The Sizewell C Project

6.10 Volume 9 Rail

Chapter 7 Terrestrial Ecology and Ornithology

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Contents

Tables

Plates

None Provided.

Figures

All figures are found within **Annex 7.1** of **Appendix 7A:** Ecological Baseline for Rail.

Appendices

7. Terrestrial Ecology and Ornithology

7.1 Introduction

7.1.1 This chapter of **Volume 9** of the **Environmental Statement (ES)** presents an assessment of the potential of the terrestrial ecology and ornithology effects arising from the construction, operation and removal and reinstatement proposals relating to rail.

7.1.2 The proposals considered in this volume are as follows:

- the part of the green rail route comprising a temporary rail extension of approximately 1.8km from the existing Saxmundham to Leiston branch line to and including the proposed B1122 (Abbey Road) level crossing (the 'proposed rail extension route') as shown on **Figure 2.1; Volume 9, Chapter 2** of the **ES**.

- Saxmundham to Leiston branch line upgrades (including track replacement and level crossing upgrades) (the 'proposed rail improvement works') as shown in **Figure 2.11; Volume 9, Chapter 2** of the **ES**.

- Together, these comprise the 'proposed development' in this volume.

7.1.3 The proposed green rail route in its entirety comprises of a temporary rail extension of approximately 4.5km from the existing Saxmundham to Leiston branch line to a terminal within the main development site. The 2.7km part of the green rail route between the proposed B1122 (Abbey Road) level crossing and the terminal within the main development site (which runs north of the Aldhurst Farm Habitat Scheme) is detailed in **Volume 2, Chapters 1** to **4** and assessed in **Volume 2** of the **ES**.

7.1.4 Once no longer required for the construction of the Sizewell C Project, the proposed rail extension route would be removed and the land reinstated, however the proposed rail improvement works would be permanent.

7.1.5 Detailed descriptions of the proposed development sites (referred to throughout this volume as the ‘site’ as relevant to the location of the works) the proposed development and different construction, operation and removal and reinstatement phases 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 **Appendix 1A** of **Volume 1** of the **ES**.

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

- **Chapter 10**: Transport **of Volume 2** of the **ES**.
- **Chapter 4**: Noise and vibration, of this volume of the **ES**.
- **Chapter 5**: Air quality of this volume of the **ES**.
- **Chapter 6**: Landscape and visual lighting of this volume of the **ES**.
- **Chapter 10**: Soils and agriculture of this volume of the **ES**.
- **Chapter 12**: Groundwater and surface water of this volume of the **ES**.

7.1.7 This assessment has been informed by data presented in the following technical appendices:

- **Appendix 7A**: Ecological Baseline for the green rail route and level crossings.

7.2 Legislation, policy and guidance

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

7.2.2 This section provides an overview of the specific legislation, policy and guidance of relevance to the proposed rail extension route and proposed rail improvement works sites 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).
- 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 **Appendix 6J** of **Volume 1** of the **ES** (Doc Ref. 6.02).

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 (CRoW) Act (Ref 7.9).
- Natural Environment and Rural Communities (NERC) Act (Ref 7.10).
- The 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 (NPPF) (Ref 7.17).
- National Policy Statements (NPSs) for Energy Infrastructure (Ref 7.18).

7.2.6 The requirements of these, as relevant to the terrestrial ecology and ornithology assessment, are set out in **Appendix 6J** of **Volume 1** of the **ES** (Doc Ref. 6.02).

7.2.7 The overarching NPS for Energy (EN-1) (Ref 7.18) and NPS for Nuclear Power Generation (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, Chapter 3** of the **ES**, with requirements specific to this site set out in **Table 7.1** and **Table 7.2**.

Table 7.1: Requirements of the National Policy Statement for Energy (EN-1).

Ref.	NPS topic requirement.	How the requirement has been addressed.
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 HRA Report** for the Sizewell C Project (Doc Ref. 5.10). The **Shadow HRA Report** (Ref 7.19) considers the possible pathways whereby the proposed development (in this case the green rail route and proposed rail improvement works) could have a significant effect on a European Site. It concludes that whilst possible pathways do exist, there is no potential for a significant effect.
EN-1 5.2.3	*"A particular effect of air emissions from some energy infrastructure may be eutrophication, which is the excessive enrichment of nutrients in the environment. Eutrophication from air pollution results mainly from emissions of NOx and ammonia. The main emissions from energy infrastructure are from generating stations. Eutrophication can affect plant growth and functioning, altering the competitive balance of species and thereby damaging biodiversity. In aquatic ecosystems it can cause changes to algal composition and lead to algal blooms, which remove oxygen from the water, adversely affecting plants and fish. The effects on ecosystems can be short term or irreversible and can have a large impact on ecosystem services such as pollination, aesthetic services and water supply."*	Air emissions have not been considered as a significant effect pathway due to the enforcement of the tertiary mitigation measures which would suitably protect neighbouring habitats. This is detailed in **section 7.5** of this chapter.
EN-1 5.2.7	*"The **ES** should describe… any potential eutrophication impacts."*	Please see response to EN-1 5.2.3 above.
EN-1 5.3.3	*"Where the development is subject to EIA the applicant should ensure that the **ES** clearly sets out any effects on internationally, nationally and locally designated sites of*	Potential for significant effects on internationally designated sites have been considered within this assessment (see EN-1 4.3 above).

Ref.	NPS topic requirement.	How the requirement has been addressed.
	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."	Designated sites have been detailed within **section 7.4** of this chapter. The majority of these have been scoped out of the assessment in **Table 7.4** due to the distance from the site. The exception to this is Buckle's Wood County Wildlife Sites (CWS) which has been scoped into the assessment in **section 7.6** 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 existing habitats and, where practicable, to create new habitats of value within the site landscaping proposals."*	Primary and tertiary mitigation has been defined within **section 7.5** of this chapter. The site boundary has been selected so as to avoid the most sensitive habitats. Habitat would be restored to its original use (agriculture) during removal and reinstatement.

Table 7.2: Requirements of the National Policy Statement for Energy (EN-6)

Ref.	NPS topic requirement.	How the requirement has been addressed.
EN-6 1.7.4	*"Possible adverse effects on nature conservation sites of European importance were identified by the Nuclear Habitats Regulations Assessment (HRA). Further studies will need to be carried out, as part of the project HRA and environmental impact assessment (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 AoS. Further studies will need to be carried out, as part of the project EIA process for individual development consent applications, to determine the significance of*	A Habitat Regulations Assessment (HRA) Screening assessment is included in the **Shadow HRA Report** for the Sizewell C Project (Doc Ref. 5.10). The **Shadow HRA Report** (Doc Ref. 5.10) considers the possible pathways whereby the proposed development (in this case the green rail route and proposed rail improvement works) could have a significant effect on a European Site. It concludes that whilst possible pathways do exist, there is no potential for a significant effect. Within this **ES**, the methodology to

Ref.	NPS topic requirement.	How the requirement has been addressed.
	the effects and the effectiveness of any mitigation measures."	determine the ecological baseline and baseline for terrestrial ecology and ornithology is detailed within **section 7.3**, **section 7.4**, both of the **ES,** and **Appendix 7A** of this volume**. Section 7.4** of this chapter also identifies the IEFs, for which the impacts have been assessed within **section 7.6** of this chapter, in line with the methodology defined within **section 7.3** of this chapter.
EN-6 Annex A A.7.4 EN-6 Annex C C.8.54	*"All project level Habitats Regulations Assessments must take account of the potential adverse effects and the proposed avoidance and mitigation measures identified through the strategic level assessment(s)."* *"The Habitats Regulations Assessment on sites of international importance has proposed a suite of avoidance and mitigation measures to be considered as part of the project level Habitats Regulations Assessment. At this stage, it is assessed that the effective implementation of the proposed suite of avoidance and mitigation measures may help to address adverse effects on European Site integrity, but that more detailed project level Habitats Regulations Assessment is required to reach conclusions that are in accordance with the requirements of the Habitats Directive."*	
EN-6 Annex C C.8.53	*"A precautionary approach suggests that the assessment at this strategic level cannot rule out the potential for adverse effects on the integrity of nine European Sites (Alde-Ore and Butley Estuaries Special Area of Conservation (SAC), Alde-Ore Estuary SPA / Ramsar, Minsmere to Walberswick Heaths and Marshes SAC, Minsmere to Walberswick SPA/ Ramsar, Orfordness-Shingle Street SAC, Sandlings SPA, Outer Thames Estuary SPA) through potential impacts on water resources and quality, habitat and species loss and fragmentation, and disturbance (noise, light and visual)."*	An assessment of internationally, nationally and locally designated sites of ecological conservation importance is detailed within **section 7.4** of this chapter. This included Minsmere to Walberswick Heaths and Marshes SAC, Special Protection Area (SPA), Ramsar site and Site of Special Scientific Interest (SSSI). The majority of designated sites have been scoped out of the detailed assessment due to their distance from the site boundary and the lack of direct and indirect impact pathways. This has been described within **Table 7.11**, along with the relevant justifications. The exception to this is Buckle's Wood CWS which has been scoped into the assessment in **section 7.6** of this chapter.
EN-6 Annex C C.8.60	*"Some responses focused on designated sites including Sizewell Marshes SSSI and Leiston-Aldeburgh SSSI, and potential effects on Minsmere-Walberswick Heaths and Marshes SSSI, from which the site boundary includes some land-take. Some responses questioned how direct land take could be mitigated."*	
EN-6 Annex C C.8.61	*"The Appraisal of Sustainability identified the potential for adverse effects on sites and species considered to be of national nature conservation importance means that significant strategic effects on biodiversity cannot be ruled out at this stage of the*	

Ref.	NPS topic requirement.	How the requirement has been addressed.
	appraisal. The Appraisal of Sustainability identifies that there could be potential significant effects at the following SSSIs which are within 5km of the site: Sizewell Marshes SSSI; Minsmere-Walberswick Heaths and Marshes SSSI; Leiston-Aldeburgh SSSI; Alde-Ore Estuary SSSI."	

c) Regional

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

- Suffolk Nature Strategy (Ref 7.20).
- Suffolk Local Biodiversity Action Plan (BAP) (Ref 7.21).
- Suffolk's Priority Species and Habitats list (Ref 7.22).

7.2.9 The requirements of these, as relevant to the terrestrial ecology and ornithology assessment, are set out in **Appendix 6J** of **Volume 1** of the **ES** (Doc Ref. 6.02).

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 7.23).
- Suffolk Coastal District Council Final Draft Local Plan (Ref 7.24); 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 **Appendix 6J** of **Volume 1** of the **ES** (Doc Ref. 6.02).

e) Assessment guidance

7.2.12 This assessment has been undertaken in accordance with the Chartered Institute of Ecology and Environmental Management (CIEEM) Guidelines for

Ecological Impact Assessment (EcIA) (Ref 7.25), 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 7.26).
- Bird Monitoring Methods: A Manual of Techniques for Key UK Species (Ref 7.27).
- UK Birds of Conservation Concern (BoCC) (Ref 7.28).
- Red Data Book (RDB) of British Invertebrates (Ref 7.29).
- Hedgerows Regulations Guidelines (Ref 7.11).
- Technical Information Note 102 – Reptile Mitigation Guidelines (Ref 7.30).
- Great crested newt mitigation guidelines (Ref 7.31).
- Evaluating the suitability of habitat for the great crested newt (*Triturus cristatus*) (Ref 7.32).
- Natural England. Standing advice for local planning authorities who need to assess the impacts of development on badgers (Ref 7.33).
- Bat Surveys: Good Practice Guidelines, 2nd edition (Ref 7.34). Please note all bats surveys were conducted in accordance with the guidance in place at the time of survey. Although this guidance was updated in 2016, the surveys undertaken are suitable for assessment the surveys undertaken are suitable for assessment as agreed through ongoing consultation as part of the assessment process.

7.3 Methodology

a) Scope of the assessment

7.3.1 The generic EIA methodology is detailed in **Volume 1**, **Chapter 6** of the **ES**. The full method of assessment for terrestrial ecology and ornithology that has been applied for the Sizewell C Project is included within **Appendix 6J** of **Volume 1** of the **ES**.

7.3.2 This section provides specific details of the terrestrial ecology and ornithology methodology applied to the assessment of the proposed development.

7.3.3 Under the CIEEM guidelines (Ref 7.25) 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 Important Ecological Features (IEFs). Ecological features can be important for a variety of reasons (e.g. quality and extent of designated sites or habitats, habitat/species rarity).

7.3.4 To comply with the CIEEM Guidelines for EcIA (Ref 7.25), **Section 7.4** of this chapter identifies the IEFs that are 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. **Section 7.4** of this chapter also identifies IEFs that are not likely to be significantly affected and so do not require further assessment; that is, they can reasonably be scoped out of the EcIA. Where protected species are present and there is the potential for a breach of the legislation, those species are also considered to be IEFs to be included in the EcIA.

7.3.5 A screening exercise, as detailed below, has been undertaken for the upgrades on the level crossings on the Saxmundham to Leiston branch line which has reviewed the works proposed. Where the works are considered to have potential likely significant effects, these have been assessed. The scope of assessment considers the impacts of the upgrade works and operational use of the Saxmundham to Leiston branch line.

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

7.3.7 Comments raised in the EIA scoping opinion received in 2014 and 2019 have been taken into account in the development of the assessment methodology. These are detailed in **Appendices 6A** to **6C** of **Volume 1** of the **ES**.

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 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 Coast & Heaths (Letter).	17 January 2013	*"It brings development into the habitat of the Barbastelle bat and would need to be offset to a suitable level as indicated by the European directive."*	Baseline bat surveys were conducted for the proposed rail extension route, the details of which are provided in **section 7.4** of this chapter and **Appendix 7A** of this volume**.** From desk-study data and data collected from surveys, the study area is of limited importance to barbastelle. Bats have been assessed as an IEF in **section 7.6** of this chapter for the proposed rail extension route.
Royal Society for the Protection of Birds (RSPB) (Letter).	5 February 2013	*"Careful consideration needs to be made of each* [railway] *option against ecological impacts. The RSPB expects that surveys should consider birds, bats, reptiles, mammals and flora. This information can then be used to not only assess potential impacts but identify appropriate mitigation or enhancement."*	Site-specific surveys were conducted for the proposed rail extension route that included extended Phase 1 habitat surveys, amphibian surveys, bat surveys and ornithological (breeding and wintering) surveys. Appropriate assessments have been described within **section 7.6** of this chapter, while primary and tertiary mitigation are described in **section 7.5** also of this chapter.
RSPB (Letter).	5 February 2013	*"No evidence is presented regarding the potential impacts on species and habitats of a new railway on the area"*	A full baseline for the proposed rail extension route has been provided in **section 7.4** of this chapter and **Appendix 7A** of this volume, which also provides justification for the IEFs scoped into the detailed assessment of potential impacts presented in **section 7.6** of this chapter.
Suffolk Wildlife Trust (SWT) (Letter).	5 February 2013	*"Option 2 (Blue, Green and Red Routes) – None of the three routes proposed for the potential rail line extension have been subject to any ecological survey and therefore their exact impacts are currently impossible to quantify. However, based on knowledge of the area we have considerable concerns about all three routes shown on Initial Proposals and Options Consultation Document Figure 6.17. All three of the proposed*	Only the green rail route has been taken forward and only those parts of the route that lie outside of the main development site are considered within this Volume. The effects of those within the main development site are covered in **Volume 2, Chapter 14** of the **ES**. Baseline bat surveys were conducted for the proposed rail extension route, the details of which are provided in **section 7.4** of this chapter and **Appendix 7A**

Consultee	Date	Comment	SZC Co. response.
		routes cross important bat commuting[1] corridors that run north-south through the development site. Construction and operation of any of the three rail extensions will sever this connectivity and is likely to have a significant adverse impact on bat species, particularly through increased levels of lighting, vehicle movement and vibration. Areas of particular concern for such an impact are where the Blue route runs north of Upper Abbey Farm and where the Green and Red routes run adjacent to the woodland known as Fiscal Policy."	of this volume**.** From desk-study data and data collected from surveys, no bat commuting routes within the area covered by this volume were identified, and bat activity was generally low. Bats have been assessed as an IEF in **section 7.6** of this chapter.
Environment Agency (Letter).	22 May 2014	*"There are no rivers located within or adjacent to the options for a new rail terminal and freight laydown area or the green route. Considering this we concur that this particular issue can be scoped out of this section of the EIA. We refer you back to our earlier general comments on water quality. Of particular relevance is minimising any risk of pollution to the water environment."*	The primary and tertiary mitigation described in **section 7.5** and the **Code of Construction Practice (CoCP)** (Doc Ref. 8.11) detail how pollution to water would be prevented.
Natural England (Letter).	22 May 2014	*"Table 8.8 'Rail line extension options - potential impacts and effects' should include an assessment of the impacts on the notified features of statutory designated sites and the purpose of designation of protected landscapes. An assessment of the impacts of removing the rail line should also be included."*	The baseline, provided in **section 7.4** of this chapter and **Appendix 7A** of this volume, includes details of statutory designated sites within 2km of the site boundary. Those scoped into the assessment are detailed **Table 7.11** and an appropriate assessment is detailed in **section 7.6** of this chapter. This assessment also includes an assessment of the removal and reinstatement phase of the proposed rail extension route.
Natural	2 February	*"Table 8.1: We note the key*	The full baseline for the proposed

[1] Bats use woodland edges, hedgerows, rivers and other linear features like tree-lined footpaths as corridors to 'commute' from one area of countryside to another.

Consultee	Date	Comment	SZC Co. response.
England (Letter).	2017	*considerations for the green rail route which are identified in this table. The landscape and biodiversity impacts arising from the construction, operation and subsequent dismantling of a rail route must be fully assessed. The impact of the crossing of Leiston Drain (see section on surface water) on Sizewell Marshes SSSI and other downstream sites should be included in this assessment."*	development has been provided in **section 7.4** of this chapter and **Appendix 7A** of this volume, which also provides justification for the IEFs scoped into the detailed assessment. Primary and tertiary mitigation measures are described in **section 7.5** of this chapter while IEFs have been assessed within **section 7.6**, also of this chapter. Sizewell Marshes SSSI is 930m away from the site and Leiston Drain is over 1km. At these distances, and considering the primary and tertiary mitigation described in **section 7.5** of this chapter, both these receptors would not experience any impacts.

c) Environmental Screening

7.3.9 The proposed rail extension route has the potential to result in environmental effects which could be significant and, therefore these works have been considered in the environmental assessment.

7.3.10 The track upgrades to the Saxmundham to Leiston branch line are not considered to have the potential to result in environmental effects which could be significant and have therefore been screened out of this assessment.

7.3.11 An environmental screening exercise was undertaken to identify which of the level crossing upgrade works on the Saxmundham to Leiston branch line may give rise to environmental effects that could potentially be significant. This concluded that two level crossing upgrade works should be taken forward to the assessment of likely effects on terrestrial ecology and ornithology.

7.3.12 Six of the level crossing upgrade works have been screened out of the terrestrial ecology and ornithology assessment as they are not likely to give rise to significant environmental effects.

7.3.13 **Table 7.4** provides a summary of the environmental screening exercise for the proposed level crossing improvements. With regards to the rail improvement works, these have been screened out as they would be

considered to have minimal ecological impacts and can be appropriately mitigated for in the contractors **CoCP** (Doc Ref. 8.11).

Table 7.4: Summary of environmental screening exercise.

Proposed Level Crossing Improvement.	Summary of potential effects.	Screened in or out of the assessment.
Bratts Black House	There would be the potential loss and impact on hedgerows and other habitats within, and adjacent to the site during the construction of this level crossing upgrade. In addition, a pond is located immediately adjacent to the proposed works to the south west of the level crossing within in area of scrub habitat.	Screened in.
Knodishall	Some minor vegetation trimming is anticipated for surrounding scrub habitat. Ecological constraints unlikely, assuming any minor vegetation trimming is undertaken outside of the nesting bird season. No ecological constraints are considered relevant to this site.	Screened out.
West House	Limited vegetation surrounding the West House Level crossing. Although there is a pond located to the south of the level crossing, it is surrounded by suitable terrestrial habitat suitable for use by great crested newts which is isolated. Assuming any minor vegetation trimming is undertaken outside of the nesting bird season. No ecological constraints are considered relevant to this site.	Screened out.
Snowdens	Some minor vegetation removal may be required. Whilst there is a pond located to the north of the level crossing. Given the distance and the quality of habitat between the pond and this site. No ecological constraints are considered relevant to this site.	Screened out.
Saxmundham Road	Minimal vegetation clearance to be carried out. There are ponds in the local area but at a sufficient distance not to be of concern in this instance. No ecological constraints are considered relevant to this site.	Screened out.
Buckles Wood	Although all works to upgrade the level crossing would be within the rail land boundary and would not result in the loss of additional hedgerow or other habitat great crested newts have been confirmed as present. The works to this level crossing fall within the footprint of the proposed rail	Screened in but assessed under the proposed rail extension route.

Proposed Level Crossing Improvement.	Summary of potential effects.	Screened in or out of the assessment.
	extension route and therefore any works which may include vegetation clearance has been included within the proposed rail extension route environmental assessment.	
Summerhill	Potentially some minor scrub vegetation trimming required. No ecological constraints are considered relevant to this site.	Screened out.
Leiston	No ecological constraints identified.	Screened out.

d) Study area

7.3.14 The study area includes the land within the site and Zone of Influence (ZOI) (defined below) of the proposed development. Due to the variable sensitivity of terrestrial ecology and ornithology receptors, the ZOI (and therefore the study area) differed depending on the receptor considered.

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

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

7.3.17 Areas and resources that may be affected by the identified activities arising from the proposed development were considered. These areas and resources identify the ZOI. 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 7.25).

7.3.18 The ZOIs have been developed as species/species assemblage-appropriate distances from the site boundary, taking into account factors such as varying mobility. Based on the process set out above, **Table 7.5** defines the ZOI, study area and survey area for the ecological features of relevance to this assessment.

Table 7.5: Specific ZoI, study area and survey areas for ecological features.

Ecological Feature.		ZOI	Study Area.	Survey Area[2]
Designated Sites.	Statutory designated.	5km	5km	N/A
	Non-statutory designated.	2km	2km	N/A
Plants and Habitats.		2km	2km	Within the site boundary.
Invertebrates		2km	2km	Not surveyed as habitat within the site boundary is sub optimal.
Reptile		2km	2km	Not surveyed as habitat largely suboptimal.
Amphibians		2km	2km	Within the site boundary and a 500m buffer area[3].
Birds		2km	2km	Within the site boundary.
Bats	Daubenton's bat (*Myotis daubentonii*)..	2km	2km	Within the site boundary and around adjacent woodland and hedgerow habitat.
	Natterer's bat (*Myotis nattereri*).	4km	4km	
	Noctule (*Nyctalus noctula*).	4km	4km	
	Leisler's bat (*Nyctalus leisleri*).	3km	3km	
	Common pipistrelle (*Pipistrellus pipistrellus*).	2km	2km	
	Soprano pipistrelle (*Pipistrellus pygmaeus*).	3km	3km	
	Nathusius' pipistrelle (*Pipistrellus nathusii*).	3km	3km	
	Serotine (*Eptesicus serotinus*).	4km	4km	

[2] The survey area was where access was granted. Please note that access was granted for the rail extension route but not for the branch line upgrades.
[3] 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[2]
	Barbastelle	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.

7.3.19 Additionally, a **Shadow HRA Report** (Doc Ref. 5.10) has been prepared which considers the site in the context of possible impacts on European sites, and a project-wide Water Framework Directive (WFD) compliance assessment has been undertaken (Doc Ref. 8.14) which also considers a number of the Important Ecological Features in the context of the WFD (Ref 7.35).

e) Assessment scenarios

7.3.20 The assessment of effects on terrestrial ecology and ornithology is based on each of the construction, operation and removal and reinstatement phases (where relevant) of the proposed development, rather than specific assessment years.

f) Assessment criteria

7.3.21 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.

7.3.22 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 **Appendix 6J** of **Volume 1** of the **ES** (Doc Ref. 6.02). A summary of the assessment criteria used in this assessment is presented in the following sub-sections.

i. Sensitivity

7.3.23 The definitions of value and sensitivity criteria used in this assessment are set out in **Table 7.6**. Value and sensitivity are assessed separately, as they are to an extent independent of each other.

Table 7.6: 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 (e.g. designated features of international/national importance, such as SACs, SPAs, Ramsar sites and SSSIs). **Sensitivity:** Feature/receptor has a very low capacity to accommodate the proposed form of change.
Medium	**Value:** Feature/receptor possesses key characteristics which contribute significantly to the distinctiveness and character of the site/receptor (e.g. designated features of regional or county importance such as CWSs and local Biodiversity Action Plan (BAP) species). **Sensitivity:** Feature/receptor has a low capacity to accommodate the proposed form of change.
Low	**Value:** Feature/receptor only possesses characteristics which are locally significant. Feature/receptor not designated or only designated at a district or local level (e.g. Local Nature Reserves). **Sensitivity:** Feature/receptor has some tolerance to accommodate the proposed change.
Very Low.	**Value:** Feature/receptor characteristics do not make a significant contribution to local character or distinctiveness. Feature/receptor not designated. **Sensitivity:** Feature/receptor is generally tolerant and can accommodate the proposed change.

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

7.3.25 In addition, in line with the CIEEM guidelines (Ref 7.25), 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).

- Local importance, including assessment with a district or borough context, or within the ZOI of the proposed development.

g) Magnitude

7.3.26 **Table 7.7** sets out the thresholds that have been used in the definition of the different scales of magnitude to act as a guide for the assessment.

Table 7.7: Assessment of magnitude of impact for terrestrial ecology and ornithology.

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.

7.3.27 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.

7.3.28 In compliance with the CIEEM guidelines (Ref 7.25) 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 7.7** above are therefore indicative and not absolute). **Table 7.8** provides impact criteria used in line with the CIEEM guidelines.

Table 7.8: Criteria for determining the impact on ecological features under CIEEM guidelines (Ref 7.25).

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.

Characteristic	Criteria
	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. Impacts and 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 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 Sizewell C 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 chance of action being taken to reverse it. Reversible: an effect from which spontaneous recovery is possible or which may be counteracted by mitigation.

7.3.29 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.

h) Effect definitions

7.3.30 The definitions of effects for terrestrial ecology and ornithology are shown in **Table 7.9**, in line with the EIA methodology set out within **Volume 1**, **Chapter 6** of this volume.

Table 7.9: 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 or county level.
Minor	Effects that could be important considerations at a local level.
Negligible	An effect that is likely to have a negligible or neutral influence, irrespective of other effects.

7.3.31 Following the classification of an effect as presented in **Table 7.9,** a clear statement is made as to whether the effect is 'significant' or 'not significant'. Under CIEEM guidelines (Ref 7.25) the significance of effect on the IEF(s) has been determined based on the analysis of the factors that characterise the impact (**Table 7.8**). The significance of effect is defined as *'an effect that either supports or undermines biodiversity conservation objectives for the IEFs or for biodiversity in general'*.

7.3.32 Using the CIEEM guidelines (Ref 7.25) and approach, significance of effect has been qualified regarding 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.

7.3.33 To allow a consistent approach across all disciplines within this ES, the standard levels of significance defined in the CIEEM guidelines (Ref 7.25) are set out in **Table 7.10**, 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 7.10: Summary and comparison of EIA and CIEEM based measures of significance of ecological effects.

Significance following the CIEEM guidelines.	Equivalent significance definitions following the EIA guidelines 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)

i) Assessment methodology

i. Establishing the baseline

Existing baseline

7.3.34 Baseline conditions were determined through a combination of a desk-study and field surveys. Technical data has been assimilated from survey work carried out between 2007 and the present. 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 so are not replicated here; however, a summary has been provided below.

7.3.35 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 (NNR) within 5km, and Local Nature Reserves and CWSs within 2km;
- review of Suffolk Biodiversity Information Service and Joint Nature Conservation Committee records;
- a review of the Suffolk BAP (Ref 7.21), Suffolk's Priority Species and Habitats list (Ref 7.22) and Section 41 of the NERC Act (Ref 7.10);
- a review of relevant survey results for associated development sites; although the proposed development alignment has changed since these were completed, some of the baseline data collected are still relevant to the current alignment. These data were reviewed to understand the baseline conditions relevant to the current site boundary; and
- a review of survey data, conducted for the Sizewell C main development site.

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

7.3.37 A detailed suite of ecological survey work has been undertaken within the site boundary and/or its immediate surrounds (i.e. within the ZOI), conducted during the period 2007 to 2016. The following surveys have been conducted within the ZOI:

- extended Phase 1 habitat and protected species surveys;
- amphibian surveys;
- ornithological surveys (breeding and wintering); and
- bat surveys (tree roost assessment, and activity and static surveys).

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

7.3.39 It should be noted that for the screened in level crossing upgrade location of Bratts Black House, no access for baseline surveys was granted. Only desk-study information has been included within the baseline for this site.

Future baseline

7.3.40 The future baseline considered 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.

Construction

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

Operation

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

Removal and reinstatement

7.3.43 The assessment of effects on terrestrial ecology and ornithology is based on the full removal and reinstatement period of the proposed rail extension route and its associated activities rather than specific assessment years. The proposed rail improvement works would be retained as permanent and are therefore not considered as part of the removal and reinstatement assessment.

j) Inter-relationships

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

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

k) Assumptions and limitations

7.3.45 The assessment is based on the prevailing ecological conditions which are not expected to change in the absence of the proposed development.

7.3.46 The following limitations have been identified:

- no access for baseline surveys was possible for the screened in level crossing upgrade works at Bratts Black House. Only desk-study information has been used in the assessment for this site;
- due to restrictions in land access, it was not possible to survey all ponds within a 500m radius of the rail extension route site boundary to conduct great crested newt surveys. Of the 28 ponds with 500m of the rail extension route boundary, access was not provided to five ponds. Baseline data was therefore collected from 23 ponds, allowing sufficient information to be collected to inform the **ES**. Given that great crested newts were detected within nine of the ponds which could be surveyed, on a precautionary basis it has been assumed that great crested newts are present in the remaining five ponds that could not be accessed. The assessment is therefore based on the worst-case scenario;
- for the analysis of samples for the great crested newt DNA surveys, there are the following limitations: (1) any variation between the characteristics of the sample and a batch will depend on the sampling procedure used; (2) the method is qualitative and therefore the levels given in the score do not constitute the quantification of great crested newt DNA against a calibration curve; (3) a 'not detected' result does not exclude the presence at levels below the limit of detection; and

- due to access constraints, it was not possible to conduct bat surveys across the full extent of the proposed rail extension route alignment. However, sufficient information was gathered across the remainder of the survey area to describe the bat assemblage and level of activity.

7.4 Baseline environment

7.4.1 This section presents a description of the baseline environmental characteristics within the footprint of the proposed rail extension route and surrounding area with specific reference 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. Proposed rail extension route

Designated Sites

7.4.3 There are twelve statutory designated sites of nature conservation importance within 5km. These are:

- Sizewell Marshes SSSI (930m east).
- Minsmere to Walberswick Heaths and Marshes SAC, SPA, Ramsar site and SSSI (2.29km north-east).
- Leiston to Aldeburgh SSSI (2.2km south-east).
- Sandlings SPA (2.2km south-east).
- Outer Thames Estuary SPA (3km east).
- Alde-Ore Estuary SPA, SAC, Ramsar Site and SSSI (4.8km south).

7.4.4 The SAC, SPA and Ramsar sites support habitat and/or species of European importance listed under Annex I of the EC Birds Directive (Ref 7.3) and Annex I and II of the EC Habitats Directive (Ref 7.4). These designated sites are therefore of International importance under the CIEEM guidelines (Ref 7.25) and of high importance under the EIA-specific methodology. The SSSIs support habitats and species of national importance and are therefore

considered to be of national importance under the CIEEM guidelines (Ref 7.25) and of high importance under the EIA-specific methodology.

7.4.5 Six non-statutory designated CWSs are within 2km of the site. These are:

- Buckle's Wood CWS (adjacent to the western boundary of the proposed rail extension route).
- Sizewell Levels and Associated Areas CWS (750m to the east).
- Leiston Common CWS (1.3km south-east).
- Minsmere Valley Eastbridge to Reckford Bridge CWS (1.4km east).
- Leiston Airfield CWS (1.8km north-west).
- Theberton Woods CWS (2km north-west).

7.4.6 County Wildlife Sites support habitat types listed on Section 41 of the NERC Act (Ref 7.10) and are targeted for action under the Suffolk BAP (Ref 7.21) and Suffolk's Priority Species and Habitats list (Ref 7.22). These sites are therefore of county importance under the CIEEM guidelines (Ref. 7.25) 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 site and non-statutory designated sites within 2km are shown on **Figure 7.1** and **Figure 7.2** in **Appendix 7A** of this volume respectively.

Plants and Habitats

7.4.8 **Figure 7.3** in **Appendix 7A** of this volume provides the Extended Phase 1 Habitat map for the site.

7.4.9 The site comprises predominantly intensively managed arable fields with no scarce arable weeds or other notable plant species identified. The fields are bounded by fences and hedgerows, with the majority of the hedgerows present being species-poor with large gaps. Hedgerows H1, H2, and H4 (see **Figure 7.3** in **Appendix 7A** of this volume) are 'important' when assessed against the Wildlife and Landscape Criteria of the Hedgerows Regulations (Ref 7.11). Hedgerows are a Suffolk BAP priority habitat (Ref 7.21) and are listed as a habitat of principal importance under Section 41 of the NERC Act (Ref 7.10). The hedgerows on site are of local importance under the CIEEM guidelines (Ref 7.25) and of very low importance under the EIA-specific methodology.

7.4.10 Several blocks of woodland were present within the ZOI. Buckle's Wood CWS (4.3ha) is ancient semi-natural woodland located adjacent to the site to the west of Buckleswood Road. A small, broadleaved copse (0.1ha, see Target Note (TN 6)) is located immediately east of Buckle's Wood CWS on the opposite side of Buckleswood Lane, the lane separating the two areas. A further small copse (0.4ha, see TN 9) is located approximately 150m east of the site, located in the middle of a large arable field to the north of Buckleswood Lane. Lowland mixed deciduous woodland is a priority habitat (Ref 7.22) and is listed under Section 41 of the NERC Act (Ref 7.10). Buckle's Wood CWS is of county importance under the CIEEM guidelines (Ref 7.25) and of medium importance under the EIA-specific methodology, while other the blocks of woodland, due to their small extent, would be of local importance under the CIEEM guidelines (Ref 7.25) and of low importance under the EIA-specific methodology.

7.4.11 Twenty-eight waterbodies (ponds) are located within 500m of the site (see **Figure 7.4** in **Appendix 7A** of this volume). Of these, Pond 42 is located within the site boundary while Pond 41 is adjacent to the site boundary. The sites of both ponds were dry at the time of surveying in 2014 and considered to no longer exist. Ponds are on Suffolk's Priority Species and Habitats list (Ref 7.22). As a whole, this network of ponds within the ZOI is of local importance under the CIEEM guidelines (Ref 7.25) and of low importance under the EIA-specific methodology.

Invertebrates

7.4.12 The desk-study identified a number of notable and/or legally protected invertebrate species within the ZOI, primarily associated with the Kenton Hills conifer plantation and Sizewell Marshes SSSI. Most notably recorded was white-letter hairstreak (*Satyrium w-album*). This species is RDB 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 7.22). All records were identified outside of the site boundary. White-letter hairstreak feeds on Elm (*Ulmus* sp.) and could therefore be present within the hedgerows which border fields within the site.

7.4.13 A further four RDB butterfly species were identified during the desk-study: (small heath (*Coenonympha pamphilus*); grayling (*Hipparchia semele*); wall (*Lasiommata megera*); and white admiral (*Limenitis camilla*)) that are also listed under Section 41 of the NERC Act (Ref 7.10), and are on Suffolk's Priority Species and Habitats list (Ref 7.22).

7.4.14 The area of ancient woodland (Buckle's Wood CWS) and associated species-rich hedgerows, are likely to be of some value to invertebrates and particularly butterflies and moths. However, the site consists of primarily arable fields with no species-rich margins or other features of importance to

invertebrates. The invertebrate assemblage within the ZOI of the site is therefore of local importance under the CIEEM guidelines (Ref 7.25) and of very low importance under the EIA-specific methodology.

Amphibians

7.4.15 There are desk-study records of great crested newts within 500m of the site within ponds identified for further amphibian surveys, provided in **Appendix 7A** of this volume. Desk-study records were also identified for common toad (*Bufo bufo*) between 100 and 200m from the site.

7.4.16 28 waterbodies are within 500m of the site and an additional three are present just beyond 500m (see **Figure 7.3** and **Annex 7A.4** in **Appendix 7A** of this volume). Survey data of ponds beyond 500m is available and has been used to understand the wider great crested newt population.

7.4.17 Great crested newts were confirmed in Ponds 2, 4, 26, 27, 30 and 55 (and 57, just outside the 500m buffer) with evidence of breeding (from eggs) in Ponds 2, 4, 30 and 55. Ponds 28 and 36 had evidence of great crested newts, and Ponds 2 and 4 also had desk-study records of great crested newts. (See **Figure 7.3** in **Appendix 7A** of this volume). A 'medium-sized' meta-population[4] population is estimated to be present at Ponds 2, 4, 55 and 57. There is also a 'medium-sized' population at Pond 30. The eDNA surveys also revealed the presence of great crested newts in Ponds 21, 28 and 37 (and 20, adjacent to the 500m buffer), although population estimates have not been carried out for these ponds.

7.4.18 Great crested newts populations are therefore found throughout the ZOI: to the north in the land around Leiston Abbey (Ponds 2, 4, 55 and 57); in the middle of the ZOI at Pond 30 and 36; to the west at Ponds 27 and 28 within adjacent woodland and gardens respectively; Ponds 21 and 37 (and 20, adjacent to the 500m buffer) to the west (adjacent to Crossings Farm and Crossing Cottages); and Pond 26.

7.4.19 Although the majority of the site is of arable fields of limited suitability for foraging great crested newts, the field margins, hedgerows and blocks of woodland are suitable foraging habitat, with the woodland providing suitable hibernation sites, and hedgerows and associated margins providing some but limited connectivity between ponds and woodland blocks.

[4] Great crested newts often exist in meta-populations, a group of associated populations which breed in and live around a cluster of ponds (Ref.7.43). This means that populations within separate ponds can migrate between ponds when pond conditions fluctuate and therefore ensure stability within the overall population.

7.4.20 The woodland blocks provide suitable foraging habitat for common toad and the larger ponds suitable breeding habitat. The woodland blocks (all of which are being retained) may therefore support a small population of common toads.

7.4.21 Great crested newts and common toads are protected under Schedule 5 of the Wildlife and Countryside Act (Ref 7.7), are listed under Section 41 of the NERC Act (Ref 7.10) and Suffolk's Priority Species and Habitats list (Ref 7.22). Great crested newts are also protected under 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 7.25) and medium importance under the EIA-specific methodology. The population of common toads are of local importance under the CIEEM guidelines (Ref 7.25) and very low importance under the EIA-specific methodology.

Reptiles

7.4.22 The closest reptile records were for grass snake (*Natrix helvetica helvetica*) and common lizard (*Zootoca vivipara*) at between approximately 100m and 200m from the site boundary, with grass snake and common lizard recorded to the south-east at Wood Farm and a further common lizard record near the south-western corner of the site.

7.4.23 Within the site boundary, suitable habitat for reptiles is limited but includes marginal habitats, such as field boundaries. These areas are restricted in extent and often isolated within large tracts of arable farmland, so are sub-optimal for reptiles. During surveys, a male grass snake was observed, outside the site boundary, to the west of a pond in the woodland block south of Aldhurst Farm.

7.4.24 All four common species of reptile (i.e. grass snake, adder (*Vipera berus*), common lizard and slow-worm (*Anguis fragilis*)) are listed under Suffolk's Priority Species and Habitats list (Ref 7.22) 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 7.25) and of very low importance under the EIA-specific methodology.

Ornithology

7.4.25 During breeding bird surveys (undertaken in 2011 and 2014), no Schedule 1 species of the Wildlife and Countryside Act (Ref 7.7) were recorded. Four species listed on both the Red List of BoCC (Ref 7.28) and Section 41 of the NERC Act (Ref 7.10) were recorded (see **Figure 7.5** in **Appendix 7A** of this volume). These were: herring gull (*Larus argentatus*); skylark (*Passer domesticus*); song thrush (*Turdus philomelos*); and yellowhammer (*Emberiza citronella*). Dunnock (*Prunella modularis*) and bullfinch (*Pyrrhula pyrrhula*) were also recorded and are listed within the NERC Act (Ref 7.10); these

species are Amber List species of BoCC (Ref 7.28). Two additional species listed on the Amber List of BoCC (Ref 7.28) were also recorded: lesser black backed gull (*Larus fuscus*) and willow warbler (*Phylloscopus trochilus*).

7.4.26 During the winter bird surveys (2011-2012 and 2014-2015) three species listed on Schedule 1 of the Wildlife and Countryside Act (Ref 7.7) were recorded (see **Figure 7.6** in **Appendix 7A** of this volume). There were peregrine (*Falco peregrinus*), fieldfare (*Turdus pilaris*) and redwing (*Turdus iliacus*). A total of seven species listed on both the Red List of BoCC (Ref 7.28) and Section 41 of the NERC Act (Ref 7.10) were recorded within the survey area during the Winter bird surveys (see **Figure 7.7** in **Appendix 7A** of this volume): herring gull; house sparrow (*Passer domesticus*); lapwing (*Vanellus vanellus*); skylark; song thrush; starling (*Sturnus vulgaris*) and yellowhammer. In addition, dunnock, a NERC Act (Ref 7.10) and BoCC Amber List species (Ref 7.28), was also recorded. In addition, a further six species listed on the Amber List of BoCC Ref 7.28) were also recorded: black headed gull (*Larus ridibundus*); common gull (*Larus canus*); kestrel (*Falco tinnunculus*); lesser black backed gull; meadow pipit (*Anthus pratensis*) and stock dove (*Columba oenas*). All of the species recorded during winter bird surveys are considered to be using the site as a winter foraging resource, with the gull species likely to forage over a wider area.

7.4.27 **Appendix 7A,** in this volume, provides the full baseline results. The breeding and wintering bird assemblage within the ZOI is of local importance under the CIEEM guidelines (Ref 7.25) and of low importance under the EIA-specific methodology.

Bats

7.4.28 Ten species of bats have been recorded within the ZOI, these being Daubenton's bat, Natterer's bat, noctule, Leisler's bat, common pipistrelle, soprano pipistrelle, Nathusius' pipistrelle, serotine, barbastelle and brown long-eared bat. **Appendix 7A** provides the baseline results and can be found in this volume.

7.4.29 Surveys within the adjacent EDF Energy estate[5] identified the presence of breeding populations of Natterer's bat, soprano pipistrelle, barbastelle and brown long-eared bat, as well as the likely presence of a breeding population of common pipistrelle within or in close proximity to the area surveyed. The desk-study also identified a common pipistrelle roost, and a serotine maternity roost within the ZOI of the site.

[5] Land owned by SZC Co. in the Sizewell area.

7.4.30 Barbastelle are additionally considered likely to hibernate within the EDF Energy estate. Evidence of hibernation by other species within the EDF Energy estate is less clear, although small numbers of hibernating Natterer's bat, common pipistrelle, soprano pipistrelle and brown long-eared bat are likely. Daubenton's bat, Leisler's bat, Nathusius' pipistrelle and serotine were recorded in only low numbers within the adjacent EDF Energy estate with no evidence identified to suggest the presence of breeding or hibernating populations.

7.4.31 Based on survey data, the closest known roost is a Natterer's bats maternity colony at Leiston Abbey, approximately 300m north of the site boundary. Site-specific surveys from within the site indicate that use of the habitats present within the site boundary, by Natterer's bats, is likely to occur only intermittently and at only very low levels.

7.4.32 Radio-tracking data identified a single male barbastelle foraging in Buckle's Wood CWS and roosting at Wood Farm (50m south away from the site boundary) in 2010. Another male barbastelle, tagged and tracked in 2014, was recorded using a large range that included the site, although no activity was registered within the site boundary. Overall, based on the survey results, the site is not considered to be of value to the adjacent breeding population of barbastelle. Roosts of noctule, serotine, brown long-eared bat, common pipistrelle and soprano pipistrelle are known within the EDF Energy estate, although all known roosts are over 1km away from the site boundary.

7.4.33 A common pipistrelle maternity roost was confirmed in 2011 at Gypsy Lodge, located approximately 360m to the west of the site. Based on survey data, the level and timing of soprano pipistrelle activity is considered to be indicative of the presence of a soprano pipistrelle roost in close proximity to the site.

7.4.34 Areas of woodland, hedgerows and scattered mature trees within and in land adjacent to the site have some potential for roosting bats and provide good quality commuting and foraging opportunities. The bat tree assessment survey identified 25 trees as potentially suitable for roosting bats. Within the site boundary, 16 trees (ten of high potential, three of moderate potential, two of low-moderate potential, and one of low potential) were identified with bat roost potential (see **Figure 7.8** in **Appendix 7A** of this volume).

7.4.35 During transect surveys (see **Figure 7.9** in **Appendix 7A** of this volume), common and soprano pipistrelle were the most frequently recorded. All other

species (serotine, noctule, barbastelle, *Myotis* spp., 'big bat'[6] and brown long-eared bat[7]) were recorded at only very low levels. During the course of the static detector surveys (see **Figure 7.9** in **Appendix 7A** of this volume), seven species were recorded (Natterer's bat, noctule, common pipistrelle, soprano pipistrelle, Nathusius' pipistrelle, barbastelle and brown long-eared bat) as well as unidentified species belonging to four species groups (common/soprano pipistrelle, *Myotis* spp., *Plectus* spp., and 'big bat'). Recorded activity levels largely reflected those recorded during transect surveys, with activity dominated by common and soprano pipistrelle (see **Figures 7.10** and **Figure 7.11** in **Appendix 7A** of this volume). All other species groups were recorded at substantially lower levels (see **Figure 7.12, Figure 7.13** and **Figure 7.14** in **Appendix 7A** of this volume). Survey results suggested occasional use of the habitat within the site boundary by foraging and commuting bats. There is no clear evidence from site-specific surveys to suggest the presence of additional roosts close to the site.

7.4.36 All bat species in the UK are 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). Five species (barbastelle, brown long-eared, lesser horseshoe, noctule and soprano pipistrelle bat) are listed as priority species on the Suffolk's Priority Species and Habitats list (Ref 7.22); these and two species not normally present in Suffolk (greater horseshoe and Bechstein's bat) are priority species in England under Section 41 of the NERC Act (Ref 7.10). Barbastelle additionally receive protection under Annex II of the Habitats Directive (Ref 7.4). The assemblage of bats within the ZOI is of county importance under the CIEEM guidelines (Ref 7.25) and of medium importance under the EIA-specific methodology.

Other Mammals

7.4.37 Otter (*Lutra lutra*), badger (*Meles meles*), hedgehog (*Erinaceus europaeus*), water shrew (*Neomys fodiens*), brown hare (*Lepus europaeus*), water vole (*Arvicola terrestris*) and harvest mouse (*Micromys minutus*) were identified from the desk-study within the ZOI of the proposed rail extension route.

7.4.38 No habitat suitable for otters or water voles is present within the site boundary, and both species are unlikely to be present within the site.

[6] 'Big bat' is a group classification consisting of noctule, Leisler's bat and serotine. These species are often grouped due to the similarities and overlapping characteristics of their echolocation calls making species-specific identifications difficult and unreliable.

[7] All long-eared bat recordings are considered to relate to brown long-eared bat echolocation calls due to the absence of grey long-eared bat from Suffolk based on their current known distribution and Suffolk Bat Group records.

7.4.39 One water shrew was found in Pond 25 south of Buckle's Wood CWS and there was a single desk-study record associated with a pond within Buckle's Wood CWS. Water shrews are reported as declining in Suffolk (Ref 7.36). The water shrew is on Suffolk's Priority Species and Habitats list (Ref 7.22) and considered locally important, but is not included within Section 41 of the NERC Act (Ref 7.10). Water shrew within the ZOI is of local importance under the CIEEM guidelines (Ref 7.25) and of very low importance under the EIA-specific methodology.

7.4.40 A single badger outlier sett was recorded within the site, and a subsidiary sett was found within the site. Badgers are of local importance under the CIEEM guidelines (Ref 7.25) and of low importance under the EIA-specific methodology.

7.4.41 There are no records of hedgehog within the site. The majority of the site comprises arable fields and so is suboptimal for hedgehogs. Buckle's Wood CWS, broadleaved woodland and the hedgerows provide suitable habitat for hedgehogs and this species could be present within the site boundary. Hedgehog is a Suffolk BAP species (Ref 7.21) and listed on Section 41 of the NERC Act (Ref 7.10). Hedgehog within the ZOI is of local importance under the CIEEM guidelines (Ref 7.25) and of very low importance under the EIA-specific methodology.

7.4.42 During surveys, a single brown hare was seen in a rape crop to the south of Aldhurst Farm located to the north of the site. East Anglia holds approximately 20% of the national population across the three counties (Cambridgeshire, Suffolk and Norfolk) (Ref 7.37). The Suffolk BAP for brown hare states that the species is widespread in Suffolk (Ref 7.21), however, recent reports in the east of England in 2018 suggest brown hare are suffering from a disease epidemic with records of sick or dead animals (Ref 7.38), and with rabbit haemorrhagic disease type 2 now confirmed in brown hare from Dorset and Essex (Ref 7.39). Brown hare within the ZOI is of local importance under the CIEEM guidelines (Ref 7.25) and of very low importance under the EIA-specific methodology.

ii. Proposed rail improvement works

7.4.43 As detailed in **Table 7.4**, Bratt's Black House is the only level crossing improvement to be screened in for further assessment. The baseline for this site has been compiled from available desk-study information.

Designated Sites

7.4.44 There is one statutory designated site of nature conservation importance within 5km, this being Minsmere to Walberswick Heaths and Marshes SSSI (4.9km north-east). This SSSI supports habitats and species of national importance and is therefore considered to be of national importance under

the CIEEM guidelines (Ref 7.25) and of high importance under the EIA-specific methodology.

7.4.45 One non-statutory designated CWS is within 2km of the site. This is Kelsale Morio Meadow CWS (300m north). CWS support habitat types listed on Section 41 of the NERC Act (Ref 7.10) and are targeted for action under the Suffolk BAP (Ref 7.21) and Suffolk's Priority Species and Habitats list (Ref 7.22). This site is therefore of county importance under the CIEEM guidelines (Ref 7.25) and of medium importance under the EIA-specific methodology.

7.4.46 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 site and non-statutory designated sites within 2km are shown on **Figure 7.15** in **Appendix 7A** of this volume.

Plants and habitats

7.4.47 There are desk-study records of only two plant species, Chicory (*Cichorium intybus*) and Gold-of-pleasure (*Camelina sativa*), within the study area which were identified approximately 150m north-east of the site boundary. Chicory is listed as vulnerable in England (Ref 7.40) and is found on roadsides, field margins and rough grassland. Field margins are found directly adjacent to the site boundary; therefore, this species could be present in the ZOI but outside the site boundary.

7.4.48 The site comprises railway track and lineside habitat of dense scrub, adjacent to arable fields and hedgerows with a small number of scattered trees. An existing vehicle level crossing is present within the site. Hedgerows and trees within site were unable to be assessed in detail through aerial imagery. Hedgerows are a Suffolk BAP priority habitat (Ref 7.21) and are listed as a habitat of principal importance under Section 41 of the NERC Act (Ref 7.10). Given the small, discrete nature of the hedgerow habitat available within the site boundary at this location, hedgerows are of local importance under the CIEEM guidelines (Ref 7.25) and very low importance under the EIA-specific methodology.

7.4.49 Seven waterbodies (ponds) are within 500m of the site (see **Figure 7.16** in **Appendix 7A** of this volume); however, access for surveys was not granted for any of these ponds. All seven are outside of the site boundary. One pond is located within a small area of woodland, adjacent to the site (see **Figure 7.16** in **Appendix 7A** of this volume). Ponds are on Suffolk's Priority Species and Habitats list (Ref 7.22). The ponds within the ZOI are of local importance under the CIEEM guidelines (Ref 7.25) and of low importance under the EIA-specific methodology.

Invertebrates

7.4.50 The desk-study identified two notable and/or legally protected invertebrate species within the ZOI. Most notably recorded was purple emperor (*Apatura iris*) and white-letter hairstreak (*Satyrium w-album*). Purple emperor is protected under Schedule 5 of the Wildlife and Countryside Act (Ref 7.7) and is associated with broad-leaved woodland. White-letter hairstreak is also protected under Schedule 5 of the Wildlife and Countryside Act (Ref 7.7) and is also listed on the RDB and likely to be associated with broad-leaved woodland containing Elm species (*Elmus* sp.). Aerial imagery shows that the site consists of a section of railway tracks with predominantly scrubby lineside habitat. Hedgerows of adjacent arable fields have a small number of scattered trees, assessment of these trees through aerial imagery is not possible. The railway tracks and lineside habitat are unlikely to be of importance to invertebrates, and the purple emperor and white-letter hairstreak are unlikely to be found within the site boundary. The invertebrate assemblage within the Zol of the site is therefore of local importance under the CIEEM guidelines (Ref 7.25) and of very low importance under the EIA-specific methodology.

Amphibians

7.4.51 There is one historical record (2005) of great crested newts located approximately 240m north of the site. Desk-study records were also identified for common toad (*Bufo bufo*) and common frog (*Rana temporaria*) between 1.4km and 1.8km south-west of the site, provided in **Appendix 7A** of this volume.

7.4.52 There are seven ponds within 500m of the site (see **Figure 7.16** in **Appendix 7A** of this volume) (access for surveys not granted) with one pond located adjacent to the site. The site offers limited potential in terms of breeding and foraging for great crested newts and other amphibians. Lineside and railway ballast habitat may offer suitable hibernating opportunities. A review of aerial imagery suggests that the pond located adjacent to site (see **Figure 7.16** in **Appendix 7A** of this volume) may offer suitable foraging, breeding and hibernating opportunities for amphibians. The surrounding arable fields are of limited suitability for foraging great crested newt although hedgerows surrounding the arable fields would provide suitable habitat for commuting and hibernation.

7.4.53 Great crested newts, common toad and common frogs are protected under Schedule 5 of the Wildlife and Countryside Act (Ref 7.7). Great crested newts and common toads are listed under Section 41 of the NERC Act (Ref 7.10) and Suffolk's Priority Species and Habitats list (Ref 7.22). Great crested newts are also protected under Schedule 2 of the Conservation of Habitats and Species Regulations (Ref 7.8).

7.4.54 The value of site with regards to great crested newt has been considered. There is an historical (2005) great crested newt record 240m north of the site. Due to the lack of baseline data available for the ponds within 500m of the site, the potential for great crested newt presence has been assumed as a worst-case scenario. Given the small size of ponds within 500m of the site and the limited suitable terrestrial habitat on site, the population within 500m would not likely be maintained by the site, nor is the site likely to be essential in supporting great crested newts from those ponds. Great crested newts are therefore considered to be of local importance under the CIEEM guidelines (Ref 7.25) and low importance under the EIA-specific methodology. The population of common amphibians are of local importance under the CIEEM guidelines (Ref 7.25) and very low importance under the EIA-specific methodology.

Reptiles

7.4.55 There are reptile records for grass snake, slow-worm and common lizard between approximately 1.1km and 1.7km south-west from the site, within Saxmundham.

7.4.56 Within the site boundary and wider area, suitable habitat for reptiles is limited but includes lineside habitats, such as dense scrub, a small cluster of trees and field margins, and therefore sub-optimal for reptiles. Overall, the available habitat to support reptile species is limited and the site is judged to be of little value to reptile species.

7.4.57 All three common species of reptile recorded (i.e. grass snake, common lizard and slow-worm) are protected under Schedule 5 of the Wildlife and Countryside Act (Ref 7.7); listed under Suffolk's Priority Species and Habitats list (Ref 7.22) 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 7.25) and of very low importance under the EIA-specific methodology.

Ornithology

7.4.58 Thirty-nine records for birds have been identified within 2km of the site. Of these, 26 species were identified approximately 150m north-east of site, within arable land. Three Schedule 1 species were identified 150m north-east of the site; redwing, fieldfare and barn owl (*Tyto alba*). An additional two Schedule 1 species were identified within 2km of the site, hobby (*Falco subbuteo*) and red kite (*Milvus milvus*).

7.4.59 Within the site boundary, suitable habitat for birds is limited but includes potential nesting habitats, such as dense scrub, scattered trees and hedgerow boundaries.

7.4.60 All bird species are protected under the Wildlife and Countryside Act (Ref 7.7); listed under Suffolk's Priority Species and Habitats list (Ref 7.22) and Section 41 of the NERC Act (Ref 7.10). However, given the limited nesting and foraging potential for birds within the site, the bird assemblage is of local importance under the CIEEM guidelines (Ref 7.25) and of very low importance under the EIA-specific methodology.

Bats

7.4.61 Two records were identified for bats; Pipistrelle species (*Pipistrellus* sp.) and brown long-eared approximately 1.5km south-west and 1.8km west, respectively, of the site. From a review of satellite imagery, there is limited habitat suitable for foraging, commuting and roosting bats within the site.

7.4.62 All bat species in the UK are protected under Schedule 5 of the Wildlife and Countryside Act (Ref 7.7), and are listed on Suffolk's Priority Species and Habitats list (Ref 7.22) and Section 41 of the NERC Act (Ref 7.10). Given the small and discrete nature of the works, the assemblage of bats within the ZOI is of local importance under the CIEEM guidelines (Ref 7.25) and of very low importance under the EIA-specific methodology.

Other Mammals

7.4.63 Hedgehog was identified from the desk-study, approximately 1.1km west of site (within the Zol). There are no other relevant mammal records.

7.4.64 The site offers suitable foraging and nesting habitat for hedgehogs with connectivity to small areas of woodland outside of the site, and so is optimal for the species. However, given the small, discrete nature of the works, there is sufficient optimal habitats within the surrounding area. Hedgehog is a Suffolk BAP species (Ref 7.21) and listed on Section 41 of the NERC Act (Ref 7.10). Hedgehog within the ZOI is of local importance under the CIEEM guidelines (Ref 7.25) and of very low importance under the EIA-specific methodology.

b) Future baseline

i. Proposed rail extension route

7.4.65 There are no committed developments or forecasted changes (climate change or otherwise) that would materially alter the baseline conditions during the construction, operation and removal and reinstatement phases of the proposed rail extension route.

ii. Saxmundham to Leiston branch line upgrades

7.4.66 There are no committed developments or forecasted changes (climate change or otherwise) that would materially alter the baseline conditions during the construction and operation phases of the proposed rail improvement works.

c) IEFs

7.4.67 Following a review of the known baseline 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 require further consideration within this chapter.

7.4.68 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 tertiary mitigation to ensure legislative compliance for their protection has been described.

Table 7.11: Determination of IEFs to be taken forward for detailed assessment.

Feature/Receptor.	Importance (CIEEM/ EIA Methodology).	Justification	Scope in/Out.
Proposed rail extension route.			
Statutory designated sites within 5km of the site boundary.	International and National/High.	These statutory designated sites support a range of habitats and European and nationally protected species. Given the distance of these sites from the site (the nearest being 930m away), no direct or indirect impacts are anticipated on these statutory designated sites. Statutory designated sites have therefore been scoped out of the detailed assessment.	Scoped out.
Non-statutory Designated Sites within 2km of the site boundary (excluding Buckle's Wood CWS).	County/Medium.	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 7.21). Given the distance of these sites (with the exception of Buckle's Wood CWS) (the nearest being 750m away) from the site, no direct land take of these sites would occur, and no obvious impact pathways have been identified. Five CWS (Sizewell Levels and Associated Areas, Leiston Common, Theberton Woods, Leiston Airfield and Minsmere Valley Eastbridge to Reckford Bridge) have therefore been scoped out of the detailed assessment.	Scoped out.
Buckle's Wood CWS.	County/Medium.	Buckle's Wood CWS is listed on the Ancient Woodland inventory and is targeted for action in the Suffolk BAP (Ref 7.21). This CWS also supports habitat types that are priority habitats (Ref 7.22) and listed under Section 41 of the NERC Act (Ref 7.10). While it would be retained in its entirety, this CWS could experience indirect impacts as it is adjacent to the site. Buckle's Wood CWS has therefore been scoped into the detailed assessment.	**Scoped in.**
Broadleaved woodland (excluding Buckle's Wood CWS).	Local/Low.	The broadleaved copse (0.1ha) is located immediately east of Buckle's Wood CWS alongside Buckleswood Lane but is only 0.1ha in extent and separated from Buckle's Wood CWS. The copse would be retained in its entirety and has therefore been scoped out of the assessment.	Scoped out.
Pond within the site boundary and ZOI.	Local/Low.	Ponds are a habitat listed under Suffolk's Priority Species and Habitats (Ref 7.22). There are 28 ponds within the ZOI. Pond 42, which was dry at the time of survey, would be lost during construction, while all others are outside the site boundary. The ponds within the wider area are known to support populations of great crested newt, which has been assessed as an IEF in its own right. Ponds have therefore been	Scoped out.

Feature/Receptor.	Importance (CIEEM/ EIA Methodology).	Justification	Scope in/Out.
		scoped out of the detailed assessment.	
Hedgerows	Local/Low.	Hedgerows are a habitat listed under Suffolk's Priority Species and Habitats (Ref 7.22). There would be the loss of a small section of species-rich 'important' hedgerow to accommodate the proposed rail extension route, as well as small sections of defunct, species-poor hedgerows; the remaining hedgerows would be retained as part of the primary mitigation measures as detailed in **section 7.5** of this chapter. Hedgerows are widespread in Suffolk and it is the loss of a small section of species-rich hedgerow at this location would not result in a significant effect. Therefore, hedgerows have been scoped out of the detailed assessment. However, primary and tertiary mitigation measures have been described to protect this feature. Details of these measures are provided in **section 7.5** of this chapter.	Scoped out.
Invertebrate assemblage.	Local/Very Low.	During field studies, no habitat of particular value for invertebrates within the site was identified. The majority of the site comprises of arable fields, with some species-rich hedgerows but with hedgerows largely defunct or species poor, or no other features of particular importance to invertebrate species. Invertebrates have therefore been scoped out of the detailed assessment.	Scoped out.
Great crested newts.	County/Medium.	Great crested newts populations are found throughout the ZOI: to the north in the land around Leiston Abbey (Ponds 2, 4, 55 and 57); in the middle of the ZOI at Pond 30 and 36; to the west at Ponds 27 and 28 within adjacent woodland and gardens respectively; Ponds 20, 21 and 37 to the west (adjacent to Crossings Farm and Crossing Cottages); and Pond 26. Great crested newt is 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). Although the majority of the site consists of arable fields of limited suitability for foraging great crested newts, the field margins, hedgerows and blocks of woodland provide suitable foraging habitat, with the woodland providing suitable hibernation sites, and hedgerows and associated margins providing some connectivity between ponds and woodland blocks. Great crested newt has therefore been scoped into the detailed assessment.	**Scoped in.**

Feature/Receptor.	Importance (CIEEM/ EIA Methodology).	Justification	Scope in/Out.
Common toad.	Local/Very Low.	Woodland blocks are likely to support a small population of common toads. Common toad is listed under Section 41 of the NERC Act (Ref 7.10). While a species of principal importance, all woodland blocks are located outside of the site boundary. This species has therefore been scoped out the detailed assessment. In addition to this, the tertiary mitigation for great crested newts would also safeguard this species and has been described in s**ection 7.5** of this chapter.	Scoped out.
Reptile assemblage.	Local/Very Low.	There is limited habitat available to support reptile species along the alignment of the rail extension route and the habitat within the site boundary was of little value to reptile species. Reptiles have therefore been scoped out of the detailed assessment. However, all four common reptile species with potential to be present are protected under Section 41 of the NERC Act (Ref 7.10). A limited amount of habitat which would be lost was identified as having the potential to support a small population of foraging and/or hibernating reptiles. Tertiary mitigation measures to safeguard reptiles are therefore described in **section 7.5** of this chapter.	Scoped out.
Breeding and wintering bird assemblage.	Local/Low.	The breeding and wintering 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 breeding and wintering bird assemblage it supports, is widespread in Suffolk and the arable habitat is not being managed specifically to benefit birds. In addition, the nesting and foraging resource of the surrounding woodlands are being retained. It is therefore not considered that any impacts would significantly affect the breeding and wintering bird populations. Breeding and wintering birds are therefore scoped out of the detailed assessment. However, nesting birds are protected under the Wildlife and Countryside Act (Ref 7.7). As such, there may be the potential for impacts on nesting birds, should works be undertaken during the nesting bird period (end of February to end of August inclusive). Tertiary mitigation measures to safeguard nest birds are therefore described in **section 7.5** of this chapter.	Scoped out.
Roosting, foraging and commuting bats.	County/Medium.	At least seven bat species have been recorded within the site; with ten known from desk-study review and surveys undertaken on the adjacent EDF Energy estate. The Zol of the proposed development is known to support breeding populations of barbastelle, Natterer's bat, common pipistrelle, soprano pipistrelle,	**Scoped in.**

Feature/Receptor.	Importance (CIEEM/ EIA Methodology).	Justification	Scope in/Out.
		serotine, barbastelle and brown long-eared bat. A number of trees were identified within the site boundary that have a high or medium potential to support roosting bats. Maternity roosts of common pipistrelle and Natterer's bat have been identified at Gypsy Lodge and Leiston Abbey respectively, and survey work has indicated the likely presence of a soprano pipistrelle roost in close proximity. Despite the Natterer's bat roost proximity, surveys within site boundary indicate that use of these habitats by Natterer's bats is intermittent and at only very low levels. A single male barbastelle was identified foraging in Buckle's Wood CWS and roosting at Wood Farm (50m away from the site boundary) in 2010. Subsequent site-specific surveys, however, indicated that the proposed development is not of significant value to the adjacent breeding population of barbastelle. All other species were recorded at low levels of activity, with the timing and level of use suggesting occasional use of this habitat for foraging and commuting The degree of sensitivity bats display varies between species; however, it is recognised that all bat species can be negatively impacted by human activities. All bat species in the UK are protected under Annex IV of the Habitats Directive (Ref 7.4), transposed to UK law under the Conservation of Habitats and Species Regulations (Ref 7.8). Additional relevant legislation includes the Wildlife and Countryside Act (Ref 7.7) and the NERC Act Ref 7.10). The bat assemblage is therefore scoped into the detailed assessment	
Badgers	Local/Low.	Surveys recorded two badger setts within the site boundary and study area. Badgers are widespread across England and Wales, and populations are increasing both in England and Wales and in Suffolk (Ref 7.42, Ref 7.36). 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, described in **section 7.5** of this chapter.	Scoped out.
Brown hare.	Local/Very Low.	A single brown hare was recorded on site during surveys. While a limited number of brown hares are likely to be found within or adjacent to the proposed development, there is sufficient adjacent habitat to support this species, and the population found within the site boundary is not likely to be a major part of the	Scoped out.

Feature/Receptor.	Importance (CIEEM/ EIA Methodology).	Justification	Scope in/Out.
		potential wider population within the ZOI. 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. Brown hare is listed under Suffolk's Priority Species and Habitats (Ref 7.22) and Section 41 of the NERC Act (Ref 7.10). Details of the tertiary mitigation measures to safeguard brown hare are detailed in **section 7.5** of this chapter**.**	
Water shrew.	Local/Very Low.	One water shrew was found in Pond 25 and a single desk-study record was associated with Buckle's Wood CWS 70m to the north-west of the site boundary. The population found within this pond is not considered to be important in the context of the wider population of the species, and this habitat type is being retained in its entirety as part of the proposed development. This species has therefore been scoped out the detailed assessment.	Scoped out.
Hedgehog	Local/Very Low.	The majority of the site comprises arable fields, and so suboptimal for hedgehogs; there were no records of hedgehogs on the site. Buckle's Wood CWS and the boundary hedgerows provide potentially suitable habitat for hedgehogs and this species could be present within the site boundary. While hedgehogs are likely to be found within or adjacent to the site, 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 has therefore been scoped out of the detailed assessment. Hedgehog is listed under Suffolk's Priority Species and Habitats (Ref 7.22) and Section 41 of the NERC Act (Ref 7.10). Details of tertiary mitigation measures to safeguard hedgehogs are detailed in **section 7.5** of this chapter**.**	Scoped out.
Proposed Rail Improvement Works - Bratt's Black House.			
Statutory designated sites within 5km of the site boundary	National/High.	Minsmere to Walberswick Heaths and Marshes SSSI supports a range of habitats and nationally protected species. Given the distance of this site from the proposed development (4.9km away), no direct or indirect impacts are anticipated on this statutory designated site. Minsmere to Walberswick Heaths and Marshes SSSI has therefore been scoped out of the detailed assessment.	Scoped out.

Feature/Receptor.	Importance (CIEEM/ EIA Methodology).	Justification	Scope in/Out.
Non-statutory Designated Sites. within 2km of the site boundary.	County/Medium.	Kelsale morio Meadow CWS supports 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 7.21). Given the distance of the site to the CWS (300m away) and the discrete nature of the proposed works, no direct land take would occur, and no obvious impact pathways have been identified. Kalsale morio Meadow CWS has therefore been scoped out of the detailed assessment.	Scoped out.
Hedgerows	Local/Very Low.	Hedgerows are a habitat listed under Suffolk's Priority Species and Habitats (Ref 7.22). Hedgerows are widespread in Suffolk and given the small, discrete nature of the hedgerow habitat available within the site boundary at this location, it is not considered that the loss of a small section of hedgerow would result in a significant effect. Therefore, hedgerows have been scoped out of the detailed assessment. However, primary and tertiary mitigation measures have been described to protect this feature. Details of these measures are provided in **section 7.5** of this chapter.	Scoped out.
Ponds within the ZOI.	Local/Low.	Ponds are a habitat listed under Suffolk's Priority Species and Habitats (Ref 7.22). No ponds are within the site boundary at this location. The closest pond is adjacent to the site and would be retained in its entirety. Ponds have therefore been scoped out of the detailed assessment.	Scoped out.
Invertebrate assemblage.	Local/Very Low.	During desk studies, no habitat of particular value for invertebrates within the site was identified. The majority of the site comprises a section of railway tracks with predominantly scrubby lineside habitat. Invertebrates have therefore been scoped out of the detailed assessment.	Scoped out.
Great crested newts.	Local/Low.	Great crested newt is 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). Given the small nature of ponds within 500m of the site and the limited suitable terrestrial habitat on site, the population within 500m is not likely to be dependent on the site and the site is also not likely to be important in supporting great crested newts from those ponds. There is an historical (2005) great crested newt record 240m north of the site. Given the lack of baseline data available for the ponds within 500m of the site, the potential for great crested newt presence is assumed as a worst-case scenario.	**Scoped in.**

Feature/Receptor.	Importance (CIEEM/ EIA Methodology).	Justification	Scope in/Out.
		Great crested newts have therefore been scoped into the detailed assessment.	
Other amphibians.	Local/Very Low.	Given the discrete nature of the works and limited suitable habitat within the site, other amphibians have been scoped out of the detailed assessment.	Scoped out.
Reptiles	Local/Very Low.	Within the site boundary, suitable habitat for reptiles is limited but includes lineside habitats, such as dense scrub, a small cluster of trees and field boundaries, and therefore sub-optimal for reptiles. Overall, the available habitat to support reptile species is considered to be extremely limited and the site of little value to reptile species. Reptiles have therefore been scoped out of the detailed assessment. Tertiary mitigation measures to safeguard reptiles are therefore described in **section 7.5** of this chapter.	Scoped out.
Bird assemblage.	Local/Very Low.	Within the site boundary and given the discrete nature of the proposed works, suitable habitat for foraging and breeding birds is limited. Birds are therefore scoped out of the detailed assessment. However, nesting birds are protected under the Wildlife and Countryside Act (Ref 7.7). As such, there may be the potential for impacts on nesting birds, should works be undertaken during the nesting bird period (end of February to end of August inclusive). Tertiary mitigation measures to safeguard nest birds are therefore described in **section 7.5** of this chapter.	Scoped out.
Bat assemblage.	Local/Very Low.	Within the site boundary and given the discrete nature of the proposed works, suitable habitat for foraging, roosting and commuting bats is limited. Bats have therefore been scoped out of the detailed assessment. All bat species in the UK are protected under Annex IV of the Habitats Directive (Ref 7.4), transposed to UK law under the Conservation of Habitats and Species Regulations (Ref 7.8). Additional relevant legislation includes the Wildlife and Countryside Act (Ref 7.7) and the NERC Act (Ref 7.10). Tertiary mitigation measures to safeguard roosting bats are therefore described in **section 7.5** of this chapter.	Scoped out.
Hedgehog	Local/Very Low.	The site offers suitable foraging and nesting habitat with connectivity to small areas of woodland outside of the site, and so is optimal for hedgehogs; however, given the small, discrete nature of the works, there is sufficient optimal habitats within the surrounding area and the effects of the proposed development on this	Scoped out.

Feature/Receptor.	Importance (CIEEM/ EIA Methodology).	Justification	Scope in/Out.
		species is unlikely to be of significance. Hedgehog has therefore been scoped out of the detailed assessment. Hedgehog is listed under Suffolk's Priority Species and Habitats (Ref 7.22) and Section 41 of the NERC Act (Ref 7.10). Details of tertiary mitigation measures to safeguard hedgehogs are detailed in **section 7.5** of this chapter**.**	

7.4.69 In summary, the IEFs taken forward for a detailed assessment within **section 7.6**, of this chapter, are:

- Proposed rail extension route:
  - IEF: Buckle's Wood CWS;
  - IEF: great crested newt; and
  - IEF: bat assemblage.
- Proposed rail improvement works - Bratt's Black House:
  - IEF: great crested newt.

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 will be implemented as part of the proposed development.

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

a) Primary mitigation

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

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

- Buckle's Wood CWS and surrounding blocks of broadleaved woodland (TN 6 and TN 9) would be retained in their entirety.
- Most hedgerows on-site would be retained and only four small sections of defunct, species-poor hedgerow and one section of species-rich 'important' hedgerow would be removed and there would therefore be

only limited direct loss of hedgerow habitat. All hedgerows removed during construction would be replanted during the removal and reinstatement phase.

- Two landscape bunds 2m in height would be provided within the site. These would help screen the adjacent landscape and ecological receptors.

- The proposed rail extension route would be bounded by security fences. All security fencing around the proposed rail extension route would be sufficient to resist damage by livestock and would be regularly checked and maintained in a suitable condition. Any damage to fencing would be repaired immediately. All landscape bunds would be within the fenced area. The security fence would include a buried return and would be sufficient to prevent access by badgers and so would prevent badgers establishing setts within the landscaped bunds.

- While the proposed rail extension route would be fenced, safe crossing points would be established for the diversion of three public rights of way. Footpath E-363/003/0 would be diverted to a safe crossing point at the Buckleswood Road level crossing, while the remaining two public rights of way (Footpaths E-363/006/0 and E-363/010/0) would be diverted to a safe crossing point at the B1122 (Abbey Road) level crossing. The same crossing points would also act as safe crossing points for badgers and other large terrestrial mammals, thereby minimising any potential fragmentation effect.

- Operational lighting would be limited to the B1122 (Abbey Road) level crossing and the level crossing at Buckleswood Road. The remaining rail route extension would be unlit. The lighting design for the proposed developent would use light fittings chosen to limit stray light. These measures would minimise impacts on nocturnal species such as bats that may use the nearby tree lines or habitats for roosting or foraging.

- Soft landscaping would be maintained during the operational lifetime of the proposed rail extension route before being removed when the agricultural use is reinstated.

- Sustainable Drainage Systems (SuDS) would be implemented to minimise surface water runoff.

b) Tertiary mitigation

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

7.5.6 Tertiary mitigation relevant to terrestrial ecology and ornithology is detailed in the **Code of Construction Practice** (**CoCP**) (Doc Ref. 8.11). The **CoCP** (Doc Ref. 8.11) 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) 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.

7.5.7 Mitigation measures relevant to terrestrial ecology and ornithology that would be included in the **CoCP** (Doc Ref. 8.11) would comprise:

- temporary SuDS would be implemented early in the construction phase. Construction phase water management zones would intercept surface run-off, sediment and contaminants from the construction compound and laydown areas, and incorporate sustainable drainage measures such as swales, filter drains, infiltration basins and soakaways to promote infiltration. Construction drainage would be contained within the site, with drainage to ground. Only if full infiltration is not possible would these systems discharge into the surface drainage network (at greenfield runoff rates) to minimise the potential for impact;

- where required, temporary construction lighting would be controlled to minimise light spill on surrounding habitats. The lighting design would use light fittings chosen to limit stray light and minimise impacts on sensitive species. The lighting would also be designed to minimise the visibility from sensitive receptors off-site. This would minimise impacts on nocturnal species such as bats that may use the nearby tree lines or habitats for commuting, roosting or foraging;

- a Dust Management Plan would be developed and implemented across the site. This would minimise impacts to neighbouring habitats, such as Buckle's Wood CWS;

- standard pollution prevention control measures would be implemented to avoid any pollution risk to watercourses and sensitive habitats;

- there is the potential for non-native species to be introduced during the construction phase. Contractors would be required to undertake a biosecurity risk assessment as part of the planning for the scheme and a management plan put in place to avoid potentially facilitating the spread of non-native species during construction;

- works with the potential to affect great crested newts would be carried out either under a reasonable avoidance methods statement or under a licence from Natural England, as required, following agreement with Natural England on an appropriate mitigation strategy;

- the sections of hedgerow to be removed would be cleared outside of the amphibian hibernation period (October to February inclusive). If this is not possible, vegetation would be cut to just above ground level (to remove potential bird nesting habitat), but the roots would remain intact until the newt hibernation season is complete. The root system of vegetation would then be removed once the great crested newt hibernation season is over. This work would be overseen by a suitably experienced Ecological Clerk of Works (ECoW), under licence from Natural England. Any great crested newts encountered would be translocated to an appropriate pond within the ZOI, known to support them, with suitable adjacent terrestrial habitats;

- to minimise the risk of incidental mortality, all vegetation within the site boundary would be maintained in a state unsuitable for great crested newts, i.e. vegetation would be maintained to ground level, this would also support mitigation for reptiles. A suitably experienced ECoW would oversee all ground-breaking activities and would inspect all excavations, if uncovered, on a daily basis;

- during the removal and reinstatement phase, the removal of the railway ballast and bunds would be conducted outside of amphibian and reptile hibernation period (October to February inclusive) where possible. Otherwise a suitably experienced ECoW would oversee all dismantling and removals;

- should a great crested newt be found during the removal and reinstatement phase, a licence may be required from Natural England following agreement with Natural England on an appropriate mitigation strategy;

- the proposed vegetation clearance includes the removal of trees with the potential to support roosting bats. Tree inspections to determine evidence of use as roosts would be undertaken sufficiently in advance

of tree-felling to enable licence application(s) to be submitted to Natural England, if required. A final inspection of these trees would be undertaken as close to the timing of felling as possible to take into account the regular roost-switching behaviour displaced by tree-roosting bat species. Should bats (or evidence of use by bats) be identified, the mitigation strategies laid out in the licence application(s) would be implemented (for example, the fitting of exclusion devices). Should evidence of bat roosting be found, felling would ideally be undertaken under licence in September/October, to avoid the maternity and hibernation periods during which bats are more vulnerable to disturbance (this timing would also avoid the bird-nesting season);

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

- prior to the commencement of construction, an inspection would be undertaken by a suitably experienced ecologist of any potential reptile refugia, after which they should be removed. In addition, 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;

- removal of vegetation, ground clearance and the commencement of construction activities have the potential to risk killing or injuring nesting birds, and to damage or destroy nests, including those of ground-nesting species, should works be undertaken during the breeding bird season (considered to be late February to August). Birds and their nests are protected under the Wildlife and Countryside Act (Ref 7.7) and the 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, if conducted during the reptile hibernation period, the ground would need to remain undisturbed. Where it is not possible to undertake these works outside of the breeding bird season, an inspection for nests would be undertaken by a suitably experienced ECoW prior to the removal of vegetation. If nesting birds are identified during this process, works in the vicinity of the nest (estimated to be a 10m standoff) would cease until the young have fledged;

- for trees and hedges to be retained within or immediately adjacent to the site boundary, tree and hedgerow root protection zones would be established. Tree protective fencing as described in section 6.2 of British Standard 5837:2012 (Ref 7.41) would be erected, where required, prior to plant and machinery arriving on site and construction works commencing. The fencing would remain intact throughout the duration of the works and would only be removed upon completion of construction. Weather-proof notices would be attached to any protective fencing located adjacent to retained trees displaying the words 'Construction Exclusion Zone'. If works need to be undertaken within the root protection zones, an arboricultural survey would be undertaken and the recommended measures implemented to secure the long-term survival of the tree/hedgerow;

- prior to construction and again prior to removal and restoration, a walkover of the proposed rail extension route would be conducted by a suitably experienced ecologist to determine the status of previously identified badger setts and to confirm if any new setts have become established within or adjacent to where works would be conducted;

- the known badger setts would be at risk of damage or destruction due to construction works and would require closure under licence from Natural England. Construction activities that may cause disturbance, damage and/or destruction to any other active badger setts recorded during the pre-construction walkover would also require a licence from Natural England. Any badger setts that require closure would be closed between 1 July and 30 November;

- there is potential for badgers to enter the site during construction, or for new setts to be excavated within the bunds (prior to the installation of the security fence). During construction and operation, an ecological watching brief would be conducted of the earthworks bund to monitor for any signs of badger activity. Any excavations made during the course of construction activities would be closed at the end of the day to prevent access by badgers. Should it not be possible for excavations to be closed at night, a means of egress (i.e. a wooden plank) would be

provided to ensure that any badgers that may access these excavations have a means of escape; and

- during the preliminary works and site preparatory works, a phased approach to site clearance and topsoil stripping would discourage brown hares and hedgehogs away from the site of activity and into the surrounding suitable habitat.

7.6 Assessment

a) Introduction

7.6.1 This section presents the findings of the terrestrial ecology and ornithology assessment for the construction, operation, and removal and reinstatement phases (where relevant) 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 site. Using the criteria set out within the CIEEM guidelines (Ref 7.25), 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:

- land-take;
- habitat fragmentation (including connectivity);
- incidental mortality of individuals;
- 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 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. In order to assess each impact pathway, the first four elements of the CIEEM assessment process (Ref 7.25) are addressed here, namely:

- activity, duration of activity, biophysical change and relevance to IEF in terms of ecosystem structure and function;
- characterisation of unmitigated 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.

7.6.5 The remaining elements of the CIEEM assessment process, mitigation and significance of effects of residual impacts after mitigation, are discussed in **section 7.7** and **section 7.8** respectively provided in this chapter.

i. Proposed rail extension route

Construction impact pathways scoped out of the assessment

7.6.6 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 scoping out, are:

- **Effects of changes in local hydrology and hydrogeology and air quality on Buckle's Wood CWS.** Given the embedded mitigation, it is unlikely that Buckle's Wood CWS would be impacted and therefore there would be no significant effect on this receptor. Embedded mitigation includes the development of an appropriate dust management plan, pollution prevention control measures, and return of extracted water to the ground. In addition, both **Chapter 5: Air Quality** and **Chapter 12: Groundwater and Surface Water** of this volume, have assessed no significant effects due to the proposed rail extension route;

- **Disturbance effects on species populations within Buckle's Wood CWS and the woodland immediately east of Buckle's Wood CWS**. The key species of concern within this IEF would be the bat assemblage, nesting bird assemblage and mammal assemblage. Roosting, foraging and commuting bats have been assessed as a separate IEF and so have not been considered for this IEF. Breeding birds and the mammal assemblage have not been identified as separate IEFs as no species of conservation interest were identified; however, birds and mammals have been assigned appropriate tertiary mitigation to ensure adequate protection of these assemblages;

- **Effects of changes in local hydrology and hydrogeology, air quality and water quality on great crested newts**. Given the embedded mitigation, the water quality of ponds within the ZOI is unlikely to be impacted and there would be no significant effect on this receptor. Tertiary mitigation includes compliance with relevant environmental legislation that would minimise dust pollution and air quality changes that could impact ponds and associated vegetation. In addition, the design ensures surface water runoff is returned to ground at green field rates and there would be no changes to the local hydrology regimes; and

- **Incidental mortality to bat species**. Construction works would entail the movement of plant and other vehicles along Buckleswood Road and around the site. The likelihood of incidental mortality from vehicles accessing the site would be minimised as traffic would be travelling at reduced speeds. In addition, normal working hours (07:00 – 19:00) would largely avoid the times when bats are active. This potential impact would therefore not have a significant effect on the bat assemblage.

IEF: Great crested newt

7.6.7 During construction, the impact pathways experienced by this IEF would be associated with:

- habitat loss and habitat fragmentation (including connectivity); and

- incidental mortality.

7.6.8 The characterisation of the above impacts are described in detail below.

Habitat loss and habitat fragmentation (including connectivity)

7.6.9 There is no loss of aquatic breeding habitat or terrestrial habitat within proximity to breeding habitat. Construction would result in the loss of four small sections of defunct, species-poor hedgerow and one section of species-rich 'important' hedgerow to allow for the construction of the proposed rail extension route. As outlined in **section 7.5** of this chapter, the extent of habitat loss has been kept to a minimum by the retention of the woodland blocks, including Buckle's Wood CWS, and the retention of most hedgerows within the site boundary. All works would be conducted under an appropriate reasonable avoidance method statement or licence from Natural England. Great crested newts are most likely to be encountered during their terrestrial phase when moving between ponds and woodland habitat, using existing hedgerows as connecting features. Activities such as site clearance and vegetation removal, excavations, construction of the railway line, construction of the landscape bunds, and ongoing vehicle and plant movements would sever this species' access routes along existing hedgerows.

7.6.10 Any potential impact from 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 the proposed removal of those sections of hedgerow take place during these months.

7.6.11 Within the ZOI, the hedgerows, Buckle's Wood CWS, and other woodland blocks provide habitat that would be suitable for great crested newts in their terrestrial phase (for foraging, dispersal or hibernation). Great crested newts would potentially experience habitat loss through the loss of small lengths of hedgerow and loss of field margin and arable farmland. Arable land is of very low value for foraging great crested newts. Great crested newts are sensitive to habitat loss due to their two-stage lifecycle, breeding within aquatic environments, and foraging and hibernation within terrestrial environments. This species would therefore be sensitive to change that would sever their access between habitats for each part of the lifecycle, impairing their ability for breeding, foraging and hibernating. Great crested newts are likely to have a medium sensitivity to change.

7.6.12 Natural England guidelines (Ref 7.43) 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. Habitat destruction within 50m has 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 considers the total amount of terrestrial land loss.

7.6.13 The total area of terrestrial habitat within a 500m radius of the proposed rail extension route is 311.2ha (note the majority of this is arable habitat and therefore largely unsuitable for great crested newts). The area of habitat to be lost to the proposed rail extension route is 22ha, resulting in a loss of 7% of total terrestrial habitat, regardless of quality. However, most of the habitat that would be lost is arable land, which is of very low value for foraging great crested newts. Thus, the overall magnitude of impact is low. This applies to all ponds within a 500m radius of the site boundary (i.e. Ponds 2, 4, 21, 26, 27, 28, 30 and 55; see **Figure 7.4** in **Appendix 7A** of this volume).

7.6.14 Construction activity would cause a severance in hedgerows H2, H4, H5 and H7. However, given that generally meta-populations are likely to be within 250m of one another (Ref 7.44), the nature of lack of connectivity between the meta-populations within groups of ponds within 500m of the site boundary, and the nature of available habitat remaining surrounding the ponds within the individual meta-populations, then the meta-populations are not likely to be using habitat that would be severed due to development. The great crested newts within 500m of the site are unlikely to be greatly impacted by this severance.

7.6.15 The great crested newt population within Ponds 2, 4, 55 and 27 are located 350m from Pond 30 and 270m away from Pond 28, with poor habitat connectivity between these ponds. Newts found in Ponds 2, 4 and 55 would retain access to small woodland blocks north of B1122 (Abbey Road). It is therefore considered that sufficient suitable habitat remains within the wider area, and the great crested newts found within Ponds 2, 4, 55 and 57 would not be greatly impacted by habitat fragmentation.

7.6.16 Newts found within Ponds 27 and 28 are likely to primarily access Buckle's Wood CWS and surrounds during their terrestrial phase, given the proximity of this woodland to these ponds. Access to this woodland from these ponds would not be severed by the proposed rail extension route.

7.6.17 Great crested newts within Pond 30 (over 300m from other ponds supporting great crested newts) are isolated within a block of woodland within an arable field, with no habitat connectivity to the wider area through arable field margins or hedgerows. As newts found within Pond 30 already reside within a small woodland copse; therefore, it is likely that the population within this pond would primarily forage and hibernate within this woodland. It is less likely that these animals would try to cross arable habitat to access other woodland areas or ponds due to their distance and lack of suitable habitat.

7.6.18 Pond 26 is located to the south of the existing Leiston to Saxmundham branch line. While the existing railway line would not act as a barrier to great crested newt movements, the nearest suitable habitat north of the Pond 26 (towards the site) is Buckles Wood CWS, 420m away and therefore likely too

far to maintain or support the newt population associated within Pond 26 or be part of a meta-population with Ponds 27 and 28. However, there are hedgerows and smaller blocks of woodland and arable margins available as alternative terrestrial habitat within the surrounding area of Pond 26. It is, therefore, considered that sufficient suitable habitat remains within the wider area and fragmentation effects would be minimal.

7.6.19 Habitat loss would be temporary, and reversible. Overall, habitat loss and fragmentation, of low impact magnitude and medium sensitivity, would result in a minor adverse effect, which is considered to be **not significant**.

Incidental mortality

7.6.20 Construction activities and site clearance works would include vegetation and ground clearance works during the preliminary works and site establishment phases within the arable fields, field margins and small sections of hedgerow. Construction activities could affect great crested newts through incidental injury or mortality. The effect would likely occur throughout the construction phase, expected to last approximately 18 months. As outlined in **section 7.5** of this chapter, all works would be conducted under an appropriate reasonable avoidance method statement or licence from Natural England, as required.

7.6.21 For reasons described in **paragraphs 7.6.14** to **7.6.18**, there is limited connectivity between the newt populations between the groupings of Ponds 2, 4 and 55, Ponds 28 and 27, Pond 30, and Pond 26. It is, therefore, unlikely that great crested newts would attempt to cross the site to access woodland blocks found to the east and west of the site boundary, rather that they would utilise closer more suitable habitat.

7.6.22 It is not possible to accurately quantify the magnitude of this impact from the available literature; however, it is unlikely that large numbers of great crested newts within the existing meta-population would be killed due to the proposed rail extension route. Additionally, great crested newts are more likely to be found in the arable field margins and hedgerow habitat than the arable fields themselves. The Natural England guidelines (Ref. 7.43.) for measuring the scale of impacts from a development project are described above. A similar magnitude of impact is assumed for incidental injury and mortality.

7.6.23 Injury and incidental mortality could occur during site clearance and construction activities. With the existence of a meta-population of this species across a number of ponds, meta-populations are much less vulnerable to incidental mortality than populations based in single breeding ponds (Ref 7.45). Great crested newts would therefore have a low sensitivity to change due to this impact.

7.6.24 The risk of any incidental injury or mortality could have a one-off, non-reversible, permanent impact on a small number of individuals of the meta-population that occurs within the ZOI. Overall, it is difficult to accurately quantify the magnitude of this impact; however, due to the embedded tertiary mitigation, this impact would have a minor adverse effect, which is considered to be **not significant**.

IEF: Bat assemblage

7.6.25 During the construction phase of works, the main impacts would be associated with:

- habitat loss;
- disturbance from noise and vibration; and
- disturbance from light.

7.6.26 The characterisation of the above impacts is detailed below.

Habitat loss

7.6.27 As outlined in **section 7.5** of this chapter**,** the extent of habitat loss has been kept to a minimum by the retention of the woodland blocks, including Buckle's Wood CWS which is located immediately adjacent to the site boundary, and the retention of most hedgerows. These mitigation measures ensure that those habitats most suitable for bats within the immediate vicinity of the proposed development are retained.

7.6.28 The construction of the proposed rail extension route would result in the loss of primarily arable land as well as four small sections of defunct, species-poor hedgerow and one section of species-rich 'important' hedgerow (a total of 780m). There would also be the loss of two trees with the potential to support roosting bats (T8 and T20, both with low-moderate potential, see **Figure 7.8** in **Appendix 7A** of this volume). 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. Additionally, while the hedgerows on site are not confirmed to be used by commuting or foraging bats, they comprise linear features that may be used on occasion.

7.6.29 The arable habitat to be lost is approximately 22ha. This habitat, while sub-optimal, is used by foraging bats to a limited extent. The proportion of foraging habitat lost that the proposed rail extension route 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, as developed following an

extensive literature review by the Bat Conservation Trust (Ref 7.46), has been used to make this assessment, as detailed in **Table 7.12.**

Table 7.12: Summary of the proportion of a 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	1.75%
Soprano pipistrelle Brown long-eared bat Nathusius' pipistrelle.	3km	0.78%
Natterer's bat Noctule Myotis spp. Serotine.	4km	0.44%
Barbastelle	10km	0.0007%

7.6.30 This demonstrates that only a small proportion of each bat species' CSZ would be 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 value of habitats to be lost are **not significant** and are unlikely to be an important component of any of the species' CSZs.

7.6.31 The habitats present within the site are largely sub-optimal for bats, being intensively managed for arable farming purposes and primarily open in nature. The sub-optimal arable land has fewer invertebrates on which bats can forage. Activity levels, except for common and soprano pipistrelle, were consistently low over the open arable habitat, and marginally increased within and adjacent to the woodland. The bat assemblage is therefore not reliant on the habitat to be lost for foraging.

7.6.32 Evidence from activity surveys (specifically, the timings of the earliest recordings) did not indicate the presence of a roost in trees that may be felled. However, 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** of this chapter. Tree-roosting species are known to switch roost on a regular basis (Ref 7.47), 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.

7.6.33 The requirement of bats for linear features varies between species, with the majority of the species recorded within the site ('big bats' and pipistrelle species) less reliant on linear features for commuting. Additionally, evidence for barbastelle's reliance on linear features is mixed, with radio-tracking surveys undertaken across the EDF Energy estate (Ref 7.48) demonstrating the ability of barbastelle to commute and forage in the absence of linear features. While bat activity of several species was recorded adjacent to the short sections of hedgerows to be lost, these were determined to largely be foraging passes, and there is no evidence that a commuting route would be severed.

7.6.34 The degree of sensitivity bats display varies between species although as the surrounding landscape is dominated by similar arable habitat, any bats affected by the loss of this habitat would be able to use the large areas of similar arable habitat present within the Zol. The bat assemblage within the ZOI would therefore has a low sensitivity to this impact.

7.6.35 The loss of land used for arable farming would be temporary and reversible, with the site returned to agricultural use and hedgerows replanted once the construction of Sizewell C Project is complete, reinstating the land as a sub-optimal foraging resource for the bat assemblage.

7.6.36 Overall, the bat assemblage within the ZOI has low sensitivity to habitat loss and would experience a very low or low magnitude of impact. This impact on the bat assemblage would have a minor adverse effect, which is considered to be **not significant**.

Disturbance from noise

7.6.37 The construction of the proposed rail extension route may result in an increase in noise within the site and adjacent habitats. Noise disturbance may arise though construction activities (such as noise from machinery), increased vehicle movements and increased human presence on site during construction (up to 18 months).

7.6.38 Primary mitigation, as provided in **section 7.5** of this chapter, includes the provision of landscape bunds along the northern side of the proposed rail extension route, and along part of the southern side. This would facilitate attenuation of noise to habitats associated with foraging, commuting and roosting bats.

7.6.39 Construction working hours would generally not overlap with periods when bats are active so foraging and commuting bats would not be affected by construction noise. However, noise from construction activity could disturb

roosting bats in Buckle's Wood CWS and the small woodland and TN 9 (see **Figures 7.3** in **Appendix 7A** of this volume) potentially resulting in delayed emergence, or at worst, roost abandonment.

7.6.40 Anecdotal evidence, such as the use of Wolvercote Railway Tunnel by roosting bats (Ref 7.49) 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 7.50), which may result in the period of peak invertebrate activity (at or soon after dusk; Ref 7.51) being missed, reducing the duration of potential foraging activity.

7.6.41 Noise associated with human activity may be more detrimental than mechanical and vehicle noise, as such noise is more likely to be assessed by bats as potential predation (Ref 7.52). 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 (relatively to other species) while, other species including barbastelle appear to avoid areas with intense human activity (Ref 7.51).

7.6.42 Given the tertiary mitigation**,** provided in **section 7.5** of this chapter, 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 its ZOI. It is therefore considered that bats would be able to use adjacent large areas of more suitable habitat present within the wider ZOI. For these reasons, together with the primary mitigation embedded in the design, the bat assemblage is likely to have a low sensitivity to increases in noise levels.

7.6.43 The extent of noise from the construction of the proposed development is likely to be restricted to the footprint of the facility 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 reversible over time, once construction, operation and removal and reinstatement are complete.

Disturbance from light

7.6.44 When required, construction lighting of the proposed rail extension route would increase light levels and could cause light intrusion into nearby habitats. Primary mitigation**,** provided in **section 7.5** of this chapter, includes lighting design to minimise light spill and the potential for light disturbance on adjacent land. Primary mitigation also includes the provision of a landscape

bund along the northern side of the rail extension route, and part of the southern side. This would facilitate attenuation of light to habitats associated with foraging, commuting and roosting bats.

7.6.45 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 7.53); and
- impacts to foraging and commuting bats, due to aversion to lit areas (Ref 7.53), or effects on prey behaviour and availability (Ref 7.50, Ref 7.52).

7.6.46 The type of lighting has also been shown to impact the degree to which bats are affected by artificial lighting (Ref 7.54, Ref 7.55). 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 7.52). 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* species and brown long-eared bats, recorded within the site, generally avoid well-lit areas (Ref 7.53) and are therefore more sensitive to an increase in light levels. Additionally, some studies suggest that streetlights might negatively affect moths (the preferred prey of barbastelle) (Ref 7.56). Artificial light is further thought to attract insects into lit areas from further afield, with the potential for this to reduce the levels of insect prey available within adjacent habitats.

7.6.47 For the reason stated above, the bat assemblage in this location is likely to have a low sensitivity to increases in light levels. The area over which an increase in lighting is likely to occur would be limited to the footprint of the site (including hedgerows) and due to the primary and tertiary mitigation, light spillage into the surrounding habitats (including Buckle's Wood CWS) 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.

ii. Proposed rail improvement works

7.6.48 As identified in **section 7.3** of this chapter, one level crossing is considered to have the potential to result in significant environmental effects and have therefore been assessed in further detail. The remaining eight proposed level

crossing upgrades are considered not likely to result in significant environmental effects during their construction or operation or are already covered in the assessment of the proposed rail extension route (Buckles Wood level crossing).

7.6.49 The following sections summarise the outcome of the assessment of the likely construction effects as a result of the level crossing upgrade works at Bratts Black House.

Bratts Black House level crossing

IEF: Great crested newt

7.6.50 During construction, the main impact pathways experienced by this IEF would be associated with (although there would be a low potential of these):

- habitat loss and habitat fragmentation (including connectivity); and
- incidental mortality.

7.6.51 The above impacts are described in detail below.

Habitat loss and habitat fragmentation (including connectivity)

7.6.52 The works associated with the Bratts Black House level crossing is unlikely to require any vegetation clearance works, installation of crossing deck panels, and installation of fencing. Great crested newts are most likely to be encountered during their terrestrial phase when moving between ponds and woodland habitat, using existing hedgerows as connecting features, or when hibernating within these features. These proposed construction works are limited and discrete in nature located within the existing rail boundary, There would be no loss of aquatic breeding habitat or terrestrial habitat within proximity of breeding habitat. Habitat fragmentation would be minimal and temporary as connectivity would re-establish once the works are completed. In addition, as detailed in the tertiary mitigation, as provided in **section 7.5** of this chapter, all works would be conducted under licence from Natural England, if deemed required.

7.6.53 Habitat loss would be temporary, and reversible. Overall, habitat loss and fragmentation, of low impact magnitude and low sensitivity would result in a minor adverse effect, which is considered to be **not significant**.

Incidental mortality

7.6.54 Construction activities and site clearance works would include vegetation and ground clearance works during the preliminary works and site establishment phases within the lineside scrubland habitat. Injury and incidental mortality

could occur during site clearance and construction activities; however, as detailed in the tertiary mitigation, as provided in **section 7.5** of this chapter, site clearance works would avoid removing root systems during the amphibian hibernation period. In addition, works would be conducted under an appropriate Natural England licence, if this is deemed required.

7.6.55 The risk of any incidental injury or mortality could have a one-off, non-reversible, permanent impact on a small number of individuals of the meta-population that occurs within the ZOI. Overall, it is difficult to accurately quantify the magnitude of this impact; however, due to the embedded tertiary mitigation, this impact would have a negligible effect, which is considered to be **not significant**.

iii. Inter-relationship effects

7.6.56 The assessment has inherently considered the impacts of noise, lighting, air, and water on IEFs. Potential construction impacts have been assessed independently above. This section provides a description of the identified inter-relationship effects that are anticipated to occur on terrestrial ecology and ornithology receptors between the individual environmental effects arising from construction of the proposed development.

7.6.57 The potential impacts on the great crested newt meta-population and the bat assemblage have been assessed as being minor adverse and **not significant**, and even in combination with each other would not be expected to have a significant effect.

c) Operation

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

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

iv. Proposed rail extension route

Operational impact pathways scoped out of the assessment

7.6.59 Several 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 would be negligible. The operational impact pathways that have been scoped out of this assessment, along with the reasons for scoping out, are:

- **effects of changes in local hydrology and hydrogeology and air quality on Buckle's Wood CWS.** Given the primary and tertiary mitigation measures, Buckle's Wood CWS is unlikely to be impacted and there would be no significant effect on this receptor. In addition, both **Chapter 5: Air Quality** and **Chapter 12: Groundwater and Surface Water** of this volume have not identified significant effects due to the proposed development.

- **incidental mortality to bat species**: During the operation of the proposed rail extension route, there would be a maximum of six train movements a day along the track alignment, over a 24hr period, with five movements between 23:00 to 06:00 and one movement outside of these hours. There is the potential for incidental mortality to bats due to the movement of trains; however, trains would operate at a maximum speed of 25mph. At this low speed, coupled with the low number of train movements within a night, it is considered that bats would be able to move out of the way of any passing train. Therefore, there would not be a significant adverse effect on the bat assemblage due to train collisions.

7.6.60 Further details of the specific anticipated impacts on the identified IEFs are provided in the subsequent sections.

IEF: Great crested newt

7.6.61 During operation, it is envisioned that there would be no impacts to great crested newts. Great crested newts are regularly encountered on both sides of operational National Rail infrastructure. It is therefore not considered that a railway line constitutes a linear barrier for this species, as newts can easily cross the line. Overall, however, the operation of the proposed rail extension route would not have a significant effect on great crested newts.

IEF: Bat assemblage

7.6.62 During the operational phase of works, the main impacts would be associated with:

- disturbance from noise and vibration; and
- disturbance from light.

7.6.63 These impacts are described in detail in the subsequent sections.

Disturbance from noise

7.6.64 The operation of the proposed development would lead to increases in noise levels through the operation of the trains. There would be up to five train movements overnight (23.00 - 06.00) and one train movement during the day outside of these hours. The effect would occur for the duration of the operational phase (9-12 years). Noise levels associated with the operational phase would be substantially lower than those associated with the construction phase of the proposed rail extension route. As outlined in **section 7.5** of this chapter, primary mitigation measures (such as the landscape bunds) would reduce the impact of operational noise levels on adjacent habitats.

7.6.65 As noted in above, although bats can be impacted by noise, the level of bat activity recorded during 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 and would have low sensitivity to increases in noise levels for the same reasons as described in **section 7.6** of this chapter.

7.6.66 The noise impacts from the proposed rail extension route are likely to be restricted to the immediate vicinity of the rail route and habitats on the immediate boundary, resulting in a very low magnitude of impact, and minor adverse effect, which is considered to be **not significant**. Such an effect would be reversible over time, once the operational phase is complete and the site is restored to agricultural use.

Disturbance from light

7.6.67 The operation of the proposed development would result in an increase in light intrusion due to the operational lighting required. The rail extension route itself would be unlit although lighting would be provided at the B1122 (Abbey Road) level crossing and the level crossing at Buckleswood Road. Primary mitigation, provided in **section 7.5** of this chapter, includes lighting design which would minimise light spill and the potential for light disturbance on

adjacent land. Primary mitigation also includes the development of a landscape bunds along the northern side of the proposed rail extension route, and part of the southern side. This would facilitate attenuation of light to habitats associated with foraging, commuting and roosting bats.

7.6.68 The operational lighting would be in place for the operational period of the proposed development, approximately a 9-12 year period. This lighting would remain lit overnight during the times at which bats are active. In addition, there would be five train movements at night, which would result in short, periodic increases in light, with extended periods where there would be no light and conditions would be similar to is currently experienced by bats. The operational lighting design has ensured that light levels onto adjacent habitats at the crossing points do not exceed 1 lux and the crossing extents are illuminated in accordance with Network Rail guidelines.

7.6.69 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 levels, would be restricted to the footprint of the B1122 (Abbey Road) level crossing, the Buckleswood Road crossing, and from train headlights into adjacent habitats.

7.6.70 The impacts of artificial lighting vary between species (Ref 7.51). Some species can capitalise on the increased insect prey often recorded around artificial light sources, while other light-avoiding bat species may be impacted to a greater degree. This is due to the deterrent effect of artificial lighting on these species and the potentially reduced prey availability in surrounding areas, as artificial lighting attracts insects from adjacent habitats (Ref 7.51). Therefore, lighting can act as a deterrent to bats but only a relatively small number of bats have been recorded within the site. Bats using the site are almost certainly not dependent on the sub-optimal habitats present within the site and would also be using a range of additional habitats in the ZoI. This includes the more valuable Buckle's Wood CWS, adjacent to the site boundary.

7.6.71 For the reason stated above**,** the bat assemblage in this location is likely to have a low sensitivity to increases in light levels. Overall, fixed lighting would have a very low magnitude of impact on the bat assemblage, resulting in a minor adverse effect, which is considered to be **not significant**. Train lights would have a low magnitude of impact on the bat assemblage, resulting in a minor adverse effect, which is considered to be **not significant**. These effects would be temporary and reversible over time, once the operational phase is complete and the site is restored to agricultural use.

v. Proposed rail improvement works

7.6.72 As identified in **section 7.3** of this chapter, one level crossing is considered to have the potential to result in significant environmental effects and has therefore been assessed in further detail. The remaining eight proposed level crossing upgrade works are considered not likely to result in significant environmental effects during their construction or operation or are already covered in the assessment of the proposed rail extension route (i.e. Buckleswood level crossing).

7.6.73 The following sections summarise the outcome of the assessment of the likely construction effects as a result of the level crossing upgrade works at Bratts Black House level crossing.

Bratts Black House level crossing

IEF: Great crested newt

7.6.74 During operation, no significant effects on great crested newts are likely.

vi. Inter-relationship effects

7.6.75 The assessment has inherently considered the impacts of noise, lighting, air, and water on IEFs. Potential operational impacts have been assessed independently above. This section provides a description of the identified inter-relationship effects that are anticipated to occur on terrestrial ecology and ornithology receptors between the individual environmental effects arising from the operation of the proposed development.

7.6.76 No operational effects on great crested newts were identified and there would be no inter-relationship effects.

7.6.77 The potential impacts on the bat assemblage have been assessed as being of very low magnitude, minor adverse and **not significant**, and even in combination with each other would not be expected to result in a significant inter-relationship effect.

d) Removal and reinstatement

7.6.78 During removal and reinstatement of the proposed rail extension route, the impacts experienced by IEFs would be similar to those during construction. As for construction, several impact pathways have been scoped out; these are the same impacts as those described in **paragraph 7.6.6**.

7.6.79 In addition to this, the impact pathway of habitat loss and habitat fragmentation on great crested newts has also been scoped out, as during the removal and reinstatement stage, the site would be returned to

agricultural use. Infrastructure would be removed, including railway ballast, landscape bunds and any hard standing. During the restoration activity, this would constitute a temporary severance of habitat, of the same nature, magnitude and significance as construction, but ultimately, habitat connectivity would be reinstated to the sites original baseline conditions. The effects of habitat loss and habitat fragmentation have therefore not been assessed further.

7.6.80 The specific impact pathways that could be experienced by each IEF have been identified and detailed within the subsequent sections.

IEF: Great crested newt

7.6.81 During the removal and reinstatement phase, the main impact pathway experienced by great crested newts would be associated with incidental mortality. The characterisation of this impact is described in detail below.

Incidental mortality

7.6.82 Removal and reinstatement activities would entail the movement of plant and other vehicles around the site. Additionally, landscape bunds and railway ballast would also be removed. These activities could lead to the accidental injury or mortality of great crested newts.

7.6.83 While there is limited evidence, great crested newts are known to use railway ballast as hibernation habitat. For example, during works to upgrade the existing railway line between Glasgow and Cumbernauld, great crested newts were found to be hibernating within the ballast under the tracks near Gartcosh (Ref 7.57). If railway ballast is removed during this species' terrestrial and hibernating phase, then it would be possible for small numbers of individuals to suffer incidental mortality.

7.6.84 There is also the potential for accidental injury or mortality of great crested newt from works vehicles. As detailed in above, injury and incidental mortality could occur should any great crested newts cross the site to reach the various woodland blocks during their terrestrial phase. However, the risk of this impact would be low as great crested newts are more likely to be found in the arable field margins and hedgerows than within developed areas.

7.6.85 It is not possible to accurately quantify the magnitude of this impact, nor this species sensitivity to this impact, from the available literature. The extent of this impact would be the footprint of the proposed rail extension route including the full footprint of the railway ballast alignment. While meta-populations are much less vulnerable to habitat change than populations based on single breeding ponds (Ref 7.45), removal of hibernacula could lead to the loss of a number of individuals from a number of breeding ponds, thereby having a potential low magnitude of effect on this meta-population.

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

ii. IEF: Bat assemblage

7.6.87 During the removal and reinstatement phase, temporary planting within the site would be removed and hedgerows along the access route would be removed and reinstated along the original hedgerow lines.

7.6.88 The main impacts on the bat assemblage would be the same type, magnitude as those described for construction, with the exception of habitat loss. As habitat would be reinstated to agricultural use (the original land use, this would have a permanent, very low magnitude of impact, which would have a neutral effect (as baseline conditions would be restored), which is considered to be **not significant**.

iii. Inter-relationship effects

7.6.89 The assessment has inherently considered the impacts of noise, lighting, air, and water on IEFs. Potential removal and reinstatement impacts have been assessed independently above. This section provides a description of the identified inter-relationship effects that are anticipated to occur on terrestrial ecology and ornithology receptors between the individual environmental effects arising from the removal and reinstatement of the proposed development.

7.6.90 Overall, the great crested newt population would only experience a negligible adverse effect, which would be **not significant** and there would be no additional inter-relationship effects on great crested newts during the removal and reinstatement phase.

7.6.91 The potential effects on the bat assemblage during removal and reinstatement have been assessed above as **not significant** as individual effects, and even in combination with each other 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 summarised in **section 7.5** of this chapter. As the assessment has not identified any likely significant effects when considering the primary and tertiary mitigation measures, no further secondary mitigation

measures for the terrestrial ecology and ornithology assessment are required.

b) Monitoring

7.7.2 This section describes the monitoring requirements 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.

i. Construction

7.7.3 All vegetation clearance and all ground-breaking activities would be under the supervision of a suitably experienced ECoW and excavations would be inspected on a regular basis.

7.7.4 During construction, there would be regular checks of the security fence to check the fence remains intact, and that there is no encroachment of construction activities beyond the site boundary or within the buffer areas. This would also include checks that badgers remain excluded from the site and the landscape bunds. Should badgers have gained access and created setts within the site, a licence would be sought from Natural England to close these setts prior to the removal and reinstatement phase.

7.7.5 There would be regular checks of construction lighting to monitor and correct any excessive light spill into the surrounding habitats and particularly into the adjacent woodland.

7.7.6 There would be regular checks of tree and hedgerow protection fencing to ensure the root protection buffer is maintained.

ii. Operation

7.7.7 Throughout the operational phase, there would be regular checks of the security fence to check the fence remains intact, and that there is no encroachment of construction activities beyond the site boundary or within the buffer areas. This would also include checks that badgers remain excluded from the site and the landscape bunds. Should badgers have gained access and created setts within the site, a licence would be sought from Natural England to close these setts prior to the removal and reinstatement phase.

7.7.8 There would be regular checks of operational lighting to monitor and correct for any excessive light spill into the surrounding habitats and particularly into the adjacent woodland.

7.7.9 Bat boxes would be monitored over a five-year period post-construction, to confirm the presence/absence of bats and use of the bat boxes. If bat boxes have not been occupied within three years of erection, consideration would be given to moving them to alternative sites nearby, to be determined by a licensed bat ecologist.

iii. Removal and reinstatement

7.7.10 Monitoring during the removal and reinstatement phase of the proposed rail extension route would be in accordance with that described for construction.

7.8 Residual effects

7.8.1 The following tables (**Table 7.13**, **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.

7.8.2 Overall, no significant residual effects have been identified.

Table 7.13: 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.
Proposed rail extension route.					
Buckle's Wood CWS.	Changes in local hydrology and hydrogeology.	Minimal groundwater abstraction. Return of extracted water to the ground. Standard pollution prevention control measures and implementation of CoCP. Temporary SuDS.	Negligible adverse.	No additional mitigation required. Regular checks of Buckles Wood CWS to monitor for human incursion and littering. Monitoring of construction lighting.	Negligible adverse **(not significant).**
	Air quality effects.	Dust Management Plan. Control of air quality impacts through the CoCP.	Negligible adverse.		Negligible adverse **(not significant).**
Great crested newts.	Habitat loss and habitat fragmentation.	Retention of the woodland blocks, including Buckle's Wood CWS, and the retention of the majority of hedgerows within the boundary of the site. Vegetation clearance outside of hibernation period. Vegetation clearance conducted under reasonable avoidance method statements or a European Protected Species licence if required. Clearance to be overseen by ECoW. Excavation inspected on daily basis and ECoW to oversee all ground breaking activities.	Minor adverse.	None required.	Minor adverse **(not significant).**
	Incidental mortality.		Minor adverse.		Minor adverse **(not significant).**

Receptor	Impact	Primary or Tertiary mitigation.	Classification of effect.	Additional Mitigation.	Residual Effect.
Bat assemblage.	Habitat loss.	Retention of the woodland blocks, including Buckle's Wood CWS, and the retention of the majority of hedgerows within the site boundary. Tree assessment surveys prior to tree felling, and Natural England licence application, if required. Loss of roost resource mitigated through the installation of bat boxes.	Minor adverse.	No additional mitigation required. Regular checks of Buckles Wood CWS to monitor for human incursion and littering. Monitoring of construction lighting.	Minor adverse **(not significant).**
	Disturbance from noise.	Landscape bunds along the northern side of the railway, as well as partial bunding along the south.	Minor adverse.		Minor adverse **(not significant).**
	Disturbance from light.	Landscape bunds along the northern side of the railway, as well as partial bunding along the south. Control of temporary lighting to minimise light spill	Minor adverse.		Minor adverse **(not significant).**
Saxmundham to Leiston branch line level crossing upgrades – Bratts Black House.					
Great crested newts.	Habitat loss and habitat fragmentation.	Works conducted under reasonable avoidance method statement or a European Protected Species licence if required. Vegetation clearance outside of hibernation period, as well as vegetation clearance overseen by ECoW. Excavation inspected on daily basis and ECoW to oversee all	Minor adverse.	None required.	Minor adverse **(not significant).**
	Incidental mortality.		Negligible adverse.		Negligible adverse **(not significant).**

Receptor	Impact	Primary or Tertiary mitigation.	Classification of effect.	Additional Mitigation.	Residual Effect.
		groundbreaking activities.			

Table 7.14: Terrestrial ecology and ornithology summary of effects arising during operation of the proposed development.

Receptor	Effect	Primary or Tertiary mitigation.	Classification of effect.	Additional Mitigation.	Residual Effect.
Proposed rail extension route.					
Buckle's Wood CWS.	Changes in local hydrology and hydrogeology.	SuDS with petrol/oil interceptors and silt traps.	Negligible adverse.	No additional mitigation required. Regular checks of Buckles Wood CWS to monitor for human incursion and littering. Monitoring of operational lighting.	Negligible adverse **(not significant).**
	Air quality effects.	None proposed.	Negligible adverse.		Negligible adverse **(not significant).**
Great crested newts.	No direct or indirect effects.	None applicable.	No effect.	None required.	**Not significant**
Bat assemblage.	Disturbance from noise.	Landscape bunds along the northern side of the railway, as well as partial bunding along the south.	Minor adverse.	No additional mitigation required. Regular checks of Buckles Wood CWS to monitor for human incursion and littering. Monitoring of operational lighting. Monitoring of any installed bat boxes (if required).	Minor adverse **(not significant).**
	Disturbance from light.	Landscape bunds along the northern side of the railway, as well as partial bunding along the south. Control of lighting to minimise light spill	Minor adverse.		Minor adverse **(not significant).**
Saxmundham to Leiston branch line level crossing upgrades – Bratts Black House.					
Great crested newts.	No direct or indirect effects	None applicable.	No effect.	None required	**Not significant**

Table 7.15: Terrestrial ecology and ornithology summary of effects arising during the removal and reinstatement the proposed development.

Receptor	Effect	Primary or Tertiary mitigation.	Classification of effect.	Additional Mitigation.	Residual Effect.
Buckle's Wood CWS.	Changes in local hydrology and hydrogeology.	Standard pollution prevention control measures and implementation of **CoCP**. SuDS.	Negligible adverse.	No additional mitigation required. Monitoring inline construction above.	Negligible adverse **(not significant).**
	Air quality effects.	Dust Management Plan. Control of air quality impacts through the **CoCP**.	Negligible adverse.		Negligible adverse **(not significant).**
Great crested newts.	Incidental mortality.	Removal of ballast material and spoil mounds outside of amphibian hibernation period under licence from Natural England (if required). A suitably experienced ECoW would oversee ballast removal.	Minor adverse.	None required.	**Minor adverse** **(not significant).**
Bat assemblage.	Habitat reinstatement.	All hard standing would be removed, and the land returned to agricultural use.	Neutral .	No additional mitigation required. Monitoring inline construction above.	Neutral **(not significant)**
	Disturbance from noise.	Some protection from landscape bunds prior to their removal.	Minor adverse.		Minor adverse **(not significant).**
	Disturbance from light.	Some protection from landscape bunds prior to their removal. Control of temporary lighting to minimise light spill.	Minor adverse.		Minor adverse **(not significant).**

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