9.58 Habitat losses during construction will result in the fragmentation of habitat used by local Badger clans, limiting access to some of their foraging areas. However, the majority of territory occupied by local Badger clans, based on the baseline distribution of Badger territories as identified in bait marking surveys, will be retained along with associated connectivity and therefore the habitat losses are unlikely to undermine the local conservation status of this species. Measures embedded in the Scheme, including eight mammal underpasses designed to provide connectivity, fencing and strategic planting (refer to Biodiversity Management Plan (BMP) in the First Iteration EMP **[TR010044/APP/6.8]**), will ensure that loss of connectivity will be temporary

8.9.59 The magnitude of impact during construction on a Badger population of Local value will be Minor (adverse), leading to a significance of Slight.

Riparian Mammals

8.9.60 Otter activity is centred on the River Great Ouse corridor, with some use being made of Hen Brook and the likelihood of other tributaries of the River Great Ouse being used in the future particularly where improvements are made in some of the brooks as a result of the work of the Hen and Abbotsley Catchment Group and embedded in the design of the Scheme. There will be a loss of two resting sites on Hen Brook as a result of the Scheme. However, there will be no loss of Otter holts or other habitat used by breeding Otter.

8.9.61 There is a risk that any Otter making use of Hen Brook within the Order Limits will be disturbed, for example by a temporary increase in noise or increased human presence during construction. Pre-construction checks will be carried out to confirm that there has been no change in the status of Otter activity with appropriate avoidance and mitigation measures implemented, this will include incorporation of ledges into the culvert design ensuring that disruption to connectivity is temporary.

8.9.62 Construction disturbance and temporary disruption to connectivity upon Otter, a species of Medium environmental value are likely to result in a magnitude of impact of Minor (adverse), leading to a significance of Slight (adverse) (**Table 8-8**).

8.9.63 No evidence of Water Vole was found in the Survey Area and as such no effects on the species are predicted.

Birds (wintering and breeding and wintering)

8.9.64 Surveys have identified that habitats within the Order Limits support assemblages of over-wintering and breeding farmland birds that are typical of the habitats present and each of the assemblages is of Local importance. The potential impacts associated with construction are habitat loss, direct mortality, habitat degradation and disturbance (noise and visual disturbance).

8.9.65 Nesting bird mortality, and that of their young, will be avoided through the working methods set out in the First Iteration EMP **[TR010044/APP/6.8]**, which will restrict vegetation clearance activities to outside of the breeding bird season, where possible, and will provide protection for birds and their nests throughout the construction period. Therefore, through the appropriate timing of works and/or the avoidance of harm/disturbance to active nests, the magnitude of impact of direct mortality to all breeding bird species will be Negligible (adverse), leading to a significance of Neutral effect in the construction period.

8.9.66 Retained habitat within and near to the Order Limits may be temporarily degraded during construction in terms of its suitability for nesting and wintering birds. Noise levels will increase overall, and levels and tones are likely to be irregular, meaning that birds are less likely to become habituated to them, although habituation is more likely should there be a frequent or continuous noise or activity. Visual disturbance may also reduce the suitability of habitat, although this is likely to impact only a limited number of ground-nesting bird species. It is relevant that the Scheme is adjacent to an existing major road (i.e. the existing A428), therefore the increase in the level of disturbance during construction is relatively limited.

8.9.67 There will be a direct loss of farmland bird breeding habitat as a result of the Scheme. The removal of hedgerow, scrub, grassland and arable farmland (**Table 8-8**) will reduce the availability of breeding habitat and the winter foraging resource that is available for birds. Farmland birds including scrub specialists will be displaced from their current breeding territories during construction. There will be a localised impact on opportunities for breeding, feeding and roosting during construction and until replacement habitat has established.

8.9.68 Throughout construction, where appropriate, topsoil mounds and temporarily fallow areas of farmland within the Order Limits will provide opportunities for nesting and foraging birds,

Hobby and Red Kite

Hobby

8.9.69 Of the two Hobby nesting sites confirmed within the Survey Area, one will be directly affected by the Scheme and the other could be impacted indirectly through disturbance. Since the nest location of Hobbys tend to move year to year and that Hobby will readily use old crow nests which are rarely limited in the landscape, the magnitude of impact on this species of Medium environmental value will be Negligible and the significance will be Neutral. Enhancement measures will be implemented ahead of construction by identifying suitable alternative locations for the installation of artificial nests. A number of artificial nests will be installed to ensure successful enhancement.

Red Kite

8.9.70 Red Kite is known to be breeding close to, or possibly within the Survey Area and will be exposed to similar risks to those of Hobby. Assuming that Red Kite is displaced, Red Kite generally build a new nest every year and there is good scope for alternative nesting sites in the landscape bearing in mind the substantial territories held by this species.

8.9.71 The magnitude of impact on this species of Low environmental value is assessed to be Negligible and the significance will be Neutral.

Barn Owl

8.9.72 Three occupied nest sites, seven active roosts and three temporary roost sites were recorded within the Survey Area between July 2017 and August 2019. Of these, three active roost sites and one temporary roost site will be removed or undergo significant disturbance.

8.9.73 Lighting of construction areas and access routes could cause owls to avoid affected foraging areas and/or have an impact on roosting. An increase in noise and possibly physical disturbance during construction, e.g. vehicle movements activities have the potential to cause abandonment of roosts and/or nests, particularly if disturbance occurs during the early breeding season when birds are egg-laying or incubating. This could apply to two of the three occupied nests with associated territory fragmentation leading to temporarily dispersal from disturbed areas of habitat to more distant and possibly less productive habitats with potential impact on breeding success.

8.9.74 Based on the assessment of Barn Owl as having a Low environmental value, the loss of three active roost sites and one temporary roost site and the disruption and disturbance associated with construction will have a magnitude of impact of Minor (adverse). This leads to a significance of Slight. Enhancement measures will be implemented ahead of construction by identifying suitable alternative locations for the installation of artificial nest boxes. A number of artificial nest boxes will be installed to ensure successful enhancement.

Reptiles

8.9.75 The presence of reptiles is limited to Common Lizard and Grass Snake which has a restricted distribution within the Scheme, (**Figure 1** of **Appendix 8.13** Reptiles of the Environmental Statement **[TR010044/APP/6.3]**).

8.9.76 In order to avoid any injury or killing of any reptiles, habitat will be manipulated to move Common Lizard (from the location where it is within. This will have a Negligible magnitude of impact on Common Lizard.

8.9.77 This will be a temporary effect as the Environmental Masterplan (refer to **Figure 2.4** of the Environmental Statement **[TR010044/APP/6.2]**) will provide habitat for Common Lizard and also for Grass Snake and Slow-worm (*Anguis fragilis*) through the creation of grassland and scrub providing habitat for feeding and to strengthen connectivity, and installation of artificial hibernacula for refuge and shelter. The significance would be Neutral.

Great Crested Newt

8.9.78 There are approximately three Great Crested Newt meta-populations within the Survey Area (refer to **Figure 1** in **Appendix 8.14** of the Environmental Statement **[TR010044/APP/6.3]**) and these are of County importance. The potential impacts to Great Crested Newt during construction of the Scheme are loss of breeding and terrestrial habitat and direct mortality. There are fragmentation impacts to some of the Great Crested Newt populations as a result of the Scheme.

8.9.79 There are six ponds within the Order Limits which are either known to contain Great Crested Newts (five ponds, one of which presence was indicated by eDNA analysis alone) or may support Great Crested Newt (one pond which could not be surveyed) (refer to **Figure 1** in **Appendix 8.14** of the Environmental Statement **[TR010044/APP/6.3]**). Two of these ponds, existing attenuation ponds located at the eastern and western extremities of the Scheme, will be retained in the design along with the associated terrestrial habitat and it is recommended that they are opened up to prevent them becoming terrestrialised due to sediment accumulation and growth of vegetation. As well as conserving the existing Great Crested Newt population, there would be scope to translocate newts from ponds which will be lost into these ponds. A further two ponds within the Order Limits will be retained although there will be a temporary decrease in the surrounding terrestrial habitat. Two ponds will probably be lost as a result of the construction process. These losses will be mitigated through the use of District Licensing or the application for a license from Natural England using pond resources within the Order Limits, or a combination of the two.

8.9.80 Regardless, a method statement will be prepared detailing precautionary methods of working to minimise the risk of injury to and killing of Great Crested Newt. Further to the pond which could support Great Crested Newt but could not be visited, there were 13 other ponds outside of the Order Limits which could not be visited. On a precautionary basis, these ponds are assumed to contain Great Crested Newt until shown otherwise. If feasible, these ponds should be surveyed prior to commencement of construction in order to identify presence or absence of Great Crested Newt.

8.9.81 In addition to the loss of breeding habitat, the Scheme could affect the surrounding terrestrial habitat used by Great Crested Newt in at least five more ponds outside or relatively close to the Order Limits which support of may support newts. The actual effect will depend on the habitat lost which mostly comprises sub-optimal habitat such as arable fields or short, grazed pasture, the nature of activity within the Order Limits and the scope for mitigating effects.

8.9.82 Within clusters of ponds supporting breeding Great Crested Newt, the ponds are connected via hedgerows and, in places, some of these connections will be severed. Between such clusters of ponds, connectivity is restricted due to the large arable fields and long hedgerows unsuitable for movement between pond and the Scheme will have no effect. Once habitats are established along the Scheme, they will provide scope for movement and dispersal along the Scheme as well as additional suitable terrestrial habitat, *i.e.* the impact will be temporary.

8.9.83 On the basis of the environmental value of the Great Crested Newt being Medium and the magnitude of impact Slight (negative), the significance would be Slight (adverse).

Fish

8.9.84 Consistent with existing desk study records (refer to **Appendix 8.1** of the Environmental Statement **[TR010044/APP/6.3]** and Section 8.6), a habitat appraisal of stretches of watercourses within the Order Limits indicated that they were likely to support low numbers and a low diversity of fish species. Hen Brook, which appeared to have more scope for fish species, was surveyed and found to be of no more than Local environmental value for fish.

8.9.85 A review of the fish fauna of the River Great Ouse identified a diversity of species present in the section river over which the Scheme will pass. This included the likelihood of Spined Loach occurring as part of the fish fauna, a species on Annex II of the EC Directive on the Conservation of Natural Habitats and Flora and Fauna (*The Habitats Directive* (Ref 8-2)). The River Great Ouse is also CWS and has a Medium environmental value.

8.9.86 During construction there may be some degradation of watercourse habitats. The section of the Hen Brook that will be beneath the Scheme is in an underpass with footpath and bridleway, being in semi-darkness and with altered temperature regime. For other watercourses passing under the Scheme, the effect will be more profound with a significant section of the watercourse being in darkness. This may influence connectivity, discouraging fish from moving up and downstream. The effects will not be entirely negative, as the cooler water would be of value during spells of warm weather and low oxygen in the brook.

8.9.87 Indirect impacts on fish could arise from construction related pollution incidents and silt laden site runoff entering Hen Brook and other watercourses and the River Great Ouse as well. This would potentially have impacts on fish populations downstream of the works. The implementation of pollution prevention best practice described in the First Iteration EMP **[TR010044/APP/6.8]** will be sufficient to prevent the potential of adverse impacts on the fish assemblages present.

8.9.88 The ecological function of Hen Brook and other watercourses will be maintained for all fish species present, which are no more than Local environmental value. The magnitude of impact on fish in these watercourses is Negligible (adverse), resulting in a significance of Neutral effect on the local fish population during construction.

8.9.89 In the case of the River Great Ouse, the magnitude of impact on fish in is also Negligible (adverse), resulting in a significance of Neutral effect on the local fish population during construction

Terrestrial invertebrates

8.9.90 The majority of habitat that will be lost to the Scheme comprises intensively managed arable fields which provide poor habitat for invertebrates. However, site clearance will involve the removal of hedgerows that represent suitable habitat for a Local assemblage of terrestrial invertebrates with some hedgerows in two parts of the Survey Area being found to be of County importance in terms of the dead wood habitat and associated invertebrate assemblages present.

8.9.91 Two closely associated small areas of short rabbit-grazed sward grassland were evaluated as being of above Local to County value for invertebrates of open habitats.

8.9.92 The impact upon terrestrial invertebrates as a result of hedgerow loss will be temporary being mitigated through a combination of the establishment of replacement hedgerows and new woodland, and the retention and introduction of deadwood habitat.

8.9.93 Assessing the environmental value of terrestrial invertebrates as being Medium and the magnitude of impact as temporarily Minor (adverse), the significance would be Slight (adverse).

Aquatic invertebrates

8.9.94 Of the 20 ponds scoped for detailed survey, there were nine ponds that could not be surveyed mostly because they were dry at the time of the survey and, in some case due to access problems. The Hen Brook was also surveyed.

8.9.95 Eleven ponds were surveyed following the *National Pond Survey (NPS) (Pond Action, 1998) guidance* (Ref 8-41) or *Predictive System for Multimetrics (PSYM) (Pond Action, 2002) guidance* (Ref 8-42) as described in **Appendix 8.4** of the Environmental Statement **[TR010044/APP/6.3]**.

8.9.96 This assessment has identified species and communities of aquatic invertebrates to be of Local to District importance in terms of their biodiversity evaluation.

8.9.97 Most of the species recorded were common, although ‘Local’ (Conservation value 5) species were recorded those ponds surveyed using the PSYM method. Four ponds were considered of District importance based on the diversity of families recorded by the PSYM analysis.

8.9.98 The design of the Scheme includes the creation of 18 ponds and patches of wetland as well as the restoration of sections of the Hen Brook and other watercourses as mitigation for this loss and degradation in habitats.

8.9.99 Aquatic invertebrates are assessed of being of Medium environmental value and the magnitude of impact resulting from the temporary loss of pond habitat and degradation of those section of watercourses passing under the Scheme including the Hen Brook will be Minor (adverse), leading to a significance of Slight (adverse). aquatic invertebrates during the construction period.

Invasive non-native plants

8.9.100 Although a total of eleven species of invasive non-native plants were found to be present, five terrestrial and six aquatic species, most were found outside the Order Limits and hence the risk of spreading any of these plants during the construction phase is low due to a lack of pathways.

a. Himalayan (Indian) balsam was found within the Order Limits along part of Hen Brook and along the riparian zone of the River Great Ouse and New Zealand Pigmyweed was present within the Order Limits in a pond at the western extremity of the Scheme. Given the risk assessment for both species, particular measures should be taken to prevent the spread of both during preliminary works and construction phases.

b. Giant Hogweed and Japanese Knotweed although not found within the Order Limits are present within distances and in locations where rhizome fragments and seeds respectively could be inadvertently spread into the Scheme before or during the construction phase. As such they pose a risk that they could be spread onto the Scheme.

c. In the case of Rhododendron and Variegated Yellow Archangel and the species of waterweeds also present in the general area, the risk of spread into the Order Limits is low due to lack of pathways of spread (Rhododendron and Yellow Archangel) and habitats that could be invaded (aquatic plants in the corridor of the River Great Ouse).

d. A management plan for invasive non-native plant species will be produced which will detail treatments and the best timing for such works, biosecurity procedures to adhere to, and how to carry out the works whilst minimising the risk of dispersion of invasive non-native plant species from, into and within the Scheme and to ensure that they do not cause any delays to the programme.

e. Given the low frequency of invasive non-native plant species within the Order Limits and within the wider area and the measures that will be taken ahead of works, these plants will not negatively impact the Scheme including its programme.

Operation

8.9.101 This section considers the effects upon designated sites, habitat and species that could occur during the operational phase of the Scheme.

8.9.102 **Table 8-10** summarises the magnitude of impact and significance of effect during the operational phase for sites designated for their biodiversity value, habitats and protected species.

Table 8-10: Magnitude of impact and significance of effect during operation

Receptor	Environmental value (sensitivity) (habitats to be lost or damaged)	Description of impact	Magnitude of impact	Significance of effect
Designated sites				
International	Very high	Negligible	No change	Neutral
National	High	Negligible	No change	Neutral
County	Medium	Impact of nitrogen emissions on two CWSs	Minor (adverse)	Neutral
Habitats				
Woodland (parts of)	Low	Increase in areas of woodland	Moderate (beneficial)	Slight (beneficial)
Grassland	Low	Increase in areas of grassland	Moderate (beneficial)	Slight (beneficial)
Arable fields with arable weeds	Low	Loss of arable weed habitat	Minor (adverse)	Slight (adverse)
Hedgerow	Medium	Increase in length of hedgerows	Moderate (beneficial)	Slight (beneficial)
Ancient and veteran trees	Medium	Impact of nitrogen emissions	No change	Neutral
Brooks and other watercourses	Medium	Restoration of watercourses	Minor (beneficial)	Slight (beneficial)
Ponds and other wetland habitat	Medium	Increase in ponds and wetland areas	Minor (beneficial)	Slight (beneficial)
Species				
Mammals				
Bats				

Receptor	Environmental value (sensitivity) (habitats to be lost or damaged)	Description of impact	Magnitude of impact	Significance of effect
Roosting bats	Up to Medium	Bat roost disturbance (Indirect)	Negligible (adverse) in the short to long-term.	Neutral
Foraging and commuting bats	Up to Medium	Disturbance to foraging and commuting bats (Indirect)	Minor (adverse) in the short to long-term	Slight (adverse)
Roosting, foraging and commuting bats	Up to Medium	Risk of bat mortality through collision with motor vehicles (Direct)	Minor (adverse) in the short to long-term	Slight (adverse)
Badger	Low	Creation of new sett. Provision of underpasses	Negligible	Neutral
Otter	Medium	Restoration of watercourses. Provision of underpasses	Minor (beneficial)	Slight (beneficial)
Birds				
Wintering birds	Medium	Increase in areas of a range of habitats	Minor (beneficial)	Slight (beneficial)
Breeding birds	Medium	Increase in areas of a range of habitats	Minor (beneficial)	Slight (beneficial)
Hobby	Medium	Provision of artificial nests	Negligible	Neutral
Red Kite	Low	None	Negligible	Neutral
Barn Owl	Medium	Provision of nest boxes	Negligible	Slight (beneficial)
Reptiles				
Common Lizard	Low	Increase in areas of a range of habitats	Minor (beneficial)	Slight (beneficial)

Receptor	Environmental value (sensitivity) (habitats to be lost or damaged)	Description of impact	Magnitude of impact	Significance of effect
Amphibians				
Great Crested Newt	Medium	Increase in ponds and wetland areas	Minor (beneficial)	Slight (beneficial)
Fish	Medium	Restoration of watercourses	Minor (beneficial)	Slight (beneficial)
Invertebrates				
Terrestrial	Medium	Increase in areas of a range of habitats	Minor (beneficial)	Slight (beneficial)
Aquatic	Medium	Restoration of watercourses and increase in ponds and wetland areas	Minor (beneficial)	Slight (beneficial)

Designated sites of international importance

8.9.103 The distance separating the Scheme from all designated sites of international importance, which are of SAC importance, is sufficient to ensure that there are no impact pathways including from nitrogen emissions from traffic on roads close to any such sites. There will be No change and no impact upon any sites designated for their international biodiversity value, and therefore no associated effects (**Table 8-10**).

8.9.104 Further detail is provided in the Habitats Regulations Assessment: No Significant Effects Report **[TR010044/APP/6.7]**.

Designated sites of national importance

8.9.105 The distance separating the Scheme from designated sites of national importance is sufficient to ensure that there are no impact pathways including from nitrogen emissions from traffic on roads close to any such sites. There will be No change and therefore no impact upon any sites designated for their national biodiversity value (**Table 8-10**).

8.9.106 Further detail is provided in **Appendix 8.2** of the Environmental Statement **[TR010044/APP/6.3]**.

Non-statutorily designated sites

8.9.107 The distance separating the Scheme from non-statutorily designated sites is sufficient to ensure that there are no impact pathways including from nitrogen emissions from traffic on roads close to all but two such sites. As a result, there will be no change and therefore no impact upon any these non-statutorily designated sites for their biodiversity value.

8.9.108 Sir John's Wood CWS and ancient woodland may be negatively impacted by the operation of the Scheme,, the likely effect being through the indirect impact on connectivity between this CWS to the south of the Scheme and Boys and Alington Hill Woods to the north of the Scheme. The creation of a mammal tunnel, specifically designed for bats, linking Sir John's Wood and the other two woodlands will maintain connectivity. As a result, there will be a Minor (adverse) magnitude of impact leading to a significance of Slight (**Table 8-10**).

8.9.109 One of the three sections that make up the Madingley Slip Road Roadside Verge CWS will experience a >1% change in critical load and >0.4kg N/ha/yr increase in nitrogen during the operational phase. The flora of this particular section is relatively tolerant to nitrogen and the magnitude of impact is assessed to be Minor (adverse), leading to a significance of Slight (**Table 8-10**).

8.9.110 Further detail is provided in **Appendix 8.2** of the Environmental Statement **[TR010044/APP/6.3]**.

Habitats

8.9.111 This section reports the operational impacts on habitats considered to be important biodiversity features, namely terrestrial habitats (woodland, hedgerow, arable flora and ancient and veteran trees) and aquatic habitats (ponds and other waterbodies, brooks and other watercourses and wetlands).

8.9.112 Sprays from carriageways including salt, may have a detrimental effect upon vegetation, although this is largely confined to areas within 5 metres of the carriageway, which for the Scheme will extend only to the newly created verges which are assessed as being of Low environmental value. The magnitude of impact of spray upon this habitat is Negligible (adverse), leading to a significance of Neutral.

8.9.113 There is potential for habitat degradation as a result of pollution, including acute pollution incidents from traffic collisions and diffuse pollution as a result of oil deposition and tyre wear and on the carriageway. Mitigation measures set out in **Chapter 13, Road drainage and the water environment** of the Environmental Statement **[TR010044/APP/6.1]** for managing surface water runoff from the road include provision of appropriate measures for treatment of surface water to mitigate pollution to higher standards than at present, including from acute pollution events. The newly created verges are assessed as being of Low environmental value and the magnitude of impact of pollution upon this habitat is Negligible (adverse), leading to a significance of Neutral.

Terrestrial habitats

8.9.114 Post-construction, the terrestrial habitat created along the Scheme will establish and mature, achieving a net gain in biodiversity (**Appendix 8.19** of the **Environmental Statement [TR010044/APP/6.3]**). This includes woodland and hedgerow as well as grassland and scrub habitats.

6.1.2 Woodland, hedgerow, grassland and scrub planting measures have been developed as part of the landscape and visual effects assessment reported in **Chapter 7, Landscape and visual effects** of the Environmental Statement **[TR010044/APP/6.1].** This will provide a combined function of landscape integration, habitat creation and replacement, to mitigate effects on biodiversity interests

6.1.3 For terrestrial habitats overall, assessed of Low environmental value, the magnitude of impact is assessed as Moderate (beneficial), resulting in a significance of Slight (beneficial) (**Table 8-10**).

6.1.4 In the specific case of arable field habitat, no such habitat will be included in the habitat creation, resulting in a magnitude of impact of Minor (adverse), resulting in a significance of Slight (adverse) (**Table 8-10**).

8.9.115 The one veteran tree found in the Scheme will experience a change in n nitrogen emissions of >1% in critical load and >0.4kg N/ha/year, In the context of the nitrogen environment of this veteran elm tree located in hedge either side of which is arable agriculture, these changes are insignificant. Given the land use change around the tree, there could be a decrease in exposure to nitrogen in the soils. On a precautionary basis, the magnitude of impact is assessed as Negligible. The tree was assessed as being of Medium environmental value, hence a significance of Neutral (**Table 8-10**).

8.9.116 The wetland restored at the Black Cat Quarry site, which will continue to attract wildfowl and other birds will experience negative impact through noise and visual disturbance as a result of traffic and some lighting. This disturbance is in the context of the existing traffic with associated noise, visual disturbance and lighting around the Black Cat roundabout and the A1. There will be planting alongside the Scheme to reduce the impact of visual disturbance which coupled with the tolerance of birds currently using the wetland, the magnitude of impact during the operational phase will be Minor (adverse), leading to a significance of Slight (adverse) (**Table 8-10)**.

Aquatic habitats

8.9.117 Those sections of brooks and other watercourses upstream and downstream of the culverted section of the channel have been assessed as being in poor ecological condition and will be subject to restoration as indicated in the Environmental Masterplan shown on **Figure 2.4** of the Environmental Statement **[TR010044/APP/6.2]**. The environmental enhancements for the various watercourses affected by the Scheme, from small ditches to brooks, are envisaged to fall into three types, ranging from medium to very high biodiversity benefit. The type of enhancement for any given watercourse will depend on factors such as the nature of the watercourse, the scope for restoration and its

accessibility for maintenance. Taking an equivalence of 1:4 for a medium type of enhancement, 1:3 for high and 1:2 for very high, it is estimated that damaged channels will be mitigated leaving a net gain in watercourse habitat.

8.9.118 Post-construction, the aquatic habitat created along the Scheme will establish and mature, achieving a net gain in biodiversity (**Appendix 8.19** of the **Environmental Statement [TR010044/APP/6.3]**). This includes ponds and other waterbodies, and brooks and other watercourses.

8.9.119 For aquatic habitats overall, assessed of Medium environmental value, the magnitude of impact is assessed as Minor (beneficial), resulting in a significance of Slight (beneficial) (**Table 8-10**).

Species

Bats

8.9.120 The potential operational impacts upon bats relate to direct mortality and habitat degradation.

8.9.121 The severance of flight lines has the potential to increase levels of bat mortality through accidental collision with vehicles. This could occur where bats attempt to cross the highway following existing or new linear features (hedgerows, tree lines, and other features). Vehicle collision tends to be associated with the species adapted to edge habitat, such as pipistrelle, which are more likely to attempt to cross larger unsheltered and open spaces at a height that may bring them into the path of oncoming vehicles. Species that regularly fly at height, for example noctule, may reasonably be expected to either avoid or fly over the road. The Scheme includes measures to reduce the risk of collision mortality, including for vulnerable bat species; these include the provision of underpasses and tunnels linked into the existing movement of bats, hedgerows and the design of landscaping to encourage bats to fly up and over the Scheme, especially where there are cuttings. As a result of these measures accidental mortality is unlikely to adversely impact the conservation status of the local bat population, and the magnitude of impact on all bat species will be negligible adverse in the operational period, leading to a neutral effect.

8.9.122 Artificial lighting has the potential to impact upon bats, causing them to avoid otherwise suitable areas of habitat. The lighting design has been developed to minimise light-spill onto adjacent habitats, including where there are potential roosts or important foraging and/or commuting habitat that is regularly used by the local bat population. Furthermore, the majority of the length of the Scheme will be unlit and at the existing Black Cat and Caxton Gibbet roundabouts, and at Eltisley, artificial lighting is already present on the existing road network. Given these factors, the magnitude of the artificial lighting impact on the bat population will be Negligible (adverse) in the operational period, resulting in a significance of Neutral (**Table 8-10**).

Badger

8.9.123 There are records of Badger collision mortalities along the existing A428, indicating that the Badger population currently moves across this road. Mitigation measures have been incorporated into the Scheme design to maintain habitat connectivity, including the use of eight underpasses and fencing (refer to the Environmental Masterplan illustrated in **Figure 2.4** of the Environmental Statement **[TR010044/APP/6.2]**). The underpasses have been sited to maintain connectivity and reduce collision mortality and will therefore reduce the risk of associated Badger deaths due to collision with vehicles.

8.9.124 The magnitude of impact during operation is assessed as Negligible adverse, resulting in a significance of Neutral effect.

Barn Owl

8.9.125 Accidental collision with vehicles is a cause of significant levels of mortality in Barn Owl populations. There is a risk of direct mortality to Barn Owl through accidental collision with vehicles using the Scheme and this would result in permanent/ irreversible damage to the Barn Owl population.

8.9.126 The risk of accidental collisions with traffic during operation of the Scheme will be managed through the use of 1.5m high fencing and the establishment of tall vegetation on the verges. These measures will be established on both verges along those sections of the Scheme known to have Barn Owl in the vicinity.

8.9.127 Management of grassland verges, keeping grassland short in specified areas or planting scrub on verges will reduce the suitability of habitat for small mammal and therefore the foraging potential for Barn Owl. The planting design is aimed at providing suitable foraging and commuting routes for Barn Owls to connect existing habitat on one side of the road corridor where Barn Owls are known to be present to avoid the need for them to cross the carriageway.

8.9.128 Fencing and vegetation (hedges and scrub) will be used to guide Barn Owl to certain safe flight paths over the Scheme. Maintenance of the fence and vegetation will form part of the management of the soft estate (see **Landscape and Ecology Management Plan**, Annex L of the First Iteration EMP **[TR010044/APP/6.8]**).

8.9.129 The erection of nest boxes for Barn Owl will achieve an enhancement for the species by expanding the scope for nesting in a predominantly arable landscape (**Biodiversity Management Plan,** Annex D of the First Iteration EMP **[TR010044/APP/6.8]**).

8.9.130 The magnitude of impact on the Barn Owl population which is of Medium environmental value is assessed as being of Negligible magnitude of impact, with a significance of Slight (beneficial).

Fish and aquatic invertebrates

8.9.131 Fish and aquatic invertebrates exist in the same habitats and will be subject to the same potential impacts that are associated with the operational phase of the Scheme. As such, they have been grouped together. There will be no direct impacts to the habitats supporting fish and aquatic invertebrates during operation of the Scheme; however, there may be impacts as a result of habitat degradation.

8.9.132 There is potential for indirect impacts associated with acute pollution incidents such as traffic collisions or from longer term diffuse pollution. Mitigation measures for managing surface water runoff, set out in **Chapter 13, Road drainage and the water environment** of the Environmental Statement **[TR010044/APP/6.1]**, include provision of measures for the treatment of polluted runoff to the appropriate standards.

8.9.133 The creation of 18 new ponds and wetland patches coupled with the restoration of sections of those brooks and other watercourses within the Order Limits will provide a significant enhancement for fish and aquatic invertebrates.

8.9.134 The overall outcome for fish and aquatic invertebrates, both assessed as being of Medium environmental value will be Minor (beneficial) magnitude of impact leading to a Slight (beneficial).

Other fauna

8.9.135 No operational impacts are predicted to occur for any other fauna, including mammals (apart from bats and Badger), birds including Hobby and Red Kite (apart from Barn Owl), reptiles, Great Crested Newt and terrestrial invertebrates.

8.9.136 All these species will benefit from the enhancements in habitats both terrestrial (woodland, hedgerows and grassland) and aquatic habitats (ponds and other waterbodies and brooks and other watercourses). The magnitude of impact upon these species and groups of species in the operational period will be Minor (beneficial) leading to a significance of Slight (beneficial).

8.9.137 Measures that will be taken to ensure that the Scheme is free of invasive non-native plant species will mean that there are no invasive non-native plants at the commencement of the operational phase (**Biodiversity Management ,** Annex D of the First Iteration EMP **[TR010044/APP/6.8]**).

8.10 Overall effects on biodiversity

8.10.1 The baseline habitat data were used to undertake a biodiversity assessment, calculating whether the Scheme would achieve a net loss, net gain or a neutral outcome. The method used to calculate the biodiversity net gain for the Scheme is that published by Highways England in April 2018 within CHE Memorandum 422/18, CPF metric 5.1b). The process and the calculations are described in **Appendix 8.19** of the Environmental Statement **[TR010044/APP/6.3].**

8.10.2 The outcome of the biodiversity calculation was a net gain of approximately 20.5%. The design of the Scheme includes a range of habitats with the gain

being primarily due to significant increases in woodland and grassland (**Table 8-9**).

8.10.3 There will be additional biodiversity gains for the Scheme such as the creation of patches of wetlands and restoring riparian habitat to the sections of brooks crossed by the Scheme (see **Biodiversity Management Plan,** Annex D of the First Iteration EMP **[TR010044/APP/6.8]**). Whilst valuable biodiversity enhancements, they do not contribute to the calculated biodiversity net gain as described above.

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