The Sizewell C Project

6.6 Volume 5 Two Village Bypass

Chapter 7 Terrestrial Ecology and Ornithology

Revision: 1.0

Applicable Regulation: Regulation 5(2)(a)

PINS Reference Number: EN010012

May 2020

Planning Act 2008
Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

Contents

Tables

Plates

None provided.

Figures

All figures are found within Annex 7A.1 of Appendix 7A: Ecological Baseline for Two Village Bypass.

Figure 7.1: Location of statutory designated sites within 5km of two village bypass

Figure 7.2: Location of non-statutory designated sites within 2km of two village bypass

Figure 7.3: Phase 1 habitat survey Plan for Two village bypass

Figure 7.4: National Vegetation Classification results for two village bypass

Figure 7.5: Invertebrate survey locations for two village bypass

Figure 7.6: Great Crested Newt Survey Results for Two village bypass

Figures 7.7-7.8: Schedule 1, Red List, Amber List and NERC Species Recorded at Two Village Bypass During Breeding Bird Surveys in April - June 2019

Figures 7.9-7.11: Bat activity survey results for two village bypass

Figures 7.12-7.14: Bat tree survey results for two village bypass

Figure 7.15: Otter and water vole survey results for two village bypass

Appendices

Appendix 7A Ecological Baseline for Two Village Bypass

7 Terrestrial Ecology and Ornithology

7.1 Introduction

7.1.1 This chapter of **Volume 5** of the **Environmental Statement** (**ES**) (Doc Ref. 6.6) presents an assessment of the terrestrial ecology and ornithology effects arising from the construction and operation of the two village bypass (referred to throughout this volume as the 'proposed development'). This includes an assessment of potential impacts, the significance of effects, the requirements for mitigation and the residual effects.

7.1.2 Detailed descriptions of the two village bypass site (referred to throughout this volume as the 'site'), the proposed development and the different phases of development are provided in **Chapters 1** and **2** of this volume of the **ES**. A glossary of terms and list of abbreviations used in this chapter is provided in **Volume 1**, **Appendix 1A** of the **ES** (Doc Ref. 6.2).

7.1.3 This assessment has been informed by data from other assessments as follows: **Volume 2**, **Chapter 10:** Transport (Doc Ref. 6.3);

- **Chapter 4** of this volume: Noise and vibration;
- **Chapter 5** of this volume**:** Air quality;
- **Chapter 6** of this volume: Landscape and visual (lighting);
- **Chapter 10** of this volume: Soils and agriculture; and
- **Chapter 12** of this volume: Ground water and surface water.

7.1.4 This assessment has been informed by data presented in the following technical appendix:

- **Appendix 7A** of this volume: Ecological Baseline for Two Village Bypass. This appendix includes all figures (**Annex 7A.1**), desk-study (**Annex 7A.2**), primary survey data (**Annex 7A.3**), biodiversity net gain report (**Annex 7A.4**), draft protected species licences (**Annex 7A.5**) and non-licensable method statements (**Annex 7A.6**).
- **Appendix 12A** of this volume: Two Village Bypass River Corridor Survey

7.2 Legislation, policy and guidance

7.2.1 **Volume 1, Appendix 6J** (Doc. Ref. 6.2) identifies and describes legislation, policy and guidance of relevance to the assessment of the potential terrestrial ecology and ornithology impacts associated with the Sizewell C Project across all **ES** volumes.

7.2.2 This section provides an overview of the specific legislation, policy and guidance of relevance to the proposed development assessment.

a) International

7.2.3 International legislation and policies relating to the terrestrial ecology and ornithology assessment include:

- Convention on Biological Diversity (Ref. 7.1);
- Convention on Wetlands of International Importance especially as Waterfowl Habitat 1971 (Ref. 7.2);
- Directive 2009/147/EC of the European Parliament and of the Council on the conservation of wild birds (Birds Directive) (Ref. 7.3);
- Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (Habitats Directive) (Ref. 7.4);
- Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention) (Ref. 7.5); and
- Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention) (Ref. 7.6).

7.2.4 The requirements of these, as relevant to the terrestrial ecology and ornithology assessment, are set out in **Volume 1**, **Appendix 6J** of the ES.

b) National

7.2.5 National legislation and policies relating to the terrestrial ecology and ornithology assessment include:

- Wildlife and Countryside Act (Ref. 7.7);
- Conservation of Habitats and Species Regulations (Habitat Regulations) (Ref. 7.8);

- Countryside and Rights of Way Act (Ref. 7.9);
- Natural Environment and Rural Communities (NERC Act) Act (Ref. 7.10);
- Hedgerows Regulation (Ref. 7.11);
- Protection of Badgers Act (Ref. 7.12);
- UK Biodiversity Action Plan (BAP) (Ref. 7.13) (now superseded by the "UK Post-2010 Biodiversity Framework" (Ref. 7.14));
- Planning Practice Guidance (Ref. 7.15);
- Government's 25 Year Environment Plan (Ref. 7.16);
- National Planning Policy Framework (Ref. 7.17); and
- National Policy Statements (NPS) for Energy Infrastructure (Ref. 7.18).

7.2.6 The requirements of these, as relevant to the terrestrial ecology and ornithology assessment, are set out in **Volume 1, Appendix 6J** of the ES.

7.2.7 The NPS 2011 sets out the national policy for energy infrastructure. The overarching NPS for Energy (NPS EN-1) (Ref. 7.18), and NPS for Nuclear Power Generation (NPS EN-6) (Ref. 7.18) provide the primary policy framework within which the development will be considered. A summary of the relevant planning policy, together with consideration of how the advice has been taken into account is provided in **Volume 1, Appendix 6J** of the ES, with requirements specific to this site set out in **Table 7.1** and **Table 7.2**.

Table 7.1: Requirements of the National Policy Statement for Energy

Ref	NPS Topic Requirement	How the Requirement Has Been Addressed in Relation to Terrestrial Ecology and Ornithology
EN-1 4.3.	*'Under the Habitats and Species Regulations consideration must be given to whether the project may have a significant effect on a European site, or on any site to which the same protection is applied as a matter of policy, either alone or in combination with other plans or projects. In the event that an Appropriate Assessment is required, the applicant must provide information as may reasonably be required to enable the*	A Habitat Regulations Assessment (HRA) screening assessment is included in the **Shadow HRA Report** for the Sizewell C Project (Doc Ref. 5.10). The **Shadow HRA Report** considers the possible pathways whereby the proposed development (in this case the two village bypass) could have a significant effect on a European site. It concludes that whilst possible pathways do exist (such as the

Ref	NPS Topic Requirement	How the Requirement Has Been Addressed in Relation to Terrestrial Ecology and Ornithology
	Appropriate Assessment to be conducted. This should include information on any mitigation measures that are proposed to minimise or avoid likely effects.'	Alde-Ore Estuary Special Protection Area (SPA), Special Area of Conservation (SAC) and Ramsar site), there is no potential for a significant effect.
EN-1 5.2.3.	*'A particular effect of air emissions from some energy infrastructure may be eutrophication, which is the excessive enrichment of nutrients in the environment. Eutrophication from air pollution results mainly from emissions of Nitrogen Oxides and ammonia. The main emissions from energy infrastructure are from generating stations. Eutrophication can affect plant growth and functioning, altering the competitive balance of species and thereby damaging biodiversity. In aquatic ecosystems it can cause changes to algal composition and lead to algal blooms, which remove oxygen from the water, adversely affecting plants and fish. The effects on ecosystems can be short-term or irreversible, and can have a large impact on ecosystem services such as pollination, aesthetic services and water supply.'*	Air emissions have not been considered as a significant effect pathway due to the enforcement of tertiary mitigation measures which would suitably protect neighbouring habitats. See **Chapter 5** for further details of the air quality assessment. Consideration of the potential air quality effects on Foxburrow Wood due to proximity of the proposed development is reported in **section 7.6** of this chapter, and no significant effect is identified.
EN-1 5.2.7.	*'The **ES** should describe… any potential eutrophication impacts.'*	Please see response to EN-1 5.2.3.
EN-1 5.3.3.	*'Where the development is subject to Environmental Impact Assessment (EIA) the applicant should ensure that the **ES** clearly sets out 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.'*	There would be no signifiant effects on internationally designated sites (see EN-1 4.3). Designated sites have been detailed within **section 7.4**. Designated sites have been scoped out of the assessment in **Table 7.10** due to the distance from the proposed development. In additon for further inofrmation on internationally designated sites please refer to the **Shadow HRA Report**.
EN-1 5.3.18.	*'The applicant should include appropriate mitigation measures as an integral part of the proposed development. In particular, the applicant should demonstrate that:* • *during construction, they will seek to ensure that activities will be confined to the minimum areas required for the works;* • *during construction and operation best practice will be followed to ensure that risk of disturbance, or damage to species or habitats is minimised, including as a*	Primary and tertiary mitigation is defined within **section 7.5**. Secondary mitigation has is detailed in **section 7.7**.

Ref	NPS Topic Requirement	How the Requirement Has Been Addressed in Relation to Terrestrial Ecology and Ornithology
	consequence of transport access arrangements; • *habitats will, where practicable, be restored after construction works have finished; and* • *opportunities will be taken to enhance existing habitats and, where practicable, to create new habitats of value within the site landscaping proposals.'*	

Table 7.2: Requirements of the National Policy Statement for Nuclear Power Generation

Ref	NPS Topic Requirement	How the Requirement Has Been Addressed in Relation to Terrestrial Ecology and Ornithology
EN-6 1.7.4.	*'Possible adverse effects on nature conservation sites of European importance were identified by the Nuclear HRA. Further studies will need to be carried out, as part of the project HRA, and EIA processes for individual development consent applications, to determine the significance of the effects and the effectiveness of any mitigation measures.'* *'Possible significant adverse effects on nationally important nature conservation sites and designated landscapes were identified by the Nuclear Appraisal of Sustainability (AoS). Further studies will need to be carried out, as part of the project EIA process for individual development consent applications, to determine the significance of the effects and the effectiveness of any mitigation measures.'*	A HRA screening assessment is included in the **Shadow HRA Report** for the Sizewell C Project (Doc Ref. 5.10). The **Shadow HRA Report** considers the possible pathways whereby the proposed development (in this case the two village bypass) could have a significant effect on a European site. It concludes that whilst possible pathways do exist (such as the Alde-Ore Estuary SPA, SAC and Ramsar site), there is no potential for a significant effect. Within this **ES**, the methodology to determine the ecological baseline, and baseline for terrestrial ecology and ornithology is detailed within **section 7.3**, **section 7.4** and **Appendix 7A. Section 7.4** also identifies the Important Ecological Features (IEFs), for which the impacts have been assessed within **section 7.6**, in line with the methodology defined within **section 7.3**. **Section 7.7** describes the additional mitigation prescribed to minimise significant effects and monitoring required to measure mitigation effectiveness.
EN-6 Annex A A.7.4.	*'All project level HRA must take account of the potential adverse effects and the proposed avoidance and mitigation measures identified through the strategic level assessment(s). '*	
EN-6 Annex C C.8.54.	*'The HRA on-sites of international importance has proposed a suite of avoidance and mitigation measures to be considered as part of the project level HRA. At this stage, it is assessed that the effective implementation of the proposed suite of avoidance and mitigation measures may help to address adverse effects on European Site integrity, but that more detailed project level HRA is required to reach conclusions that are in accordance with the requirements of the Habitats Directive.'*	

Ref	NPS Topic Requirement	How the Requirement Has Been Addressed in Relation to Terrestrial Ecology and Ornithology
EN-6 Annex C C.8.53.	*'A precautionary approach suggests that the assessment at this strategic level cannot rule out the potential for adverse effects on the integrity of nine European Sites (Alde-Ore and Butley Estuaries SAC, Alde-Ore Estuary SPA/Ramsar, Minsmere to Walberswick Heaths and Marshes SAC, Minsmere to Walberswick SPA/Ramsar, Orfordness-Shingle Street SAC, Sandlings SPA, Outer Thames Estuary SPA) through potential impacts on water resources and quality, habitat and species loss and fragmentation, and disturbance (noise, light and visual).'*	An assessment of statutory designated sites within 5 kilometres (km) of the site was carried out and is detailed in **section 7.4.** Of the designated sites identified, Alde-Ore Estuary SPA, SAC, Ramsar site and Site of Special Scientific Interest (SSSI) has been scoped into the detailed assessment as a potential impact pathways has been identified. All other designated sites have been scoped out due to their distance from the site boundary and the lack of direct and indirect impact pathways. This is described within **Table 7.10**.
EN-6 Annex C C.8.60.	*'Some responses focused on designated sites including Sizewell Marshes SSSI and Leiston-Aldeburgh SSSI, and potential effects on Minsmere-Walberswick Heaths and Marshes SSSI, from which the site boundary includes some land take. Some responses questioned how direct land take could be mitigated'*	
EN-6 Annex C C.8.61.	*'The AoS identified the potential for adverse effects on-sites and species considered to be of national nature conservation importance means that significant strategic effects on biodiversity cannot be ruled out at this stage of the appraisal. The AoS identifies that there could be potential significant effects at the following SSSIs which are within 5km of the site: Sizewell Marshes SSSI; Minsmere-Walberswick Heaths and Marshes SSSI; Leiston-Aldeburgh SSSI; Alde-Ore Estuary SSSI.'*	
EN-6 Annex C C.8.65.	*'The Government has noted that there will be further assessment of any proposal for [Sizewell C] at the project level and that NPS EN-1 sets out detailed consideration that must be given to issues related to nationally designated sites, should an application for development consent come forward.'*	Please refer to the explanation in relation to EN-1 5.3.3.

c) Regional

7.2.8 Regional policies relating to the terrestrial ecology and ornithology assessment include:

- Suffolk Nature Strategy (Ref. 7.19);

- Suffolk Local BAP (Ref. 7.20); and
- Suffolk's Priority Species and Habitats List (Ref. 7.21).

7.2.9 The requirements of these, as relevant to the terrestrial ecology and ornithology assessment, are set out in **Volume 1, Appendix 6J** of the ES.

d) Local

7.2.10 Local policies relating to the terrestrial ecology and ornithology assessment include:

- Suffolk Coastal District Council (SCDC) Local Plan Core Strategy and development management polices (Ref. 7.22);
- East Suffolk Council Final Draft Local Plan (Ref. 7.23); and
- County wildlife site (CWS).

7.2.11 The requirements of these, as relevant to the terrestrial ecology and ornithology assessment, are set out in **Volume 1, Appendix 6J** of the ES.

e) Assessment guidance

7.2.12 This assessment has been undertaken in accordance with the Chartered Institute of Ecology and Environmental Management (CIEEM) Guidelines for Ecological Impact Assessment (EcIA) (Ref. 7.24), to provide the determining body with clear and concise information about the likely significant ecological effects associated with the proposed development. In addition, the following guidance documents were considered during the survey and assessment process.

- Hanbook for Phase 1 Habitat survey – a technique for environmental audit (Ref. 7.25);
- Bird Monitoring Methods: A Manual of Techniques for Key UK Species (Ref. 7.28);
- UK Birds of Conservation Concern (Ref. 7.29);
- Red Data Book of British Invertebrates (Ref. 7.30);
- Hedgerows Regulations Guidelines (Ref. 7.11);

- Technical Information Note 102 – Reptile Mitigation Guidelines (Ref. 7.31);
- Great crested newt (*Triturus cristatus*) mitigation guidelines (Ref. 7.32);
- Evaluating the suitability of habitat for the great crested newt (Ref. 7.33);
- Natural England. Standing advice for local planning authorities who need to assess the impacts of development on badgers (*Meles meles*) (Ref. 7.34); and
- Bat Surveys: Good Practice Guidelines, third edition (Ref. 7.35).

7.2.13 Further details on this guidance, as relevant to the assessment of terrestrial ecology and ornithology, is provided in **Volume 1, Appendix 6J** of the ES.

7.3 Methodology

a) Scope of the assessment

7.3.1 The generic EIA methodology that has been applied for the Sizewell C Project is detailed in **Volume 1**, **Chapter 6**.

7.3.2 The full method of assessment for terrestrial ecology and ornithology that has been applied for the Sizewell C Project is included in **Volume 1**, **Appendix 6J** of the ES.

7.3.3 This section provides specific details of the terrestrial ecology and ornithology methodology applied to the assessment of the proposed development, and a summary of the general approach to provide appropriate context for the assessment that follows. The scope of assessment considers the impacts of the construction and operation of the proposed development.

7.3.4 Under the CIEEM guidelines (Ref. 7.24) habitats and species considered sufficiently important (in nature conservation terms) to be a material consideration in the planning decision, as well as legally protected and/or controlled species for which there is a potential for a breach of their respective legislation as a result of the proposed development, are considered to be IEFs. Ecological features can be important for a variety of reasons (e.g. quality and extent of designated sites or habitats, habitat/species rarity).

7.3.5 To comply with the CIEEM Guidelines for EcIA (Ref. 7.24), this EcIA has also identified the IEFs that are of sufficient importance, and likely to be

sufficiently affected by the proposed development, so as to be a material consideration in the planning decision, and require a more detailed assessment. The same process also allowed for the identification of those IEFs that are not likely to be significantly affected, and so do not require further assessment; that is, they can reasonably be scoped out of the EcIA. Where protected species are present, and there is the potential for a breach of the legislation, those species are also considered to be IEFs to be included in the EcIA.

7.3.6 The scope of this assessment has been established through a formal EIA scoping process undertaken with the Planning Inspectorate in 2019. A request for an EIA scoping opinion was initially issued to the Planning Inspectorate in 2014, with an updated request issued in 2019, see **Volume 1, Appendix 6A**.

7.3.7 Comments raised in the EIA scoping opinion received in 2019 have been taken into account in the development of the assessment methodology. These are detailed in **Volume 1**, **Appendices 6A** to **6C**.

b) Consultation

7.3.8 The scope of the assessment has also been informed by ongoing consultation and engagement with statutory consultees throughout the design and assessment process. A summary of the comments raised and SZC Co. Responses are detailed in **Table 7.3.**

Table 7.3: Summary of consultation responses that have informed the scope and methodology of the terrestrial ecology and ornithology assessment

Consultee	Date	Comment	SZC Co. Response
Natural England.	17th February 2017.	Options 3 and 4 involve the crossing of the River Alde which flows into Alde-Ore Estuary SSSI/SPA/Ramsar site and Alde-Ore and Butley Estuaries SAC; potential effects on the designated sites should be evaluated. The proposed routes should be surveyed for the presence of protected species and appropriate mitigation measures identified.	A full suite of ecology surveys was undertaken during 2019 to establish the ecological baseline of the site in order to inform the assessment and development of appropriate mitigation. The potential impacts to linked designated sites has been undertaken as part of this assessment.
Suffolk County Council.	February 2017.	While the two village bypass is more extensive than the one village bypass, having a much larger total footprint, the ecological sensitivity of the receiving land is, for the most part, less than that of the one village bypass route. The majority this route passes through a fragmented arable ecosystem with a	As part of design evolution, where possible the boundary of the site has been amended to reduce the land take to a minimum and has been sited where possible to avoid important ecological features. Mitigation measures have

Consultee	Date	Comment	SZC Co. Response
		limited network of hedges and scattered woodlands. Only a short section of the two village bypass passes through the floodplain and floodplain grazing marsh, and thus the extent of disruption to ecological function is less than the one village route. Additionally, the section through the floodplain may, unlike the one village option, be suitable for an elevated section rather than a culverted embankment, as shown in the consultation document. Such a solution would minimise adverse impacts on the hydrological and ecological function of the floodplain.	been incorporated into the design of the development to reduce the impacts to ecological receptors where reasonably practicable.
Suffolk County Council.	February 2017.	Significant direct impacts on ancient woodland are avoided as Foxburrow Wood is bypassed, although there may be indirect effects to the north-west corner of the wood. Some small areas of secondary woodland may also be impacted at Nuttery Belt and Pond Wood. However, these impacts can be mitigated in the long term through effective and robust planting schemes and mitigation for disruption to connectivity for both otters and badgers can be incorporated into the detailed design of the scheme as required. It may also be possible for minor alterations to the routing of the two village bypass in order to avoid these woodlands.	The design of the proposed development has sought to avoid woodland where possible or reduce land take from these areas as far as reasonably practicable. Woodland planting also is also proposed as part of the design to mitigate for the loss of woodland where avoidance of woodland loss cannot be avoided.
Suffolk County Council.	February 2017.	It is also notable that where this route does cross the flood plain it is principally through arable fields, minimising the landscape and ecological impacts in this sensitive location. Furthermore, as identified in the consultation document, there is likely to be scope to review the detailed routing.	A detailed assessment of the impacts to the floodplain grazing marsh has been undertaken within this chapter.
Suffolk County Council.	10th April 2019.	It is acknowledged that the alignment of the two-villages bypass needs further work and assessment to ensure mitigation measures are in place for occupiers of properties close to the new route. The optimum routing needs to be examined and micro-sited to ensure	The design of the proposed development has sought to avoid areas of woodland where possible. Woodland planting is also proposed as part of the design to mitigate for the loss of woodland where avoidance

Consultee	Date	Comment	SZC Co. Response
		impacts on ancient woodland and residents are minimised and that environmental sensitivities are minimised.	of woodland loss cannot be avoided.
Environment Agency.	29th March 2019.	Protected species: Impacts to a range of protected species, habitat fragmentation and direct loss of habitat and changes to hydromorphology as a result of proposed river crossings has not been assessed.	A full suite of ecology surveys was undertaken during 2019 to establish the ecological baseline of the site in order to inform the assessment and development of appropriate mitigation. Details of the primary measures incorporated into the design and management measures to reduce the impacts on protected species is provided in **section 7.5** of this chapter.
Environment Agency.	29th March 2019.	In the absence of detailed baseline information means that it is currently not possible to adequately assess the impact of the development on ecology. Section 7.3.17 discounts the likelihood of the proposed road causing significant effects on otter and water vole. We consider this conclusion to be premature given that we are unaware of any baseline protected species surveys that may have been undertaken. This has the potential to detrimentally impact protected species (including water vole, otter and European eel) through direct habitat loss, habitat fragmentation and direct loss of protected species. A flood risk permit from the Environment Agency will be needed for any proposed works in, over, under or within 8 metres (m) of a main river.	A full suite of ecology surveys was undertaken during 2019 to establish the ecological baseline of the site in order to inform the assessment and development of appropriate mitigation.
Natural England.	9th April 2019.	Designated sites We note that these proposals include re-alignment of the River Alde and would involve construction over freely draining acid soils prone to leaching and erosion and fen peat soils which could potentially disrupt the hydrological integrity of the	The proposed development would not require a realignment of the River Alde. Instead, a crossing over the river is proposed which accounts for the river alignment. Assessments of the ecological and hydro geomorphological effects on the River Alde have been undertaken with

Consultee	Date	Comment	SZC Co. Response
		peat. The River Alde eventually flows into the SAC, SPA, Ramsar site and SSSI some way downstream and so further hydrological assessment is required to enable informed decisions to be made and ensure that adverse effects do not occur.	consideration of the impacts on the designated sites.
Natural England.	9th April 2019.	Where possible the use of lighting should be avoided to maintain a 'dark sky'. Where it is considered necessary to relocate water voles by displacement, during the creation of crossing points at water courses, sufficient adjacent habit of suitable quality must be available or created in advance of the works. Please note that this activity will require a licence from Natural England. We consider that the principles of the mitigation and compensation are broadly acceptable. However, we are unable to provide further comment until full surveys for protected species are carried out and mitigation/compensation proposals provided for any identified impacts.	The majority of route of the proposed two village bypass would be unlit, thereby maintaining a dark corridor and minimising the potential impacts to nocturnal species. To ensure road safety, lighting would be provided at the A12 western roundabout and the A12/A1094 Friday Street eastern roundabout extending north to highlight the junction to approaching vehicles. The remaining junctions would have low minor road flows, and be similar to existing unlit rural junctions, and would therefore be unlit to minimise light spill. Operational lighting design would be compliant with relevant highway standards and where possible would be chosen to limit light spill Where reasonably practicable, a buffer distance of 10m would be maintained during construction from the toe of the banks the River Alde and ditches, to protect the integrity of the banks as well as the associated ecological features. Where this is not possible, and if water vole habitat will be impacted, then a licence from Natural England would be sought. A full suite of ecology surveys was undertaken during 2019 to establish the ecological baseline of the site and inform the assessment and development of appropriate mitigation.

Consultee	Date	Comment	SZC Co. Response
Natural England.	9th April 2019.	From the consultation documents it would appear that the proposed route would pass between Foxburrow Wood and Hall Cottages (Vol 1, para 12.5.4, pg. 336). However, according to Figures 2.12 and 12.1 (Vol 1, pg. 31 and pg. 337 respectively), part of the Foxburrow Wood ancient woodland would be destroyed by the bypass. As set out in NPS EN – 1, "Ancient woodland is a valuable biodiversity resource both for its diversity of species and for its longevity as woodland. Once lost it cannot be recreated. The IPC should not grant development consent for any development that would result in its loss or deterioration unless the benefits (including need) of the development, in that location outweigh the loss of the woodland habitat" (para 5.3.14, pg. 71). Clarity is therefore required on this issue within the ES.	Foxburrow Wood CWS ancient woodland will be retained in its entirety. A buffer distance of 15m from earthworks would be applied to minimise any impacts to the trees on the edge of the ancient woodland.
Natural England.	9th April 2019.	We note from the consultation documents that, if progressed, the road would be approximately 2.4 km in length with 2.5m wide verges (Vol 1, paras 2.7.2 and 2.7.3, pg. 31); we advise that this presents excellent opportunities for biodiversity creation through the planting up of verges with native species, particularly given that the intention is to retain the road as a lasting legacy of the project following completion of the power station (Vol 1, para 2.7.4, pg. 31). This should be considered in terms of potential environmental net gain when assessed against the current baseline value of the site.	A landscaping strategy has been incorporated into the scheme design and is illustrated on the masterplan provided in **Figures 2.1** to **2.4** of this volume. A biodiversity net gain assessment has been undertaken to help inform the landscape and ecology design. This is presented in **Annex 7A.4**. Biodiversity net gain will be achieved as a result of the proposed mitigation planting post construction.
Suffolk Wildlife Trust.	8th April 2019.	The PEI assessment concludes that the construction of the proposed road has the potential to result in significant adverse impacts on great crested newts, bats, otters and water vole, but then concludes "no residual effects" based on the implementation of "potential mitigation measures under Natural England licence". Impacts on other ecological receptors, such as reptiles, breeding birds and the River	Ecology surveys were undertaken during 2019 to establish the ecological baseline of the of the site in order to inform the assessment and development of appropriate mitigation. Details of the ecological baseline are provided in

Consultee	Date	Comment	SZC Co. Response
		Alde and its surrounding habitats are scoped out as embedded mitigation measures will form part of the proposal. However, without further surveys and assessment of the habitats and species present along the route of the proposed road we consider that it is not possible to be confident that mitigation can be achieved in this way. The proposed bypass has the potential to result in significant adverse ecological impacts during both construction and operation and as currently presented the measures referenced do not appear to be adequate to mitigate such impacts.	**section 7.4** of this chapter and in **Appendix 7A** of this volume.
Environment Agency.	27th September 2019.	Protected species: Impacts to a range of protected species, habitat fragmentation and direct loss of habitat and changes to hydromorphology as a result of proposed river crossings has not been assessed.	Ecology surveys were undertaken during 2019 to establish the ecological baseline of the of the site in order to inform the assessment and development of appropriate mitigation for all species.
Environment Agency.	27th September 2019.	In the stage 3 consultation document it stated that the crossing would be elevated over the valley of the River Alde. Now embankments are proposed across the valley of the river and a small span bridge is proposed to cross the river itself.	The crossing of the River Alde would comprise an overbridge approximately 60m in length, and 7.5m (+/- 1m) in height. The positioning of the intermediary piers would avoid the River Alde. This would preserve the natural integrity of the banks of the river, bed and bankside, and minimise shading effects and is of sufficient size, and capacity to enable passage for otters and water voles to be maintained during construction and operation
Natural England.	3rd October 2019.	We note that a pedestrian bridge crossing over the bypass is now proposed within in a 4.5 metre cutting in close proximity to Foxburrow Wood. Whilst Figure 2.23 shows a semi natural buffer which would appear to be more than 15m from the road to the woodland (in line with the minimum buffer stated in the Ancient Woodland Standing Advice), this area will presumably be sloped from	The proposed landscape strategy has sought to incorporate ecological connectivity into the design of where practicable. A buffer distance of 15m from earthworks would be applied to minimise any impacts to the trees on the edge of the ancient woodland.

Consultee	Date	Comment	SZC Co. Response
		the woodland down to the road into the cutting. Whilst this buffer could, if planted up, mitigate impacts to the woodland from lighting, air quality (dust and NOx), pollution, fly tipping etc. during construction and operation, the potential remains for impacts from damage to soil around the tree roots, changes to the water table and reduced ecological connectivity; we advise that the latter could be largely maintained through the implementation of a green bridge. This must therefore be assessed in further detail within the EIA in line with the avoid-mitigate-compensate hierarchy.	A biodiversity net gain assessment has been undertaken to help inform the landscape and ecology design. This is presented in **Annex 7A.4**. Biodiversity net gain at the site will be achieved as a result of the proposed mitigation planting post construction.
Natural England.	3rd October 2019.	The TVB, Sizewell Link Road (SLR), Theberton bypass and Freight Management Facilities (FMFs), the proposals are on land which includes habitats listed under Section 41 of the NERC Act, Paragraphs 2.8.7 and 2.12.7 Table 6.7 which in the Secretary of State's opinion are of principal national importance for the purpose of conserving biodiversity. These include floodplain grazing marsh for the TVB, deciduous woodland and parkland for the SLR and Theberton bypass, and deciduous woodland for the FMF Option 1. Natural England's preferred design options here (as for the Sizewell C MDS proposals) are those which would have the least environmental impact in this regard, in line with paragraphs 5.3.7, 5.3.8 and 5.3.17 of NPS EN-1.	As part of the design development process, the site boundary has been amended to reduce the land take where possible, and has been sited where possible to avoid important ecological features. Mitigation measures have been incorporated into the design of the development to reduce impacts on ecological receptors where reasonably practicable.
Natural England.	3rd October 2019.	We note that the proposed river crossing for the TVB crosses the River Alde and a considerable area of floodplain grazing marsh. We therefore advise that a clear span bridge would be preferable to a culvert in this regard, as this would likely be less damaging to this priority habitat and the other priority species which are likely to be present such as otter and water vole (also protected species). Impacts must be fully assessed in this context within the EIA, with avoidance (including consideration	The crossing of the River Alde would comprise an overbridge, approximately 60m in length, which would preserve the natural integrity of the banks of the river, bed and bankside, and minimise shading effects and is of sufficient size, and capacity to enable passage for otters and water voles to be maintained during construction and operation.

Consultee	Date	Comment	SZC Co. Response
		of less damaging alternatives), mitigation and compensation measures set out in accordance with the mitigation hierarchy.	The impacts to the floodplain grazing marsh have been assessed within this chapter.
Royal Society for the Protection of Birds.	23rd September 2019.	We are concerned about the proximity of Foxburrow Wood CWS. Whilst it is difficult to determine from the map, we assume there will be no net loss from the site. Even so, in our view the likely impact would require mitigation. A cut through, with ancillary footbridge for the public footpath would, in our view, not be enough to mitigate impact and the loss of ecological functionality across the landscape. Therefore, we strongly advise the construction of a green bridge at this location to help retain connectivity with several locally important hedge lines. The drainage infiltration basins will need habitat surveys and protected species surveys prior to works. However, we believe these basins could be designed in such a way as to provide opportunities for Net Gain and request that careful thought is given to this. The areas of grass could be planted with wild flower and/or pollen and nectar mixes and managed in a sensitive way. There are also options to include skylark plots. Again, careful thought over the long-term management of these areas could contribute to Net Gain. We also have significant concerns on the loss of ecological connectivity along the river corridor as a result of the crossing. More detail is required to determine this and we expect mitigation in terms of mammal passes and related protected species surveys. Furthermore, more evidence is required to understand how the by-pass might affect hydrology and the relationship between the river and its floodplain and consequently, the local wet meadows. If there is an effect, considerable effort will be needed to meet Net Gain, over and above what is currently being proposed.	The proposed landscape strategy has sought to incorporate ecological connectivity into the design where practicable, including hedgerow planting along the length of the route and areas of tree and shrub planting. Ecology surveys were undertaken during 2019 to establish the ecological baseline of the site in order to inform the assessment and development of appropriate mitigation. A biodiversity net gain assessment has been undertaken to help inform the landscape and ecology design. This is presented in **Annex 7A.4**. Biodiversity net gain at the site will be achieved as a result of the proposed mitigation planting post construction.

Consultee	Date	Comment	SZC Co. Response
Suffolk County Council and East Suffolk Council.	26th September 2019.	The route of the proposed two-village bypass crosses the River Alde and its floodplain and runs in close proximity to Foxburrow Wood County Wildlife Site, designated as ancient woodland. As well as the route of the road, the plans provided identify the need for areas of flood compensation storage to be created close to the route. The bypass is likely to result in several ecological impacts which have not been demonstrated can be adequately mitigated or compensated. Of particular concern is the loss of floodplain grazing marsh which is UK Priority Habitat (under Section 41 of the Natural Environment and Rural Communities Act (2006)); the fragmentation of habitats and species as a result of the use of a causeway and narrow span bridge crossing of the river, and the impact (particularly on hydrology) on Foxburrow Wood as a result of the construction of a cutting adjacent to it. The information presented in the Stage 4 consultation does not address any of these matters. This must be done before the submission of the DCO.	The proposed development has been designed to minimise the loss of floodplain grazing marsh where practicable. Since Stage 4 consultation, the design of the proposed development has been amended and sought to minimise the loss of floodplain grazing marsh where practicable. This includes increasing the length of the overbridge over the River Alde from 36m to approximately 60m as part of design evolution as well as providing additional culverts; both measures reduce the need for floodplain compensation and so reduce the potential damage to any floodplain grazing marsh. The crossing of the River Alde would comprise an overbridge and the positioning of the intermediary piers would avoid the River Alde. This would preserve the natural integrity of the banks of the river, bed and bankside, and minimise shading effects and is of sufficient size, and capacity to enable passage for otters and water voles to be maintained during construction and operation. The impacts to floodplain grazing marsh are assessed within this chapter.
Suffolk County Council and East Suffolk Council.	26th September 2019.	River Alde crossing/flood compensation land: Stage 4 has identified areas of land for flood compensation (paragraph 2.8.7). The amount of flood compensation land should be minimised. The Councils wish to see a viaduct or an alternative design that	Since Stage 4 consultation, the design of the proposed development has been amended and sought to minimise the loss of floodplain grazing marsh where practicable. This includes increasing the length of the overbridge over the River Alde from 36m to approximately

Consultee	Date	Comment	SZC Co. Response
		reduces the requirement for flood storage compensation and reduces the potential impacts on ecology and archaeology from an increase in upstream flood risk and the requirement for flood compensation storage.	60m as part of design evolution as well as providing additional culverts to reduce the areas required for floodplain compensation. The impacts to the floodplain grazing marsh have been assessed within this chapter.

c) Study area

7.3.9 The study area includes the land within the site boundary and ZOI of the proposed development. Due to the variable sensitivity of terrestrial ecology and ornithology receptors, the study area differed depending on the receptor considered.

7.3.10 The survey area for which baseline data was collected is defined as *'the geographical extent over which a particular field survey activity took place'*. The survey area differed depending on the receptor being surveyed.

7.3.11 Ecological features have been considered within areas of the site boundary and their immediate environs, taking into account their legislative protection, conservation status, and their status/distribution in the vicinity of the site, as well as desk-study information and previous survey work.

7.3.12 Areas and resources that may be affected by the identified activities arising from the whole lifespan of the proposed development were considered. These identify the ZOIs. The ZOI is defined as '*the area over which ecological features may be affected by potential biophysical changes caused by a proposed project and associated activities'* (Ref. 7.24).

7.3.13 The ZOIs have been developed as species or species assemblage-appropriate distances from the site boundary, taking into account varying mobility. **Table 7.4** defines the ZOI, study area and survey area for the considered ecological features.

Table 7.4: Specific Zone of Influence, study area and survey areas for ecological features

Ecological Feature		ZOI	Study Area	Survey Area
Designated sites.	Statutory designated.	5km	5km	N/A
	Non-statutory designated.	2km	2km	

Ecological Feature		ZOI	Study Area	Survey Area
Plants and habitats.		2km	2km	Within the site boundary.
Invertebrates		2km	2km	Included as part of extended Phase 1 habitat and protected species survey. Targeted surveys of the River Alde, ditches, riparian vegetation and floodplain grassland.
Reptile		2km	2km	Included as part of extended Phase 1 habitat and protected species survey.
Amphibians		2km	2km	Within the site boundary and a 500 metre (m) buffer area[1].
Birds		2km	2km	Within the site boundary.
Bats	Daubenton's bat (*Myotis daubentonii*).	2km	2km	Within the site boundary.
	Natterer's bat (*Myotis nattereri*).	4km	4km	
	Noctule (*Nyctalus noctula*).	4km	4km	
	Leisler's bat (*Nyctalus leisleri*).	3km	3km	
	Common pipistrelle (*Pipistrellus pipistrellus*).	2km	2km	
	Soprano pipistrelle (*Pipistrellus pygmaeus*).	3km	3km	
	Nathusius' pipistrelle (*Pipistrellus nathusii*).	3km	3km	
	Serotine (*Eptesicus serotinus*).	4km	4km	
	Barbastelle (*Barbastella barbastellus*).	10km	10km	
	Brown long-eared bat (*Plecotus auritus*).	3km	3km	
Otters (*Lutra lutra*).		2km	2km	Within the site boundary and watercourses within 500m of the site boundary.

[1] This is in accordance with standing advice from Natural England for assessing the impacts of developments on great crested newts (Natural England, 2015).

Ecological Feature	ZOI	Study Area	Survey Area
Water vole (*Arvicola amphibius*).	2km	2km	Within the site boundary and watercourses within 500m of the site boundary.
Other terrestrial mammals.	2km	2km	Included as part of extended Phase 1 habitat and protected species survey.

7.3.14 Additionally, a **Shadow HRA Report** (Doc Ref. 5.10) assessment has been undertaken for the site, and a project-wide **Water Framework Directive** (**WFD**) **Compliance Assessment** (Doc Ref. 8.14) has been undertaken in conjunction with the environmental assessment.

d) Assessment scenarios

7.3.15 The assessment of effects on terrestrial ecology and ornithology is based on each of the construction and operational phases of the proposed development, rather than specific assessment years. Further detail on the different considerations of these phases is detailed later.

e) Assessment criteria

7.3.16 As described in **Volume 1, Chapter 6**, the EIA methodology considers whether impacts of the proposed development would have an effect on any resources or receptors. Assessments broadly consider the magnitude of impacts and value/sensitivity of resources/receptors that could be affected in order to classify effects.

7.3.17 A detailed description of the assessment methodology used to assess the potential effects on terrestrial ecology and ornithology arising from the proposed development is provided in **Volume 1, Appendix 6J** of the ES. A summary of the assessment criteria used in this assessment is presented in the following sub-sections.

i. Sensitivity

7.3.18 The definitions of value and sensitivity criteria used in this assessment are set out in **Table 7.5**. Value and sensitivity are assessed separately, as they are to an extent independent of each other.

Table 7.5: Environmental Impact Assessment criteria for the assessment of ecological value/sensitivity

Importance/ Sensitivity	Guidelines
High	Value: feature/receptor possesses key characteristics which contribute significantly to the distinctiveness, rarity and character of the site/receptor (e.g. designated features of international/national importance, such as SACs, SPAs, Ramsar sites and SSSI). Sensitivity: feature/receptor has a very low capacity to accommodate the proposed form of change.
Medium	Value: feature/receptor possesses key characteristics which contribute significantly to the distinctiveness and character of the site/receptor (e.g. designated features of regional or county importance such as CWSs and local BAP species). Sensitivity: feature/receptor has a low capacity to accommodate the proposed form of change.
Low	Value: feature/receptor only possesses characteristics which are locally significant. Feature/receptor not designated or only designated at a district or local level (e.g. local nature reserves). Sensitivity: feature/receptor has some tolerance to accommodate the proposed change.
Very Low	Value: feature/receptor characteristics do not make a significant contribution to local character or distinctiveness. Feature/receptor not designated. Sensitivity: feature/receptor is generally tolerant and can accommodate the proposed change.

7.3.19 The sensitivity of individual IEFs within the ZOI of the proposed development is determined within **section 7.6** where the potential impacts on IEFs are described. Different IEFs may have different levels of sensitivity, depending upon the type of impact being described as well as the predicted duration, extent and magnitude of the impact. The sensitivity of individual IEFs has been qualified, where sufficient information exists. In the absence of detailed information, professional judgement has been used to determine the sensitivity of individual IEFs.

7.3.20 In addition, in line with the CIEEM guidelines (Ref. 7.24), the importance of an ecological feature, as determined with reference to legal, policy and/or nature conservation considerations, has been assessed within the following geographical context:

- international and European importance;
- national importance (i.e. England);
- regional importance (i.e. the East of England);

- county importance (i.e. Suffolk); and
- local importance, including an assessment with an East Suffolk Council context, or within the ZOI of the proposed development.

ii. Magnitude

7.3.21 **Table 7.6** sets out the following thresholds that have been used in the definition of the different scales of magnitude of impact to act as a guide for the assessment.

Table 7.6: Generic guidelines for the assessment of magnitude of impact

Magnitude	Guidelines
High	Large-scale, permanent/irreversible changes over a large area; for example, loss of greater than 30% of designated site/habitat used by an ecological receptor or greater than 30% loss of a species population within the development area (where this can be determined).
Medium	Medium-scale, permanent/irreversible changes; for example, loss of between 5 and 30% of designated site/habitat used by an ecological receptor or loss of between 5 and 30% of a species population within the development area (where this can be determined).
Low	Noticeable but small-scale change over a partial area; for example, loss of between 1 and 5% of designated site/habitat used by a receptor or loss of a few individuals of a species population.
Very Low	Noticeable, but very small-scale change; for example, less than 1% of designated site/habitat used by an ecological receptor.

7.3.22 Where possible, magnitude of impact has been quantified taking account of not only the habitat or species resource within the site but also within the wider area, as appropriate. For example, for bats, consideration has been given to the core sustenance zone (CSZ) for each species, but also habitat quality within the CSZ.

7.3.23 In compliance with the CIEEM guidelines (Ref. 7.24) impacts on biodiversity are assessed not only by magnitude, but are also characterised, and described as positive/negative together with their extent, duration, reversibility, timing and frequency (figures for percentage loss in **Table 7.6** are therefore indicative not absolute). **Table 7.7** provides impact criteria used in line with the CIEEM guidelines.

Table 7.7: Criteria for determining the impact on ecological features under Chartered Institute of Ecology and Environmental Management guidelines (Ref. 7.24)

Characteristic	Criteria
Positive or Negative	Positive impact: a change that improves the quality of the environment. Positive impacts may also include halting or slowing an existing decline in the quality of the environment. Negative impact: a change that reduces the quality of the environment.
Extent	The spatial or geographic area over which the impact/effect may occur.
Magnitude	Refers to the size, amount, intensity and volume. It will be quantified if possible and expressed in absolute or relative terms.
Duration	Duration will be defined in relation to ecological characteristics (such as a species' lifecycle), as well as human timeframes. The duration of an activity may differ from the duration of the resulting effect caused by the activity. Effects may be described as short, medium or long-term and permanent or temporary. Where durations of short, medium, long-term, and temporary are given in this assessment, they are defined in months/years, where possible, and often depend on the IEF being assessed.
Frequency	The number of times an activity that will impact biodiversity will occur.
Timing	The timing of an activity or change caused by the project may result in an impact if this coincides with critical life-stages or seasons.
Reversibility	Irreversible: an effect from which recovery is not possible within a reasonable timescale, or there is no reasonable change of action being taken to reverse it. Reversible: an effect from which spontaneous recovery is possible or which may be counteracted by mitigation.

7.3.24 Impacts can also be defined as being direct or indirect. A direct impact is defined as an impact resulting in the direct interaction of an activity with an environmental or ecological component. An indirect impact is defined as an impact on the environment which is not a direct result of a project or activity, often produced away from or as a result of a complex impact pathway.

iii. Effect definitions

7.3.25 The definitions of effects for terrestrial ecology and ornithology are shown in **Table 7.8** in line with the EIA methodology set out within **Volume 1, Chapter 6**.

Table 7.8: Generic effect definitions

Effect	Description
Major	Effects, both adverse and beneficial, which are likely to be important considerations at a national to regional level because they contribute to achieving national/regional objectives, or, which are likely to result in exceedance of statutory objectives and/or breaches of legislation.
Moderate	Effects that are likely to be important considerations at a regional and county level.
Minor	Effects that could be important considerations at a local level.
Negligible	An effect that is likely to have a negligible or neutral influence, irrespective of other effects.

7.3.26 Following the classification of an effect as presented in **Table 7.8**, a clear statement is made as to whether the effect is 'significant' or 'not significant'.

7.3.27 Under CIEEM guidelines (Ref. 7.24), the significance of effect on the IEF(s) has been determined based on the analysis of the factors that characterise the impact (**Table 7.7**). A significant effect is defined as *'an effect that either supports or undermines biodiversity conservation objectives for the IEFs or for biodiversity in general'*.

7.3.28 Using CIEEM guidelines (Ref. 7.24) and approach, significant effects are identified with regard to an appropriate geographical scale, using the following terms:

- significant at the international level;
- significant at the national level;
- significant at the regional level;
- significant at the county level;
- significant at the local level; and
- not significant.

7.3.29 To allow a consistent approach across all disciplines, the standard levels of significance defined in the CIEEM guidelines (Ref. 7.24) are set out in **Table 7.9**, alongside the equivalent definitions of effect used elsewhere in this ES. Therefore, as a deviation from the standard EIA methodology, minor effects identified within this chapter have been classified as significant at a local level.

Table 7.9: Summary and comparison of Environmental Impact Assessment and Chartered Institute of Ecology and Environmental Management based measures of significance of ecological effects

Significance Following the CIEEM Guidelines	Equivalent Effect Categories and Significance Definitions Following the Standard EIA Methodology Presented within Volume 5, Chapter 7
Significant at the international level.	Major (significant).
Significant at the national level.	Major (significant).
Significant at the regional level.	Moderate (significant).
Significant at the county level.	Moderate (significant).
Significant at the local level.	Minor (not significant).
Not significant.	Negligible (not significant).

f) Assessment methodology

i. Establishing the baseline

Existing baseline

7.3.30 Baseline conditions were determined through a combination of a desk-study and field surveys. Technical data has been assimilated from survey undertaken in 2019. A review was also conducted to determine any European and nationally designated sites located within 5km of the site. Through this method, habitat and species of importance were identified and assessed. **Appendix 7A** contains the detailed methodology and results of this baseline study and is summarised later.

7.3.31 The desk-study exercise comprised the following steps:

- identification of designated sites (statutory and non-statutory) including SPAs, SACs, Ramsar sites, SSSIs and national nature reserves within 5km, and local nature reserves and CWSs within 2km;
- review of Suffolk Biodiversity Information Service and the Joint Nature Conservation Committee records;
- review of the ancient woodland inventory information held on the Multi-Agency Geographic Information for the Countryside website (Ref. 7.36); and

- a review of the Suffolk BAP (Ref. 7.20), Suffolk's Priority Species and Habitats List (Ref. 7.21), and the listed under section 41 of the NERC Act (Ref. 7.10).

7.3.32 A full account of the desk-study conducted for this EcIA has been provided in **Appendix 7A**.

7.3.33 A detailed suite of ecological survey work was undertaken within the site and/or its immediate surrounds (i.e. within the ZOI) in 2019. The following surveys have been conducted:

- extended Phase 1 habitat and protected species surveys and Hedgerow Assessment;
- national vegetation classification (NVC) habitat survey of the ditches and the River Alde, as well as the floodplain grassland either side;
- invertebrate surveys within the area of River Alde, ditches, riparian vegetation and floodplain grassland;
- great crested newt Habitat Suitability Index and environmental DNA surveys;
- breeding bird surveys;
- bat surveys (tree assessments, and activity and static surveys); and
- otter and water vole surveys.

7.3.34 **Appendix 7A** and its associated annexes contain the detailed methodologies and results of these surveys.

Future baseline

7.3.35 The future baseline considers any committed development(s) or forecasted changes that would materially alter the baseline conditions during the construction and operation of the proposed development. It also considered what the land use would be in the absence of the proposed development.

ii. Assessment

7.3.36 The assessment of effects on terrestrial ecology and ornithology is based on the full construction and operation period of the proposed development and its associated activities rather than specific assessment years.

iii. Inter-relationships

7.3.37 A number of inter-relationships and their effects have been considered on the different receptors, where relevant. This has included consideration of:

- noise;
- air quality;
- lighting; and
- groundwater and surface water.

g) Assumptions and limitations

7.3.38 The impact assessment is based on the prevailing ecological conditions on the site and in the study area, which are not expected to change in the absence of the proposed development.

7.3.39 All assessments consider development within the site parameters as set out in the description of development in **Chapter 2** of this volume of the **ES** and illustrated on the **Work plans** provided in **Appendix 2A.**

7.3.40 The following limitations have been identified:

- Of the 25 ponds identified within the a 500m radius of the site boundary, access was not granted to six ponds to conduct great crested newt surveys. Where access was not possible, an assessment on the likelihood of great crested newts being present/absent was completed by examining the surrounding habitat suitability, interconnectivity, and the survey results of the ponds where access was obtained.
- For the analysis of samples for the great crested newt environmental DNA surveys, there are the following limitations: (1) the results are based on analyses of the samples obtained during the surveys and received by the laboratory; (2) any variation between the characteristics of the sample and a batch will depend on the sampling procedure used; (3) the method is qualitative, and therefore the levels given in the score are informative only, they do not constitute the quantification of great crested newt DNA against a calibration curve; and (4) a 'not detected' result does not exclude the presence at levels below the limit of detection.
- The terrestrial invertebrate surveys were compromised to some extent by weather conditions during the first sampling event and by wet ground

conditions during the second sampling event, however, the diversity of taxa recorded were well represented and the species assemblages recorded were representative of the habitats present. On this basis, it is considered that this constraint did not undermine the assessment.

7.4 Baseline environment

7.4.1 This section presents a description of the baseline environmental characteristics within the site boundary and in the surrounding area in relation to terrestrial ecology and ornithology.

7.4.2 Further details can be found in **Appendix 7A**. Where a habitat or species is of conservation concern, this is stated, and the conservation status provided along with the appropriate legislation.

a) Current baseline

i. Designated sites

7.4.3 There are 12 statutory designated sites of nature conservation importance within 5km of the site. These being: Gromford Meadow SSSI (1.3km south-east); Blaxhall Heath SSSI (2.4km south); Sandlings SPA (2.4km south); Sandlings Forest SSSI (2.4km south); Alde-Ore Estuary SPA, SAC, Ramsar site and SSSI (2.8km south-east); Iken Wood SSSI (3.5km south-east); Snape Warren SSSI (3.2km south-east); Tunstall Common SSSI (4.2km south); and Cransford Meadow SSSI (4.9km north-west).

7.4.4 The SAC, SPA and Ramsar sites support habitat and/or species of European importance listed under Annex I of the EC Birds Directive (Ref. 7.3) and Annex I of the EC Habitats Directive (Ref. 7.4). These designated sites are therefore considered to be of international importance under the CIEEM guidelines (Ref. 7.24), and of high importance under the EIA-specific methodology. The SSSIs support habitats and species of national importance and is therefore considered to be of national importance under the CIEEM guidelines (Ref. 7.24), and of high importance under the EIA-specific methodology.

7.4.5 There are nine non-statutory designated CWS within 2km radius of the site. The closest of these are Foxburrow Wood CWS (adjacent to the site; also an ancient and semi-natural woodland on the ancient woodland inventory) and Farnham Churchyard CWS (20m west). Others include: Great Glemham Wood CWS (also on the ancient woodland inventory) (1.3km north-west); Denny's Grove CWS (1.6km north-west); Great Wood CWS (also on the ancient woodland inventory) (1.1km west); Benhall Churchyard CWS (1.2km north); Manor Farm Meadows CWS (600m east); River Fromus Marshes CWS (1km south-east; and Benhall Green Meadows CWS (1.2km north-east). CWSs support habitat types listed on section 41 of the NERC Act (Ref.

7.10), and are targeted for action in the Suffolk BAP (Ref. 7.20), and Suffolk's Priority Species and Habitats List (Ref. 7.21), and are therefore considered to be of county importance under the CIEEM guidelines (Ref. 7.24), and of medium importance under the EIA-specific methodology.

7.4.6 Details of the reasons for designation are provided in **Appendix 7A**. The boundaries of statutory designated sites within 5km of the development boundary, and non-statutory designated sites within 2km are shown on **Figures 7.1** and **7.2** respectively in **Appendix 7A**.

7.4.7 The proposed development will involve no direct land take from any of these designated sites; however, the site is hydrologically linked to the Alde-Ore Estuary SPA, SAC, Ramsar and SSSI, as the River Alde flows through the site boundary upstream of this designated site. In addition, indirect impacts may be experienced by Foxburrow Wood CWS as it is adjacent to the site boundary. These sites are of international importance under the CIEEM guidelines (Ref. 7.24), and of high importance under the EIA-specific methodology.

7.4.8 Given the distance of the remaining designated sites from the site, that there would be no direct land take from the designated sites, and that there are no clear impact pathways that have the potential to cause an effect, the remaining designated sites have been scoped out from the assessment of the proposed development.

ii. Plants and habitats

7.4.9 **Figure 7.3** in **Appendix 7A** shows the Phase 1 habitat map for the site. **Figure 7.4** in **Appendix 7A** shows the results of the national vegetation classification (NVC) habitat survey of the ditches and the River Alde, as well as the floodplain grassland

7.4.10 The habitats present within the site boundary predominantly comprise intensively managed arable fields with no scarce arable weeds or other notable plant species identified. Arable field margins are a habitat listed under Suffolk's Priority Species and Habitats List (Ref. 7.21), however, no botanically rich arable margins were identified within the site. Arable farmland is widespread in Suffolk. The arable habitat on-site is of local importance under the CIEEM guidelines (Ref. 7.24), and of very low importance under the EIA-specific methodology.

7.4.11 There are also small areas of semi-improved grassland which are heavily grazed by cattle and horse paddocks, as well as improved floodplain grassland which is managed, and interspersed patches of tall ruderal and scattered scrub. One NVC community was recorded within the area of floodplain grassland comprising the widespread improved grassland type - MG7 *Lolium perenne - Trifolium repens.* Coastal and floodplain grazing

marsh is a habitat listed under Suffolk's Priority Species and Habitats List (Ref. 7.21), and is listed under section 41 of the NERC Act (Ref. 7.10). Floodplain grassland is of county importance under the CIEEM guidelines (Ref. 7.24), and of medium importance under the EIA-specific methodology.

7.4.12 The River Alde and a series of ditch systems are within the site. Ten ditches were recorded within the site boundary. The majority of these ditches were predominantly dry at the time of survey.

7.4.13 One NVC community was recorded within the River Alde - S14 *Sparganium erectum* swamp community. The vegetation present within the southern part of the site comprised *Phalaris arundinacea* sub-community. The vegetation present within the northern part of the river within the survey area comprised *Sparganium erectum* sub-community. The bankside was dominated by tall ruderal species. Two NVC communities were recorded within the ditches surveyed, S7 - *Carex acutiformis* community and M23 - *Juncus effusus/acutiflorus*. The bankside vegetation comprised predominately tall ruderal species.

7.4.14 Rivers are a habitat listed under Suffolk's Priority Species and Habitats List (Ref. 7.21), and are listed under section 41 of the NERC Act (Ref. 7.10). The River Alde is of county importance under the CIEEM guidelines (Ref. 7.24), and of medium importance under the EIA-specific methodology.

7.4.15 The fields are bounded by fences and hedgerows, with the majority of the hedgerows present being intact species-poor hedgerows, species-rich hedgerows with trees, and defunct species-poor hedgerows. Hedgerows H45, H46. H49, H50, H53, H61 and H66, shown on **Figure 7.3** in **Appendix 7A**, are 'Important' when assessed against the wildlife and landscape criteria of the Hedgerows Regulations (Ref. 7.11). Hedgerows are a Suffolk BAP priority habitat (Ref. 7.20), and are listed as a habitat of principal importance under section 41 of the NERC Act (Ref. 7.10). All hedgerows on-site are of county importance under the CIEEM guidelines (Ref. 7.24), and of medium importance under the EIA-specific methodology.

7.4.16 Several blocks of woodland are within the ZOI. Foxburrow Wood CWS (3.82 hectares (ha)) is an ancient woodland located immediately to the east of the site and is listed on the ancient woodland inventory. Given the ancient woodland designation for Foxburrow Wood CWS (and the connected woodland immediately to the east) Foxburrow Wood CWS is considered to be of national importance under the CIEEM guidelines (Ref. 7.24), and of high importance under the EIA-specific methodology.

7.4.17 There are seven other small, broadleaved copses present within the ZOI (see TN2, TN3 (Nuttery Belt), TN4 (The Belt), TN5, TN6 (Pond Wood), TN7 and TN9 shown on **Figure 7.3** in **Appendix 7A**). Lowland mixed deciduous

woodland is listed under Suffolk's Priority Species and Habitats List (Ref. 7.21), and under section 41 of the NERC Act (Ref. 7.10). These blocks of woodland are considered to be of county importance under the CIEEM guidelines (Ref. 7.24) and of medium importance under the EIA-specific methodology.

7.4.18 Twenty-five ponds have been identified within 500m of the site as shown on **Figure 7.6** in **Appendix 7A**. None of these ponds are within the site. Ponds are on the Suffolk's Priority Species and Habitats List (Ref. 7.21), and section 41 of the NERC Act (Ref. 7.10). In aggregate, this network of ponds within the ZOI is of local importance under the CIEEM guidelines (Ref. 7.24) and of low importance under the EIA-specific methodology.

iii. Invertebrates

7.4.19 The desk-study identified two notable species as having been recorded within the ZOI: grayling (*Hipparchia semele*) and small heath (*Coenonympha pamphilus*). Both species are Red Data Book listed species (Ref. 7.30), listed under section 41 of the NERC Act (Ref. 7.10), and on Suffolk's Priority Species and Habitats List (Ref. 7.21). All records of these species were outside of the site boundary.

7.4.20 A total of five species of recognised conservation value were recorded during the 2019 surveys (the results of which are shown on **Figure 7.5** in **Appendix 7A**). Of these species both the *'Near Threatened'* (Ref. 7.26) and nationally scarce great silver water beetle (*Hydrophilus piceus*) and a nationally scarce soldier beetle *Cantharis fusca* (Ref. 7.27) were recorded and are considered to be characteristic species of higher quality floodplain grazing marsh habitats. The presence of these species, as well as more local species also associated with such habitat, such as a species of water-scavenger beetle *Anacaena bipustulata* and a backswimmer *Notonecta viridis* on site, indicates the importance of the site as linkage habitat within the wider River Alde floodplain.

7.4.21 The invertebrate assemblage within the ZOI is considered to be of county importance under the CIEEM guidelines (Ref 7.25) and of medium importance under the EIA-specific methodology.

iv. Amphibians

7.4.22 Twenty-five water bodies are within 500m of the site as shown on **Figure 7.6** in **Appendix 7A**.

7.4.23 Ponds P23, P24, P25, P101, P102, P155, P156 and P157 are located on the north side of the A12 which is considered a barrier to great crested newt movement. These ponds have therefore been scoped out of the assessment. Access was not granted to six ponds (P018, P019, P026, P097, P099 and

P100). Of the remaining 11 ponds, environmental DNA for great crested newt surveys were undertaken on nine ponds (P014, P016, P017, P020, P021, P022, P098, P162 and P300), as at the time of survey one pond was dry and one did not exist. The results for the environmental DNA surveys confirmed absence of great crested news of the ponds surveyed.

7.4.24 Of the six ponds (P018, P019, P026, P097, P099 and P100) which were not surveyed as access was not granted, the pond locations, habitat suitability and connectivity of these ponds to the site were examined to consider the potential for great crested newts to be present (please refer to **Figure 7.6** in **Appendix 7A** for all pond locations).

- Ponds P018 and P019 (access not granted) are located in between Pond P020, and the cluster of ponds P016, P017, and P300, which have confirmed absence for great crested newts. There is good connectivity of habitat between these ponds with blocks of woodland and hedgerows; therefore, great crested newts are likely to be absent from P018 and P019;

- There is good habitat connectivity between the group of ponds P016, P017, P020 and P300, which were accessed for survey and great crested newt were confirmed to be absent, and the two other un-accessed ponds (P018 and P019) and P099 and P100; therefore, great crested newt absence is also likely in P099 and P100;

- Pond P097 is approximately 190m south of Pond 098 where great crested newts are confirmed absent. There is some habitat connectivity between these two ponds through a woodland strip and hedgerow; therefore, great crested newt absence is likely within Pond P097; and

- Pond P026 is approximately 360m east of the site boundary in an arable field (unsuitable habitat), west of Manor Farm house and north of the A1094, with poor connectivity of any suitable great crested newt habitat. This pond is not considered to be within the ZOI of the site. Great crested newt absence from this pond is also assumed.

7.4.25 Great crested newts are, therefore, likely to be considered absent from the ZOI.

7.4.26 There were two desk-study records of amphibians within 2km of the site boundary; common toad (*Bufo bufo*) (one record) and common frog (*Rana temporaria*) (one record), both of which were approximately 1.2km from the site boundary. No targeted surveys for other amphibian species were undertaken although the field margins, hedgerows and blocks of woodland comprise suitable foraging habitat, with the woodland providing suitable

hibernation sites, and field margins providing connectivity between ponds. It is therefore assumed that the site could support common amphibian species.

7.4.27 Common toad is included on Suffolk's Priority Species and Habitats List (Ref. 7.21), and section 41 of the NERC Act (Ref. 7.10). Common toads are of local importance under the CIEEM guidelines (Ref. 7.24), and very low importance under the EIA-specific methodology. Common frog has a low nature conservation status, and so is considered to be of local importance under the CIEEM guidelines (Ref. 7.24), and of very low importance under the EIA specific methodology.

v. Reptiles

7.4.28 There were four desk-study records of reptiles within 2km of the site boundary. Species recorded comprised grass snake (*Natrix helvetica helvetica*) and common lizard (*Zootoca vivipara*) with the closest record being that of a common lizard 580m from the site.

7.4.29 Within the site boundary, the site is largely sub-optimal habitat for reptiles as it generally comprises arable fields. There are small pockets of suitable habitat recorded during the Phase 1 habitat survey, but these are isolated and discrete in nature. No targeted reptile surveys were conducted given the limited number of desk-study records, and the limited suitable habitat within the site. During the Phase 1 habitat survey, a single grass snake was seen in an area of semi-improved grassland surrounding the River Alde. Overall, the available habitat to support reptile species is considered to be limited, and the site of little value to reptile species; however, grass snakes are likely to be present within the River Alde floodplain.

7.4.30 All four common species of reptile (grass snake, adder (*Vipera berus*), common lizard, and slow-worm (*Anguis fragilis*)) are listed under Suffolk's Priority Species and Habitats List (Ref. 7.21), and section 41 of the NERC Act (Ref. 7.10). However, given the limited habitat suitable for reptiles within the majority of the site, the reptile assemblage within the site is of local importance under the CIEEM guidelines (Ref. 7.24), and of very low importance under the EIA-specific methodology.

vi. Ornithology

7.4.31 A number of Schedule 1 bird species of the Wildlife and Countryside Act (Ref. 7.7) have been recorded within or close to the site; however, most of these species are likely to be incidental sightings of passage migrants and therefore unlikely to be breeding within the site. Of those species recorded, only barn owl (*Tyto alba*) is considered likely to breed in the vicinity of the site.

7.4.32 During breeding bird surveys undertaken in 2019, no Schedule 1 species of the Wildlife and Countryside Act (Ref. 7.7) were recorded. A total of 22 bird species of nature conservation importance were identified, including: herring gull (*Larus argentatus*), song thrush (*Turdus philomelos*), marsh tit (*Poecile palustris*), black-headed gull (*Chroicocephalus ridibundus*), dunnock (*Prunella modularis*), mallard (*Anas platyrhynchos*), snipe (*Gallinago gallinago*), reed bunting (*Emberiza schoeniclus*), willow warbler (*Phylloscopus trochilus*), Linnet, Mistle thrush (*Turdus viscivorus*), stock dove *(Columba oenas*), house martin (*Delichon urbicum*), house sparrow (*Passer domesticus*), skylark (*Alauda arvensis*), nightingale (*Luscinia megarhynchos*), bullfinch (*Pyrrhula pyrrhula*), meadow pipit (*Anthus pratensis*), Mediterranean gull (*Ichthyaetus melanocephalus*), lesser black-backed gull (*Larus fuscus*), kestrel (*Falco tinnunculus*), and teal (*Anas crecca*). The results of the bird surveys undertaken are shown on **Figures 7.7** and **7.8** in **Appendix 7A**.

7.4.33 The majority of the birds recorded during the breeding bird surveys are associated with the River Alde floodplain. Floodplain grassland habitats are in decline within Suffolk and the distribution of birds associated with these habitats will be dependent on the quality of these habitats.

7.4.34 Of the species recorded during the surveys, lesser black-backed gull (a Alde-Ore SPA qualifying species), herring gull, black-headed gull, teal, snipe, reed bunting, and mallard, are predominately associated with the floodplain grassland habitat that is present within the site. The site is located 3.4km upstream of Alde-Ore SAC, SPA, Ramsar site and SSSI. However, lesser black-backed gull was typically present in low numbers and the habitat present within the site is considered to be of relatively low foraging value for this mobile and partially marine species. Given the large areas of suitable habitat in the surrounding landscape and similar very extensive areas much closer to the Alde-Ore site itself, the floodplain grasslands within the site are not considered to be important to this species in this context.

7.4.35 Of the species recorded during the breeding bird survey, linnet, stock dove, kestrel, skylark, reed bunting, whitethroat (*Sylvia communis*), greenfinch (*Carduelis chloris*), rook (*Corvus frugilegus*), goldfinch (*Carduelis carduelis*), wood pigeon (*Columba palumbus*) and jackdaw (*Corvus monedula*) are associated with farmland habitats and are included on the UK Farmland Indicator list (Ref. 7.37).

7.4.36 Arable farmland is extensive within Suffolk and the distribution of farmland bird species such as linnet and stock dove, to a large extent, be dependent on the diversity of the arable habitat. The intensively managed arable farmland present within the site is likely to be less valuable to farmland birds.

7.4.37 The breeding bird assemblage within the ZOI is considered to be of local importance under the CIEEM guidelines (Ref. 7.24) and of low importance under the EIA-specific methodology.

vii. Bats

7.4.38 Six confirmed species of bat have been recorded historically within the study area, these being: noctule, common pipistrelle, soprano pipistrelle, serotine, barbastelle and brown long-eared bat. Records were also identified for unspecified species within the *Plecotus* spp., *Myotis* spp. and *Pipistrellus* spp. groups.

7.4.39 Habitats within the site boundary predominantly consist of open arable land, which is of limited value for bats. However, the site also includes habitat features such as hedgerows and blocks of woodland which provide suitable foraging, commuting and roosting habitat. An assessment of trees within the woodland blocks identified 114 trees with bat roost potential (37 high potential, 43 medium potential, 27 low potential, and seven negligible potential).

7.4.40 Activity and static detector surveys recorded at least 13 bat species/species groups within the site (Natterer's, common pipistrelle, soprano pipistrelle, Nathusius' pipistrelle (*Pipistrellus nathusii*), serotine, barbastelle, noctule, brown long-eared, pipistrelle species, *Myotis* species, *Nyctalus* species, "big bat" and long-eared species (*Plecotus* spp). The activity surveys demonstrated that activity within the site and within adjacent habitats was dominated by common and soprano pipistrelle with low levels of other species recorded. The results of the bat surveys undertaken are shown on **Figures 7.9 to 7.14** in **Appendix 7A**.

7.4.41 Bats using the site are almost certainly not dependent on the sub-optimal habitats present and would also be using a range of additional habitats in the ZOI. This includes the more valuable woodland blocks, external and adjacent to the site boundary.

7.4.42 All bat species in the UK are protected under Annex IV of the Habitats Directive (Ref 7.4), transposed to English law under the Conservation of Habitats and Species Regulations (Ref 7.8), Schedule 5 of the Wildlife and Countryside Act (Ref. 7.7), and are included on Suffolk's Priority Species and Habitats List (Ref. 7.21), and seven species are listed under section 41 of the NERC Act (Ref. 7.10). The assemblage of bats within the ZOI is of county importance under the CIEEM guidelines (Ref. 7.24) and is of medium importance under the EIA-specific methodology.

viii. Other mammals

7.4.43 Otter, badger, hedgehog (*Erinaceus europaeus*), water shrew (*Neomys fodiens*), and brown hare (*Lepus europaeus*) have desk-study records within the ZOI.

7.4.44 Habitat suitable to support otters is present within the site within the River Alde floodplain. Three otter records were identified by the desk-study, with the closest record located north of the proposed development along a drain which connects to the River Alde which runs through the south of site. During surveys, a single otter footprint was recorded along the River Alde within the site boundary (please refer to **Figure 7.15** in **Appendix 7A**). Otters are protected under Schedule 5 and 6 of the Wildlife and Countryside Act (Ref. 7.7), and Schedule 2 of the Conservation of Habitats and Species Regulations (Ref. 7.8), and are included within section 41 of the NERC Act (Ref. 7.10) and Suffolk's Priority Species and Habitats List (Ref. 7.21). Otters are of local importance under the CIEEM guidelines (Ref. 7.24) and of low importance under the EIA-specific methodology.

7.4.45 During targeted surveys, numerous recent water vole field signs, including burrows, droppings, latrines and feeding signs were found along the River Alde and a connected ditch to the north of the River Alde within the site, indicative of a low population within this length of the River Alde (please refer to **Figure 7.15** in **Appendix 7A**). Water voles are protected under Schedule 5 of the Wildlife and Countryside Act (Ref. 7.7), and are included under section 41 of the NERC Act (Ref. 7.10) and Suffolk's Priority Species and Habitats List (Ref. 7.21). Water vole is of is of county importance under the CIEEM guidelines (Ref. 7.24), and of medium importance under the EIA-specific methodology.

7.4.46 The closest record of water shrew identified during the desk-study was 1.3km from the site. This species was not recorded during surveys although habitats within the site including the River Alde and ditch habitats are suitable for water shrews. Water shrews are reported as declining in Suffolk (Ref. 7.38). The water shrew is on Suffolk's Priority Species and Habitats List (Ref. 7.21), and considered locally important, but is not included within section 41 of the NERC Act (Ref. 7.10). Water shrew within the ZOI is of local importance under the CIEEM guidelines (Ref. 7.24), and of very low importance under the EIA-specific methodology.

7.4.47 A single record of badger has been made within the site boundary. Baseline surveys recorded a single outlier badger sett within the site. Badgers are protected under the Protection of Badgers Act (Ref. 7.12). Badgers within the ZOI is of local importance under the CIEEM guidelines (Ref. 7.24), and of very low importance under the EIA-specific methodology.

7.4.48 The closest hedgehog record was adjacent to the site boundary. The woodland blocks and hedgerows within the survey area provide potentially suitable habitat for hedgehogs and this species is likely to be present within the site boundary. Hedgehog is a Suffolk Priority Species and Habitats Listed species (Ref. 7.21) and is listed under section 41 of the NERC Act (Ref. 7.10). Hedgehog within the ZOI is of local importance under the CIEEM guidelines (Ref. 7.24), and of very low importance under the EIA-specific methodology.

7.4.49 The desk-study identified three brown hare records, the closest of which was approximately 600m away from the site. During the extended Phase 1 habitat surveys, there were several incidental records of brown hare within the site boundary, and the species is likely to be relatively widespread within the site boundary as the arable and hedgerow habitats present provide extensive suitable habitats for this species. East Anglia (Cambridgeshire, Suffolk and Norfolk) holds approximately 20% of the national population of brown hare (Ref. 7.39). The Suffolk BAP for brown hare states that the species is widespread in Suffolk (Ref. 7.40). However, recent reports in the east of England in 2018 suggest brown hare are suffering from a disease epidemic with records of sick or dead animals (Ref. 7.41), and with rabbit haemorrhagic disease type 2 now confirmed in brown hare from Dorset and Essex (Ref. 7.42). Brown hare within the ZOI is of local importance under the CIEEM guidelines (Ref. 7.24) and is of very low importance under the EIA-specific methodology.

b) Future baseline

7.4.50 There are no committed development(s) or forecasted changes that would materially alter the baseline conditions during the construction and operational phases of the proposed development.

c) Important Ecological Features

7.4.51 Following a review of the known baseline information within the ZOI, **Table 7.10** lists the ecological features/receptors and details which have been carried forward into the detailed assessment. Further justification for these is also found within **Appendix 7A**. Those carried forward are IEFs of sufficient conservation value (local/low importance or above) with a potential to be affected by the proposed development, and therefore requiring further consideration within this chapter.

7.4.52 There are several ecological features that, while not of a significant nature conservation value within the ZOI, do require some consideration because of the legislative protection afforded to them. While not taken forward for detailed assessment, these have been considered further within **section 7.7** where appropriate mitigation to ensure legislative compliance for their protection has been described.

Table 7.10: Determination of Important Ecological Features to be taken forward for detailed assessment

Feature/Receptor	Importance (CIEEM/EIA Methodology)	Justification	Scope In/Out
Statutory designated sites within 5km of the site boundary (excluding Alde-Ore Estuary SPA, SAC, Ramsar site and SSSI).	International and National/High.	Statutory designated sites Gromford Meadow SSSI; Blaxhall Heath SSSI; Sandlings SPA; Sandlings Forest SSSI; Iken Wood SSSI; Snape Warren SSSI; Tunstall Common SSSI; and Cransford Meadow SSSI are located within 5km of the site boundary. These statutory designated sites support a range of habitats and European protected species. Given the distance of these sites from the site, and the implementation of the primary and tertiary mitigation measures detailed in **section 7.5**, no direct or indirect impacts are anticipated on the statutory designated sites. Therefore, the impact on these sites has been scoped out of the detailed assessment.	Scoped out.
Statutory designated sites - Alde-Ore Estuary SPA, SAC, Ramsar site and SSSI.	International/ High.	The Alde-Ore Estuary SPA, SAC, Ramsar site and SSSI is a statutory designated site that supports a range of habitats and European protected species. While there will be no direct land take from Alde-Ore Estuary SPA, SAC, Ramsar site and SSSI, the River Alde, which is located within the site, is hydrologically linked to this designated site. The impact on the Alde-Ore Estuary SAC, Ramsar and SPA has therefore been scoped in to the detailed assessment.	IEF Scoped in.
Non-statutory designated sites within 2km of the site boundary (excluding Foxburrow Wood CWS).	County/Medium.	Farnham Churchyard CWS; Great Glemham Wood CWS; Denny's Grove CWS; Great Wood CWS; Benhall Churchyard CWS; Manor Farm Meadows CWS; River Fromus Marshes CWS; and Benhall Green Meadows CWS are located within 2km of the site boundary. CWS support a range of habitats types that are listed on section 41 of the NERC Act (Ref. 7.10), and which are targeted for action in the Suffolk BAP (Ref. 7.20). Given the distance of these sites from the site, and the implementation of the primary and tertiary mitigation measures detailed in **section 7.5**, no direct or indirect impacts are anticipated on the non-statutory designated sites. Therefore, the impact on these CWS has been scoped out of the detailed assessment.	Scoped out.

Feature/Receptor	Importance (CIEEM/EIA Methodology)	Justification	Scope In/Out
Non-statutory designated sites – Foxburrow Wood CWS.	National/High.	Foxburrow Wood CWS is immediately to the east of the site. This site is also listed on the ancient woodland inventory. The site supports habitat types listed on section 41 of the NERC Act (Ref. 7.10), and has been targeted for action within the Suffolk BAP (Ref. 7.20). Whilst this site will be retained in its entirety there is the potential for it to experience indirect impacts. Foxburrow Wood CWS has therefore been scoped in to the detailed assessment.	IEF Scoped in.
Lowland mixed deciduous woodland.	County/Medium.	There is 0.71ha of broadleaved woodland located within the site, and larger areas of woodland adjacent to and near the site. Whilst only small areas of woodland would be directly impacted, they would not be able to be retained in their entirety, and therefore the impact on this habitat has been scoped in to the detailed assessment.	IEF Scoped in.
Arable	Local/Very low.	Arable field margins are a habitat listed under Suffolk's Priority Species and Habitats List (Ref. 7.21). Arable farmland is widespread in Suffolk, and no botanically rich arable margins were identified within the site boundary. The arable margins support common ruderal and weed species. This habitat has therefore been scoped out of the detailed assessment on its own; however, it does support farmland bird assemblages which have been considered further.	Scoped out.
Ponds within the site and ZOI.	Local/Low.	25 ponds are present within 500m of the site boundary, however, none were recorded within the site. Ponds are a habitat listed under Suffolk's Priority Species and Habitats List (Ref. 7.21), and section 41 of the NERC Act (Ref. 7.10). As no ponds will be lost due to the construction of the proposed development, this habitat has been scoped out of the detailed assessment.	Scoped out.
Hedgerows	County/Medium.	Construction of the proposed development would lead to the loss of five 'important' hedgerows All hedgerows are a habitat listed under Suffolk's Priority Species and Habitats List (Ref. 7.21). Hedgerows are widespread in Suffolk although it is considered that the loss of 'important' hedgerows and species-rich hedgerows due to the construction of the proposed development has the potential to result in a significant effect. Hedgerows have therefore been scoped in to the detailed assessment.	IEF scoped in.

Feature/Receptor	Importance (CIEEM/EIA Methodology)	Justification	Scope In/Out
River Alde.	County/Medium.	Rivers are a habitat listed under Suffolk's Priority Species and Habitats List (Ref. 7.21). The River Alde runs through the site, and there is the potential for both direct and indirect impacts. This habitat has therefore been scoped into the detailed assessment.	IEF scoped in.
Floodplain grassland.	County/Medium.	Floodplain grassland is a habitat listed under Suffolk's Priority Species and Habitats List (Ref. 7.21). Although the grassland itself is of a widespread, intensively managed vegetation type, this habitat within the site boundary supports breeding bird assemblages associated with wetland habitat including species listed under section 41 of the NERC Act (Ref. 7.10), Birds of Conservation Concern Red List species (Ref. 7.29), and Birds of Conservation Concern Amber List species (Ref. 7.29) and the ditches support invertebrate species of conservation value Floodplain grassland has therefore been scoped into the detailed assessment.	IEF Scoped in.
Invertebrate assemblage.	County/medium.	Five species of recognised conservation value were recorded within the site boundary, including the *'Near Threatened'* (Ref. 7.26) and nationally scarce great silver water beetle and a nationally scarce soldier beetle *Cantharis fusca* (Ref. 7.27) were recorded and are considered to be characteristic species of higher quality floodplain grazing marsh habitats. The species assemblages within the site indicates the importance of the site as linkage habitat within the wider River Alde floodplain. Invertebrate assemblages have therefore been scoped into the detailed assessment.	IEF Scoped in.
Great crested newt.	Local/Very low.	Great crested newts were not found in any of the ponds that were surveyed within 500m of the site, and this species is considered absent from the ZOI. Great crested newts have therefore been scoped out of the detailed assessment.	Scoped out.
Common toad and common frog.	Local/Very low.	It is envisaged that the woodland blocks within and adjacent to the site would support a small population of both common toad and common frog. Common toad is listed under section 41 of the NERC Act (Ref. 7.10), while common frog has a low conservation status. Only a small area of woodland suitable for this species within the site boundary would be lost with extensive suitable habitats remaining outside the site boundary.	Scoped out.

Feature/Receptor	Importance (CIEEM/EIA Methodology)	Justification	Scope In/Out
		Common toad and common frog have therefore been scoped out of the detailed assessment; however, mitigation measures employed to protect reptiles from harm would also protect these two species. These measures are detailed in the within **section 7.5**.	
Reptile assemblage.	Local/Very low.	All four common, native reptile species (adder, common lizard, grass snake and slow-worm) are protected under Schedule 5 of the Wildlife and Countryside Act (Ref. 7.7), and are listed on section 41 of the NERC Act (Ref. 7.10), and included on Suffolk's Priority Species and Habitats List (Ref. 7.21). Habitat within and adjacent to the site boundary is of relatively little value to reptile species given that it comprises predominantly arable fields. From the review of available baseline data, the reptile population is predicted to be fragmented within the wider landscape, and the population within the ZOI would not be important in the context of the wider reptile population within Suffolk. Overall, it is considered that any effects on foraging and/or hibernating reptiles are unlikely to be significant. Reptiles have therefore been scoped out of the detailed assessment, but details of the mitigation measures that should be employed to avoid harm to reptiles have been detailed within the **section 7.5**.	Scoped out.
Breeding bird assemblage.	Local/Low.	Breeding birds are protected while nesting under the Wildlife and Countryside Act (Ref. 7.7). The breeding bird assemblage identified within the site is typical of the arable, wetland and woodland habitats present, and both the assemblage and population densities are comparable to those across the wider landscape. Many of the species recorded are common and widespread, including the intensively managed arable habitat, and the farmland bird assemblage it supports, which is widespread in Suffolk. However, farmland birds are in decline nationally due to a combination of habitat loss and intensive farming practices. Eleven birds on the Farmland Bird Indicator List have been found on-site. It is therefore considered that any impacts could affect the farmland bird populations found within the site. The intensively managed arable habitat, and the farmland bird assemblage it supports, is widespread in Suffolk with some farms adopting Higher Level Stewardship Schemes which can provide benefits to birds. Many of the species recorded are common and widespread, including the intensively managed arable habitat, and the farmland bird assemblage it supports, which is widespread in Suffolk. However, farmland birds are in decline nationally due to a combination of habitat loss and intensive farming practices. Eleven birds on the Farmland Bird Indicator List have been found on-site. It is therefore considered that any	IEF Scoped in.

Feature/Receptor	Importance (CIEEM/EIA Methodology)	Justification	Scope In/Out
		impacts could affect the farmland bird populations found within the site and farmland birds have therefore been scoped into the assessment.	
Bat assemblage.	County/Medium.	At least thirteen bat species/species groups have been recorded within the site. The ZoI of the proposed development is known to support roosts for noctule, common pipistrelle, soprano pipistrelle, serotine, barbastelle, brown long-eared bat and *Myotis* species. Activity surveys within the site boundary revealed common and soprano pipistrelle as the mostly frequently recorded species with other species recorded at very low levels. A number of trees were identified within the site boundary that have a high or medium potential to support roosting bats, these trees are found scattered across the site and within Nuttery Belt and The Belt. The degree of sensitivity bats display varies between species; however, it is recognised that all bat species can be negatively impacted by human disturbance. All bat species in the UK are protected under Annex IV of the Habitats Directive (Ref. 7.4), transposed to English law under the Conservation of Habitats and Species Regulations (Ref. 7.8). Additional relevant legislation includes the Wildlife and Countryside Act (Ref. 7.7), and the NERC Act (Ref. 7.10). Bats have therefore been scoped into the detailed assessment.	IEF scoped in.
Badgers	Local/Very low.	Badgers are protected under Schedule 6 of the Wildlife and Countryside Act (Ref. 7.7) and by the Protection of Badgers Act (Ref. 7.12). A single record of badger and a single well used outlier badger sett was recorded within the site boundary. Badgers are widespread across England and Wales, and populations are increasing both in England and Wales and in Suffolk (Ref. 7.43). Badgers have therefore been scoped out of the detailed assessment; however, details of the mitigation measures that would be employed to avoid harm to badgers are given within **section 7.5**.	Scoped out.

Feature/Receptor	Importance (CIEEM/EIA Methodology)	Justification	Scope In/Out
Otter	Local/Low.	A single otter footprint was recorded along the River Alde within the site boundary. Although no other fields signs were recorded, habitat present within the site is considered suitable to support this species. A review of the Suffolk's Priority Species and Habitats List (Ref. 7.21) identified otters as a priority species for conservation action in the county. Otters are protected under Schedule 5 and 6 of the Wildlife and Countryside Act (Ref. 7.7), and Schedule 2 of the Conservation of Habitats and Species Regulations (Ref. 7.8), and listed under section 41 of the NERC Act (Ref. 7.10). Otter has therefore been scoped in to the detailed assessment.	IEF scoped in.
Water vole.	County/Medium.	Habitat suitable to support water vole was recorded within the site and numerous water vole signs were recorded within the site boundary. Survey results indicate a low population of water vole along the River Alde within the ZOI of the proposed development. A review of the Suffolk's Priority Species and Habitats List (Ref. 7.21) identified water vole as a priority species for conservation action in the county. Water vole are protected under Schedule 5 and 6 of the Wildlife and Countryside Act (Ref. 7.7), and listed under section 41 of the NERC Act (Ref. 7.10). Water vole has therefore been scoped into the detailed assessment.	IEF scoped in.
Brown hare.	Local/Very low.	Brown hare have been recorded within the site boundary, comprising of a few individual records. Brown hare is likely to be relatively widespread within the site boundary as the arable and hedgerow habitats present provide extensive suitable habitats for this species. The population found within the site boundary is not considered to be an important part of the wider population within the ZOI. The brown hare is listed under Suffolk's Priority Species and Habitats (Ref. 7.21), and section 41 of the NERC Act (Ref. 7.10). The effects of the proposed development on this highly mobile species are unlikely to be significant and therefore brown hare have been scoped out of the detailed assessment. Details of the mitigation measures that should be employed to avoid harm to brown hare are given in **section 7.5**.	Scoped out.

Feature/Receptor	Importance (CIEEM/EIA Methodology)	Justification	Scope In/Out
Hedgehog	Local/Very low.	Records of hedgehog have been identified within close proximity to the site boundary and areas of the areas of broadleaved woodland, and the boundary hedgerows present within the site boundary provide suitable habitat to support this species. Hedgehog is a priority species for conservation action on Suffolk's Priority Species and Habitats List (Ref. 7.21), and listed under section 41 of the NERC Act (Ref. 7.10). While hedgehogs are likely to be found within or adjacent to the site, there is sufficient adjacent habitat to support these species, and the effects of the proposed development on this species (in both habitat loss and fragmentation) is unlikely to be of significance. Hedgehog has therefore been scoped out of the detailed assessment, but details of the mitigation measures that would be employed to safeguard hedgehog populations are given in the **section 7.5**.	Scoped out.
Water shrew.	Local/Very low.	No water shrews were found during surveys within the site boundary although habitats present within the River Alde floodplain could support this species. Water shrews are considered to be declining in Suffolk (Ref. 7.38). The water shrew is also on Suffolk's Priority Species and Habitats List (Ref. 7.21), and considered locally important, but is not listed under section 41 of the NERC Act (Ref. 7.10), so is not identified as a species of principal importance for the purpose of conserving biodiversity in England. This species has been scoped out of the detailed assessment.	Scoped out.

7.4.53 In summary, the IEFs taken forward for detailed assessment within **section 7.6** are:

- IEF: Alde-Ore Estuary SPA, SAC, Ramsar site and SSSI;
- IEF: Foxburrow Wood CWS;
- IEF: Lowland mixed deciduous woodland;
- IEF: Hedgerows;
- IEF: River Alde;
- IEF: Floodplain grassland;
- IEF: Invertebrate assemblage
- IEF: Breeding bird assemblage;
- IEF: Bat assemblage;
- IEF: Otter; and
- IEF: Water vole.

7.5 Environmental design and mitigation

7.5.1 As detailed in **Volume 1, Chapter 6**, a number of primary mitigation measures has been identified through the iterative EIA process, and has been incorporated into the design and construction planning of the proposed development. Tertiary mitigation measures are legal requirements or are standard practices that will be implemented as part of the proposed development.

7.5.2 The assessment of likely significant effects of the proposed development assumes that primary and tertiary mitigation measures are in place. For terrestrial ecology and ornithology, these measures are identified later, with a summary provided on how the measures contribute to the mitigation and management of potentially significant environmental effects.

a) Primary mitigation

7.5.3 Primary mitigation is often referred to as 'embedded mitigation' and includes modifications to the location or design to mitigate impacts, these measures become an inherent part of the proposed development.

7.5.4 A summary of the primary mitigation that has been incorporated into the design of the proposed development that will protect the existing habitats and species is provided in the following section:

- The temporary contractor compound would be located to the east of the site, approximately 1km away from sensitive surface water habitats such as the floodplain grasslands and the River Alde.

- Sustainable Drainage Systems (SuDS) infrastructure (proposed as swales and infiltration basins) would be installed along the length of the highway. SuDS would minimise surface water run-off and prevent diffuse pollution from sediment and other pollutants arising. Separators and silt traps would be incorporated within the drainage design where considered necessary. The swales would attenuate and convey surface water run-off at a rate not exceeding existing green field run-off rates. Existing local drainage from fields would be culverted so that their use would continue unchanged.

- Proposed River Alde overbridge:

  - The crossing of the River Alde would comprise an overbridge, approximately 60m in length which would preserve the natural integrity of the banks of the river, bed and bankside, and minimise shading effects. This would be of sufficient size to enable passage for otters and water voles to be maintained during construction and operation. An otter ledge would be installed on bridge abutments, if required, to allow passage at times of high flows. Otter fencing would be incorporated where appropriate to guide otters to the crossing point.

  - There would be eight 5.4m long, 3m wide flood relief culverts proposed (four on either side of the River Alde overbridge). There would also be two further culverts within the embankment outside the floodplain extent; on the western side of the River Alde overbridge (approximately 200m south-east from the existing A12), the culvert would be approximately 5.4m by 3m and would allow an existing watercourse and livestock access track to pass beneath the road (on their existing alignment of an existing accommodation access track which would be diverted under the

proposed bridge). A mammal mitigation culvert would be provided on the east side of the River Alde overbridge outside of the floodplain extent (approximately 5.4m by 1.2m)

- Field drains located at the western end of the bypass, either side of the proposed River Alde overbridge, would be diverted along the base of the embankment to the River Alde where possible with additional/excess water culverted through the embankments.

- Any required flood compensation areas would be designed to minimise impacts to ditches and watercourses to avoid interfering with suitable otter and water vole habitat. The banks of the River Alde and the associated ditches would be protected during construction of any flood compensation areas.

- Broadleaved woodland habitat:

  - Foxburrow Wood CWS ancient woodland will be retained in its entirety. A buffer distance of 15m from earthworks would be applied to prevent impacts to the trees on the edge of the woodland. Some limited footpath works would however be required at the edge of this zone.

- The landscaping strategy for the site has been designed to minimise potential effects through the provision of planting, and will follow the design principles set out in the **Associated Development Design Principles** document (Doc Ref. 8.3), indicative locations for planting are shown on **Figures 2.1** to **2.4**.

  - Existing vegetation would be retained where possible, except where the route crosses field boundaries. Native hedgerow planting would integrate the road with the surrounding landscape, compensating for the loss of hedgerows severed by the route. These new hedgerows would connect into the existing hedgerow network, where possible.

  - A12/Tinker Brook to Pond Wood planting: Grass verges are proposed along this section of the route (except on the overbridge). Additional grassed areas are proposed around the infiltration basins south of the A12 roundabout and east of Whin Covert. Native tree and shrub planting is proposed around the infiltration basins to integrate them into the surrounding landscape.

  - Pond Wood to north of Farnham Hall planting: native tree and shrub planting is proposed along the western side of the cutting

as the route of the two village bypass passes Farnham Hall and residential properties, as well as along the western side of the proposed embankment up to the overbridge, to provide visual screening. Native tree and shrub planting is also proposed on the east side of the overbridge, adjacent to Foxburrow Wood and Farnham Hall Farmhouse to provide visual screening and enhance ecological connectivity. Grass verges are proposed along the length of the route on this section.

- North of Farnham Hall to A12/A1094 (Friday Street) planting: grass verges are proposed along the length of the proposed development in this section as well as around the proposed roundabout. Additional native tree and shrub planting is also proposed around the infiltration basin, south-west of Friday Street Farm, to help integrate this feature into the landscape.

- The provision of up to four ponds is also proposed along the route, which would provide additional pond habitat in the area and contribute to bio-diversity net gain. Indicative locations are shown on **Figures 2.1** to **2.4**.

- The route of the proposed development would be mostly unlit, thereby maintaining a dark corridor and minimising the potential impacts to nocturnal species. To ensure road safety lighting would be provided at the A12 western roundabout and the A12/A1094 eastern roundabout extending north to highlight the junction to approaching vehicles. The remaining junctions would have low minor road flows, and be similar to existing unlit rural junctions, and would therefore be unlit to minimise light spill. Operational lighting design would be compliant with relevant highway standards and where possible would be chosen to limit light spill. Guidance within the latest Institution of Lighting Professionals Guidance Note: Bats and artificial lighting in the UK (Ref. 7.44) would be followed as far as possible. These measures would minimise impacts on nocturnal species such as bats that may use the nearby tree lines or habitats for roosting or foraging.

- To reduce the potential for incidental mortality through collisions with vehicles, the design of the proposed development includes safe crossing points for bats and terrestrial mammal species such as oversized culverts as well as bat hop-over features whereby tree planting would be installed as close the carriageway edge as possible to encourage an inter-linking canopy, that in the long-term that would keep bats at height and away from the path of vehicles using the road.

b) Tertiary mitigation

7.5.5 Tertiary mitigation will be required regardless of any EIA assessment, as it is imposed, for example, as a result of legislative requirements and/or standard sectoral best practices.

7.5.6 Tertiary mitigation relevant to terrestrial ecology and ornithology is detailed in the **Construction Code of Practice** (**CoCP**) (Doc Ref. 8.11). The **CoCP** has been informed by relevant environmental legislative requirements, as well as general requirements and compliance with current standards, construction and operational experience. The **CoCP** defines the arrangements required to manage environmental and ecological impacts, mitigate nuisance to the public and safeguard the environment during the enabling works, preliminary works and the main construction phase.

7.5.7 Mitigation measures relevant to terrestrial ecology included in the **CoCP** comprise:

- Construction lighting, where required, would be provided at the minimum luminosity and would be designed, positioned and/or directed so as not to unnecessarily intrude on adjacent ecological receptors or habitats. Such measures could include (but not limited to) shielding of luminaires to reduce backward spill of light or use of sensors or timing devices to automatically switch off lighting where appropriate and provision of closed boarded fencing where the site abuts retained woodland. This would minimise impacts on nocturnal species such as bats that may use the nearby tree lines or habitats for commuting, roosting or foraging.

- During the construction stage, close-boarded fencing would be erected along the side of woodland blocks, where the site abuts these (e.g. TN2, Whin Covert, Nuttery Belt, The Belt and Foxburrow Wood CWS). This would help to minimise impacts from construction lighting and noise from construction activity.

- No equipment or material would be stored within 10m of a watercourse, and no materials would be stored in areas of high flood risk to avoid sediment loss during flooding.

- All soils would be stored away from watercourses (or potential pathways to watercourses), and any potentially contaminated soil would be stored on an impermeable surface and covered to reduce leachate generation and potential migration to surface waters.

7.5.8 Prior to any works taking place in watercourses and ditches, the following approaches would be used for otter and water vole:

- Otter: a pre-construction survey for otters would be conducted. If an otter lying up site or holt is recorded that would be impacted by the works, then an appropriate mitigation strategy would be developed and completed under agreement and, where necessary, licence to Natural England.

- Water voles: a pre-construction survey for water voles would be conducted. In the event of works being required that affect the banks of watercourses and ditches/ within the wetted channel and where water voles are known to be present, then a licence from Natural England would be required. All survey work would be in line with best practice guidelines (Ref. 7.46). If the proposed works do not require more than 50m of vegetation clearance from either bank of the ditch, then works would be conducted under a class licence WML-CL31. If works would require vegetation clearance exceeding 50m, then a conservation licence would be required.

7.5.9 The proposed development includes the removal of 56 trees identified as having the potential to support roosting bats. Tree inspections would need to be undertaken sufficiently in advance of tree-felling to determine evidence of use as roosts to enable licence application(s) to be submitted to Natural England, and develop an appropriate mitigation strategy, if required. Management measures would likely include:

- A final inspection of these trees would be undertaken as close to the timing of felling as possible to take into account the regular roost-switching behaviour displaced by tree-roosting bat species. Should bats (or evidence of use by bats) be identified, the mitigation strategies set out in the licence application(s) would be implemented (for example, the fitting of exclusion devices).

- Felling would ideally be undertaken in September or October, to avoid the maternity and hibernation periods during which bats are more vulnerable to disturbance (this timing also avoids the breeding bird season).

- To mitigate for the loss of the tree and potential roost resources, bat boxes would be installed on retained trees in suitable locations within the site boundary.

- Bat boxes would be installed in trees with medium or high bat roost potential if they are due to be lost, whether or not a roost has been identified. A variety of bat boxes would be used to support different species.

7.5.10 A small proportion of habitat within the site was identified as having limited potential to support a small population of reptiles. All reptile species are protected from killing or injury under the Wildlife and Countryside Act (Ref. 7.7). Therefore, the following measures would be undertaken prior to the commencement of construction:

- An inspection would be undertaken by a suitably experienced ecological clerk of works (ECoW) of any potential reptile refugia, after which the reptiles and refugia would be removed.

- A phased vegetation clearance process would be undertaken to displace any reptiles from the site, under the supervision of a suitably experienced ECoW. Removal of vegetation and of places of shelter/hibernation features would be undertaken outside of the reptile hibernating period (October to February inclusive), during periods of warm, dry weather (with due consideration of the seasonal constraints of clearance works during breeding bird season). If this is not possible, vegetation would be cut to the ground (to remove potential bird nesting habitat), but the roots would remain intact until hibernation is complete. The root system of vegetation would then be removed once the reptile hibernation season is over. Clearing of vegetation would be undertaken under the supervision of the ECoW.

7.5.11 Where feasible, for the trees and hedgerows being retained, works would be undertaken outside of root protection zones. Tree protective fencing as described in section 6.2 of British Standard 5837:2012 (Ref. 7.47) would be installed, where required, prior to works commencing adjacent to these areas. If works need to be undertaken within the root protection zones, an arboricultural survey would be undertaken, and any advice provided adhered to, to support the long-term survival of the tree/hedgerow.

7.5.12 Construction activities have the potential to risk killing or injuring breeding birds, and damage or destroy nests, including those of ground-nesting species, should works be undertaken during the breeding bird season (late February to August inclusive). Birds and their nests are protected under the Wildlife and Countryside Act (Ref. 7.7), therefore removal of scrub and trees and ground clearance works would generally be undertaken outside of the breeding bird season. Measures could also be put in place to deter birds from nesting in any hedgerow to be removed (for example, cutting back vegetation

and making the area less suitable); however, the ground would need to remain undisturbed during the reptile hibernation period. Where it is not possible to undertake these works outside of the breeding bird season, an inspection for nests would be undertaken by a suitably experienced ECoW prior to the removal of vegetation. If breeding birds are identified during this process, works in the vicinity of the nest (estimated to be a 10m standoff) would need to cease until the young have fledged.

7.5.13 The following measures would be implemented in relation to badgers during construction:

- Prior to construction works commencing, a pre-construction walkover of the site would be conducted in order to identify whether there are any signs of badgers and/or any newly established setts that may be impacted by the works. If any setts are identified that would be disturbed by the construction works, or would require closures, then a licence from Natural England would be obtained. All licensable works would be undertaken between July to November (inclusive).

- Any construction excavations would be closed at the end of the day to prevent access by badgers (and any other nocturnal animals). Should it not be possible for excavations to be closed at night, a means of egress (i.e. a wooden plank or soil ramp) would be provided to ensure that any badgers that may access these excavations have a means of escape.

7.5.14 The phased approach to site clearance and topsoil stripping (as described previously to safeguard reptiles) would discourage brown hare, and hedgehogs away from the site of activity, and into the surrounding suitable habitat.

7.5.15 Further details of tertiary mitigation measures taken into account within the design of the proposed development to minimise noise and vibration impacts, dust pollution and air quality changes and to protect water quality are outlined in **Chapters 4, 5** and **12** respectively.

7.6 Assessment

a) Introduction

7.6.1 This section presents the findings of the terrestrial ecology and ornithology assessment for the construction and operation of the proposed development. It brings together the information presented in the preceding sections to consider the specific impacts likely to be experienced by the IEFs within the ZOI of the proposed development. Using the criteria set out within the CIEEM

guidelines (Ref. 7.24), the sensitivity of the IEFs, and all of the potential impacts related to each IEF have been characterised.

7.6.2 This section identifies any likely significant effects that are predicted to occur and **section 7.7** then highlights any secondary mitigation and monitoring measures that are proposed to minimise any adverse significant effects (if required).

b) Construction

7.6.3 During the construction phase of the works, the main impact pathways would be associated with:

- habitat loss (land take);
- habitat fragmentation (including connectivity);
- incidental mortality of species;
- disturbance effects (comprising light, noise and visual effects);
- changes in water quality;
- alteration of local hydrology and hydrogeology; and
- changes in air quality.

7.6.4 A number of the construction impact pathways have been scoped out of this assessment where, due to the primary and tertiary mitigation detailed in **section 7.5**, an impact is removed, or where it is considered that the effect of an impact would be negligible. The impact pathways that have been scoped out of this assessment, along with the reasons for this, are:

- Effects of habitat fragmentation on Foxburrow Wood CWS: while there would be no habitat loss of Foxburrow Wood CWS, there would be a loss of species-rich hedgerows that connect to Foxburrow Wood CWS. However, these hedgerows do not connect to any other substantial block of woodland in the surrounding area. The effect of habitat fragmentation on Foxburrow Wood CWS would, therefore, not be significant. The effect of fragmentation of hedgerows, however, has been assessed separately.

- Effects of changes in water quality, local hydrology and hydrogeology, and air quality on Foxburrow Wood CWS: given the embedded mitigation, Foxburrow Wood CWS would unlikely be impacted and there would be no significant effect on this receptor. Embedded mitigation includes the development of an appropriate dust management plan, pollution prevention control measures, and any dewatering would be localised and of short duration. In addition, both **Chapter 5** and **Chapter 12** have assessed no significant effects due to the proposed development.

- Disturbance effect on species within Foxburrow Wood CWS: species associated with Foxburrow Wood CWS may experience adverse disturbance effects (comprising human, light, noise and visual disturbance). These have been assessed within the separate IEFs of species groups associated with the CWS and not under the CWS itself.

- Effects of changes in local hydrology and hydrogeology, and air quality on lowland mixed deciduous woodland and hedgerows: given the primary and tertiary mitigation, lowland mixed deciduous woodland and hedgerows would unlikely be impacted and there would be no significant effect on this receptor. Tertiary mitigation includes the development of an appropriate dust management plan, pollution prevention control measures, and any dewatering would be localised and of short duration. In addition, both **Chapter 5** and **Chapter 12** have assessed no significant effects due to the proposed development.

- Disturbance effect on species populations within lowland mixed deciduous woodland: species associated with lowland mixed deciduous woodland may experience adverse disturbance effects (comprising human, light, noise and visual disturbance effects). These have been assessed within the separate IEFs of species groups associated with the habitat type and not under the habitat type itself.

- Habitat loss of the River Alde: as detailed in the primary mitigation, the crossing of the River Alde would preserve the natural integrity of the banks of the river, bed and bankside.

- Incidental mortality to bird species: as part of the tertiary mitigation described in **section 7.5**, the removal of scrub and trees and ground clearance works would generally be undertaken outside of the breeding bird season. Where it is not possible to undertake these works outside of the breeding bird season, an inspection for nests would be undertaken by a suitably experienced ECoW prior to the removal of

vegetation. If nesting birds are identified during this process, works in the vicinity of the nest (estimated to be a 10m standoff) would cease until the young have fledged. This would remove the risk of incidental mortality to bird species.

- Incidental mortality to bat species: construction works would entail the movement of plant and other vehicles around the proposed development site. The likelihood of incidental mortality from vehicles accessing the site would be minimised as traffic would be travelling at reduced speeds. In addition, construction working hours would largely avoid the times when bats are active. This potential impact would therefore not have a significant effect on the bat assemblage.

7.6.5 Of the impact pathways taken forward within the assessment, the specific impact pathways that could be experienced by each IEF have been identified and detailed within the subsequent sections. To assess each impact pathway, the first four elements of the CIEEM assessment process (Ref. 7.24) are addressed here, namely:

- activity, duration of activity, biophysical change and relevance to IEF in terms of ecosystem structure and function;
- characterisation of impact on the feature (taking into consideration the primary and tertiary mitigation, as detailed in **section 7.5**);
- rationale for prediction of effect on integrity (of a site or ecosystem) or conservation status (of a habitat or population); and
- effect without further (i.e. secondary) mitigation.

7.6.6 The remaining elements of the CIEEM assessment process, mitigation and significance of effects of residual impacts after mitigation, are discussed in **sections 7.7** and **7.8** respectively.

i. Important Ecological Features: Alde-Ore Estuary Special Protection Area, Special Area of Conservation, Ramsar site and Site of Special Scientific Interest

7.6.7 During construction, the main impact pathways experience by Alde-Ore Estuary SPA, SAC, Ramsar and SSSI would be associated with changes in water quality. The characterisation of this impact is described in detail below.

Changes in water quality

7.6.8 As detailed in **section 7.4**, while the Alde-Ore Estuary SPA, SAC, Ramsar and SSSI is located 3.4km from the site, this designated site is hydrologically linked to the proposed development as the River Alde and associated ditches/tributaries flows through the site boundary. As described in **section 7.5**, all construction works would be conducted in compliance with the **CoCP** (Doc Ref. 8.11), which defines pollution prevention and control measures across the site. The temporary contractor compound would be located over 1km from the River Alde. In addition, no equipment or material would be stored within 10m of all watercourses and no materials would be stored in areas of high flood risk to avoid sediment loss during flooding where practicable. These primary and tertiary mitigation measures would ensure no significant effect on water quality.

7.6.9 The impact to the Alde-Ore Estuary SPA, SAC, Ramsar and SSSI would be of very low magnitude resulting in a negligible adverse effect, which is considered to be **not significant**.

ii. Important Ecological Features: Foxburrow Wood County Wildlife Site

7.6.10 The potential impacts that could be experienced by Foxburrow Wood CWS are: habitat fragmentation; changes in water quality; changes in local hydrology and hydrogeology; and air quality. As detailed under scoped out construction impacts, this impact has been scoped out of the assessment due to the primary and tertiary mitigation.

iii. Important Ecological Features: Lowland mixed deciduous woodland

7.6.11 During construction, lowland mixed deciduous woodland could be affected by habitat loss and habitat fragmentation. The characterisation of this impact is described in detail below.

Habitat loss and fragmentation

7.6.12 Approximately 0.71ha of lowland mixed deciduous woodland is present within the site boundary. Of this area, approximately 0.38ha of woodland would be within the area required permanently for the proposed development and a further 0.1ha would be temporarily lost to facilitate construction and replanted at the end of the construction phase. This would equate to a high magnitude of impact on lowland mixed deciduous woodland within the site.

7.6.13 However, as detailed in **section 7.5**, the design of the proposed development has sought to minimise the loss of lowland mixed deciduous woodland habitat through avoidance (where practicable) and retention of woodland blocks adjacent to the site to maintain habitat connectivity to the wider

landscape, with only small areas of woodland lost within the site boundary. More extensive areas of woodland are present within the wider area which would not be impacted and the small loss of woodland in the context of the wider landscape would not be significant.

7.6.14 New tree planting is also proposed along the route of the proposed two village bypass from south of Pond Wood to north of Mollett's Farm, and adjacent to Foxburrow Wood CWS and Farnham Hall Farmhouse to improve ecological connectivity. A total of 1.59ha of new trees would be planted, and 0.1ha of woodland lost within the area required temporarily for the construction of the proposed development would be reinstated at the end of the construction phase.

7.6.15 The replanted woodland (0.1ha) and new planting (1.59ha), as well as 0.23ha of woodland retained and unaffected by construction of the proposed development, would result in a total of 1.92ha of deciduous woodland within the site boundary, resulting in an overall increase of woodland within the site compared to the existing baseline. However, these plantings would be installed towards the end phase of the construction phase and it is anticipated that these areas would take ten years to become functional woodland.

7.6.16 Overall, given the primary mitigation measures, habitat loss would result in a short-term, temporary, reversible, minor adverse effect, which is considered to be **not significant.**

iv. Important Ecological Features: Hedgerows

7.6.17 During construction, the impact pathway that would affect hedgerows is habitat loss and habitat fragmentation. The characterisation of this impact is described in detail below.

Habitat loss and fragmentation

7.6.18 Approximately 3,788m of hedgerows are present within the site boundary. Of these hedgerows, 1,189m of hedgerows, of which 310m are considered 'Important' under the Hedgerows Regulations (Ref. 7.11), would be within the area required permanently for the proposed development (approximately 31.3% of hedgerow within the site, of which 8.1% are 'Important' hedgerows). This which would equate to a high magnitude of impact. Approximately 506m of hedgerow would be within land required to facilitate construction, and would be replanted at the end of construction (of which 195m are 'Important' hedgerow).

7.6.19 However, there are extensive lengths of hedgerow present within the wider area which would not be impacted and this relatively small loss of hedgerow in the context of the wider landscape. As detailed in **section 7.5**, hedgerow

planting would be completed along the route to integrate the road with the surrounding landscape, compensating for the loss of hedgerow severed by the route. Hedgerow planting would connect into the existing hedgerow network adjacent to the route, where possible.

7.6.20 A total of 4,830m of new hedgerow would be planted, with a further 506m of replanted hedgerow and 2,093m of hedgerow unaffected by construction of the proposed development, resulting in a total of 7,429m of hedgerow within the site boundary. However, the hedgerows would predominantly be planted towards the end phase of the construction phase and it is anticipated that the hedgerows would take up to 10 years to become functional.

7.6.21 Overall, given the primary mitigation measures, habitat loss would result in a short-term, temporary, reversible, minor adverse effect, which is considered to be **not significant**.

v. Important Ecological Feature: River Alde

7.6.22 During construction, the impact pathways to the River Alde would be affected by would be associated with:

- changes in water quality; and
- changes in hydrology and hydrogeology.

7.6.23 The characterisation of these impacts is provided below.

Changes in water quality

7.6.24 As described in **section 7.5**, all construction works would be undertaken in compliance with the **CoCP** (Doc Ref. 8.11). Mitigation measures includes the development of an appropriate dust management plan and pollution prevention control measures. No materials would be stored in areas of high flood risk to avoid sediment loss during flooding and the temporary contractor compound (and therefore main chemical, material and equipment storage area) would be located over 1km away. These primary and tertiary mitigation measures would ensure no significant effect on the water quality of the River Alde.

7.6.25 Overall, impact to the water quality of the River Alde would be of very low magnitude resulting in a negligible adverse effect, which is considered to be **not significant**.

Changes in hydrology and hydrogeology

7.6.26 A section of the River Alde is located within the site and is considered to have the potential to receive baseflow from the underlying aquifers. The assessment of the River Alde within **Chapter 12** concludes that with the implementation of the primary and tertiary mitigation measures identified, there would be no significant effects to the hydrogeological environment. Additionally, the assessment concludes that there would be no effect on the River Alde with respect to groundwater level and flow.

7.6.27 Any changes to the flow regime have the potential to increase existing pressures and adversely affect the hydromorphology of the River Alde, functional floodplain of the River Alde, surface drainage network, existing ponds, and the surface water abstraction.

7.6.28 Where construction increases the extent of bare and compacted ground for a prolonged period, there is the potential for an increase in surface run-off, and an increase in flood peaks in the nearest receptor. Construction of the proposed development would create new areas of bare ground for prolonged periods.

7.6.29 Construction phase water management is embedded in the design, with on-site surface water run-off being infiltrated or discharged at greenfield run-off rates until the SuDS infrastructure is operational. This would result in a very low magnitude impact on the River Alde, functional floodplain of the River Alde, surface drainage network, existing ponds, and the surface water abstraction. This effect is classified as negligible adverse and considered to be **not significant**. Once the drainage infrastructure is operational, there would be no effect on the receptors from increased surface run-off from the proposed development.

7.6.30 The flow regime of the River Alde, functional floodplain and surface drainage network during construction would, however, be altered by the embankment across the floodplain during periods of higher flow, when the river is 'out of bank'. Even though flood relief culverts through the embankment would be present, temporary and localised back-flooding on the floodplain and potentially within the surface drainage network during high flow periods is anticipated. The effect is classified as minor adverse and considered to be **not significant**.

vi. Important Ecological Features: Floodplain grassland

7.6.31 During construction, floodplain grassland would be affected by the following impact pathways:

- habitat loss and habitat fragmentation;
- changes in water quality; and
- changes in hydrology and hydrogeology.

7.6.32 The characterisation of the impacts is described in detail below.

Habitat loss and fragmentation

7.6.33 There is 6.82ha of floodplain grassland within the site. Construction of the two village bypass across the River Alde floodplain would result in the permanent loss of 2.91ha of floodplain grassland habitat, with the temporary loss of 3.91ha to facilitate construction of the proposed development which would be re-instated as floodplain grassland on completion of construction. The areas of existing floodplain grassland habitat are species-poor and reinstatement of this habitat type would be relatively straightforward.

7.6.34 If floodplain compensation areas are required, these areas would require some element of excavation to lower the ground levels but in this case the reinstated area would be enhanced and could include additional surface water features to maximise the ecological benefits.

7.6.35 Overall, habitat loss would result in a temporary minor adverse effect, which is considered to be **not significant**.

Changes in water quality

7.6.36 As described in **section 7.5**, all construction works would be undertaken in compliance with the **CoCP** (Doc Ref. 8.11). Mitigation measures includes the development of an appropriate dust management plan and pollution prevention control measures. No materials would be stored in areas of high flood risk to avoid sediment loss during flooding. In addition, the temporary contractor compound (and therefore main material and equipment storage area) would be located over 1km from the site. These primary and tertiary mitigation measures would ensure no significant effect on water quality.

7.6.37 Overall, impact to the water quality for this habitat type would be of very low magnitude resulting in a negligible adverse effect, which is considered to be **not significant**.

Changes in hydrology and hydrogeology

7.6.38 Whilst there would be some alterations of surface water flows and potential mobilisation of contaminants, residual effects are considered to be minor

adverse in the worst case and therefore not significant. Overall, impacts resulting in changes in hydrology and hydrogeology would be of very low magnitude resulting in no or limited habitat loss and / or fragmentation. Therefore, any changes would result in a negligible adverse effect which is considered to be **not significant**.

vii. Important Ecological Features: Invertebrate assemblage

7.6.39 During construction, the invertebrate assemblage would be affected by the following impact pathways:

- habitat loss and habitat fragmentation (including connectivity); and
- changes in water quality

7.6.40 The characterisation of the impacts is described in detail below.

Habitat loss and fragmentation

7.6.41 The invertebrate assemblage within the site would be affected by the loss of floodplain grassland. The five species of invertebrates of recognised conservation value were recorded, which are considered to be characteristic of floodplain grazing marsh habitat. The presence of those species and more local species associated with the floodplain grazing marsh habitats, indicates the importance of the site as linkage habitat within the wider River Alde floodplain habitat. The assessment of the community of invertebrate species identified the River Alde was of high conservation values, whilst the ditch network in the area was of moderate conservation value.

7.6.42 As stated in the section above for floodplain grassland, there is 6.82ha of floodplain grassland within the site. Construction of the two village bypass across the River Alde floodplain would result in the permanent loss of 2.91ha of floodplain grassland habitat. There would also be the temporary loss of 3.91ha to facilitate construction of the proposed development which would be re-instated as floodplain grassland on completion of construction.

7.6.43 During construction, impacts on the River Alde habitat would be avoided due to the construction of the bridge over the watercourse, and existing valuable ditch habitat would be avoided where practicable and additional surface water features would be created if feasible. Given that the floodplain habitat is linked to the wider River Alde floodplain there are extensive areas of adjacent habitat within the wider area available to the invertebrate assemblage which would enable recolonization of any new habitats.

7.6.44 Overall, given the primary mitigation measures, habitat loss would result in a, minor adverse effect, which is considered to be **not significant**.

Changes in water quality

7.6.45 As detailed above and described in **section 7.5**, all construction works would be conducted in compliance with the **CoCP** (Doc Ref. 8.11). Mitigation measures include the development of an appropriate dust management plan and pollution prevention control measures. No materials would be stored in areas of high flood risk to avoid sediment loss during flooding. In addition, the temporary contractor compound (and therefore main material and equipment storage area) would be located over 1km from the floodplain. These primary and tertiary mitigation measures would ensure no significant effect on water quality within the River Alde floodplain and its ditches which could impact the invertebrate assemblage that these features support.

7.6.46 Overall, the impact to water quality on the invertebrate assemblage would be of very low magnitude resulting in a negligible adverse effect, which is considered to be **not significant**.

viii. Important Ecological Features: Breeding bird assemblage

7.6.47 During construction, the breeding bird assemblage would be affected by would the following impact pathways:

- habitat loss and habitat fragmentation; and
- disturbance effects (comprising light, noise and visual effects).

7.6.48 The characterisation of the impacts is described in detail later.

Habitat loss and habitat fragmentation

7.6.49 Breeding birds within the site, including assemblages of both farmland birds and birds associated with the floodplain grasslands, would be affected by the loss of these habitats. Additional breeding species would also be impacted by the loss of woodland and hedgerows.

7.6.50 The construction of the proposed development would result in the permanent loss of:

- 18ha of arable habitat;
- 2.91ha of floodplain grassland;

- 0.38ha of woodland (until replacement habitats become fully established); and
- 1,189m of hedgerow (until replanted and replacement habitats become fully established).

7.6.51 There are extensive areas of arable and woodland habitats in the surrounding landscape. Within the site, as part of the primary mitigation, habitat loss would be mitigated through woodland and hedgerow planting to increase the extents of these habitats and improve ecological connectivity on completion of construction. While there may be displacement of the farmland and woodland bird assemblages due to construction and some permanent loss of habitats, given the availability of similar habitats in adjacent areas, recolonization of the reinstated habitats following construction is expected to occur, once these habitats are established.

7.6.52 Breeding birds associated with the floodplain grassland would be displaced during construction due to the development of the flood compensation areas. This habitat type extends northward for over 10km and southward for over 20km from the site as it follows the River Alde. While there may be some displacement of the bird assemblage during construction, given the availability of alternative habitat, recolonization of the reinstated floodplain grassland habitats following construction is expected to occur, once these habitats are established.

7.6.53 Overall, given the primary mitigation measures, habitat loss would result in permanent, minor adverse effect, which is considered to be **not significant**.

Disturbance effects (comprising light, noise and visual effects)

7.6.54 Breeding birds could be impacted by noise, as well as visual disturbance, during the construction phase. Close boarded fencing would be used to minimise noise impacts to woodlands (and roosting bats in particular) as well as sensitive residential areas as part of construction best practice measures and this would help reduce noise impacts on the woodland bird assemblage.

7.6.55 Noise disturbance is likely to arise through construction activities (such as noise from machinery), increased vehicle movements and increased human presence on-site during construction.

7.6.56 Construction is expected to take up to 24 months to complete, commencing at the north-eastern end of the proposed development at the A12/A1094 junction. The majority of the works would be carried out in daylight; however, as construction would take place during normal working hours 07:00 to 19:00 weekdays and Saturday, then some lighting may be required during the

Winter months, dependent upon what construction activities are taking place. Artificial lighting during the construction phase would only be used during the hours of darkness, low levels of natural light or specific construction methods or phases to ensure the health, safety and welfare of construction staff and members of the public.

7.6.57 At its peak, there would be a workforce of 100 personnel. All contractor vehicles would enter the temporary contractor compound primarily from the A1094, with minor access from the A12. It is anticipated that up to 60 heavy goods vehicles would arrive per day during the construction period. Vehicles would travel from the compound along a temporary access route to reach the remainder of the site.

7.6.58 Birds are vulnerable to changes in their noise environment that may be caused by human activity. Research indicates that noise may disrupt acoustic communication, interfere with detection of warning signals, and elevate stress levels. Increased noise levels have been associated with declining bird densities as a result of displacement from otherwise suitable habitat due to ecological sensitivities or intolerance to noise.

7.6.59 Infrequent activities/operations that can generate intense noise levels (e.g. intermittent industrial activities) over a short period of time in a relatively small area may lead to species abandoning areas of suitable habitat. Evidence from this type of noise event indicates that generally birds, if undertaking a flight response, would return to the affected area once the noise has dissipated (Ref. 7.48, 7.49).

7.6.60 Construction activities can also lead to visual disturbance to bird species. A review of the literature suggests that bird species are most likely to be disturbed in close proximity to the source of visual disturbance and that at distances beyond 200m visual disturbance is less likely. Whilst some localised disturbance and related displacement during the early stages of construction may occur, this is considered to be a minor adverse effect.

7.6.61 Overall, the effects of construction noise and visual disturbance on the bird assemblage would be a short-term (maximum 24 months), temporary, reversible, minor adverse effect, which is considered to be **not significant**.

ix. Important Ecological Features: bat assemblage

7.6.62 During construction, the bat assemblage would be affected the following impact pathways:

- habitat loss and habitat fragmentation (including connectivity);

- disturbance from noise; and
- disturbance from light.

7.6.63 The characterisation of these impacts is described in detail below.

Habitat loss and habitat fragmentation (including connectivity)

7.6.64 The construction of the proposed development would result in the loss of primarily arable land as well as hedgerows, broadleaved woodland and mature trees with bat potential. A total of 56 trees with the potential to support roosting bats (18 with high potential, 18 with moderate potential, 15 with low potential, and five with negligible potential) are predicted to be lost. The loss of habitat would cause a reduction in foraging habitat available to bats and the loss of features suitable for bats to roost in.

7.6.65 As detailed in **section 7.5**, existing vegetation would be retained where possible. There would be the inevitable loss of some woodland from Whin Covert, Nuttery Belt, and The Belt, but the majority of these woodland blocks would be retained, along with the complete retention of Pond Wood and Foxburrow Wood CWS. These measures would ensure that the habitats most suitable for bats are retained.

7.6.66 The proposed development would result in the permanent loss of approximately 24.6ha of sub-optimal arable foraging habitat, 2.91ha floodplain grassland, 0.38ha broadleaved woodland and 1,189m of hedgerow. During the construction phase there would also be a temporary loss of habitat suitable to support foraging bats, although habitats would be re-instated and new habitats planted upon the completion of the construction phase.

7.6.67 The proportion of foraging habitat lost due to the construction of proposed development represents is dependent on the home range used by bats. This home range varies between species and is dependent on a range of criteria, including the quality of habitats available. The concept of CSZ, developed following an extensive literature review by the Bat Conservation Trust (Ref. 7.35), has been used to make this assessment, as detailed in **Table 7.11**.

Table 7.11: Summary of the proportion of each bat species' Core Sustenance Zone to be lost as a result of the proposed development

Species	CSZ (km)	Percentage of CSZ to Be Lost Due to Proposed Development
Common pipistrelle.	2km	1.9%
Soprano pipistrelle. Brown long-eared bat. Nathusius' pipistrelle. *Plecotus* spp. *Pipistrellus* spp.	3km	0.8%
Noctule Natterer's bat. *Nyctalus* spp. *Myotis* spp. Serotine "Big bat".	4km	0.5%
Barbastelle	10km	0.07%

7.6.68 **Table 7.11** demonstrates that only a small proportion of each bat species' CSZ would be permanently affected as a result of habitat loss (even in the absence of any consideration of quality), resulting in a very low or low magnitude of impact. This is further supported as the majority of habitats which would be lost are generally of relatively low value to bats and so are unlikely to be an important component of any of the species' CSZs.

7.6.69 The habitats present within the site are largely sub-optimal for bats, being intensively managed for arable farming purposes. The sub-optimal arable land has fewer invertebrates on which bats can forage. The exception to this is the floodplain grassland and riparian habitats within the site which provide optimal foraging sources as they generally support higher densities and diversities of invertebrates. During activity and static detector surveys, activity indicative of both foraging and commuting bats was recorded across the site although activity levels were consistently low, with marginally increased activity levels within and adjacent to the broad-leaved plantation woodland compared to the open arable habitats. Thus both habitats would likely support the local bat assemblage within the ZOI, it is not likely to be critical in maintaining the population.

7.6.70 The degree of sensitivity bats display varies between species; however, the surrounding landscape provides extensive areas of similar arable habitat, with optimal floodplain grassland and riparian habitats found to the north and south of the site. Alternative foraging would therefore be available in similar habitats present within the remainder of ZOI.

7.6.71 The majority of species (serotine, noctule, common pipistrelle, soprano pipistrelle and *Myotis* species) recorded within the site tend not to be reliant on linear features for commuting unlike brown long-eared, horseshoes and barbastelle. Although there would be some loss of linear features during construction, given the low numbers of bat species recorded within the site boundary, it is considered that the bat assemblage within the ZOI would have a low sensitivity to this impact.

7.6.72 As part of the primary mitigation detailed in **section 7.5**, habitat loss would be mitigated through woodland planting along the western side of the road as it passes Farnham Hall and residential properties, as well as along the western side of the proposed embankment up to the overbridge. Planting is also proposed on the east side of the overbridge, adjacent to Foxburrow Wood CWS and Farnham Hall Farmhouse to improve ecological connectivity. A total of 1.59ha of new woodland would be planted, and with 0.1ha of woodland re-instated and 0.23ha retained which would be unaffected by the proposed development during construction, would result in a total of 1.92ha of woodland within the site boundary. This planting would also provide habitat for bats and their prey (invertebrates) although these habitats would take a number of years to mature and be of maximum benefit to these species.

7.6.73 Evidence from activity surveys (specifically, the timings of the earliest recordings) indicates the likely presence of a pipistrelle roost in the area of the site. Given the presence of a large number of buildings within the area, which pipistrelle species favour for roosting, it is considered unlikely that the bats recorded are roosting in trees that may be felled, although this cannot be excluded.

7.6.74 Other bat species were recorded during the activity surveys although their time of first encounter did not suggest the presence of roosts within the site. Surveys undertaken to establish the nature of use at any point in time do not exclude the potential for trees to be occupied in the future. In the event that a tree to be felled is found to be occupied by a roosting bat, licensing and mitigation procedures would be followed. These procedures are detailed in **section 7.5**. Tree-roosting species are known to switch roost on a regular basis (Ref. 7.45) and therefore the impacts of tree removal need to be determined on the basis of the wider tree resource available to roosting bats. In this case, the relatively small number of trees to be removed would not substantially reduce the roosting opportunities, given the retained woodland blocks adjacent to the site.

7.6.75 Therefore, while there would still be permanent habitat loss with some fragmentation, the effect of this would be minimised, particularly once

mitigation habitats are fully established. Overall, this would result in a permanent, minor adverse effect, which is considered to be **not significant**.

Disturbance from noise

7.6.76 Noise disturbance is likely to arise through construction activities (such as noise from machinery), increased vehicle movements and increased human presence on-site during construction. The potential disturbing activities are the same as those described previously for the breeding bird assemblage.

7.6.77 Primary and tertiary mitigation measures (detailed in **section 7.5**) include the establishment of buffer areas between the edge of the proposed development and Foxburrow Wood CWS and between the development and adjacent watercourses and the erection of close-boarded fencing where the proposed development abuts woodland (such as along Whin Covert, Nuttery Belt, The Belt, Pond Wood and Foxburrow Wood CWS). These measures would provide some attenuation of construction noise to retained habitats associated with foraging, commuting and roosting bats.

7.6.78 Construction working hours would generally not overlap with periods when bats are active so foraging and commuting bats would not be affected by construction noise. However, noise from construction activity could disturb roosting bats in nearby woodland blocks (such as TN2, Whin Covert, Nuttery Belt, The Belt, Pond Wood and Foxburrow Wood CWS, see **Figure 7.3**) resulting in delayed emergence, or roost abandonment. Anecdotal evidence, such as the use of Wolvercote Railway Tunnel by roosting bats (Ref. 7.50) despite the presence of an operating main line railway, suggests that in certain circumstances bats can become habituated to noise, although the degree to which this may occur is likely to be species-specific. However, the occupation of a site with increased noise levels does not indicate an absence of impact, as increased noise levels can result in a delay in roost emergence time (Ref. 7.51), which may result in the period of peak invertebrate activity (at or soon after dusk; Ref. 7.52) being missed, reducing the duration of potential foraging activity.

7.6.79 Noise associated with human activity during construction may be more detrimental than mechanical and vehicle noise, as such noise is more likely to be assessed by bats as potential predation (Ref. 7.53). This is also likely to be species-dependent with pipistrelle and long-eared bat species often found roosting and foraging in close proximity to human activity (relative to other species) while, other species including barbastelle appear to avoid areas with intense human activity (Ref. 7.52).

7.6.80 Should bats be displaced by construction activities (in addition to displacement through habitat loss), there are (as for habitat loss) other areas

of woodland in the wider countryside that would provide suitable, alternative roosting and foraging habitat, and activity levels demonstrate that bat species are not wholly reliant on the habitats within the site and its ZOI. It is therefore considered that bats would be able to use the large areas of more suitable habitat present within the wider ZOI.

7.6.81 Given the embedded primary mitigation to minimise noise and tertiary mitigation measures outlined in **Chapter 4, section 4.5**, and availability of alternative roosting and foraging habitat in the surrounding countryside, it is unlikely that bats would be appreciably displaced by construction activities. Activity levels demonstrate that bat species are not wholly reliant on the habitats within the site and the ZOI. It is therefore considered that bats would be able to use adjacent large areas of more suitable habitat present within the wider ZOI. For these reasons, the bat assemblage is likely to have a low sensitivity to increases in noise levels.

7.6.82 The extent of noise from the construction of the proposed development is likely to be restricted to the footprint of the facility and habitats in the immediate vicinity of the site, resulting in a low magnitude of impact. This would result in a minor adverse effect, which is considered to be **not significant**. Such an effect would be temporary and reversible over time, once the source of noise is removed.

Disturbance from light

7.6.83 Construction lighting of the proposed development would increase light levels and could cause light intrusion into nearby habitats. As described in **section 7.5** under tertiary mitigation, the approaches used for construction lighting would minimise light spill, and the potential for light disturbance on adjacent land. As construction would take place during normal working hours then some lighting may be required during the Winter months, dependent upon those construction activities which are taking place. Artificial lighting during the construction phase would only be used during the hours of darkness, low levels of natural light or specific construction methods or phases to ensure the health, safety and welfare of construction staff and members of the public.

7.6.84 Primary and tertiary mitigation measures detailed in **section 7.5** include the presence of buffer areas between the edge of the proposed development and Foxburrow Wood CWS and watercourses where practicable and the installation of close-board fencing where the proposed development abuts woodland (such as TN2, Whin Covert, Nuttery Belt, The Belt, Pond Wood and Foxburrow Wood CWS). There would also be measures to reduce the impact of construction lighting so that it is directed away from adjacent habitats and the use of shielding of luminaires to reduce backward spill of

light. These measures would provide some attenuation of light to retained habitats associated with foraging, commuting and roosting bats.

7.6.85 Bat species are known to be sensitive to the effects of light, but this varies with the type of lighting and species under consideration. A substantial increase in light levels and light spillage over the current baseline could cause:

- disturbance to roosting bats in adjacent areas of woodland including delayed emergence, or roost abandonment (Ref. 7.54); and
- impacts to foraging and commuting bats, due to aversion to lit areas (Ref. 7.54), or effects on prey behaviour and availability (Ref. 7.51, Ref. 7.53).

7.6.86 The type of lighting has also been shown to impact the degree to which bats are affected by artificial lighting (Ref. 7.55, Ref. 7.44). Invertebrate species are highly attracted to ultraviolet, green and blue light (light with short wavelengths and high frequencies) which can result in increased insect numbers around artificial light sources (Ref. 7.55). Some bat species (including noctule, serotine and pipistrelle species) have been shown to capitalise on this, foraging around artificial light sources. However, several bat species, including barbastelle, *Myotis* spp. and brown long-eared bats, recorded within the site, generally avoid well-lit areas (Ref. 7.54). Additionally, some studies suggest that streetlights might negatively affect moths (the preferred prey of barbastelle) (Ref. 7.56). Artificial light is further thought to attract insects into lit areas from further afield, with the potential for this to reduce the levels of insect prey available within adjacent habitats.

7.6.87 For the reason stated under disturbance from noise, the bat assemblage in this location is likely to have a low sensitivity to increases in light levels. The area over which an increase in lighting is likely to occur would be limited to the footprint of the proposed development (including hedgerows) and due to the primary and tertiary mitigation, light spillage into the surrounding habitats would be minimised. This would result in a low magnitude of impact, with a minor adverse effect, which is considered to be **not significant**. Such an effect would be temporary and reversible over time, once the source of lighting is removed.

x. Important Ecological Features: Otter

7.6.88 During construction, otters could experience the following impact pathways:

- habitat loss and habitat fragmentation (including connectivity);

- disturbance effects on species population (comprising light, noise and visual effects); and
- incidental mortality.

7.6.89 The characterisation of the impacts is described in detail below.

Habitat loss and habitat fragmentation (including connectivity)

7.6.90 As detailed in the primary mitigation in **section 7.5**, the crossing of the River Alde would preserve the natural integrity of the banks of the river, bed and bankside and minimise shading effects and is of sufficient size and capacity to allow passage for otters to be maintained during construction. The banks of the River Alde would be protected during construction.

7.6.91 The optimal habitat for otters within the site is the River Alde rather than the adjacent ditches, although otters could use these ditches for commuting, and there is evidence that they also sometimes establish holts in ditches (Ref. 7.57).

7.6.92 Otter breeding and resting places ('holts') are typically tunnels under water-side trees and are legally protected. Natal or breeding holts may be used at any time of the year, as otters breed seasonally in Great Britain (Ref. 7.57). The same natal holt may be used in consecutive years, or different sites may be used in each year (Ref. 7.57). Although no holts or resting sites have been recorded within the site boundary, there remains the possibility that otters may set up a new natal holt site. Otters are strongly territorial and use many above ground lying up sites or 'holts'.

7.6.93 Only a single otter print was recorded during surveys as evidence of otter in the area. While this confirmed that otters are using the River Alde within the site boundary, the population is considered to be low. With average densities in England and Wales estimated at between one otter per 15km of water and one otter per 27km of water (Ref. 7.57), this means, depending on exactly where boundaries between adjacent otter territories may be, there more than one territory affected by the proposed development. Males have larger ranges than females, overlapping those of several females (Ref. 7.57).

7.6.94 In terms of proportion of an average range size, suitable habitat to be lost within the site boundary is a small proportion of the overall habitat present within the wider landscape which would be retained. In addition, the primary mitigation with regards to the River Alde crossing maintains the free passage of otters and would remove any potential fragmentation effects.

7.6.95 Overall, habitat loss and fragmentation would have a temporary, negligible adverse effect, which is considered **not significant**.

Disturbance effects on species population (comprising light, noise and visual effects)

7.6.96 Construction of the proposed development would result in increased levels in light, noise and visual disturbance to otters close to the construction footprint through construction activities, increased vehicle movements and increased human presence.

7.6.97 In 1987, Jefferies (Ref. 7.58) reviewed much of the anecdotal evidence available at the time and demonstrated that otter activity was not significantly affected by various forms of human disturbance. Chanin (Ref. 7.57) also noted in Shetland, where the otter population is considered to be healthy, that otters regularly breed under the islands' ferry terminals and under the jetties of Europe's largest oil terminal at Sullom Voe.

7.6.98 A single otter print was recorded during surveys providing evidence of otters in the area. While this record confirmed that otters are using the River Alde, within the site boundary, the population present is thought to be low. It is, therefore, reasonable to conclude that disturbance would have a limited effect on the otter population, given that the area of otter habitat likely to be disturbed is small compared to an average otter territory. Disturbance effects could potentially last for the duration of the construction phase (up to 24 months).

7.6.99 Disturbance on otters would have short-term, reversible, minor adverse effect, which is considered **not significant**.

Incidental mortality

7.6.100 There is the potential for incidental injury or mortality to otters from construction plant carrying out vegetation and ground clearance works, and ditch realignment during the preliminary works and site establishment phases of construction.

7.6.101 Otters are largely but not exclusively nocturnal, highly mobile and *'secretive'* (Ref. 7.57). Radio-tracking studies have shown that otters move away from an area of disturbance, reducing the risk of accidental injury or mortality (Ref. 7.57). Construction works would entail the movement of plant and other vehicles around the site. The likelihood of incidental mortality from vehicles accessing the site would be minimised as traffic would be travelling at reduced speeds. In addition, construction working hours would not include night-time works and working hours would largely avoid the times when otters are most likely to be active.

7.6.102 Overall, given the low density of otter within the site boundary, this impact would have a negligible adverse effect, which is considered **not significant**.

xi. Important Ecological Features: Water vole

7.6.103 During construction, the water vole population present would be associated with the following impact pathways:

- habitat loss and habitat fragmentation; and
- incidental mortality.

7.6.104 The characterisation of the impacts is provided in detail below.

Habitat loss and habitat fragmentation

7.6.105 As detailed in the primary mitigation in **section 7.5**, the crossing of the River Alde would preserve the natural integrity of the banks of the river, bed and bankside and minimise shading effects and is of sufficient size, and capacity to allow passage for water voles to be maintained during construction. The banks of the River Alde and nearby ditches supporting water voles would be protected during construction.

7.6.106 There would be the diversion of some local drainage, so that their use would continue unchanged and approximately 130m would need to be culverted. Field drains located at the western end of the bypass, either side of the proposed River Alde overbridge, would be diverted along the base of the embankment to the River Alde where possible. Approximately 849m of ditch habitat is present within the site boundary. Of this, approximately 143m of ditch habitat would be within the area required permanently for the proposed development, and 343m is within land required to facilitate construction works, of which all 343m would be re-instated at the end of the construction phase. Overall, survey results indicate a relatively low population of water voles largely present along the River Alde and its margins, rather than the adjacent ditches.

7.6.107 The length of a water vole territory varies between 30 to 150m for females and 60 to 300m for males (Ref. 7.59). The lower ranges are appropriate in the context of the site given the favourability of the habitat which means that densities are likely to be high and home range sizes correspondingly low. Females are territorial, although they may share territories with their offspring (Ref. 7.59). Males are not territorial as such but have ranges which overlap with those of many females and other males (Ref. 7.59).

7.6.108 Populations of water voles typically consist of small, discrete colonies comprising a few individuals and having a finite lifespan. Groups of colonies persist through dispersal and colonisation, and genetic interchange is a feature in the successful survival of water vole meta-populations. Dispersal movements are frequent and extensive and can take place both along waterways and across land. Populations of water voles, particularly small populations, require habitat connectivity which allows dispersal of water voles (Ref. 7.59).

7.6.109 Passage for water voles would be maintained during construction along the River Alde through small watercourses and ditches within the site. Any required flood compensation areas would be designed to minimise impacts to adjacent ditches and watercourses to avoid interfering with suitable water vole habitat whilst the flood compensation areas could be designed to include additional surface water features or ditches, depending on the finished ground levels.

7.6.110 In terms of proportion of an average range size, suitable habitat to be lost within the site boundary is likely to be a small proportion of the overall habitat present within the wider landscape which would be retained. In addition, the primary mitigation with regards to the River Alde crossing maintaining the free passage of water voles would remove any potential fragmentation effects.

7.6.111 Overall, habitat loss and fragmentation would have a temporary, negligible adverse effect, which is considered **not significant**.

Incidental mortality

7.6.112 There is the potential for incidental injury or mortality to water voles from construction plant carrying out vegetation and ground clearance works, especially during the ditch realignment works. Water voles would be particularly vulnerable when they are in their burrows. The risk of any incidental injury or mortality could have a one-off, non-reversible, permanent impact.

7.6.113 Water voles use a series of burrows with many entrances and interconnecting tunnels. They also occasionally build woven nests in the bases of sedges and reeds. Outside of their burrows, water vole activity is largely confined to runs in dense vegetation with 2-5m of the water's edge (Ref. 7.59).

7.6.114 Primary and tertiary mitigation outlined in **section 7.5**, require the banks of the River Alde to be protected during construction as well as adjacent ditches supporting water voles. This would be sufficient to protect water voles in most areas. Where ditches are due to be realigned and water voles are confirmed

present, then the tertiary mitigation details how impacts to water voles would be mitigated for through a Natural England licence and appropriate method statement.

7.6.115 Therefore, overall, incidental mortality of water voles would have a negligible adverse effect, which is considered **not significant**.

xii. Inter-relationship effect

7.6.116 Potential construction impacts have been assessed independently. The assessment has inherently considered the impacts of noise, lighting, air, water on IEFs. **Volume 10, Chapter 2** (Doc Ref. 6.11) Inter-relationships considers this in more detail. The potential impacts on all IEFs, have been assessed as not significant, and even in combination would not be expected to have a significant effect.

c) Operation

7.6.117 During the operational phase, the impact pathways would be associated with:

- habitat loss and fragmentation;
- incidental mortality of species;
- disturbance effects (comprising light, noise and visual effects);
- changes in air quality; and
- changes in water quality.

7.6.118 A number of the operational impact pathways have been scoped out of this assessment where, due to the primary and tertiary mitigation detailed in **section 7.5**, an impact is removed, or where it is considered that the effect of an impact would be negligible. The impact pathways that have been scoped out of this assessment, along with the reasons for scoping out, are:

- Effects on Alde-Ore Estuary SPA, SAC, Ramsar site and SSSI: the primary mitigation details that the SuDS infrastructure would minimise surface water run-off and prevent diffuse pollution from sediment and other pollutants arising. Bypass separators and silt traps would be incorporated within the drainage design where considered necessary. As such, there would be no diffuse pollution reaching waterways connected to the River Alde, and therefore, there would be no risk of water quality impacts to this hydrologically linked designated site.

- Effects of water quality, and hydrology and hydrogeology, on Foxburrow Wood CWS, lowland mixed deciduous woodland, floodplain grassland, and the River Alde: the primary mitigation details that the SuDS infrastructure would minimise surface water run-off and prevent diffuse pollution from sediment and other pollutants arising. Bypass separators and silt traps would be incorporated within the drainage design where considered necessary. The swales would attenuate and convey surface water run-off at a rate not exceeding existing green field run-off rates. Existing local drainage from fields would be culverted so that their use would continue unchanged. As such, there would be no effects on water quality for these features.

- Operational impacts on otters: during operational phase, no significant, negative impacts are envisioned for otter. The proposed River Alde overbridge would allow the free passage of otter and maintain habitat connectivity and the overbridge would preserve the natural integrity of the banks of the river, bed and bankside and minimise shading effects. in addition, an otter ledge would be installed on the bridge abutments to allow passage at times of high flows, with fencing incorporated to guide otters to the crossing points. This would minimise the potential for any otter mortality. Operational impacts to otters have therefore been scoped out of the assessment.

- Operational impact to water voles: during operational phase, no significant, negative impacts are envisioned for water vole. As part of the primary mitigation, the proposed River Alde overbridge will allow the free passage of water vole and maintain habitat connectivity and would preserve the natural integrity of the banks of the river, bed and bankside and minimise shading effects. Operational impacts to water voles have therefore been scoped out of the assessment.

i. Important Ecological Features: Alde-Ore Estuary Special Protection Areas, Special Area of Conservation, Ramsar site and Site of Special Scientific Interest

7.6.119 During the operational phase, as detailed previously, no significant effects are predicted.

ii. Important Ecological Features: Foxburrow Wood County Wildlife Site

7.6.120 During operation, the impact pathways which would affect Foxburrow Wood CWS would be associated with:

- habitat fragmentation; and

- changes in air quality.

7.6.121 The characterisation of the impacts are described in detail later.

Habitat fragmentation

7.6.122 The landscape strategy detailed in **section 7.5** of this chapter includes areas of proposed tree and shrub along both sides of the route of the proposed two village bypass as it passes Foxburrow Wood and Farnham hall and hedgerow planting along the length of the route to mitigate for the habitat lost and/or severed by the proposed development.

7.6.123 There would be a total 1.92ha of broadleaved woodland within the site (resulting in an increase of 1.21ha compared to the current baseline) and 7,429m of hedgerow planting (resulting in an increase of 3,641m compared to baseline). Whilst this planting would be completed in the construction phase, it would take time to mature. During the operation of the proposed development, this planting would continue to establish over time, and the increase in planting adjacent to Foxburrow Wood CWS and Farnham Hall Farmhouse would help to improve their connectivity to surrounding woodland blocks and the existing hedgerow network. This planting would also provide habitat for reptiles, birds, bats and invertebrates.

7.6.124 The overall effect on Foxburrow Wood CWS is considered to be minor beneficial (not significant), in the long term, due to the greater extent of habitat and the improved habitat connectivity with the wider landscape.

Changes in air quality

7.6.125 The new proposed development road would be immediately adjacent to Foxburrow Wood CWS. During operation, the proposed development would be open for public use and for construction traffic associated with the Sizewell C Project. Upon completion of the main development site, all Sizewell C construction related traffic would be removed and the road would remain open for public use. Further details of the anticipate traffic use of the proposed development are provided in **Chapter 2** of this volume.

7.6.126 Foxburrow Wood CWS would be susceptible to increases in operational air emissions from the use of the proposed road, namely nitrogen oxides concentrations and nitrogen deposition. Elevated levels of nitrogen oxides can have an adverse effect on vegetation, including leaf or needle damage and reduced growth. Deposition of pollutants derived from nitrogen oxides emissions can contribute to acidification and/or eutrophication of sensitive habitats leading to loss of biodiversity.

7.6.127 In the UK, 95% of the area of woodlands (managed and unmanaged) exceed the nitrogen critical load (Ref. 7.60). This is primarily due to woodlands and forests being able to scavenge air pollutants more effectively than shorter semi-natural vegetation, with the result that inputs of nitrogen deposition to woodlands are generally larger than for other habitat types. Nitrogen deposition on forest ecosystems can lead to increased sensitivity to natural stress, impacts on roots, reduced species diversity of the ground vegetation, reduced growth, and an unbalanced nutritional status due to eutrophication and acidification (Ref. 7.61). Changes in forest ground flora have been documented as a result of enhanced nitrogen deposition near farms (Ref. 7.62) and are also expected to occur in regions with high wet deposition of ammonium and nitrate.

7.6.128 In the UK, 50% of the area of 'unmanaged' woodlands and 60% of the area of unmanaged woodlands exceeds the critical load for acidity (Ref. 7.60). Deposition of acidifying air pollutants often results in soil acidification which can lead to mobilisation of naturally occurring soil aluminium which can have toxic effects on plant roots, potentially reducing tree health (Ref. 7.63). Acid deposition can also lead to reduce tree growth, reduced needle growth and canopy loss (Ref. 7.60).

7.6.129 Given the results of the air quality receptors in the vicinity of Foxburrow wood being negligible and the primary mitigation described within **Chapter 5**, the overall impact of air quality on Foxburrow Wood CWS would be a negligible adverse effect, which is considered to be **not significant**.

iii. Important Ecological Features: Lowland mixed deciduous woodland

7.6.130 During operation, the characterisation of the impacts arising from changes in air quality and their resulting effects is the same as that described for Foxburrow Wood CWS provided above. The main impact pathway experienced by lowland mixed deciduous woodland would therefore be habitat fragmentation.

7.6.131 The landscape strategy is detailed in **section 7.5** of this chapter and as described above includes areas of proposed tree and shrub along both sides of the route of the proposed two village bypass as it passes Foxburrow Wood and Farnham hall to mitigate for the habitat lost and/or severed by the proposed development. There would be 1.59ha of new tree planting, which with 0.1 ha of reinstated woodland and 0.23 ha of woodland which would be unaffected by the proposed development, would result in approximately 1.92ha within the site. This would result in an increase of 1.21ha compared to the current baseline. There would also be additional hedgerow planting along the route of the proposed two village bypass.

7.6.132 Whilst this planting would be completed in the construction phase, it would take time to mature. During the operation of the proposed development, this planting would continue to establish over time, and the increase in planting adjacent to Foxburrow Wood CWS and Farnham Hall Farmhouse would help to improve their connectivity to surrounding woodland blocks such as Whin Covert, Pond Wood, Nuttery Belt and The Belt. This planting would also provide habitat for reptiles, birds, bats and invertebrates.

7.6.133 The overall effect on lowland mixed deciduous woodland is considered to be minor beneficial **(not significant)** given the improved habitat connectivity and the greater extent of this habitat which would mature during operation.

iv. Important Ecological Features: Hedgerows

7.6.134 During operation, the characterisation of the impacts arising from changes in air quality and their resulting effects is the same as that described for Foxburrow Wood CWS provided above. The main impact pathway experienced by hedgerows would therefore be habitat fragmentation.

7.6.135 As detailed in **section 7.5**, landscape proposals include hedgerow and woodland planting at various locations across the scheme to mitigate for the habitat lost and/or severed by the proposed development. These would connect into the existing hedgerow network, where possible. A total of 4,830m of new hedgerow would be planted, and with 506m of hedgerow re-instated at end of construction and 2,093m unaffected by the proposed development, would result in a total of 7,429m within the site boundary. This would be an increase of 3,641m compared to the baseline. Whilst this planting would be completed in the construction phase, it would take time to mature. The hedgerow plantings would continue to establish over time, and the increase in the total extent of hedgerows and the new connections into the existing hedgerow network would increase connectivity. These hedgerow plantings would also provide habitat for reptiles, birds, bats and invertebrates.

7.6.136 The overall effect on hedgerows is considered to be minor beneficial **(not significant)** due to the improved habitat connectivity and increase in habitat extent which would mature during operation.

v. Important Ecological Features: River Alde

7.6.137 During the operational phase the main impact pathway experienced by the River Alde would be associated with any potential changes in water quality.

7.6.138 On the basis of the primary and tertiary mitigation measures, the risk on surface waters would be very low risk of change from the baseline risk. The effects from discharge of contaminants to the River Alde are classified as negligible adverse and considered to be **not significant**.

vi. Important Ecological Features: Floodplain grassland

7.6.139 During operation, the main impact pathways experienced by floodplain grassland would be associated with changes in air quality

Habitat loss and fragmentation

The operation of the proposed development would not result in any further loss of floodplain grassland. No further effects are predicted.

Changes in air quality

7.6.140 Acid deposition on this habitat type tends to lead to small effects. Nitrogen deposition on floodplain grassland, arising in this case from vehicle emissions, could lead to an increase in graminoid biomass with potential adverse effects on forbs (Ref. 7.64) although such species are generally absent in the improved floodplain grasslands immediately adjacent to the proposed development.

7.6.141 The impact characterisation and effects of air quality on this habitat type would be the same as those described earlier. In addition, acid deposition air quality effects on this habitat type tend to be small. Overall, the impact would be an negligible adverse effect, which is considered to be **not significant**.

vii. Important Ecological Features: Invertebrate assemblage

7.6.142 During the operational phase, the impact pathways experienced by the invertebrate assemblage would be associated with any changes in water quality.

7.6.143 On the basis of the primary and tertiary mitigation measures, the risk on surface waters would be at a low risk of change compared to the existing baseline risk. The effects from discharge of contaminants to the invertebrate assemblage supported by the River Alde floodplain habitat are classified as negligible adverse and considered to be **not significant**.

viii. Important Ecological Features: Breeding bird assemblages

7.6.144 During the operational phase, the main impact pathways experienced by the breeding bird assemblage would be associated with:

- habitat fragmentation; and
- disturbance effects on species population (comprising light, noise and visual effects).

7.6.145 The characterisation of the impacts is provided in detail below.

Habitat fragmentation (including connectivity)

7.6.146 As detailed in **section 7.5**, landscape proposals include woodland planting at various locations within the site (see primary mitigation for further details) which would benefit the breeding bird assemblage. Planting is also proposed on the east side of the overbridge, adjacent to Foxburrow Wood CWS and Farnham Hall Farmhouse to improve ecological connectivity.

7.6.147 The proposed development would include some grassed areas and native woodland and hedgerow planting. Hedgerow planting would be completed along the route to integrate the road with the surrounding landscape, compensating for the loss of hedgerow severed by the route. These would connect into the existing hedgerow network, where possible. A total of 1.59ha of new woodland would be planted, and with 0.1ha of woodland being re-instated and 0.23ha of woodland unaffected by the proposed development, would result in a total of 1.92ha of woodland within the site boundary. A total of 4,830m of new hedgerow would be planted, 506m of hedgerow would be re-instated and 2,093m would be unaffected by the proposed development, resulting in a total of 7,429m within the site boundary This planting would provide permanent habitat to support bird species once fully established.

7.6.148 The creation and establishment of the planted areas would have a minor beneficial effect, which is considered to be **not significant**.

Disturbance effects on species population (comprising light, noise and visual effects)

7.6.149 During operation, the proposed development would be open for public use and for construction traffic associated with the Sizewell C Project. Upon completion of the main development site, all Sizewell C construction related traffic would be removed and the road would remain open for public use. Further details of the anticipate traffic use of the proposed development are provided in **Chapter 2** of this volume.

7.6.150 During the operational phase, the breeding bird assemblage would be exposed to the noise and lighting associated with vehicular traffic using the new road. As part of the primary mitigation, the route of the proposed development would be mostly unlit, thereby maintaining a dark corridor, minimising the potential impacts to nocturnal and crepuscular species. Only the roundabouts and junctions would be lit, and in these locations, the operational lighting strategy would minimise light stray. Landscaped plantings would also aid in screening visual disturbance.

7.6.151 Overall, taking into the consideration the primary mitigation, noise and visual disturbance on the bird assemblage would have a negligible adverse effect, which is considered to be **not significant**.

ix. Important Ecological Features: Bat assemblage

7.6.152 During the operational phase, the main impact pathways experienced by the bat assemblage would be associated with:

- habitat loss and fragmentation;
- disturbance from noise and vibration;
- disturbance from light; and
- incidental mortality.

7.6.153 The characterisation of these impacts is provided in detail below.

Habitat loss and fragmentation

7.6.154 The presence of the road would result in the severing of hedgerows and fragmentation of habitats used by foraging and commuting bats. As identified on the **Figures 2.1** to **2.4** safe crossing points would be incorporated into the scheme design through the use of oversized culverts to allow bats to fly beneath the carriageway where the scheme is on embankment. In locations where the route is in cutting, tree planting is proposed as close to the carriageway as permitted in order for the vegetation to establish canopies at height and so, in the long-term, encouraging bats up and over the route. These mitigation measures would reduce the impacts of habitat fragmentation and ensure the scheme remains permeable to bats by re-establishing established flightlines.

7.6.155 The proposed development would include some grassed areas and native woodland and hedgerow planting, resulting in 1.92ha of woodland within the site boundary and 7,429m of hedgerow within the site boundary, an increase compared to the baseline. This planting would provide habitat to support foraging and roosting bats once fully established.

7.6.156 The overall effect on bats from habitat loss and fragmentation would be minor adverse **(not significant).**

Disturbance from noise

7.6.157 The operation of the proposed development would lead to increases in noise level due to an introduction of vehicle traffic in the area.

7.6.158 As noted under construction impacts to bats, although bats can be impacted by noise, the level of bat activity recorded within surveys of the site was low, and the habitats present are largely sub-optimal. The bat assemblage within the ZOI is therefore not considered to be reliant on the habitats within the site for foraging.

7.6.159 The extent of noise from the proposed development during its operational phase would largely be restricted to the scheme corridor and the immediate vicinity. The habitats on the boundary which are used by foraging, commuting and in some locations roosting bats, are likely to experience some disturbance as a result of vehicle movements on the new road which result in a very low magnitude of impact, and minor adverse effect, which is considered to be **not significant**.

Disturbance from light

7.6.160 The road itself would remain unlit; however, lighting would be provided at the A12 western roundabout and the A12/A1094 eastern roundabout extending north to highlight the junction to approaching vehicles. There could potentially also be impacts of light spillage into neighbouring habitats from the headlights of vehicles using the proposed development. Primary mitigation is described in **section 7.5** and includes lighting design which would minimise light spill and the potential for light disturbance on adjacent land. Landscaped plantings would also aid in screening visual disturbance.

7.6.161 The operational lighting at the roundabouts would be permanent. In addition, night-time movements of cars would create short, periodic increases in light, with more extended periods where there would be no light, and conditions would be similar to those currently experienced by bats.

7.6.162 As indicated in construction lighting impacts on bats, lighting can affect bats in a number of ways, and some bat species are regarded as highly sensitive to light disturbance. The increase in lighting compared to existing levels, would be restricted to the A12 western roundabout, and the A12/A1094 eastern roundabout and from vehicle headlights into adjacent habitats.

7.6.163 The impacts of artificial lighting vary between species (Ref. 7.54). Some species can capitalise on the increased insect prey often recorded around artificial light sources, while other, light-avoiding, bat species may be impacted to a greater degree. This is due to the deterrent effect of artificial lighting on these species, and the potentially reduced prey availability in

surrounding areas, because of artificial lighting attracting insects from adjacent habitats (Ref. 7.54).

7.6.164 Lighting can act as a deterrent to bats but only a relatively small number of bats have been recorded within the site. Bats using the site are almost certainly not dependent on the sub-optimal habitats present within the site and would also be using a range of additional habitats in the ZOI. This includes the more valuable woodland blocks, adjacent to the site boundary.

7.6.165 Overall, fixed lighting would have a very low magnitude of impact on the bat assemblage, while vehicle lighting would have a low magnitude of impact. Overall, operational lighting would result in a minor adverse, not **significant effect**.

Incidental Mortality

7.6.166 The presence of a new road would result in the severing of existing landscape features used by commuting and foraging bats. As identified on the **Figures 2.1** to **2.4**, safe crossing points would be incorporated into the scheme design including oversized culverts to allow bats to fly beneath the carriageway where the scheme is on embankment and tree planting as close to the carriageway as permitted in order to all for tree canopies to establish, in the long-term, encouraging bats up and over the scheme. These mitigation measures would reduce the risk of incidental mortality as a result of collisions with vehicles during the operational phase. The culvert structures would be combined with landscape planting to help guide bats to the safe crossing points.

7.6.167 The characterisation of this impact is described earlier. Even with the creation and establishment of the planted areas as well as the use of purpose-built crossing point structures, a minor adverse effect, which is considered to be **not significant** is anticipated.

Important Ecological Features: Otter

7.6.168 During the operational phase no significant effects are predicted.

Important Ecological Features: Water vole

7.6.169 During the operational phase no significant effects are predicted.

x. Inter-relationship effect

7.6.170 Potential operational impacts have been assessed independently. The assessment has inherently considered the impacts of noise, lighting, air, water on IEFs. This section considers the potential for inter-relationship

effects on terrestrial ecology and ornithology IEFs that could occur as a result of a combination of individual environmental effects.

7.6.171 The potential impacts on all IEFs, have been assessed as not significant, and even in combination would not be expected to have a significant effect.

7.7 Mitigation and monitoring

a) Introduction

7.7.1 Primary and tertiary mitigation measures which have been incorporated within the design of the proposed development and considered during the assessment are detailed in **section 7.5**.

7.7.2 Where other mitigation is required to reduce or avoid an adverse significant effect, this is referred to as secondary mitigation. No further mitigation is proposed above the primary and tertiary mitigation measures as the assessment concluded no significant effects when considering the primary and tertiary mitigation measures

7.7.3 However, further monitoring is proposed. The section describes the monitoring required of specific receptors/resources or for the effectiveness of a mitigation measure. The requirements, scope, frequency and duration of a given monitoring regime are set out, as far as possible.

b) Monitoring

i. Construction

7.7.4 All vegetation clearance would be conducted under the supervision of a suitably experience ECoW, who would monitor for breeding bird, reptile, and small mammal constraints. The ECoW would also oversee all ground-breaking activities and inspect all excavations daily.

7.7.5 During construction, there would be regular checks of the perimeter fence and close-boarded fence to check these remain intact, and that there is no encroachment of construction activities beyond the boundary or within the buffer areas.

7.7.6 There would be regular checks of construction lighting to monitor and correct for any excessive light spill into the surrounding habitats and particularly into the adjacent woodland, floodplain grassland and watercourses.

ii. Operation

7.7.7 There would be regular operational checks of lighting to monitor and correct for any excessive light spill into the surrounding habitats, and in particular into the adjacent woodland, floodplain grassland and watercourses.

7.7.8 Any bat boxes installed as mitigation would be monitored post-construction to confirm the presence/absence of bats and use of the bat boxes. If bat boxes have not been occupied by year 5 following installation, consideration would be given to moving them to alternative sites nearby, to be determined by a licensed bat ecologist.

7.8 Residual effects

7.8.1 **Table 7.12** and **Table 7.13** present a summary of the terrestrial ecology and ornithology assessment. They identify the receptor/s likely to be impacted, the level of effect and, where the effect is deemed to be significant, the tables include the mitigation proposed and the resulting residual effect.

Table 7.12: Terrestrial ecology and ornithology summary of effects arising during construction of the proposed development

Receptor	Impact	Primary or Tertiary Mitigation	Classification of Effect	Additional Mitigation	Residual Effect
Alde-Ore Estuary SPA, SAC, Ramsar site and SSSI	Changes in water quality.	**CoCP** (Doc Ref. 8.11) measures for pollution prevention and control measures implemented across the site. The construction compound (and therefore main chemical, material and equipment storage area) would be located over 1km from the River Alde. No storage of equipment or material would be allowed within 10m of watercourses no materials would be stored in areas of high flood risk to avoid sediment loss during flooding.	Negligible adverse	None required.	Negligible adverse **(not significant).**
Lowland mixed deciduous woodland	Habitat loss and fragmentation.	Woodland planting is proposed along the route to replace lost woodland and improve ecological connectivity.	Minor adverse	None required.	Minor adverse **(not significant).**
Hedgerows	Habitat loss and fragmentation.	Hedgerow planting would be completed along the route to integrate the road with the surrounding landscape, compensating for the loss of hedgerow severed by the route. These would connect into the existing hedgerow network, where possible.	Minor adverse	None required.	Minor adverse **(not significant).**
River Alde	Changes in in hydrology and hydrogeology.	SuDS would minimise surface water run-off and prevent diffuse pollution from sediment and other pollutants arising. Swales would attenuate and convey surface water run-off at a rate not exceeding existing green field run-off rates. Existing local drainage from fields would be culverted so that their use would continue unchanged.	Minor adverse	None required.	Minor adverse **(not significant).**
	Changes in water quality.	The development of an appropriate dust management plan and pollution prevention control measures. No materials would be stored in areas of high flood risk to avoid sediment loss during flooding.	Negligible adverse	None required.	Negligible adverse **(not significant).**

Receptor	Impact	Primary or Tertiary Mitigation	Classification of Effect	Additional Mitigation	Residual Effect
		The temporary contractor compound (and therefore main chemical, material and equipment storage area) would be located over 1km away.			
Floodplain grassland	Habitat loss and fragmentation.	Flood compensation areas would be provided to the north and south of the proposed development, largely to the west of the River Alde, but with some on its east side, north of the proposed development.	Minor adverse	None required.	Minor adverse **(not significant).**
	Changes in water quality.	See text for Alde-Ore Estuary SPA, SAC, Ramsar site and SSSI and River Alde.	Negligible adverse	None required.	Negligible adverse **(not significant).**
	Changes in in hydrology and hydrogeology.	See text for Alde-Ore Estuary SPA, SAC, Ramsar site and SSSI and River Alde.	Minor adverse	None required	Minor adverse **(not significant).**
Invertebrate assemblage	Habitat loss and fragmentation.	Additional habitats are to be created as part of the scheme design. However, these would take time to establish.	Minor adverse	None required.	Minor adverse **(not significant).**
	Changes in water quality.	See text for Alde-Ore Estuary SPA, SAC, Ramsar site and SSSI and River Alde.	Minor adverse	None required.	Minor adverse **(not significant).**
Breeding bird assemblage	Habitat loss and fragmentation.	Woodland planting is proposed along the route to replace lost woodland and improve ecological connectivity. Hedgerow planting would integrate the road with the surrounding landscape, compensating for hedgerow losses, but would take time to establish.	Minor adverse	None required.	Minor adverse **(not significant).**
	Disturbance effects on species population	The majority of woodland blocks, such as Whin Covert, Nuttery Belt, The Belt, Pond Wood and Foxburrow Wood CWS would be retained.	Minor adverse	None required.	Minor adverse **(not significant).**

Receptor	Impact	Primary or Tertiary Mitigation	Classification of Effect	Additional Mitigation	Residual Effect
	(comprising light, noise and visual effects).	Installation of close-board fencing where the proposed development abuts woodland.			
Bat assemblage	Habitat loss and fragmentation.	Woodland planting is proposed along the route to replace lost woodland and improve ecological connectivity. Hedgerow planting would integrate the road with the surrounding landscape, compensating for hedgerow losses, but would take time to establish Loss of any confirmed roosts through licence from Natural England. Replacement of lost roost resource through installation of bat boxes.	Minor adverse	Monitoring of bat boxes.	Minor adverse **(not significant).**
	Disturbance from noise.	Presence of buffer areas between the edge of the proposed development, and Foxburrow Wood CWS and watercourses. Presence of landscape grassed areas. Installation of close-board fencing where the proposed development abuts woodland.	Minor adverse	None required.	Minor adverse **(not significant).**
	Disturbance from light.	Control of temporary lighting to minimise light spill. Presence of buffer areas between the edge of the proposed development and Foxburrow Wood CWS and watercourses. Presence of landscape grassed areas. Installation of close-board fencing where the proposed development abuts woodland.	Minor adverse	None required.	Minor adverse **(not significant).**
Otter	Habitat loss and fragmentation.	River Alde crossing would preserve the natural integrity of the banks of the river, bed and bankside, and minimise shading effects, and is of sufficient size and capacity to allow passage for otters to be maintained during construction.	Negligible adverse	None required.	Negligible adverse **(not significant).**

Receptor	Impact	Primary or Tertiary Mitigation	Classification of Effect	Additional Mitigation	Residual Effect
		Banks of River Alde and adjacent ditches to be protected during construction.			
	Disturbance from noise and light.	Control of temporary lighting to minimise light spill. Working hours 07:00 to 19:00.	Minor adverse	None required.	Minor adverse **(not significant).**
	Incidental mortality.	Working hours 07:00 to 19:00. Reduced speed limits.	Negligible adverse	None required.	Negligible adverse **(not significant).**
Water vole	Habitat loss and fragmentation.	River Alde crossing would preserve the natural integrity of the banks of the river, bed and bankside, and minimise shading effects, and is of sufficient size and capacity to allow passage for water voles to be maintained during construction. Banks of River Alde and adjacent ditches to be protected during construction.	Negligible adverse	None required.	Negligible adverse **(not significant).**
	Incidental mortality.	Banks of River Alde and adjacent ditches to be protected during construction. Where ditches are due to be realigned and water voles are confirmed present, then impacts to water voles would be mitigated for through a Natural England licence and appropriate method statement.	Negligible adverse	None required.	Negligible adverse **(not significant).**

Table 7.13: Terrestrial ecology and ornithology summary of effects arising during operation of the proposed development

Receptor	Impact	Primary or Tertiary Mitigation	Classification of Effect	Additional Mitigation	Residual Effect
Foxburrow Wood CWS	Habitat fragmentation.	Woodland planting is proposed adjacent to Foxburrow Woodland and along the route is specific location to replace lost woodland and improve ecological connectivity.	Minor beneficial	None required.	Minor beneficial **(not significant).**
	Changes in air quality.	Tertiary mitigation measures to dust pollution and air quality changes are outlined in **Chapter 5** of this volume.	Negligible adverse	None required.	Negligible adverse **(not significant).**
Lowland mixed deciduous woodland	Habitat fragmentation.	Woodland planting is proposed along the route to replace lost woodland and improve ecological connectivity.	Minor beneficial	None required.	Minor beneficial **(not significant).**
Hedgerows	Habitat fragmentation.	Hedgerow planting would integrate the road with the surrounding landscape, compensating for hedgerow losses, but would take time to establish.	Minor beneficial	None required.	Minor beneficial **(not significant).**
River Alde	Changes in water quality.	The temporary contractor compound would be sited approximately 1km from sensitive surface water habitats. SuDS infrastructure will minimise surface water run-off preventing pollution from sediment and other pollutants arising. Minimal impacts are anticipated due to the proposed primary mitigation and tertiary mitigation measures.	Negligible adverse	None required.	Negligible adverse **(not significant).**
Floodplain grassland	Habitat loss and fragmentation.	Floodplain grassland would be re-instated if flood compensation areas are created within the site boundary.	Minor adverse	None required.	Minor adverse **(not significant).**
	Changes in air quality.	Tertiary mitigation measures to mitigate for dust pollution and air quality changes are outlined in **Chapter 5** of this volume.	Negligible adverse	None required.	Negligible adverse **(not significant).**

Receptor	Impact	Primary or Tertiary Mitigation	Classification of Effect	Additional Mitigation	Residual Effect
Invertebrate assemblage	Changes in water quality.	See text for River Alde.	Negligible adverse	None required.	Negligible adverse **(not significant).**
Breeding bird assemblage	Habitat fragmentation.	Woodland planting is proposed along the route to replace lost woodland and improve ecological connectivity. Hedgerow planting would integrate the road with the surrounding landscape, compensating for hedgerow losses, but would take time to establish.	Minor beneficial	None required.	Minor beneficial **(not significant).**
	Disturbance from noise and light.	Road corridor largely unlit. Control of operational lighting to minimise light spill. Landscaped areas would also aid in screening and buffering disturbance.	Negligible adverse	Monitoring of operational lighting.	Negligible adverse **(not significant).**
Bat assemblage	Habitat fragmentation.	Woodland planting is proposed along the route to replace lost woodland and improve ecological connectivity. Hedgerow planting would integrate the road with the surrounding landscape, compensating for hedgerow losses, but would take time to establish.	Minor adverse	Monitoring of bat boxes.	Minor adverse **(not significant).**
	Disturbance from noise.	Landscaped areas would aid in screening and buffering disturbance.	Minor adverse	None required.	Minor adverse **(not significant).**
	Disturbance from light.	Road corridor largely unlit. Control of operational lighting to minimise light spill. Landscaped areas would also aid in screening and buffering disturbance.	Minor adverse	Monitoring of operational lighting.	Minor adverse **(not significant).**

Receptor	Impact	Primary or Tertiary Mitigation	Classification of Effect	Additional Mitigation	Residual Effect
	Incidental mortality.	Safe crossing points incorporated into the scheme. Landscaped areas would also aid in bats in crossing up and over the road.	Minor adverse	None required.	Minor adverse **(not significant).**

References

7.1. United Nations. 1992. Convention of Biological Diversity.

7.2. UNESCO. 1971. The Convention on Wetlands of International Importance (Ramsar Convention).

7.3. European Parliament and of the Council. Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds (Bird Directive). Official Journal of the European Union. 2009.

7.4. Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (Habitats Directive). Official Journal of the European Communities. 1992.

7.5. European Council. 1979. The Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention).

7.6. United Nations Environment Programme. 1979. The Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention).

7.7. Wildlife and Countryside Act, as amended. 1981. (Online) Available from http://www.legislation.gov.uk/ukpga/1981/69 (Accessed 1 March 2019).

7.8. Statutory Instruments 2017 No. 1012. The Conservation of Habitats and Species Regulations 2017.

7.9. Countryside and Rights of Way Act. 2000. (Online) Available from http://www.legislation.gov.uk/ukpga/2000/37/contents (Accessed 1 March 2019).

7.10. Natural Environment and Rural Communities Act. 2006. (Online). Available from: http://www.legislation.gov.uk/ukpga/2006/16/contents (Accessed 1 March 2019).

7.11. The Hedgerows Regulations. 1997. (Online) Available from: http://www.legislation.gov.uk/uksi/1997/1160/contents/made (Accessed 18 February 2019).

7.12. Protection of Badgers Act. 1992. (Online) Available from: http://www.legislation.gov.uk/ukpga/1992/51/contents (Accessed 1 March 2019).

7.13. UK Biodiversity Action Plan. 1994.

7.14. Joint Nature Conservation Committee and Defra. 2012. UK Post-2010 Biodiversity Framework.

7.15. Ministry of Housing, Communities & Local Government. Planning Practice Guidance. The National Planning Policy Framework and relevant planning guidance. 22 October 2018. (Online). Available from: https://www.gov.uk/government/collections/planning-practice-guidance (Accessed 7 February 2019).

7.16. HM Government. A Green Future: Our 25 Year Plan to Improvement the Environment. 2018.

7.17. Department for Communities and Local Government. 2018. National Planning Policy Framework. February 2019.

7.18. National Policy Statements for energy infrastructure: National Policy Statement for Energy (EN-1) and National Policy Statement for Nuclear Power Generation (EN-6). July 2011. Available from: https://www.gov.uk/government/publications/national-policy-statements-for-energy-infrastructure (Accessed 7 February 2019)

7.19. Suffolk County Council. 2015. Suffolk's Nature Strategy.

7.20. Suffolk Biodiversity Partnership. Suffolk Local Biodiversity Action Plan. May 2012. (Online). Available from: https://www.suffolkbis.org.uk/sites/default/files/biodiversity/prioritystpeciesshabitats/actionplans/Planning_BAP_Final%2018%20May%202012.pdf (Accessed 7 February 2019).

7.21. Suffolk Biodiversity Information Service. Priority Species and Habitats. 2015 (Online) Available from: https://www.suffolkbis.org.uk/biodiversity/speciesandhabitats (Accessed 1 February 2019).

7.22. Suffolk Coastal District. 2013. Suffolk Coastal District Local Plan. Core Strategy and Development Management Policies.

7.23. East Suffolk. Suffolk Coastal and Waveney Councils. Suffolk Coastal Local Plan (in Draft). January 2019. (Online). Available from: https://www.eastsuffolk.gov.uk/planning/local-plans/suffolk-coastal-local-plan/local-plan-review/final-draft-local-plan/ (Accessed 7 February 2019).

7.24. Chartered Institute of Ecology and Environmental Management. 2018. Guidelines for Ecological Impact Assessment in the United Kingdom and Ireland. Terrestrial, Freshwater, Coastal and Marine. Winchester: CIEEM.

7.25. Joint Nature Conservation Committee. 2010. Handbook for Phase 1 habitat survey: a technique for environmental audit. Joint Nature Conservation Committee.

7.26. NBN Atlas. 2017 Great Silver Water Beetle https://species.nbnatlas.org/species/NBNSYS0000007737 (accessed 1 March 2019).

7.27. K.N.A. Alexander. 2014. Research report NECR134. A review of the beetles of Great Britain – the soldier beetles and their allies. Species status No. 16. Peterborough: Natural England.

7.28. G. Gilbert, D.W. Gibbons, & J. Evans. 1998. Bird Monitoring Methods. RSPB: Sandy.

7.29. M. A. Eaton, et al. 2015. Birds of Conservation Concern 4: Population status of birds in the United Kingdom, Channel Islands and Isle of Man. British Birds, 2015, 94:452-504.

7.30. Bratton, J.H. 1991. British red data books: part 3: invertebrates other than insects. Peterborough. Joint Nature Conservation Committee.

7.31. Natural England. 2011. Natural England Technical Information Note TIN102: Reptile Mitigation Guidelines. Natural England.

7.32. English Nature. 2001. Great Crested Newt Mitigation Guidelines. English Nature, Peterborough.

7.33. R.S. Oldham, J. Keeble, M.J.S. Swan & M. Jeffcote. 2000. Evaluating the suitability of habitat for the Great Crested Newt (Triturus cristatus). Herpetological Journal, 10(4), 143-155.

7.34. Natural England. 2015. Standing advice for local planning authorities who need to assess the impacts of development on badgers. Natural England, (Online) Available from: https://www.gov.uk/guidance/badgers-surveys-and-mitigation-for-development-projects (Accessed 7 February 2019).

7.35. Collins (ed.). 2016. Bat Surveys for Professional Ecologists: Good Practice Guidelines. 3rd edition. London: The Bat Conservation Trust.

7.36. Natural England. Ancient Woodlands (England) Inventory. MAGIC, 2019. (Online) Available from: https://data.gov.uk/dataset/9461f463-c363-4309-ae77-fdcd7e9df7d3/ancient-woodlands-england

7.37. DEFRA Farmland Bird Indicator Index Available: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/541593/agindicator-de5-29jul16.pdf.

7.38. S. Bullion. 2009. The Mammals of Suffolk. Suffolk Wildlife Trust.

7.39. P. Wheeler, S. Wray & D. Yalden. 2012. Brown Hare and Mountain Hare. In: UK BAP Mammals: Interim Guidance for Survey Methodologies, Impact

Assessment and Mitigation. Editors: Cresswell, W.J., Birks, J.D.S., Dean, M., Pacheco, M., Trewhella, W.J., Wells, D. & Wray, S. Mammal Society, Southampton

7.40. Suffolk BAP: Brown Hare (Lepus europaeus). December 2003. (Online) Available from: https://www.suffolkbis.org.uk/sites/default/files/biodiversity/prioritypeciesha bitats/actionplans/brownhare.pdf (Accessed 5 August 2019).

7.41. Norfolk Wildlife Trust. Wildlife Trusts join with University of East Anglia to identify cause of hare deaths. Article dated 11 October 2018. (Online) Available from: https://www.norfolkwildlifetrust.org.uk/news-and-articles/news/all-news/2018-10-11-wildlife-trusts-join-with-univ (Accessed 23 February 2019).

7.42. The Guardian. Deadly rabbit virus threatens UK brown hare population. (Online) Available from: https://www.theguardian.com/environment/2019/jan/25/deadly-rabbit-virus-threatens-uk-brown-hare-population (Accessed 26 February 2019).

7.43. Natural England Joint Publication JP025. 2018. A Review of the Population and Conservation Status of British Mammals. July 2018.

7.44. Institution of Lighting Professionals (2018). Bats and artificial lighting in the UK. Guidance Note 08/2018. ILP/BCT.

7.45. D. Russo. L. Cistrone. G.Jones and S. Mazzoleni. 2004. Roost selection by barbastelle bats (Barbastella barbastellus) in beech woodlands of central Italy: Consequences for conservation. Biological Conservation, 117. 73-81

7.46. Dean, M., Strachan, R. Gow, D. & Andrews, R. 2016. The Water Vole Mitigation Handbook. The Mammal Society Mitigation Guidance Series. The Mammal Society.

7.47. British Standards Institute. 2012. British Standard for Trees in relation to design, demolition and construction (BS 5837:2012). British Standards Institute. 2012.

7.48. Delaney D.K., Grubb T.G., Beier P., Patter L.L. and Hildegard-Reiser M. 1999. Effects of helicopter noise on Mexican spotted owls. Journal of Wildlife Management 63(1) 60-76

7.49. Wright M.D., Goodman P. and Cameron T.C. 2010. Exploring behavioural responses of shorebirds to impulsive noise. Wildfowl 60, p150-167

7.50. Greena Ecological Consultancy. Wolvercote Railway Tunnel. Date Unknown. (Online) Available from:

http://www.bats.org.uk/data/files/Wolvercote_Tunnel_Geoff_Billington.pdf (Accessed 19 September 2016).

7.51. M. D. F.Shirley, V. L. Armitage, T.L. Barden, M. Gough, P.W.W. Lurz, D.E. Oatway, A.B. South, & S. P. Rushton. Assessing the impact of a music festival on the emergence behaviour of a breeding colony of Daubenton's bats Myotis daubentonii. Journal of Zoology (London), 2001, 254(3): 367-373.

7.52. Bat Conservation Trust. Bat and Lighting in the UK. Bats and the Built Environment Series. 2008. Bat Conservation Trust.

7.53. J.R. Barber, K.R. Crooks, & K.M. Fristrup K.M. The costs of chronic noise exposure for terrestrial organisms. Trends Ecol Evol., 2009, 25:180–189.

7.54. E.L., Stone, G. Jones & S. Harris. Street Lighting Disturbs Commuting Bats, Current Biology, 2009, doi:10.1016/j.cub.2009.05.058 Available from: http://www.sciencedirect.com/science/article/pii/S0960982209011932

7.55. Bat Conservation Trust. 2014. Artificial Lighting and Wildlife Interim Guidance: Recommendations to help minimise the impact of artificial lighting.

7.56. A. Sierro & R. Arlettaz. 1997. Barbastelle bats (Barbastelle spp.) specialize in the predation of moths: implications for foraging tactics and conservation. Acta Oecologica, 1997, 18 (2): 91-106.

7.57. Chanin, P. 2003. Ecology of the European otter. Lutra. Conserving Natura 2000 Rivers. Ecology Series, No. 10. English Nature

7.58. Jefferies, D.J. 1987.The effects of angling interests on otters, with particular reference to disturbance. In: Angling and wildlife in fresh waters (ITE symposium No. 19). Institute of Terrestrial Ecology, Grange over Sands.

7.59. Strachan, R., Moorhouse, T., and Gelling, M. 2011. Water Vole Conservation Handbook. 3rd Edition. WildCru, Oxford.

7.60. Air Pollution Information System. 2016. Woodlands. Online) Available from: http://www.apis.ac.uk/overview/ecosystems/overview_woodlands.htm (Accessed 6 August 2019).

7.61. Erisman, J.W., Vries, W. 2000. Nitrogen deposition and effects in European forests. Environ 8 65-93.

7.62. Pitcairn, C.E.R., Leith, I.D., Sheppard, L.J., Sutton, M.A., Fowler, D., Munro, R.C., Tang, S., Wilson, D. 1998 The relationship between nitrogen deposition, species composition and foliar nitrogen concentrations in woodland flora in the vicinity of livestock farms. Environmental Pollution 102 41-48

7.63. UKCLAG. 1994. Critical Loads of Acidity in the United Kingdom A report to the Department of the Environment by the UK Critical Loads Advisory Group

7.64. Air Pollution Information System. 2016. Coastal and Floodplain Grazing Marsh. (Online) Available from: http://www.apis.ac.uk/taxonomy/term/139 (Accessed 6 August 2019).