The Sizewell C Project

6.7 Volume 6 Sizewell Link Road

Chapter 7 Terrestrial Ecology and Ornithology

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7 Terrestrial Ecology and Ornithology

7.1 Introduction

7.1.1 This chapter of **Volume 6** of the **Environmental Statement** (**ES**) (Doc Ref. 6.7) presents an assessment of the terrestrial ecology and ornithology effects arising from the construction and operation of the Sizewell Link Road (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 Sizewell Link Road 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**.

7.1.3 This assessment has been informed by data from other assessments as follows:

- **Volume 2, Chapter 10** (Doc Ref. 6.3): Transport
- **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**: Ecological baseline for Sizewell Link Road. 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 draft non-licensable method statements (**Annex 7A.6**).

7.2 Legislation, policy and guidance

7.2.1 **Volume 1, Appendix 6J** 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 Sizewell Link Road ecological 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**.

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 (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 and Nuclear Power Generation (NPS EN-1 and NPS EN-6) (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**.

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 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** 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 Appropriate Assessment to be conducted. This should include information on any mitigation measures that are proposed to minimise or avoid likely effects'*	A Habitat Regulations Assessment (HRA) screening assessment is included in the **Shadow Habitats Regulations Assessment Report** for the Sizewell C Project (Doc Ref. 5.10). The **Shadow Habitats Regulations Assessment Report** considers the possible pathways whereby the proposed development (in this case the Sizewell Link Road) could have a significant effect on a European site. It concludes that there is no potential for a significant effect arising from the construction or operation of the proposed development.
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*	Air emissions have not been considered as a significant effect pathway due to the lack of particularly sensitive habitats, the low additional emissions predicted (negligible), and enforcement of primary and tertiary mitigation measures during

Ref.	NPS Topic Requirement.	How the Requirement Has Been Addressed in Relation to Terrestrial Ecology and Ornithology.
	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.'	construction which would suitably protect neighbouring habitats. See **Chapter 5** of this volume for further details of the air quality assessment.
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 are detailed within **section 7.4** of this chapter. Designated sites have been scoped out of the assessment in **Table 7.11** due to the distance from the proposed development, and the implementation of the primary and tertiary mitigation measures described in **section 7.5** of this chapter.
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 consequence of transport access arrangements;* • *habitats will, where practicable, be restored after construction works have finished; and* • *opportunities will be taken to enhance*	Primary and tertiary mitigation has been defined within **section 7.5** of this chapter. Secondary mitigation is detailed in **section 7.7** of this chapter.

Ref.	NPS Topic Requirement.	How the Requirement Has Been Addressed in Relation to Terrestrial Ecology and Ornithology.
	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. 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 Habitats Regulations Assessment Report** for the Sizewell C Project. The **Shadow Habitats Regulations Assessment Report** considers the possible pathways whereby the proposed development (in this case the Sizewell Link Road) could have a significant effect on a European site. It concludes that there is no potential for a significant effect arising from the construjction or operation of the proposed development 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** of this volume**. 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 HRAs 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*	

Ref.	NPS Topic Requirement.	How the Requirement Has Been Addressed in Relation to Terrestrial Ecology and Ornithology.
	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.'	

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).
- 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**.

d) Local

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

- Suffolk Coastal District Council Local Plan Core Strategy and Development Management Polices (Ref 7.22);
- Suffolk Coastal District 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**.

e) 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.

- Handbook 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 7.26);
- UK Birds of Conservation Concern (Ref 7.27);
- Red Data Book of British Invertebrates (Ref 7.28);
- Hedgerows Regulations Guidelines (Ref 7.11);
- Technical Information Note 102 – Reptile Mitigation Guidelines (Ref 7.29);
- Great crested newt (*Triturus cristatus*) mitigation guidelines (Ref 7.30);
- Evaluating the suitability of habitat for the great crested newt (Ref 7.31);
- Natural England. Standing advice for local planning authorities who need to assess the impacts of development on badgers (*Meles meles*) (Ref 7.32); and
- Bat Surveys: Good Practice Guidelines, 3rd edition (Ref 7.33).

7.3 Methodology

a) Scope of the assessment

7.3.1 The generic Environmental Impact Assessment (EIA) methodology 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**.

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.

7.3.6 The scope of this assessment has been established through a formal EIA scoping process undertaken in 2019. A request for an EIA Scoping Opinion for the Sizewell C Project was initially issued to the Planning Inspectorate in 2014, with an updated request 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.'s responses in relation to methodology in respect of the Sizewell link road 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
Suffolk County Council	10 April 2019	The Councils are concerned that only high-level environmental studies have been undertaken on this route or any other option, and that there is a risk that a mitigation scheme may not be deliverable for not yet considered factors.	A full suite of ecology surveys were undertaken during 2019 to establish the ecological baseline in order to inform the assessment and development of appropriate mitigation to reduce effects on ecology.
Environment Agency	29 March 2019	There is new road infrastructure proposed in the road-led option. The disturbance impacts of this needs to be understood with mitigation proposed.	A full suite of ecology surveys were undertaken during 2019 to establish the ecological baseline and to inform the assessment and development of mitigation.

Consultee	Date	Comment	SZC Co. Response
Environment Agency	29 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 were undertaken during 2019 to establish the ecological baseline, to inform the assessment and support the 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	29 March 2019	The absence of detailed baseline information means that it is currently not possible to adequately assess the impact of the development on ecology. **Section 5.3.18** and **6.3.17** 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 full suite of ecology surveys were undertaken during 2019 to establish the ecological baseline to inform the assessment and support the development of appropriate mitigation. Details of the ecological baseline are provided in **section 7.4** of this chapter and in **Appendix 7A** of this volume.
Natural England	9 April 2019	As acknowledged within the consultation documents "*The proposed link road is* *located within the Minsmere Old River watershed"* (Stage 3 Consultation PEIR -Vol 2A, para 5.11.1, pg. 300). Furthermore, it is stated that two watercourses that are designated as main rivers by the Environment Agency and which flow into Minsmere Old River (which subsequently flows into Minsmere – Walberswick Heaths & Marshes (special area of conservation (SAC), special protection area (SPA), Ramsar	Primary measures have been incorporated into the design (such as provision of portal culverts) and management measures would be undertaken in order to reduce and minimise impacts to loss and fragmentation of riverine habitat, disruption of riverine processes and loss of floodplain habitats, disruptions in-channel and floodplain flows and morphological processes. Further detail is provided in this chapter, as well as **Chapter 12** of this volume.

Consultee	Date	Comment	SZC Co. Response
		sites and sites of special scientific interest (SSSI)) would be intersected by the proposed Link Road and that "*From the west, the first Main River reach would be crossed at the Fordley Road* *junction with the B1122. The second Main River reach would be crossed in Theberton*" (Stage 3 Consultation Vol 1, para 5.11.2, pg. 300). In addition, it is stated that "*There are several ordinary watercourses that would be crossed by the proposed link road. These are tributaries of Minsmere Old River* (Stage 3 Consultation Vol 1, para 5.11.3, pg. 300*) and that as a result, a number of impacts, such as loss and fragmentation of riverine habitat, disruption of riverine processes and loss of floodplain habitats would need mitigation. The road alignment may also disrupt in-channel and floodplain flows and morphological processes*" (Vol 1, para 5.11.15, pg. 301).	
Natural England	9 April 2019	Due to the highly sensitive nature and protections afforded to the Minsmere – Walberswick Heaths & Marshes nature reserves, at the very least comprehensive surface water and drainage strategies are key to this aspect of the proposal and further hydrological assessment is required to enable informed decisions to be made and ensure that adverse effects do not occur.	An assessment of the potential impacts to linked designated sites has been undertaken as part of this chapter and also within **Chapter 12**. Primary mitigation such as sustainable drainage systems (SuDS) would be embedded into the design, or works would be undertaken in accordance with the **Code of Construction Practice (CoCP)** (Doc Ref. 8.11) to minimise impacts on these sites.
Natural England	9 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	The route of the proposed development would be mostly unlit, thereby maintaining a dark corridor, minimising the potential impacts to nocturnal species. To ensure road safety, lighting would be provided at the A12 and B1122 roundabouts. The remaining

Consultee	Date	Comment	SZC Co. Response
		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.	junctions would have low minor road flows and be similar to existing unlit rural junctions, and would be unlit to minimise light spill. Operational lighting design would be compliant with relevant highway standards, and where possible would be chosen to limit stray light. A full suite of ecology surveys were undertaken during 2019 to establish the ecological baseline in order to inform appropriate mitigation, as described in **section 7.5.** If works would require the relocation of water voles, a licence from Natural England would be sought.
Natural England	9 April 2019	We note from the consultation documents that, if progressed, the road would be approximately 6.8 km in length with 2.5 metre wide verges (Stage 3 Consultation Vol 1, para 2.5.2, pg. 29); 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 Sizewell C project following completion of the power station (Stage 3 Consultation Vol 1, para 2.5.3, pg. 29). This should be considered in terms of potential environmental net gain when assessed against the current baseline value of the site.	A landscape strategy has been incorporated into the scheme design and is illustrated on the masterplan provided in **Figures 2.1** to **2.7** 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.**
Suffolk Wildlife Trust	8 April 2019	The Preliminary Environmental Information assessment for the proposed Sizewell Link Road concludes that its construction has the potential to result in significant adverse effects on great crested newts and bats but that "*potential mitigation measures under Natural England licence*" will reduce residual effects to "*not significant*" (Stage 3	Ecology surveys were undertaken during 2019 to establish the ecological baseline of the development boundary to ensure impacts to ecological receptors were fully assessed and in order to inform appropriate mitigation for all species.

Consultee	Date	Comment	SZC Co. Response
		Consultation Table 5.3.1). Impacts on other ecological receptors, such as reptiles, breeding birds, woodland and watercourses 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.	
Suffolk Wildlife Trust	8 April 2019	The routes of both the Sizewell Link Road and the Theberton Bypass are within approximately 2km of the Minsmere-Walberswick SPA. Whilst Stage 3 Consultation PEIR Volume 2A Tables 5.3.1 and 6.3.1 recognise this in relation to a potential pathway for watercourse pollution entering the designated site, they do not include consideration of whether the land within the proposed route provides any habitat for species for which the SPA is designated (such as foraging habitat for marsh harrier). This must be considered as part of the HRA for the proposal.	Bird surveys were undertaken in 2019 and an assessment of the sites suitablility to support bird species has been undertaken. Details of the ecological baseline are provided in **section 7.4** of this chapter and in **Appendix 7A** of this volume. A HRA Screening assessment is included in the **Shadow Habitats Regulations Assessment (HRA) Report** for the Sizewell C Project (Doc Ref. 5.10). The **Shadow HRA** considers the possible pathways whereby the proposed development (in this case the Sizewell Link Road) could have a significant effect on a European site.
Environment Agency	27 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 to ensure impacts to ecological receptors were assessed and in order to inform appropriate mitigation for all species.
Natural England	3 October 2019	The TVB [Two village bypass], Sizewell Link Road, Theberton bypass and Freight Management Facilities, 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	The proposed development has been sited where possible to avoid important ecological features. As part of design evolution, the site boundary has been amended to reduce the land take where possible. Mitigation measures have been incorporated into the design of the

Consultee	Date	Comment	SZC Co. Response
		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 Sizewell Link Road and Theberton bypass, and deciduous woodland for the Freight Management Facility Option 1. Natural England's preferred design options here (as for the Sizewell C main development site 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.	development to reduce impacts to ecological receptors where practicable.
Royal Society for the Protection of Birds (RSPB)	23 September 2019	Notwithstanding our overall concerns regarding the Sizewell C project, in principle we support the Rail Led Transport Strategy over the other strategies (this does not mean we support the Sizewell C project itself), not only in broader environmental considerations but also because it will avoid a road cutting across The area of outstanding natural beauty and the resulting additional impacts on wildlife and ecological function across the landscape. However, we recognise local concerns surrounding traffic in other locations and if this option were to progress, we would request a full suite of protected species surveys and proposals for mitigation and compensation if required and can be justified through the mitigation hierarchy. In line with proposals and recommendations currently proposed in the Environment Plan, we would also expect proposals for net gain. For example, Figures 2.19, 2.20, 2.21 indicate extensive grassed areas;	Ecology surveys were undertaken during 2019 to establish the ecological baseline to ensure impacts to ecological receptors were assessed in order to inform appropriate mitigation for all species and habitats. A biodiversity net gain assessment has been undertaken to help inform the landscape and ecology design. This is presented in **Annex 7A.4.** .

Consultee	Date	Comment	SZC Co. Response
		these could be managed sensitively. Specifically, it is likely the Link Road proposal will affect numerous species rich hedges, trees with high bat potential, great-crested newt ponds including complete loss and the loss of some broad-leaved woodland, we therefore expect the ecological impact of this road to be considerable. In particular, we note on Figure 2.20 the severance of the wide woodland/scrub belt running north east of Dovehouse Farm and request suitable mitigation and replacement to a level that achieves net gain. In Figure 2.21, wooded areas around Theberton Grange to Brown's Plantation are likely to be lost and although this area is already crossed the B1122, it will lead to further and significant separation. Again, we request mitigation planting and seeking to achieve net gain at nearby locations.	
Suffolk County Council and East Suffolk Council	26 September 2019	There is very little information in the consultation document on the existing terrestrial ecology of the route corridor and therefore the potential impact of the proposed road. We reiterate the general point's related to natural environment made in paragraph 9 above in respect of this and all associated development proposed.	Ecology surveys were undertaken during 2019 to establish the ecological baseline to ensure impacts to ecological receptors were assessed in order to inform appropriate mitigation for all species and habitats.

c) Study area

7.3.9 The study area includes the land within the site boundary and Zone of Influence (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 activity being undertaken.

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 proposed development, 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 ZOI, study area and survey areas for ecological features.

Ecological Feature.		ZOI	Study Area.	Survey Area.
Designated Sites.	Statutory designated.	5 kilometres (km)	5km	N/A
	Non-statutory designated.	2km	2km	N/A
Plants and Habitats.		2km	2km	Within the site boundary.
Invertebrates		2km	2km	Included as part of extended Phase 1 habitat and protected species survey.
Reptile		2km	2km	Included as part of extended Phase 1 habitat and protected species survey.
Amphibians		2km	2km	Within the site boundary and a 500m 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	4km	4km	

[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.
	(*Myotis nattereri*).			
	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	
Terrestrial Mammals.		2km	2km	Included as part of extended Phase 1 habitat and protected species survey.

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

e) Assessment criteria

7.3.16 As described in **Volume 1**, **Chapter 6** of the **ES**, 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: EIA 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 (for example 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 (for example 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 (for example 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 reported within **section 7.6** of this chapter. 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 a district or borough 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 CIEEM 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 local 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 and approach, significant effects are identified 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 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 EIA and CIEEM 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 1, Chapter 6.
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

7.3.30 Baseline conditions were determined through a combination of a desk-study and field surveys 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** of this volume 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 7.35); 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 is provided in **Appendix 7A** of this volume.

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

- extended Phase 1 habitat survey (this included badger (*Meles meles*), otter (*Lutra lutra*) and water vole (*Arvicola amphibius*) surveys and assessment of habitat suitability for reptiles) and Hedgerow Assessment;
- great crested newt (*Triturus cristatus*) Habitat Suitability Index[2] and DNA surveys;
- breeding bird surveys; and
- bat surveys (tree assessments, and activity and static surveys).

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

ii. 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.

iii. 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.

iv. 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;

[2] The Habitat Suitability Index assess the potential for ponds for ponds to be suitable to support a breeding population of great crested newts. A high score indicates a pond is more suitable than a pond with a lower score.

- lighting; and
- ground water 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 at **section 2.3** of **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:

- Approximately 90% of the site was surveyed (as access was not granted to all of the site), and it is considered that this extent is sufficient to undertake a reasonable assessment of the value of the habitats to protected or notable species.
- Approximately 50% of ponds within 500m were surveyed for great crested newts but no access was granted to the remainder. 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 interpolation of the survey results of the ponds where access was obtained.
- For the analysis of samples for the great crested newt DNA surveys, there are the following limitations: (1) the results are based on analyses of the samples obtained during surveys and received by the laboratory; (2) the method is qualitative, and therefore the levels given in the score are for information only, they do not constitute the quantification of great crested newt DNA against a calibration curve; and (3) a 'not detected' result does not exclude the presence at levels below the limit of detection.

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** of this volume. 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 are: Minsmere to Walberswick Heaths and Marshes SSSI (525m north-east), Minsmere to Walberswick Heaths and Marshes SAC, SPA and Ramsar site (1.5km north-east); Sizewell Marshes SSSI (2km south-east); Leiston-Aldeburgh SSSI (3.5km south); Sandlings SPA (3.5km south-east); Southern North Sea SAC (3.5km south-east); Outer Thames SPA (3.5km south-east); Potton Hall Fields SSSI (4.4km north-east) and Dews Pond SAC and SSSI (4.4km north).

7.4.4 The SAC, SPA and Ramsar sites support habitat and/or species of European importance listed under Annex I of the European Council Birds Directive (Ref 7.3) and Annex I of the European Council 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 SSSI support habitats and species of national importance and are 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 Fifteen non-statutory designated CWS are within a 2km radius of the site. These are: Kiln Grove and Meadow CWS (0.5km south-west); England Covert CWS (0.5km north-east); Minsmere Valley Reckford Bridge to Beveriche Manor CWS (0.5km north); Theberton Woods CWS (0.5km south-west); Simpson's Fromus Valley CWS (570m north); Leiston Airfield CWS (1km south-west); Stonehill Covert CWS (1km north-east); Minsmere Valley Eastbridge to Reckford Bridge CWS (1km north); Westleton Common and adjacent habitats CWS (1km north); Darsham Marshes CWS (which is also a Suffolk Wildlife Trust reserve) (1km north-east); Suffolk Coastal 212 CWS (which is a Roadside Nature Reserve Number 102) (1km south-west); Buckle's Wood CWS (also an Ancient and Semi-Natural Woodland on the Ancient Woodland Inventory) (1.2km south); Sizewell levels and associated areas CWS (1.9km south-east); Spring Wood CWS (also on the Ancient Woodland Inventory) (1.9km north-east) and Coe Wood CWS (also on the Ancient Woodland Inventory) (2km north-west).

7.4.6 CWS's support habitat types listed under section 41 of the NERC Act (Ref 7.10), and are targeted for action under the Suffolk BAP (Ref 7.20) and

Suffolk's Priority Species and Habitats list (Ref 7.21) These sites are therefore of county importance under the CIEEM guidelines (Ref 7.24), and of medium importance under the EIA-specific methodology.

7.4.7 Full details of the reasons for designation are provided in **Appendix 7A** of this volume. 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 of **Appendix 7A** of this volume.

7.4.8 The site would involve no direct land take from any of these statutory and non-statutory designated sites. Given that there would be no direct land take, and that there are no clear impact pathways that have the potential to cause an effect, both statutory and non-statutory designated sites have been scoped out of the assessment of the proposed development.

ii. Plants and habitats

7.4.9 **Figures 7.3** to **7.5** in **Appendix 7A** of this volume show the extended Phase 1 habitat map for the site.

7.4.10 The habitats present within the site boundary comprise predominantly intensively managed arable fields with no scarce arable weeds, or other notable plant species having been 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 boundary. 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 species-poor, semi-improved grassland within the site, including one large field of neutral semi-improved grassland dominated by forbes, and interspersed with patches of tall ruderal and scattered bramble scrub. The grassland habitat on-site is of local importance under the CIEEM guidelines (Ref 7.24), and of very low importance under the EIA-specific methodology.

7.4.12 The arable fields present within the site are bounded by fences and hedgerows, with the majority of the hedgerows present being species-rich with trees and intact species -poor hedgerows. In total 44 hedgerows were identified, of which 25 (H3, H5, H4, H6, H7, H8, H9, H10, H11, H13, H14, H15, H17, H18, H19, H23, H31, H35, H36, H37, H39, H40, H42, H48 and H51; see **Figures 7.3** to **7.5**) as detailed in **Appendix 7A** of this volume are considered 'Important' when assessed against the Wildlife and Landscape Criteria of the Hedgerows Regulations (Ref 7.11). Hedgerows are a Suffolk Priority Habitat (Ref 7.21), and are listed as a habitat of principal importance under section 41 of the NERC Act (Ref 7.10). All hedgerows on-

site are considered to be of county importance under the CIEEM guidelines (Ref 7.24), and of medium importance under the EIA-specific methodology.

7.4.13 Twelve blocks of broadleaved semi-natural woodland and two plantation woodlands are present, wholly or partly, within the site. None of these blocks of woodland are ancient. The locations of these woodland blocks are indicated by target notes on **Figure 7.3** to **7.5**, and further described in **Appendix 7A** of this volume**.** 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 woodland blocks are considered to be of county importance under the CIEEM guidelines (Ref 7.24), and of medium importance under the EIA-specific methodology.

7.4.14 Within the site there are four watercourses; two are classified as Main Rivers by the Environment Agency (referred to as the Middleton Watercourse and Theberton Watercourse in **Chapters 2** and **12**), and there are two further unnamed watercourses. There are also a number of seven ditches within the site. Ten of these surface water features (Middleton Watercourse, Theberton Watercourse, an unnamed watercourse and seven ditches) were surveyed at the time of the Phase 1 habitat survey, and at the time of survey, were dry and most had recently been cleared of all aquatic and marginal vegetation.

7.4.15 107 waterbodies (ponds) were initially identified (see **Figure 7.6** to **7.8**) as detailed in **Appendix 7A** of this volume, as being present within 500m of the site. Of these, 53 ponds could not be visited as no access were granted. A further 16 ponds were dry and eight ponds were not extant when surveyed. Ponds are on Suffolk's Priority Species and Habitats list (Ref 7.21) and listed under section 41 of the NERC Act (Ref 7.10). Eight ponds are present within the site boundary, of which six held water during the 2019 surveys. The assemblage of ponds within the site is of local importance under the CIEEM guidelines (Ref 7.24), and of low importance under the EIA-specific methodology.

iii. Invertebrates

7.4.16 There were a number of notable and/or legally protected invertebrate species identified within the ZOI during the desk-study. Most notably recorded were butterfly species white-letter hairstreak (*Satyrium w-album*) located 1.6km south-east of the site at Old Abbey, Leiston, purple emperor (*Apatura iris*) with the closest record located 400m west of the site at Theberton Woods, and silver-studded blue (*Plebejus argus*) with the closest records located 1.3km north at Westleton Heath and Westleton Common. These species are Red Data Book listed, protected under Schedule 5 of the Wildlife and Countryside Act (Ref 7.7), and is listed under section 41 of the

NERC Act (Ref 7.10), and Suffolk's Priority Species and Habitats list (Ref 7.21). All records were outside of the site boundary, and none of these species were recorded during surveys.

7.4.17 Further records of four Red Data Book butterfly species were identified during the desk-study: small heath (*Coenonympha pamphilus*) with the closest record located 390m north of the site at Theberton; grayling (*Hipparchia semele*) with the closest record located 58m north of the site at Theberton; wall (*Lasiommata megera*) with the closest record located 760m north of the site at Theberton; and white admiral (*Limenitis camilla*) with the closet record located 390m north of the site at Theberton. These species are also listed under section 41 of the NERC Act (Ref 7.10) and are on Suffolk's Priority Species and Habitats list (Ref 7.21).

7.4.18 There were also records of 33 moth species as seen in **Annex 7A.2**, listed under section 41 of the NERC Act (Ref 7.10), and on Suffolk's Priority Species and Habitats list (Ref 7.21). All the records are over 0.75km away from the site. The majority of these moth species are reed and fen specialists, found within Minsmere marshes, and would therefore not be present within the site as this habitat type is not present.

7.4.19 The broadleaved woodland blocks present within the site and species-rich hedgerows are of some value to invertebrates; in particular common butterfly and moth species. There are 15 hedges which supported Elm, which white-letter hairstreak feed on. White-letter hairstreak are also found most frequently within the east of the UK, and therefore would likely be present on-site. The majority of the site, however, consists of primarily arable fields with no species-rich margins, or other features of particular importance to invertebrates. The invertebrate assemblage within the ZOI of the site is therefore considered to be of local importance under the CIEEM guidelines (Ref 7.24), and of very low importance under the EIA-specific methodology.

iv. Amphibians

7.4.20 Suffolk has a high population of great crested newts, particularly in the north-east of the county, where there is a higher abundance of ponds (Ref 7.36). There are two desk-study records of great crested newts within 500m of the site located 240m west of the site at the most western extent of the site at Laurel Farmhouse and 380m north-east of the site at Middleton Moor.

7.4.21 Within 500m of the site, 107 ponds were identified - see **Figure 7.6** to **7.8, Appendix 7A** of this volume. Access was not granted to 53 ponds for surveys. Sixteen ponds (P039, P040, P043, P044, P045, P056, P080,

P082, P116, P118, P120, P135, P139, P165, P166 and P167) were scoped out for DNA survey due to being dry and eight ponds P085, P125, P127, P128, P138, P141, P149 and P169 were not present. Habitat Suitability Index surveys for great crested newts were conducted for 30 ponds and DNA surveys for 27 of these ponds in 2019. Of the three not surveyed for DNA; P051 was not DNA surveyed as it was unsafe to take water samples, P130 was not DNA surveyed due to access issues, and P068 was not surveyed for DNA as there was not enough water and it was unsafe to collect samples.

7.4.22 Great crested newts were confirmed through DNA analysis in Ponds P032, P036, P053, P054, P064, P066, P081, P107, P119, P121, P140, P163 and P164. Ponds P041 and P042 had inconclusive results. P036, P119 and P164 were the only ponds within the site boundary with confirmed great crested newt presence, whilst P041 had an inconclusive result.

7.4.23 Based upon a review of the data obtained and the distribution of ponds, it is therefore considered that the following meta-populations[3] are present:

- Population 1: P107 as seen in **Figure 7.6, Appendix 7A** of this volume represents a potential population, west of the East Suffolk line, east of the A12.
- Population 2: Ponds P036, P064, P066, P119, P121 and P164 as seen in **Figures 7.6** and **7.7**, **Appendix 7A** of this volume are a cluster of ponds located south of Middleton Moor, east of East Suffolk line, of which ponds P036, P119 and P164 are within the site boundary.
- Population 3: Ponds P053, P054 and P140 as seen in **Figure 7.7, Appendix 7A** of this volume are adjacent to each other and located 305m south of the site boundary in a large area of dense scrub and trees, adjacent to Dovehouse Farm (west of Plumtreehills Covert). Ponds P081 and P163 as seen in **Figure 7.7, Appendix 7A** of this volume are also nearby (305m north of Ponds P053, P054 and P140) in the corner of an arable field within a thin strip of woodland, south of Hawthorn Cottages.

7.4.24 Although the majority of the site comprises arable fields of limited suitability for foraging great crested newts, the scrub, hedgerows and woodland

[3] Great crested newts often exist in meta-populations, a group of associated populations which breed in and live around clusters of ponds.

blocks are suitable foraging habitat, with the woodland providing suitable hibernation and resting sites, and hedgerows and associated margins providing connectivity between ponds and woodland blocks.

7.4.25 Great crested newts are included on Suffolk's Priority Species and Habitats list (Ref 7.21), and section 41 of the NERC Act (Ref 7.10), as well as under Schedule 5 of the Wildlife and Countryside Act (Ref 7.7), and Schedule 2 of the Conservation of Habitats and Species Regulations (Ref 7.8). Great crested newts are of county importance under the CIEEM guidelines (Ref 7.24) and medium importance under the EIA-specific methodology.

7.4.26 Desk-study records were also identified for common toad (*Bufo bufo*), common frog (*Rana temporaria*) and smooth newt (*Lissotriton vulgaris*) within 2km from the site. No targeted surveys of other amphibians were undertaken; however, the woodland blocks, hedgerows and field margins provide suitable foraging habitat, with the woodland providing suitable hibernation sites. It is therefore assumed that the site could support common amphibian species in low numbers.

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 are of local importance under the CIEEM guidelines (Ref 7.24) and very low importance under the EIA specific methodology.

v. Reptiles

7.4.28 There were 17 desk-study records of reptiles within 2km of the site boundary. Species recorded comprised grass snake (*Natrix helvetica helvetica*) located 20m east of the site along the B1122 at Middleton, common lizard (*Zootoca vivipara*) with the closest record located 1.5km east of the site near the bridge of Minsmere New Cut at Eastbridge , slow-worm (*Anguis fragilis*) located 2km south of the site at Abbey Road, Leiston, and adder (*Vipera berus*). Two adder records were located as follows: 2.0km south east of the site at Meadow Marsh and 2km to the north-east of the site at Kenton Hills.

7.4.29 The site is largely sub-optimal for reptiles as it comprises predominantly of intensively managed arable fields. There are small pockets of suitable habitat for reptiles recorded during the Phase 1 habitat survey, but these are isolated and discrete in nature. Suitable habitat for reptiles is therefore considered to be limited. While no targeted surveys were conducted, as no desk-study records identified reptiles within the site and given the limited

suitable habitat, as part of a 2019 bird transect survey an adult grass snake was observed basking at the base of a hedgerow, south of B1122 Yoxford Road within the site boundary. Overall, the available habitat to support reptile species is extremely limited and the site of little value to reptile species.

7.4.30 All four common species of reptile (i.e. grass snake, adder, common lizard and slow-worm) 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 potential for reptiles within the site, the reptile assemblage 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 During the breeding bird surveys, marsh harrier was the only Schedule 1 species of the Wildlife and Countryside Act (Ref 7.7) that was recorded. Seven species listed on both the Red List of Birds of Conservation Concern (Ref 7.27), section 41 of the NERC Act (Ref 7.10) and Suffolk BAP (Ref 7.20) were recorded. These were skylark (*Passer domesticus*) yellowhammer (*Emberiza citronella*), linnet (*Linaria cannabina*), song thrush (*Turdus philomelos*), yellow wagtail (*Motacilla flava*), house sparrow (*Passer domesticus*) and cuckoo (*Cuculus canorus*). Reed bunting (*Emberiza schoeniclus*) and Dunnock (*Prunella modulari*), listed on the Amber List of Birds of Conservation Concern (Ref 7.27), and section 41 of the NERC Act (Ref 7.10) were also recorded. Kestrel (*Falco tinnunculus*), stock dove (*Columba oenas*), marsh harrier (*Circus aeruginosus*), black-headed gull (*Chroicocephalus ridibundus*), meadow pipit (*Anthus pratensis*), house martin (*Delichon urbicum*), snipe (*Gallinago gallinago*), swift (*Apus apus*) and meadow pipit (*Anthus pratensis*) are Amber List species of Birds of Conservation Concern (Ref 7.27) and were recorded. The results of the bird surveys undertaken are shown on **Figures 7.9** to **7.11** in **Appendix 7A** of this volume.

7.4.32 The breeding season peak counts for these species across the site are shown in **Table 7.10**.

Table 7.10: Breeding birds recorded during 2019 surveys.

Species	Breeding Season Peak Count.
Skylark (*Alauda arvensis*).	13
Yellowhammer (*Emberiza citronella*).	7
Linnet (*Linaria cannabina*).	10
Song thrush (*Turdus philomelos*).	1

Species	Breeding Season Peak Count.
Yellow wagtail (*Motacilla flava*).	2
House sparrow (*Passer domesticus*).	4
Cuckoo (*Cuculus canorus*).	1
Black-headed gull (*Chroicocephalus ridibundus*).	3
Meadow pipit (*Anthus pratensis*).	7
Kestrel (*Falco tinnunculus*).	2
Stock dove (*Columba oenas*).	1
Marsh harrier (*Circus aeruginosus*).	1
House martin (*Delichon urbicum*).	15
Dunnock (*Prunella modularis*).	6
Snipe (*Gallinago gallinago*).	1
Reed bunting (*Emberiza schoeniclus*).	2
Swift (*Apus apus*).	2
Meadow pipit (*Anthus pratensis*).	9

7.4.33 In addition, a further 30 species that are either Green List of Birds of Conservation Concern, or of no conservation concern (species of low conservation concern) were also identified. Please see **Appendix 7A** of this volume for full baseline results.

7.4.34 Arable farmland is extensive within Suffolk and the distribution of farmland bird species such as linnet and stock dove, is to a large extent, dependent on the diversity of the arable habitat. Fields with large diverse margins or crops sown to benefit wild birds are likely to support a greater number and diversity of bird species than the intensively managed arable farmland present along the site. The majority of the birds identified during the surveys are associated with farmland habitats. Linnet, yellowhammer, skylark, kestrel, reed bunting, and stock dove are on the UK Farmland Indicator list (Ref 7.37). The UK Farmland Bird Indicator list is made up of 19 species that are dependent on farmland.

7.4.35 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

7.4.36 Eleven species/species groups of bats have been historically recorded within the ZOI, these being, Natterer's bat, noctule, serotine, common pipistrelle, soprano pipistrelle, Nathusius' pipistrelle,barbastelle, brown long-eared bat, big bat', *Myotis* spp. and *Plecotus* spp. Please see **Appendix 7A** of this volume for full baseline results.

7.4.37 Desk-study records additionally identified a Natterer's bat roost at Upper Abbey Farm on the main development site (1.3km north-east), four pipistrelle spp. roosts (1.5km north-east, 256m south-west, 1.7km north-east, 1.5km north-east), a soprano pipistrelle maternity roost (342m north of the site at School House,Theberton) and three brown long-eared bat roosts (411m south-east of the site along Fordley Road, Middleton, 1.3km north and 1.5km east of the most eastern extent of the site) within the ZOI of the proposed development.

7.4.38 Habitats within the site boundary consist primarily of open arable land, which is of limited value for bats. However, habitat features such as woodland, hedgerows and scattered mature trees have potential for roosting bats and provide good quality commuting and foraging opportunities. Eighty-four trees were assessed during bat tree assessments as having specific features potentially suitable for use by roosting bats, (three high, 41 medium, 36 low, and four negligible) as seen in **Figures 7.15** to **7.18, Appendix 7A** of this volume.

7.4.39 During the activity and static transect surveys, common and soprano pipistrelle were the most frequently recorded bat species. All other species (serotine, noctule, barbastelle, *Myotis* spp., big bat, brown long-eared bat, long-eared spp. Natterer's and Nathusius pipistrelle) were recorded at only very low levels. Survey results suggested use of the habitat within the site by foraging and commuting bats. The results of the bat activity surveys undertaken are shown on **Figures 7.12 to 7.14** in **Appendix 7A** of this volume.

7.4.40 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 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 of medium importance under the EIA-specific methodology.

viii. Other mammals

7.4.41 Otter, badger, hedgehog (*Erinaceus europaeus*), water shrew (*Neomys fodiens*), brown hare (*Lepus europaeus*), water vole, and harvest mouse (*Micromys minutus*) were identified from the desk-study.

7.4.42 Ten water vole records are associated with Darsham Marshes, located between 1-1.3 km north-east of the western extent of the site, and 12 records associated with River Yox and Minsmere Old River, 1.6km north-east of the site, were identified by the desk-study. Records were also identified 220m north-east of the site along Rectory Road, 760m north-east of the site at Middleton, 790m north of the site between Reckford Bridge and Eastbridge, 1km north of the site at Minsmere River, Reckford, and 0.9km and 1.3km north-east of the site at Eastbridge. None of the water vole records were within the site boundary, and no habitat suitable for water voles was identified within the site, as all ditches surveyed were recently cleared at the time of survey, and there was no emergent or aquatic vegetation. The ditch network present is considered sub-optimal for water vole, and therefore this species is unlikely to be found within the site. In addition, no evidence for their occupation was identified during the Phase 1 habitat survey. This species is therefore considered absent from the site and has not been considered further within this assessment.

7.4.43 Five otter records were identified by the desk-study, all associated with RSPB Minsmere Nature Reserve, 900m north-east of the site, at its closest point. At the time of the Phase 1 habitat survey, all the watercourses within the site were dry and look to have been dry for some time; however, they do have connectivity to Minsmere Old River 1.6km north-east. These watercourses are therefore sub-optimal but could still be used by commuting otter who will also travel over ground. Otter 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 listed under section 41 of the NERC Act (Ref 7.10) and Suffolk's Priority Species and Habitats list (Ref 7.21). Otter within the ZOI is of local importance under the CIEEM guidelines (Ref 7.24), and of very low importance under the EIA-specific methodology.

7.4.44 The closest hedgehog record is 130m north of the site near Theberton. The woodland blocks and hedgerows within the survey area present provide potentially suitable habitat for hedgehogs and this species could be present within the site boundary. Hedgehog is a Suffolk Priority Species and Habitats listed species (Ref 7.21), and 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.

7.4.45 The single brown hare record was located at Upper Abbey Farm approximately 1.5km south-east from the site boundary. As part of the Phase 1 walkover there have been several incidental records of brown hare within the site boundary. Additionally, the arable and hedgerow habitat present provides suitable habitat for hares. The Suffolk BAP for brown hare states that the species is widespread in Suffolk (Ref 7.38). However, recent reports in the east of England in 2018 suggest brown hare are suffering from a disease epidemic (Ref 7.39), and with rabbit haemorrhagic disease type 2 now confirmed in brown hare from Dorset and Essex (Ref 7.40). Brown hare within the ZOI is of local importance under the CIEEM guidelines (Ref 7.24), and of very vow importance under the EIA-specific methodology.

7.4.46 Seven harvest mouse records were identified by the desk-study, with the closest record being 690m south-west of the most western extent of the site. Habitat suitable to support this species was recorded within the site including the arable fields and margins. Harvest mouse is on Suffolk's Priority Species and Habitats list (Ref 7.21), and also listed in the NERC Act (Ref 7.10). Harvest mouse 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 The desk-study revealed two water shrew records, one record was 790m and another 1.0km from the site, both north of the site at Middleton. Water shrews are reported as declining in Suffolk (Ref 7.41). The water shrew is on Suffolk's Priority Species and Habitats list (Ref 7.21) and considered locally important. 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.

7.4.48 The Phase 1 habitat and protected species surveys did not record evidence of badgers within the site surveyed, including a 30m buffer. Woodland and hedgerow habitats within the site are however likely to provide foraging opportunities for badgers. Badgers are protected under the Protection of Badgers Act (Ref 7.12). Badger within the ZOI is considered to be of local importance under the CIEEM guidelines (Ref 7.24), and of very low importance under the EIA-specific methodology.

b) Future baseline

7.4.49 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

7.4.50 Following a review of the known baseline information within the ZOI, **Table 7.11** 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** of this volume**.** 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.

7.4.51 There are several ecological features that, while not of 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 7.5** of this chapter where appropriate mitigation to ensure legislative compliance for their protection has been described.

Table 7.11: 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.	International/high	Statutory designated sites (Minsmere Walberswick Heaths and Marshes SAC, SPA, Ramsar, SSSI, Sizewell Marshes SSSI, Leiston-Aldeburgh SSSI, Sandlings SPA, Southern North Sea SAC, Outer Thames SPA, Dew's Ponds SAC and SSSI, Potton Hall Fields SSSI) were identified within the ZOI. Statutory designated sites support a range of habitats and European and nationally protected species. Given the distance of these statutory designated sites from the site (the closest of which is 1.5km north-east), and the implementation of the primary and tertiary mitigation measures detailed in **section 7.5** of this chapter, no direct or indirect impacts are anticipated on the statutory designated sites. Therefore these designated sites been scoped out of the detailed assessment.	Scoped out.
Non-statutory designated sites within 2km of the site boundary.	County/medium	CWS (Kiln Grove and Meadow, England Covert, Minsmere Valley, Reckford Bridge to Beveriche Manor CWS, Theberton Woods, Simpsons Fromus Reserve, Leiston Airfield, Stonehill Covert, Minsmere Valley Eastbridge to Reckford Bridge CWS, Westleton Common, Darsham Marshes, Suffolks Coastal 102 Roadside Nature Reserve, Buckle's Wood, Sizewell levels, Spring Wood and Coe Wood) have been identified within the ZOI. 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 non-statutory designated sites from the site (the closest of which is 0.5km north-east 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 these CWS's have been scoped out of the detailed assessment.	Scoped out.
Arable habitats.	Local/very low.	Arable field margins are a habitat listed under Suffolk's Priority Species and Habitats list (Ref 7.21). Arable land is widespread in Suffolk and the arable farmland within the site was of little intrinsic botanical diversity, and no botanically rich arable margins were identified. 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.

Feature/Receptor	Importance (CIEEM/EIA Methodology).	Justification	Scope in/Out
Lowland mixed deciduous woodland.	County/medium	There are 12 broadleaved woodland blocks identified. Lowland mixed deciduous woodland is a priority habitat in the Suffolk Priority Habitats and Species List (Ref 7.21) and is listed as a habitat of principal importance under section 41 of the NERC Act (Ref 7.10). Although only small areas of these woodland would be lost due to construction of the proposed development, they would not be retained in their entirety and therefore they have been scoped in to the detailed assessment.	IEF scoped in.
Ponds within the site and ZOI.	Local/low	Ponds are a habitat listed under Suffolk's Priority Species and Habitats (Ref 7.21, and section 41 of the NERC Act (Ref 7.10). Eight ponds, of which six were confirmed to be holding water at time of the field surveys, are within the site boundary. One pond would be within land required permanently for the proposed development and the other seven ponds would be within land required to facilitate construction. A further twelve ponds are outside of the site boundary but have the potential to be indirectly impacted by the proposed development, due to potential impacts on the water quality. In total, twenty ponds in total could be impacted by the proposed development. Ponds have therefore been scoped in to the detailed assessment. The ponds within the wider area are known to support populations of great crested newts. Great crested newts have been assessed as an IEF in its own right.	IEF scoped in.
Hedgerows	County/medium	Construction of the proposed development would result in the loss of 14 'important' hedgerows. All hedgerows are a habitat listed under Suffolk's Priority Species and Habitats (Ref 7.21). Whilst hedgerows are widespread in Suffolk; it is considered that the loss of species-rich hedgerows at this location as the potential to result in a significant effect. Therefore, hedgerows have been scoped in to the detailed assessment.	IEF scoped in.
Invertebrate assemblage.	Local/very low.	The majority of the site comprises arable fields. The broadleaved woodland blocks present within the site and species-rich hedgerows are of some value to invertebrates; in particular common butterfly and moth species. Primary mitigation measures, such as elm planting for white-letter hairstreak have been considered and described in **section 7.5** to ensure no loss to biodiversity. Invertebrates have therefore been scoped out of the detailed assessment.	Scoped out.

Feature/Receptor	Importance (CIEEM/EIA Methodology).	Justification	Scope in/Out
Great crested newts.	County/medium	Great crested newt DNA was confirmed in 13 ponds (P032, P036, P053, P054, P064, P066, P081, P107, P119, P121, P140, P163 and P164). P036, P119 and P164 are the only confirmed great crested newt ponds within the site boundary. Great crested newts are a priority species for conservation action in the county (Ref 7.21), is protected under Schedule 5 of the Wildlife and Countryside Act (Ref 7.7) and Schedule 2 of the Conservation of Habitats and Species Regulations (Ref 7.8) and is included within section 41 of the NERC Act (Ref 7.10). The majority of the site consists of arable fields of limited suitability for foraging great crested newts, however, the field margins, hedgerows and blocks of woodland provide suitable foraging habitat and suitable hibernation sites. The hedgerows would also provide connectivity between ponds and woodland blocks. Great crested newts have therefore been scoped in to the detailed assessment.	IEF scoped in.
Other amphibians.	Local/very low.	It is envisaged that the woodland blocks within and adjacent to the site could support a small population of common toad and common frog. While not legislatively protected, common toad is listed under section 41 of the NERC Act (Ref 7.10) while common frog has a low conservation status. However, only a small area of woodland, and the ponds within the site boundary are suitable to support these species. The habitat lost which could support these species' would be a small area, and there is suitable habitat surrounding the site which would be suitable. Common toad and common frog have therefore been scoped out of the detailed assessment; however, mitigation measures employed to protect reptiles (outlined in the row below) would also protect these species'. These are detailed in **section 7.5** and the **CoCP** (Doc Ref. 8.11).	Scoped out.
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 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 is of low suitability for reptile species, while one incidental sighting of a grass snake was recorded, the habitat within the site is not suitable to maintain reptile populations. 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 of the proposed development would be **not significant** to the wider reptile population within Suffolk. Overall, it is	Scoped out.

Feature/Receptor	Importance (CIEEM/EIA Methodology).	Justification	Scope in/Out
		considered that any impacts that may affect foraging and/or hibernating reptiles are unlikely to be significant. Reptiles have therefore been scoped out of the detailed assessment with regards to a potential significant effect on the population, but details of the mitigation measures that should be employed to avoid harm to individual animals should they be encountered have been outlined within the **section 7.5** of this chapter and the **CoCP** (Doc Ref. 8.11) to prevent impacts to these fauna.	
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 representative of the habitats present, and the populations observed on-site are comparable to the populations within the wider area. 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. Six 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 and farmland birds have therefore been scoped in to the assessment.	IEF scoped in.
Bats	County/medium	At least 11 bat species/species groups have been recorded historically within the site (Natterer's bat, noctule, serotine common pipistrelle, soprano pipistrelle, Nathusius' pipistrelle, barbastelle, brown long-eared bat, 'big bat', *Myotis* spp., and *Plecotus* spp). 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. 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	IEF scoped in.

Feature/Receptor	Importance (CIEEM/EIA Methodology).	Justification	Scope in/Out
		Countryside Act (Ref 7.7), and the NERC Act (Ref 7.10). Bats have therefore been scoped in to the detailed assessment.	
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). No evidence of badger was recorded within the site although it is possible they utilise woodland and hedgerows and arable margins within the site for foraging. Badgers are widespread across England, and populations are increasing in Suffolk (Ref 7.41). Badgers have therefore been scoped out of the assessment. However, due to the legal protection offered to badgers and their setts, the badger population within the ZOI will require tertiary mitigation to ensure compliance with the legislation. This has been as outlined within **section 7.5.**	Scoped out.
Water vole	Local/very low	Ten water vole records associated Darsham Marshes and 12 records associated with River Yox and Old Minsmere Old River 1.6km north-east of the site, were identified by the desk-study. None of the water vole records were within the site boundary. Water vole are listed under Suffolk's Priority Species and Habitats (Ref 7.21) and are protected under Schedule 5 and 6 of the Wildlife and Countryside Act (Ref 7.7), and are included within section 41 of the NERC Act (Ref 7.10). No habitat suitable for water voles was identified within the site, as all ditches were recently cleared at the time of survey, and there was no emergent or aquatic vegetation. The ditch network present is sub-optimal for water vole, and therefore this species is unlikely to be found within the site. This species is therefore considered absent from the site and has not been considered further within this assessment.	Scoped out
Otter	Local/very low.	Five otter records were identified by the desk-study, all associated with RSPB Minsmere Reserve 900m north-east of the site. Otter are listed under Suffolk's Priority Species and Habitats (Ref 7.21) and 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). Although all the watercourses within the site were dry at the time of survey in 2019, they do have	Scoped out.

Feature/Receptor	Importance (CIEEM/EIA Methodology).	Justification	Scope in/Out
		connectivity to Minsmere Old River 1.6km north-east, and therefore they could still be used by commuting otter; however, no evidence of otter use was recorded within the site. Otter has been scoped out of the detailed assessment as there is no predicted effect upon the otter population, however details of the mitigation measures that should be employed to safeguard indvidual otter should they commute through the site have been outlined within **section 7.5,** and the **CoCP** (Doc Ref. 8.11) to prevent impacts on otter.	
Brown hare.	Local/very low.	There were several incidental records of this species on the site during surveys. While a limited number of brown hare are likely to be found within or adjacent to the site, there is sufficient adjacent habitat to support this species, and the small number found within the site boundary is not considered to represent a major component of a 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 brown hare have therefore been scoped out of the detailed assessment.	Scoped out.
Hedgehog	Local/very low.	The majority of the site is arable fields, and so sub-optimal for hedgehog. The woodland and boundary hedgerows within the site provide potentially suitable habitat for hedgehog and this species could be present within the site boundary. While hedgehog are likely to be found within or adjacent to the proposed development, there is sufficient adjacent habitat to support this species and the effects of the proposed development on this species is unlikely to be of significance. Hedgehog is listed under Suffolk's Priority Species and Habitats (Ref 7.21), and section 41 of the NERC Act (Ref 7.10). The mitigation measures employed to protect reptiles would also protect this species. These have been outlined within **section 7.5** and the **CoCP** (Doc Ref. 8.11) to minimise impacts these fauna.	Scoped out.
Harvest Mouse.	Local/very low.	Harvest mouse are on Suffolk's Priority Species and Habitats list (Ref 7.21), and section 41 of the NERC Act (Ref 7.10), and are considered locally important. No harvest mouse records were found within the site with the closest desk-study record 690m away. This species has, therefore, been scoped out the detailed assessment.	Scoped out.

Feature/Receptor	Importance (CIEEM/EIA Methodology).	Justification	Scope in/Out
Water Shrew.	Local/very low.	No water shrew records were found during survey within the site boundary. However, the ponds present could support this species, although any population found within the site is not considered to be of particular importance to the wider population of the species. Water shrews declining in Suffolk (Ref 7.41) and the species is also on Suffolk's Priority Species and Habitats list (Ref 7.21). The species is considered locally important, although it is not included within 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 therefore been scoped out of the detailed assessment. However, mitigation measures would be incorporated as outlined within **section 7.5** of this chapter and the **CoCP** (Doc Ref. 8.11) to minimise impacts on these fauna.	Scoped out.

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

- IEF: Lowland mixed deciduous woodland;
- IEF: Hedgerows;
- IEF: Ponds;
- IEF: Great crested newt;
- IEF: Breeding bird assemblage; and
- IEF: Bat assemblage.

7.5 Environmental design and mitigation

7.5.1 As detailed in **Volume 1, Chapter 6** of the **ES,** a number of primary mitigation measures have been identified through the iterative EIA process, and have been incorporated into the design and construction planning of the proposed development. Tertiary mitigation measures are legal requirements or are standard practices that would 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 ecology has been provided here.

- The route of the proposed Sizewell Link Road has been designed to avoid direct land take from designated sites.
- The retention of existing woodland and hedgerows where possible, except where the proposed development crosses existing field boundaries or tree belts.

- The site boundary has been amended and reduced where possible to avoid direct and indirect impacts to ponds.
- Replacement habitat for the loss of woodland and hedgerows would be incorporated into the proposed development and would use native species only. 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). This would provide benefits to ecology and help maintain potential bat corridors. Proposed planting includes:
  - hedgerow planting along the lenth of the route and will include some Elm hedgerow;
  - tree and shrub planting around the proposed infiltration and flood relief basins to help integrate these features into the surrounding landscape;
  - where field corners are severed from the rest of the field by the proposed development would be planted with tree and shrubs to replicate the pattern of small woodland blocks in the surrounding landscape and replace that lost during construction;
  - tree and shrub planting on the south side of the route of the proposed Sizewell Link Road, east of the East Suffolk link;
  - tree and shrub planting at the junction with the proposed Middleton Moor Link;
  - tree planting south of the route to compensate for woodland lost in the vicinity of Fordley Road, and to minimise visibility of the route from nearby residential properties.
  - tree and shrub planting south of the route in the vicinity of Trust Farm to Hawthorn Road;
  - tree planting west of the route in the vicinity of Dovehouse Farm, to compensate for the loss of woodland in the belt west of Theberton Hall and to infill field corners severed by the proposed route. Further planting is proposed east of the route in this vicinity to minimise visibility from the Theberton Hall estate and to help integrate the proposed Pretty Road overbridge into the surrounding landscape.
  - tree planting north and south of the route between Theberton and Theberton Grange, to minimise visibility of the route from residential properties and to infill field corners severed by the proposed route.

  - Grassed areas are also proposed along the length of the route, including on embankment. These areas would help buffer any potential impacts to nearby ecological features.

- Measures would be installed into the road design to maintain connectivity for great crested newts. The locations for crossing points will be finalised at the detailed design stage, however these would be as follows:
  - The preferred option, where there is minimal fragmentation, and the development is at grade, as cited by Natural England (Ref 7.59), would be to allow newts to cross over the road. These measures would be incorporated into the proposed development design such as no kerbing or features that would inhibit the movement of newts to cross the road. In the event of gulley pots (which could become traps for amphibians) being identified as a requirement, the design will ensure that amphibian friendly gully pot designs are used so that a means of egress is provided to ensure that any amphibians do not get trapped within them.
  - Alternatively, where the development design includes embankments and in areas of greatest importance to great crested newts, culverts or underpasses would be considered where practicable and depending upon the further survey results to enable great crested newt movement across the road. These culverts or underpasses would be at least 1m in width, and newt fencing and appropriate green infrastructure would be installed along the length of the embankment to a distance of about 100m either side to the culvert/underpass to guide newts towards the culvert as recommended by Natural England[4]
- Replacement great crested breeding ponds are included within the design of the proposed development to compensate for the loss of existing ponds, although the precise number and location are to be determined. Replacement ponds would be created prior to destruction of the original ponds and appropriate terrestrial habitat would be created around the ponds. Indicative locations for replacement great crested newt ponds and great crested newts crossing points are shown on **Figure 2.2** to **2.4** of this volume.
- SuDS infrastructure would be installed along the length of the proposed development. SuDS would attenuate surface water run-off

[4] Natural England (2014). http://www.semmms.info/wp-content/uploads/2016/06/Natural-England-Favourable-Conservation-Status-FCS-PDF-221Kb.pdf

and minimise sediment generation and provide water treatment. Surface water run-off would be contained within the site, with drainage to ground via infiltration using infiltration basins and swales, wherever feasible. 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 field would be culverted so that their use would continue unchanged.

- The route of the proposed development would be mostly unlit, thereby maintaining a dark corridor, minimising the potential impacts to nocturnal species. To ensure road safety, lighting would be provided at the A12 and B1122 roundabouts. The remaining junctions would have low minor road flows and be similar to existing unlit rural junctions and would be unlit to minimise light spill. Operational lighting design would be compliant with relevant highway standards, and where possible would be chosen to limit stray light. Guidance within the latest Institution of Lighting Professionals Guidance Note: Bats and artificial lighting in the UK (Ref 7.42) 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, and would also maximise the use of reinstated 'bat crossing points'.

- Crossing points (bat hop-overs) to facilitate the passage of bats across the road alignment have been incorporated in the design where foraging or commuting routes have been identified, to reduce the potential for incidental mortality as a result of bats crossing the road and colliding with vehicles. These features would comprise hedgerow planting with tall standards planted where hedgerows meets the road to encourage bats to pass up and over the newly constructed road.

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

b) Tertiary mitigation

7.5.6 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.

7.5.7 Tertiary mitigation relevant to terrestrial ecology and ornithology is detailed in the **CoCP** (Doc Ref. 8.11). The **CoCP** is informed by relevant environmental legislative requirements as well as general requirements and

compliance with current standards, construction and operational experience. The **CoCP** (Doc Ref. 8.11) also establishes the framework of arrangements required to manage environmental and ecological impacts, mitigate nuisance to the public and safeguard the environment during the enabling works, preliminary works, the main construction phase and site restoration phases.

7.5.8 Mitigation measures relevant to terrestrial ecology and ornithology included in the **CoCP** (Doc Ref. 8.11) 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.
- No storage of equipment or material would be allowed 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.
- Close-boarded fencing would be erected along the side of woodland blocks, where the site abuts these (e.g. Target Note 3, Target Note 8, Plumtreehills Covert, Target Note 12 and Target Note 14; see **Figures 7.3** to **7.7**). This would provide additional mitigation for lighting impacts (including those from vehicle headlights) and noise impacts during the construction phase. The need for operational phase close-boarded fencing would be finalised at detailed design.

7.5.9 Works with the potential to affect great crested newts would be carried out either under a licence from Natural England, following agreement with Natural England or an appropriate mitigation strategy. The licensable works would encompass and clearance and construction works required within the intermediate and distant habitat zones of ponds within the site.

7.5.10 Where feasible, works would be undertaken outside of all tree and hedgerow root protection zones that would not be removed as part of the proposed development. Tree protective fencing as described in section 6.2

of British Standard 5837:2012 (Ref 7.43) would be installed where required, prior to works commencing in the adjacent areas. If works need to be undertaken within the root protection zones an arboricultural survey would be required and any advice provided adhered to, to support the long-term survival of the tree/hedgerow.

7.5.11 The proposed development includes the removal of 46 trees identified as having the potential to support roosting bats. Tree inspections would 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:

- 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 laid out in the licence application(s) would be implemented (for example, the fitting of exclusion devices);
- felling of trees would generally be undertaken in September or October, to avoid both 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 trees 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 that is due to be lost, whether or not a roost has been identified. A variety of bat boxes would be used to support different species.

7.5.12 A small proportion of habitat within the site, primarily around the field margins, has some limited potential to support small populations 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.

7.5.13 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.

7.5.14 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.

7.5.15 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.

7.5.16 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** of this chapter, 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 changes to water quality, in local hydrology and hydrogeology and air quality on lowland mixed deciduous woodland and hedgerows: given the embedded mitigation, these habitat types would unlikely be impacted and there would be **no significant** effect on this receptor. Mitigation includes the development of an appropriate dust management plan and pollution prevention control measures. In addition, any dewatering would be localised and of short duration. In addition, both **Chapter 5**, and **Chapter 12** have identified **no significant** effects arising from 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). These have been assessed within the separate IEFs of species groups associated with the habitat type and not under the habitat type itself.

- Incidental mortality to bird species: as part of the tertiary mitigation described in **section 7.5** of this chapter, 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 an 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 site. The likelihood of incidental mortality from vehicles accessing the site is unlikely as traffic would be travelling at low 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 embedded primary and tertiary mitigation, as detailed in **section 7.5** of this chapter);
- 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 Feature: Lowland mixed deciduous woodland

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

Habitat loss and fragmentation

7.6.8 Approximately 0.61ha of lowland mixed deciduous woodland is present within the site boundary. Of this area, approximately 0.41ha (67%) of woodland would be within the area required permanently for the proposed development and a further 0.17ha would be temporarily lost to facilitate construction and replanted at the end of the construction phase.

7.6.9 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 in adjacent areas and would not be impacted.

7.6.10 New tree planting is proposed in strategic locations throughout the route of the Sizewell Link Road corridor to integrate these areas into the surrounding landscape. A total of 13.1ha of new woodland would be planted and as noted above a further 0.17ha of woodland would be re-instated (as well as 0.03ha retained during construction), resulting in a total of 13.3ha of woodland within the site boundary, compared to 0.61ha at present. However, the landscape planting would be installed towards the end of the construction phase and it is anticipated that it would take 10 years to become functional.

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

ii. Important Ecological Feature: Hedgerows

7.6.12 During construction, hedgerows would be impacted by habitat loss and habitat fragmentation. The characterisation of this impact is described in detail below.

Habitat loss and fragmentation

7.6.13 Approximately 9,303m of hedgerows are present within the site boundary. Of these hedgerows, 4,537m of hedgerows, of which 1,302m are considered 'Important' under the Hedgerows Regulations (7.11) would be within the area required permanently for the proposed development (approximately 49% of hedgerow within the site, of which 14% are 'Important' hedgerows). Approximately 1,036m of hedgerow would be lost within land temporarily required to facilitate construction works and would be replanted at the end of the construction phase (of which 127m are 'Important' hedgerow).

7.6.14 However extensive lengths of hedgerows are present within the wider landscape and would not be impacted.

7.6.15 As detailed in **section 7.5** of this chapter, hedgerow planting would be completed along the route to integrate the road with the surrounding landscape, compensating for the loss of hedgerow removed by the development. Hedgerow planting would connect into the existing hedgerow network, where possible. A total of 12,853m of new hedgerow would be planted, with a further 1,036m of replanted hedgerow and 3,730m of hedgerow within the site boundary unaffected by the proposed development, resulting in a total of 17,619m of hedgerow within the site boundary. This planting would also provide habitat for reptiles, birds, bats and invertebrates although it would take a number of years for the planting to mature and be of maximum benefit to ecological receptors.

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

iii. Important Ecological Feature: Ponds

7.6.17 During construction, the impact pathways ponds would be affected by would be associated with:

- habitat loss and habitat fragmentation; and

- changes in water quality.

7.6.18 The characterisation of these impacts are described in detail below.

Habitat loss and fragmentation

7.6.19 There are eight ponds within the site boundary, and a further 12 ponds which are located outside the site but have the potential to be indirectly impacted by the proposed development. The number of ponds lost has been minimised by amending the site boundary to avoid pond loss where possible.

7.6.20 Of the eight ponds within the site boundary, one pond would be within the land permanently required for the proposed development. The remaining seven would be within the area required to facilitate construction works and would be restored at end of the construction phase.

7.6.21 Mitigation for the loss of ponds has been incorporated into the proposed design. Approximately 14 ponds would be created, providing habitat suitable to support amphibian species (including great crested newts) and invertebrates. It would take a relatively short time for the ponds to develop and be of maximum benefit to these species. Eight of the 14 ponds would provide replacement habitat for the loss of great crested newt breeding ponds, and these would need to be established prior to the loss of these ponds.

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

Changes in water quality

7.6.23 As described in **section 7.5**, all construction works would be conducted 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. These mitigation measures would ensure no significant effect on water quality of the ponds.

7.6.24 Overall, impacts 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**.

iv. Important Ecological Feature: Great crested newt

7.6.25 During construction, the impact pathways experienced by great crested newts would be associated with:

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

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

Habitat loss

7.6.27 Great crested newts are sensitive to habitat loss due to their two-stage lifecycle, breeding within aquatic environments, and foraging and hibernating within terrestrial environments. The effect of habitat loss on great crested newts has been kept to a minimum by the retention of woodland blocks and hedgerows adjacent to the site with only small areas of woodland loss within the site boundary. However, construction would result in the permanent loss of 4,537m of hedgerows (with a further 1,036m located within the land required to facilitate construction), 0.41ha of woodland (with a further 0.17ha lost within the land required to facilitate construction before subsequent re-instatement), and 61.57ha of arable fields (with a further 28.64ha within land required to facilitate construction), and the permanent loss within the site to allow for the construction of the road.

7.6.28 The behaviour of great crested newts during their terrestrial phase is relatively poorly understood (Ref 7.44). They use underground crevices, log or rock piles, and spaces in between tree roots as terrestrial refuges when conditions are dry (summer), or cold (winter), and forage above ground mostly at night. Rough grassland, scrub and woodland are all favourable foraging habitats and arable land is considered sub-optimal. Any potential impact from the habitat loss on foraging great crested newts would be during their active terrestrial phase (generally between March and October, with breeding adults generally in ponds between mid-March and mid-June). There is also the potential for impact on hibernation sites between October and mid-March, should sections of hedgerow to be removed during these months.

7.6.29 Within the site boundary three ponds (P036, P119 and P164) are confirmed as supporting breeding great crested newts and P041 had an inconclusive survey result and great crested newts could be present . P036, P119 and P041 fall within the site boundary (but are outside of the lateral limits of the road alignment shown on the **Works Plans** in **Appendix 2A** of the **ES**) and would be restored following completion of works. However, one pond (P164) would be permanently lost. Additionally, there would also be the loss of suitable terrestrial habitat in the vicinity of these ponds.

7.6.30 Within the ZOI, hedgerows, broadleaved woodland, and semi-improved grassland provide habitat suitable for great crested newts in their terrestrial phase (for foraging, dispersal and hibernation sites). Great crested newts would potentially experience habitat loss through the loss of sections of hedgerow, loss of field margins (considered to be of low value for foraging great crested newts) and arable farmland. As outlined in **section 7.5** of this chapter, the extent of habitat loss has been minimised by route optimisation and the retention of the adjacent woodland blocks and hedgerows where possible.

7.6.31 Natural England guidelines (Ref 7.45) for measuring the scale of impacts from a development require estimation of the loss of terrestrial habitat for great crested newts within 50m, 51-250m, and 251-500m of breeding ponds. Under the guidelines, habitat destruction within 50m is considered to have a high impact, habitat destruction within 50-250m has a medium impact, and habitat destruction within 251-500m of a breeding pond has a low impact. Note that this methodology reflects the total amount of terrestrial land loss. **Table 7.12** details the approximate area of great crested newt habitat in the vicinity of ponds (including hedgerows, broadleaved woodland, and semi-improved grassland) that would be permanently lost within the areas of available habitat within each of the Natural England defined distances.

Table 7.12: Area of great crested new habitat that would be permanently lost.

Distance	Approximate Great Crested Newt Habitat Available.	Approximate Great Crested Newt Habitat Lost Due to the Proposed Development.	Percentage (%).
0-50m (core habitat)	2.2ha	0.1ha	4.5%
51–-250m (intermediate habitat)	26.6ha	14.6ha	54.9%
251–-500m (distant habitat)	33.7ha	7.9ha	23.4%

7.6.32 The magnitude of impact for habitat loss would be low for 0-50m, high for 51-250m, and medium for 251-500m.

7.6.33 Most of the land that would be lost is arable land, considered to be of low value for foraging great crested newts. Under the habitat proposals with the design, a total of 1ha of new core habitat would be created and 0.9ha re-instated, 12.6ha of new intermediate habitat would be created and 6ha would be re-instated, and 7.1ha of new distant habitat would be created and 6.8ha re-instated. It is currently assumed that eight mitigation ponds

and six enhancement ponds would also be created. Overall, habitat loss would result in a short-term, temporary, reversible, minor adverse effect, which is considered to be **not significant**.

Habitat fragmentation

7.6.34 In addition to potential effects of habitat loss, there is potential for construction works to affect the ability of great crested newt to move between breeding, foraging and hibernation sites, impairing their ability to breed, forage and hibernate.

7.6.35 Construction activity such as site clearance and vegetation removal, construction of the topsoil bund and ongoing vehicle and equipment movements would not sever access within either of the two identified populations found within ponds P107 (Population 1), and ponds P053, P054, P081, P140 and P163 (Population 3). However, the road would sever the population in ponds P036, P064, P066, P119, P121 and P164 (Population 2) near Littlemoor Road. Construction of the proposed development would, therefore, affect the ability of great crested newts in Population 2 to move between breeding sites.

7.6.36 As described in **section 7.5,** through embedded mitigation, such as landscape planting, additional habitat areas and hibernation sites for great crested newts would be created, providing better connectivity east to west along the route in a predominately arable landscape. Additionally, depending on location and topography, the design would allow continued passage of great crested newts either beneath or across the new road to maintain connectivity. If culverts are used, the newts would be directed to these through placement of one-way directional newt fencing. This measure would be installed during the construction phase, thereby resulting in a short-term, temporary impact of habitat fragmentation until the design measure is in place.

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

Incidental mortality

7.6.38 Construction activities would include vegetation and ground clearance works during the preliminary works and site establishment phases of construction within the arable field, field margins, hedgerow and woodland.

7.6.39 There is good connectivity between Ponds P036, P064, P066, P119, P121 and P164 (Population 2), and it is likely that great crested newts would attempt to cross the proposed development during construction to access

woodland, surrounding arable field margins and hedgerow to forage and hibernate, leading to the potential for injury and incidental mortality.

7.6.40 Primary and tertiary mitigation measures to safeguard great crested newts and minimise the likelihood of injury and incidental mortality are described in **section 7.5**. These measures would prevent incidental injury or mortality during the preparatory works and throughout the construction phase, expected to last approximately 24 months.

7.6.41 It is not possible to accurately quantify the magnitude of this effect from the available literature; however, it is unlikely that a large proportion of individuals within the existing population would be killed or injured.

7.6.42 The risk of any incidental injury or mortality would have a one-off, non-reversible, permanent impact on a small number of individuals of the population that occurs within the ZOI. This impact would have an adverse effect, which is negligible within the wider population which is considered to be **not significant**.

v. Important Ecological Feature: Farmland breeding birds

7.6.43 During construction, the impact pathways experienced by the breeding bird assemblage would be associated with:

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

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

Habitat loss and fragmentation

7.6.45 Breeding birds within the site would be affected by the loss of foraging habitat, or breeding habitat for farmland birds, due to the loss of arable land to development. In addition, breeding birds would also be impacted by the loss of woodland and hedgerows.

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

- 61.57ha of arable habitat;
- 0.41ha of woodland (until replacement habitats become fully established); and
- 4,537m of hedgerow (until replacement habitats become fully established).

7.6.47 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.

7.6.48 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)

7.6.49 Breeding birds could be impacted by noise, as well as visual disturbance, during the construction phase.

7.6.50 The construction to be undertaken as part of the proposed development may result in an increase in noise within the site boundary, and the local area. Noise disturbance may arise through construction activities (such as noise from machinery), increased vehicle movements, and increased human presence on-site during construction.

7.6.51 Construction is expected to take approximately 24 months during the early years of construction of the Sizewell C Project. It is envisaged that the proposed development would generally be built in a west to east direction.

7.6.52 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 as well as the security of the site and safety of construction workers and general public. 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.

7.6.53 At its peak, there would be a workforce of 300 personnel. Contractor vehicles would enter the temporary contractor compounds from the A12, at the western end of the scheme and travel along the bypass route via a temporary access road to reach the remainder of the site. The proposed development is expected to generate up to 100 heavy good vehicle movements (each way) per day during construction (200 heavy good vehicle movements in total).

7.6.54 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.

7.6.55 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 7.46) (Ref 7.47).

7.6.56 Primary mitigation measures such as close-boarded fencing adjacent to woodlands during construction would help mitigate the noise impact to habitats which could be used by breeding birds.

7.6.57 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.

7.6.58 Overall, the noise and visual disturbance on the bird assemblage would result in a short-term (approximately 24 months), temporary, reversible, minor adverse effect, which is considered to be **not significant**.

vi. Important Ecological Feature: Bat assemblage

7.6.59 During construction, the impact pathways experienced by the bat assemblage would be associated with:

- habitat loss and habitat fragmentation (including connectivity);
- disturbance from noise; and
- disturbance from light.

7.6.60 The characterisations of the impacts are provided in detail below.

Habitat loss and habitat fragmentation

7.6.61 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. There would also be the loss of 46 trees with the potential to support roosting bats (two with high potential, 25 with moderate potential, 16 with low potential and three with negligible

potential)..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. As detailed in **section 7.5** of this chapter, existing vegetation would be retained where possible, except where the proposed road crosses field boundaries. The majority of woodland blocks would be mostly retained. These mitigation measures ensure that those habitats most suitable for bats are retained.

7.6.62 The proposed development would result in the permanent loss of approximately 61.57ha of sub-optimal arable foraging habitat, 0.41ha broadleaved woodland and 4,537m of hedgerow. During the construction phase there would be a temporary loss of habitat suitable to support foraging bats, this would be re-instated and new habitat planted upon the completion of the construction phase.

7.6.63 The proportion of foraging habitat lost that the proposed development footprint represents is dependent on the home range used by a bat. 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 7.33), has been used to make this assessment, as detailed in **Table 7.13**.

Table 7.13 Summary of the proportion of each bat species' CSZ 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	5.4%
Soprano pipistrelle. Brown long-eared bat. Nathusius' pipistrelle. *Plecotus* spp. *Pipistrellus* spp.	3km	2.4%
Noctule Natterer's bat *Myotis* spp. Serotine "Big bat"	4km	1.9%
Barbastelle	10km	0.02%

7.6.64 **Table 7.13** demonstrates that only a small proportion of each bat species' CSZ would be permanently affected due to this 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 because the habitats to be

lost are not of high value to bats and are unlikely to be an important component of any of the species' CSZs.

7.6.65 The habitats present within the site are largely sub-optimal for foraging and commuting bats, being intensively managed for arable farming purposes. The sub-optimal arable land has fewer invertebrates on which bats can forage. During activity and static detector surveys, activity indicative of both foraging and commuting bats was recorded; however, activity levels were consistently low, with marginally increased activity levels within and adjacent to the broad-leaved plantation woodland compared to the open arable habitat. The bat assemblage within the ZOI is therefore not reliant on this habitat for foraging.

7.6.66 The degree of sensitivity bats display varies between species; however, the surrounding landscape is dominated by similar arable habitat, with optimal floodplain grassland and river habitat found to the north and south of the site. It is, therefore, considered that any bats affected by the loss of this habitat would be able to use the large areas of similar habitat present within the Zol.

7.6.67 The reliance of bats on linear features varies between species, with the majority of species (serotine, noctule, common pipistrelle, soprano pipistrelle and *Myotis* species) recorded within the site less reliant on linear features for commuting, with brown long-eared and barbastelle being more reliant on linear features. However, due to the low numbers of these species recorded within the site boundary it is considered that the bat assemblage within the ZOI would therefore have a low sensitivity to this impact.

7.6.68 As part of the primary mitigation detailed in **section 7.5** of this chapter, habitat loss would be mitigated through woodland planting. A total of 13.1ha of woodland would be planted, with 0.17ha of woodland re-instated at end of construction and 0.03ha unaffected by construction of the proposed development, providing a total of 13.3ha of broadleaved woodland within the site boundary. This planting would also provide foraging, roosting and commuting habitat for bats; however, it would take a number of years for the planting to mature and be of maximum benefit to ecological receptors.

7.6.69 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 numerous buildings within the area which pipistrelle species favour roosting it is likely that the bats recorded are not roosting in trees that may be felled although their presence cannot be ruled out completely. Other bat species were recorded during the activity surveys, however their time of first encounter did not suggest the presence of roosts within the site.

7.6.70 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 are detailed in **section 7.5**. Tree-roosting species are known to switch roost on a regular basis (Ref 7.34), 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 small number of trees to be removed would not significantly reduce the extent of the wider tree resource within several small to medium-sized woodland blocks.

7.6.71 Therefore, while there would still be permanent habitat loss with some fragmentation, the effect of this would be minimised by the proposed primary mitigation. Overall, this would result in a permanent, minor adverse effect, which is considered to be **not significant.**

Disturbance from noise

7.6.72 The construction of the proposed development may result in an increase in noise within the site boundary and the local area. Noise disturbance may arise though construction activities (such as noise from machinery), increased vehicle movements and increased human presence on-site during construction. The impact pathway – disturbance effects (comprising light, noise and visual effects) on farmland breeding birds provided above, describes more fully the potential disturbing activities.

7.6.73 Noise could potentially temporarily disturb roosting and foraging bats, in particular within Plumtreehills Covert (Target Note 10), Target Note 2, Target Note 4, Target Note 9, Target Note 11 and Target Note 14 nearby (**Figure 7.3** to **7.5**). Primary mitigation measures (detailed in **section 7.5**) include the presence of buffer areas between the edge of the proposed development and woodland, and the installation of close-board fencing during the construction phase where the proposed development abuts woodland (e.g. Target Note 3, Target Note 8, Target Note 12 and Target Note 14). These measures would provide some attenuation of noise, and to retained habitats associated with foraging, commuting and roosting bats. The need for close-board fencing during the operational phase of the development would be determined at the detailed design stage.

7.6.74 Construction working hours would generally not overlap with periods when bats are active so foraging and commuting bats would not generally be affected by construction noise. However, noise from construction activity could interfere with the bat assemblage through the disturbance to roosting bats in adjacent areas of woodland resulting in delayed emergence, or roost abandonment.

7.6.75 Anecdotal evidence, such as the use of Wolvercote Railway Tunnel by roosting bats (Ref 7.48) 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 7.49), which may result in the period of peak invertebrate activity (at or soon after dusk; Ref 7.50) being missed, reducing the duration of potential foraging activity.

7.6.76 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 7.51). 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 7.49).

7.6.77 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.

7.6.78 Given the embedded primary mitigation to minimise noise and tertiary mitigation measures (outlined **Chapter 4**), 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 for foraging present within the wider ZOI. For these reasons, the bat assemblage is likely to have a low sensitivity to increases in noise levels.

7.6.79 The extent of noise from the construction of the proposed development is likely to be restricted to the footprint of the site and habitats on the immediate boundary, 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

7.6.80 Construction lighting of the proposed development would increase light levels and could cause light intrusion into nearby habitats. Tertiary mitigation, as described in **section 7.5**, details that areas would be lit for safety purposes, or for specific works/operations. The lighting design would minimise light spill and the potential for light disturbance on adjacent land. 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 as well as the security of the site and safety of construction workers and general public. Lighting may also be required for construction activities where working is occasionally required outside of these hours.

7.6.81 Mitigation measures (detailed in **section 7.5**) include the installation of close-board fencing during construction phase where the proposed development abuts woodland. These measures would provide some attenuation of noise to retained habitats associated with foraging, commuting and roosting bats.

7.6.82 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 7.52); and
- impacts to foraging and commuting bats, due to aversion to lit areas (Ref 7.52) or effects on prey behaviour and availability (Ref 7.49, Ref 7.51).

7.6.83 The type of lighting has also been shown to affect the degree to which bats are impatced by artificial lighting (Ref 7.53, Ref 7.42). 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 7.53). 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 long-eared bats, recorded within the development site, generally avoid lit areas (Ref 7.52). Additionally, some studies suggest that streetlights might negatively affect moths (the preferred prey of barbastelle) (Ref 7.54). 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.

7.6.84 For these reasons 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 site (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.

vii. Inter-relationship Effects

7.6.85 The assessment has inherently considered the potential impacts of noise, lighting, air and water on IEFs.

7.6.86 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 impacts.

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

c) Operation

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

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

7.6.89 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** of this chapter, 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 of water quality, and hydrology and hydrogeology on lowland mixed deciduous woodland, hedgerows and ponds: the embedded 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.

- Incidental mortality to bat species: during the peak construction period of the Sizewell C Project and upon completion of the Sizewell C Project , the daily number of vehicles using the Sizewell Link Road, on a typical day, has been forecast for the following: between A12 and Middleton Moor link, –; between Middleton Moor link and B1125 junction and between B1125 junction and end of Sizewell Link Road. The vehicle movements have been detailed in **Chapter 2** of the **ES**. The predicted vehicle movements levels are not considered likely to have a significant negative effect on the bat assemblage through incidental mortality.

- Effects of changes in water quality on great crested newts: given the embedded primary and tertiary mitigation, it is not considered likely that there would be an impact to the water quality of ponds (retained or created) within the ZOI, and there would be **no significant** effect on great crested newts.

- Effect of habitat fragmentation on great crested newts: as part of the embedded primary mitigation, culverts or other measures would enable newts to cross the alignment This would allow great crested newts from Ponds P036, P064, P066, P119, P121 and P164 to access both north and south of the new road for foraging and hibernation and there would be **no significant** effect on great crested newts from fragmentation.

- Incidental mortality to great crested newts: embedded primary mitigation including amphibian fencing, would prevent newts from entering the site. In addition, similar fencing would guide newts to new culverts allowing them safe passage under the road (avoiding vehicle contact) where considered practicable. Therefore, there would not be a significant adverse effect on great crested newts due to vehicle collisions.

7.6.90 Further detail of the specific anticipated impacts on the identified IEFs have been provided in the subsequent sections.

i. Important Ecological Feature: Lowland mixed deciduous woodland

7.6.91 During operation, the main impact pathways experienced by the lowland mixed deciduous woodland would be associated with:

- habitat fragmentation; and
- changes in air quality.

7.6.92 The characterisations of the impacts is provided in detail below.

Habitat fragmentation

7.6.93 The **Landscape Strategy** (as detailed in **section 7.5** of this chapter) includes areas of proposed tree and shrub along the route to mitigate for the habitat lost and/or severed by the proposed development.

7.6.94 The planting established at the end of construction would include a total of 13.3ha of broadleaved woodland planting (which would represent an increase of 12.69ha compared to the current baseline) and there would also be additional hedgerow planting along the route of the Sizewell link road.

7.6.95 Whilst this planting would be completed in the construction phase, it would take time to mature. The woodland plantings would continue to establish over time, and the increase in woodland extent and distribution would help to improve the connectivity to existing woodland blocks adjacent to the route. These plantings would also provide habitat for reptiles, birds, bats and invertebrates.

7.6.96 Once the woodland plantings are fully established, the overall effect on lowland mixed deciduous woodland is considered to be minor beneficial (**not significant**) due to the improved habitat connectivity and the increased woodland extent.

Changes in air quality

7.6.97 The Sizewell link road would sever areas of woodland including Target Note 2, Target Note 10 Plumtreehills Covert and Target Note 11 and runs adjacent to Target Note 4 and Target Note 9 (**Figure 7.3** to **7.5**). During operation, the road would be open for both public use and for construction traffic associated with the Sizewell C Project. 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.

7.6.98 Lowland mixed deciduous woodland would be susceptible to increases in operational air emissions from the use of proposed roads, 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.

7.6.99 In the UK, 95% of the area of woodlands (managed and unmanaged) exceed the nitrogen critical load (Ref 7.55). 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 7.56). Changes in forest ground flora have been documented as a result of enhanced nitrogen deposition near farms (Ref 7.57) and are also expected to occur in regions with high wet deposition of ammonium and nitrate.

7.6.100 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 7.55). 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 7.58). Acid deposition can also lead to reduce tree growth, reduced needle growth and canopy loss (Ref 7.55).

7.6.101 Given the primary mitigation detailed within **section 5.5** of **Chapter 5** of this volume, the overall impact of air quality on lowland mixed deciduous woodland would be a minor adverse effect, which is considered to be **not significant.**

ii. Important Ecological Feature: Hedgerows

7.6.102 During operation, the main impact pathways experienced by hedgerows would be associated with:

- habitat fragmentation; and
- changes in air quality.

7.6.103 The characterisation of the impacts from changes in air quality and their resulting effects is the same as that described for lowland mixed deciduous woodland presented above.

7.6.104 The landscape design (as detailed in **section 7.5** of this chapter) includes hedgerow planting along the length of the route of the proposed Sizewell Link Road to mitigate for the habitat lost and/or severed by the proposed

development. This would total 17,619m of hedgerow planting (resulting in an increase of 8,316m compared to baseline).

7.6.105 Whilst this planting would be completed in the construction phase, it would take time to mature. The hedgerows would continue to establish over time and both the increased extent of hedgerows and the additional connections into the existing hedgerow network would both increase connectivity. The new hedgerows would also provide habitat for reptiles, birds, bats and invertebrates.

7.6.106 Once the hedgerows are fully established, the overall effect on hedgerows is considered to be minor beneficial (**not significant**) due to the improved habitat connectivity and the increased hedgerow extent.

iii. Important Ecological Feature: Ponds

7.6.107 The creation and establishment of the additional ponds described above would have a long-term minor beneficial effect, which is considered to be **not significant**.

iv. Important Ecological Feature: great crested newt

7.6.108 During operation, with the relevant habitats established and measures in place to enable crossing of the route, no impacts to great crested newts are predicted.

v. Important Ecological Feature: Farmland breeding birds

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

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

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

Habitat fragmentation

7.6.111 As detailed in **section 7.5** of this chapter, landscape proposals include some grassed areas, 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 13.1ha of new woodland would be planted, with 0.17ha of woodland re-instated and 0.03ha unaffected by the construction of the proposed evelopment, resulting in a total of 13.3ha of woodland within the

site boundary. A total of 12,853m of hedgerow would be planted, with 1,036m of hedgerow re-instated and 3,730m unaffected by construction of the proposed development, resulting in a total of 17,619m within the site boundary. These plantings would provide habitat to support breeding and foraging birds, although the habitats would take a number of years to mature and be of maximum benefit to birds and other species groups.

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

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

7.6.113 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.

7.6.114 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 species. Only the roundabouts would be lit, and in these locations, light spill would be minimsied. Landscaped areas, including new woodland and hedgerow planting would also aid in screening visual disturbance.

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

vi. Important Ecological Feature: Bat assemblage

7.6.116 During construction, the main impact pathways experienced by the bat assemblage would be associated with:

- habitat fragmentation (including connectivity);
- disturbance from noise and vibration; and
- disturbance from light.

7.6.117 The characterisations of the impacts is provided in detail below.

Habitat fragmentation (including connectivity)

7.6.118 The characterisation of this impact is described previously in this section. The creation and establishment of the planted areas would have a beneficial minor effect, which is considered to be **not significant**

Disturbance from noise

7.6.119 The operation of the proposed development would lead to increases in noise levels in areas adjacent to the proposed road due to the introduction of vehicle traffic.The characterisation of this impact is similar to that described under disturbance effects on species population (comprising light, noise and visual effects) on Farmland Breeding Birds, presented above. Noise levels associated with the operational phase would be lower than those associated with the construction phase of the proposed development. As outlined in **section 7.5** of this chapter, primary mitigation measures would aim to reduce the effect of operational noise levels on adjacent habitats as far as possible.

7.6.120 As noted in impact pathway - disturbance from noise on bat assemblage, 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 this habitat for foraging.

7.6.121 The extent of noise from the proposed development is likely to be restricted to the footprint of the road and habitats within the immediate vicinity, resulting in a low magnitude of impact, and minor adverse effect, which is considered to be **not significant**.

Disturbance from light

7.6.122 The road itself would remain unlit; however, lighting would be provided at the A12 and B1122 roundabouts. There could potentially also be impacts of light spillage into neighbouring habitats from the headlights of vehicles using the proposed development. Primary mitigation as seen in **section 7.5** indicates that the lighting design would minimise light spill, and the potential for light disturbance on adjacent land. This would facilitate attenuation of light to habitats associated with foraging, commuting, and roosting bats. Buffer and landscaped areas would also aid in screening and buffering disturbance.

7.6.123 The operational lighting would be permanent. In addition, through night-time movements of cars, there would be short, periodic increases in light, with extended periods where there would be no light and conditions would be similar to conditions currently experienced by bats.

7.6.124 As indicated above, 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, would be restricted to the footprint of the A12 roundabout, and the junctions with the B1125 and the B1122 to the west and east of Theberton respectively.

7.6.125 The affects of artificial lighting vary between species (Ref 7.52). Some species can capitalise on the increased insect prey often recorded around artificial light sources, while other, light-avoiding, bat species may be affected 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 7.52).

7.6.126 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 unlikely to be 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 broadleaved woodland, adjacent to the site.

7.6.127 Overall, fixed lighting would have a very low magnitude of impact on the bat assemblage, resulting in a minor adverse, **not significant** effect. Vehicle lights would have a low magnitude of impact on the bat assemblage, resulting in a minor adverse, **not significant** effect.

vii. Inter-relationship Effect

7.6.128 The assessment has inherently considered the impacts of noise, lighting, air and water on IEFs. It is considered 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.

7.6.129 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** of this chapter.

7.7.2 Where other mitigation is required to reduce or avoid a significant effect, this is referred to as secondary mitigation.

7.7.3 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.

7.7.4 However, further monitoring is proposed as outlined below. 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

7.7.5 All vegetation clearance would be conducted under the supervision of the 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.

7.7.6 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.

7.7.7 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.

ii. Operation

7.7.8 Operational lighting would be checked to monitor and correct for any excessive light spill into the surrounding habitats, and particularly into the adjacent woodland.

7.7.9 Mitigation ponds created to compensate for the loss of great crested newt breeding ponds would be monitored in accordance with the Natural England GCN licence.

7.7.10 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.

7.7.11 There would also be maintenance checks of operational lighting to monitor and correct for any extraneous light spill into surrounding habitats.

7.8 Residual effects

7.8.1 The following tables (**Table 7.14** and **Table 7.15**) 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 7.14: 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.
Lowland mixed deciduous woodland.	Habitat loss and fragmentation.	Woodland planting included in the design to compensate for any areas of woodland loss.	Minor adverse	None required.	Minor adverse (**not significant**).
Hedgerows	Habitat loss and fragmentation.	Hedgerow planting 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**).
Ponds	Habitat loss.	Replacement ponds would be created to compensate for the temporary and permanent loss of ponds.	Minor adverse	None required.	Minor adverse (**not significant**).
Great Crested Newt.	Habitat loss.	Replacement ponds would be created to compenate for the temporary and permanent loss of GCN breeding ponds. Landscape proposals include woodland planting, hedgerow planting and grassland planting to replace lost GCN terrertial habitat and to improve ecological connectivity. Drop kerbs or filter drains/underpasses to accommodate newts over or under the road to mitigate for isolation of fragmentated populations. A Natural England development licence is anticiapted and mitigation and	Minor adverse	None required.	Minor adverse (**not significant**).

Receptor	Impact	Primary or Tertiary Mitigation.	Classification of Effect.	Additional Mitigation.	Residual Effect.
		monitoring measures will need to be agreed with statutory consultees.			
	Habitat fragmentation.	Through embedded mitigation, such as landscape planting, additional resting places for great crested newts in a predominately arable landscape would be created providing better connectivity east to west along the route. As part of the primary mitigation, design measures such as, drop kerbs, filter drains and newt tunnels would be installed to allow continued passage of great crested newts beneath and across the new road maintaining connectivity.	Minor adverse	None required.	Minor adverse (**not significant**).
	Incidental mortality.	Proposed construction mitigation would ensure that there is no incidental mortality to great crested newts. A Natural England development licence is anticiapted and mitigation and monitoring measures will need to be agreed with statutory consultees.	Minor adverse	None required.	Minor adverse (**not significant**).
Farmland breeding birds.	Habitat loss and fragmentation.	Landscape proposals include woodland planting 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	Minor adverse	None required.	Minor adverse (**not significant**).

Receptor	Impact	Primary or Tertiary Mitigation.	Classification of Effect.	Additional Mitigation.	Residual Effect.
		connect into the existing hedgerow network, where possible.			
	Disturbance effects on species population (comprising light, noise and visual effects).	Some of the woodland blocks, such as Target Note 3, Target Note 8, Target Note 12 would be retained. Some habituation anticipated.	Minor adverse	None required.	Minor adverse (**not significant**).
Bat assemblage.	Habitat loss and fragmentation.	Landscape proposals include woodland planting 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.	Minor adverse	Potential need for bat boxes to mitigate for loss of any defined roost resource, prior to tree felling	Minor adverse (**not significant**).
	Disturbance from noise.	Working hours 07:00 to 19:00. Presence of buffer areas between the edge of the proposed development and lowland mixed deciduous woodland and watercourses. 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. Working hours 07:00 to 19:00. Presence of buffer areas between the	Minor adverse	None required.	Minor adverse (**not significant**).

Receptor	Impact	Primary or Tertiary Mitigation.	Classification of Effect.	Additional Mitigation.	Residual Effect.
		edge of the proposed development and woodland and watercourses. Installation of close-board fencing where the proposed development abuts woodland.			

Table 7.15: 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.
Lowland mixed deciduous woodland.	Habitat fragmentation.	There will a variety of areas across the site where woodland will be planted to compensate for any areas of woodland loss.	Minor beneficial	None required.	Minor beneficial (**not significant**).
	Changes in air quality.	There are negligible changes in air quality during operation.	Negligible adverse	None required.	Negligible adverse (**not significant**).
Hedgerows	Habitat 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 beneficial	None required.	Minor beneficial (**not significant**).
	Changes in air quality.	There are negligible changes in air quality during operation.	Negligible adverse	None required.	Negligible adverse (**not significant**).
Ponds	Habitat fragmentation	Ponds would become established to	Minor beneficial	None required.	Minor beneficial

Receptor	Impact	Primary or Tertiary mitigation.	Classification of effect.	Additional Mitigation.	Residual Effect.
		compensate for loss of temporary and permanent ponds at construction.			(**not significant**).
Great crested newt	Incidental mortality.	Unlikely impacts of individual mortality during operation.	Minor adverse	None required.	Minor adverse (**not significant**).
Farmland breeding birds.	Habitat fragmentation.	Landscape proposals include woodland planting and hedgerow planting connected into the existing network providing connectivity.	Minor beneficial	None required.	Minor beneficial (**not significant**).
	Disturbance from noise and light.	Road corridor largely unlit. Installation of close-board fencing where the proposed development abuts woodland during construction. Buffer and landscaped areas would also aid in screening and buffering disturbance.	Minor adverse	None required.	Minor adverse (**not significant**).
Bat assemblage.	Habitat fragmentation.	Landscape proposals include woodland planting and hedgerow planting connected into the existing network providing connectivity.	Minor beneficial	None required.	Minor beneficial (**not significant**).
	Disturbance from noise.	Installation of close-board fencing where the proposed development abuts woodland during construction. Buffer and landscaped areas would also aid in screening and buffering disturbance.	Minor adverse	None required.	Minor adverse (**not significant**).

Receptor	Impact	Primary or Tertiary mitigation.	Classification of effect.	Additional Mitigation.	Residual Effect.
	Disturbance from light.	Road corridor largely unlit. Installation of close-board fencing where the proposed development abuts woodland during construction. Buffer and landscaped areas would also aid in screening and buffering disturbance.	Minor adverse	None required.	Minor adverse (**not significant**).

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