



Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions

Preliminary Environmental Information Report

Volume 1

Chapter 22 - Onshore Ecology and Ornithology

April 2021

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Table of Contents

ONSHORE ECOLOGY	9
22.1 Introduction	9
22.2 Consultation	9
22.3 Scope	36
22.4 Impact Assessment Methodology	44
22.5 Existing Environment	65
22.6 Potential Impacts.....	76
22.7 Cumulative Impacts.....	108
22.8 Transboundary Impacts	122
22.9 Inter-relationships.....	122
22.10 Interactions.....	125
22.11 Potential Monitoring Requirements	135
22.12 Assessment Summary	135
22.13 REFERENCES.....	155

List of Tables

Table 22-1: Consultation responses.	11
Table 22-2: Realistic Worst Case Scenarios.....	38
Table 22-3: Embedded Mitigation Measures	43
Table 22-4: NPS Assessment Requirements.....	45
Table 22-5: Other available data and information sources.....	59
Table 22-6: Definitions of importance levels for onshore ecology.....	61
Table 22-7: Definitions of magnitude for onshore ecology	62
Table 22-8: Impact Significance Matrix.....	64
Table 22-9: Designated Nature Conservation Sites Summary.....	65
Table 22-10: Breeding Bird Survey Results Summary.....	69
Table 22-11 Bat Activity Survey Results Summary.....	73
Table 22-12 Summary of CWS' within the PEIR boundary	78
Table 22-13: Potential Cumulative Impacts (impact screening)	109
Table 22-14: Summary of projects considered for the CIA in relation to valued ecological receptors (project screening)	111
Table 22-15: Onshore Ecology and Ornithology Inter-Relationships	123
Table 22-16: Interaction between impacts - screening	126
Table 22-17: Summary of potential impacts on onshore ecology and ornithology	137

Volume 2

- Figure 22.1 Designated Nature Conservation Sites within PEIR Boundary (North)
- Figure 22.2 Designated Nature Conservation Sites within PEIR Boundary (South)
- Figure 22.3 Great Crested Newt Survey and Desk Study Results Map (only showing Positive Records)

Volume 3

- Appendix 22.1 Extended Phase 1 Habitat Report
- Appendix 22.2 Great Crested Newt Survey
- Appendix 22.3 Bat activity survey
- Appendix 22.4 Overwintering Bird Survey Report
- Appendix 22.5 Breeding Bird Report
- Appendix 22.6 Outline Biodiversity Net Gain Strategy
- Appendix 22.7 Onshore Ecology Desk Study

Glossary of Acronyms

BAP	Biodiversity Action Plan
BDC	Broadland District Council
BNG	Biodiversity Net Gain
BoCC	Birds of Conservation Concern
CEMP	Construction Environmental Management Plan
CIA	Cumulative Impact Assessment
CIEEM	Chartered Institute of Ecology and Environmental Management
CWS	County Wildlife Site
DCO	Development Consent Order
DEFRA	Department for the Environment and Rural Affairs
DEP	Dudgeon Extension Project
DOW	Dudgeon Offshore Wind Farm
EA	Environment Agency
EC	European Commission
EIA	Environmental Impact Assessment
EMF	Electro-Magnetic Field
EP1HS	Extended Phase 1 Habitat Survey
EPP	Evidence Plan Process
EPS	European Protected Species
ES	Environmental Statement
ETG	Expert Topic Group
EU	European Union
GIS	Geographical Information System
GCN	Great Crested Newt
IDB	Internal Drainage Board
INNS	Invasive Non-Native Species
IROPI	Imperative Reasons of Overriding Public Interest
IUCN	International Union for Conservation of Nature
JNCC	Joint Nature Conservation Committee
km	Kilometre
LPA	Local Planning Authority
MW	Megawatts

NBIS	Norfolk Biodiversity Information Service
NCC	Norfolk County Council
NDR	(Norwich) Northern Distributor Road
NNDC	North Norfolk District Council
NPPF	National Planning Policy Framework
NPS	National Policy Statements
NSIP	Nationally Significant Infrastructure Project
OS	Ordnance Survey
OWF	Offshore Wind Farm
PEIR	Preliminary Environmental Information Report
PINS	Planning Inspectorate
PPG	Planning Practice Guidance
PRA	Preliminary Risk Assessment
RNR	Roadside Nature Reserve
RPA	Root Protection Area
RWCS	Realistic Worst Case Scenario
SEP	Sheringham Extension Project
SNC	South Norfolk Council
SoS	Secretary of State
UK	United Kingdom
UN	United Nations
WCA	Wildlife and Countryside Act, 1981, as amended

Glossary of Terms

The Applicant	Equinor New Energy Limited
DCO boundary	The area subject to the application for development consent, including all permanent and temporary works for DEP and SEP. The DCO boundary will be subject to updated impact assessment and further development of mitigation proposals to inform the ES.
Dudgeon Offshore Wind Farm Extension site	The Dudgeon Offshore Wind Farm Extension lease area.
European site	Sites designated for nature conservation under the Habitats Directive and Birds Directive. This includes candidate Special Areas of Conservation, Sites of Community Importance, Special Areas of Conservation and Special Protection Areas, and is defined in regulation 8 of the Conservation of Habitats and Species Regulations (Amendment) (EU Exit) 2019.
Evidence Plan Process (EPP)	A voluntary consultation process with specialist stakeholders to agree the approach, and information to support, the EIA and HRA for certain topics.
Horizontal directional drilling (HDD) zones	The areas within the onshore cable route which would house HDD entry or exit points.
Jointing bays	Underground structures constructed at regular intervals along the onshore cable route to join sections of cable and facilitate installation of the cables into the buried ducts.
Landfall	The point on the coastline at which the offshore export cables are brought onshore and connected to the onshore export cables.
Onshore cable route search area	The areas being considered within which the onshore cable route would be located. A single landfall location and onshore cable route will be identified prior to PEIR.
Onshore export cables	The cables which would bring electricity from the landfall to the onshore substation. 220 – 230kV
Onshore substation sites	Parcels of land within onshore substation zones A and B, identified as the most suitable location for development of the onshore substation. Two sites have been identified for further assessment within the PEIR.
Onshore Substation Zone	Parcels of land within the wider onshore substation search area identified as suitable for development of

	the onshore substation. Two substation zones (A and B) have been identified as having the greatest potential to accommodate the onshore substation.
PEIR boundary	The area subject to survey and preliminary impact assessment to inform the PEIR, including all permanent and temporary works for DEP and SEP. The PEIR boundary will be refined down to the final DCO boundary ahead of the application for development consent.
Sheringham Shoal Offshore Wind Farm Extension site	Sheringham Shoal Offshore Wind Farm Extension lease area.
Study area	Area where potential impacts from the project could occur, as defined for each individual EIA topic.
The Dudgeon Offshore Wind Farm Extension Project (DEP)	The Dudgeon Offshore Wind Farm Extension site as well as all onshore and offshore infrastructure.
The Sheringham Shoal Offshore Wind Farm Extension Project (SEP)	The Sheringham Offshore Wind Farm Extension site as well as all onshore and offshore infrastructure.
Transition joint bay	Connects offshore and onshore export cables at the landfall. The transition joint bay will be located above mean high water

22 ONSHORE ECOLOGY

22.1 Introduction

1. This chapter of the Preliminary Environmental Information Report (PEIR) considers the potential impacts of the proposed Dudgeon Offshore Wind Farm Extension Project (DEP) and Sheringham Shoal Offshore Wind Farm Extension Project (SEP) on terrestrial (onshore) valued ecological receptors. The chapter provides an overview of the existing environment for the proposed onshore development area (the PEIR boundary), followed by an assessment of the potential impacts and associated mitigation for the construction, operation, and decommissioning phases of SEP and DEP.
2. This chapter has been written by Wild Frontier Ecology Limited, with the assessment undertaken with specific reference to the relevant legislation and guidance, of which the primary sources are the National Policy Statements (NPS). Details of these and the methodology used for the Environmental Impact Assessment (EIA) and Cumulative Impact Assessment (CIA) are presented in [Section 22.4](#).
3. At present, the PEIR boundary is the subject of ongoing refinement and as such some targeted ecological (i.e. species-specific) surveys have not yet been undertaken. Therefore, this chapter presents a preliminary Ecological Impact Assessment (EcIA) using the information available to date and will be updated once the Order limits are further refined and all remaining baseline ecological surveys have been completed. The updated EcIA will be presented in the Environmental Statement (ES) that will be prepared to accompany the Development Consent Order (DCO) application. Similarly, the CIA will be reviewed and updated where required once the Order limits have been finalised.
4. Additional information to support this EcIA includes:
 - [Appendix 22.1 Extended Phase 1 Habitat Report](#);
 - [Appendix 22.2 Great Crested Newt Survey](#);
 - [Appendix 22.3 Bat activity survey](#);
 - [Appendix 22.4 Overwintering Bird Survey Report](#);
 - [Appendix 22.5 Breeding Bird Report](#); and
 - [Appendix 22.6 Outline Biodiversity Net Gain Strategy](#).

22.2 Consultation

5. Consultation with regard to the ecological assessment has been undertaken in line with the general process described in [Chapter 6 EIA Methodology](#). The key elements to date have included scoping and the ongoing Evidence Plan Process (EPP) via the Expert Topic Group (ETG). The feedback received has been considered in preparing the PEIR. [Table 22-1](#) provides a summary of how the consultation responses received to date have influenced the approach that has been taken.

6. This chapter will be updated following the consultation on the PEIR in order to produce the final assessment that will be submitted with the DCO application. Full details of the consultation process will also be presented in the Consultation Report alongside the DCO application.

Table 22-1: Consultation responses.

Consultee	Date/ Document	Comment	Project Response
The Planning Inspectorate (PINS)	November 2019 Scoping Opinion comment 18	The Scoping Report identifies the need for jointing bays and link boxes up to every 300m. The Scoping Report does not state whether their locations will be determined by the time of the application, however, from experience gained in other offshore wind farms the Inspectorate anticipates this may not be the case. Assuming this outcome, the ES should identify a worst-case scenario for the number of jointing pits and link boxes. Where commitments are made at specific locations to mitigate any potential effects, these should be secured for example through a detailed construction method statement or Code of Construction Practice (CoCP)/Construction Environmental Management Plan (CEMP).	As details of the proposed onshore infrastructure is not yet known, the EclA has assumed a Realistic Worst-Case Scenarios (RWCS). Please see Section 22.3.2 for further information.
PINS	November 2019 Scoping Opinion comment 33	<p>The Inspectorate recommends that in order to assist the decision-making process, the Applicant uses tables:</p> <ul style="list-style-type: none"> to demonstrate how the assessment has taken account of this Opinion; 	<p>Section 22.6 presents the potential impacts and residual impacts which have been identified during construction, operation and decommissioning.</p> <p>Section 22.7 presents the cumulative impact approach and the plans, projects and activities which have been included.</p> <p>Section 22.11 presents information relating to the proposed monitoring requirements which have been identified at this time.</p>

Consultee	Date/ Document	Comment	Project Response
		<ul style="list-style-type: none"> to identify and collate the residual effects after mitigation for each of the aspect chapters, including the relevant interrelationships and cumulative effects; to set out the proposed mitigation and/or monitoring measures including cross-reference to the means of securing such measures (e.g. a DCO requirement); to describe any remedial measures that are identified as being necessary following monitoring; and to identify where details are contained in the Habitats Regulations Assessment (HRA report) (where relevant), such as descriptions of European sites and their locations, together with any mitigation or compensation measures, are to be found in the ES. 	
PINS	November 2019 Scoping Opinion comment 37	Although the majority of onshore aspect chapters have identified a study area for the purposes of scoping, the Inspectorate assumes that given the onshore route will be refined and the onshore substation location determined prior to application, this is	The study areas used for baseline ecological surveys and desk-based assessments have been defined in consultation with the ETG and have considered the anticipated zones of influence of potential effects. Relevant industry guidance, professional guidance and understanding of species, justifications and figures

Consultee	Date/ Document	Comment	Project Response
		<p>unlikely to be the same study area for the assessments in the ES. The Inspectorate notes that where surveys are proposed, the aspect chapters of the Scoping Report have identified (at a high level), the spatial coverage of baseline surveys. The extent of study areas should relate to the zone of influence of potential effects and should be clearly defined and justified within the ES. Reference should be made to recognised professional guidance, where relevant. Figures depicting the extent of study areas should be provided where relevant.</p>	<p>showing the extents of study areas are provided in the accompanying Technical Appendices and are summarised in Section 22.3.2.</p>
PINS	November 2019 Scoping Opinion comment 38	<p>Some aspect chapters of the Scoping Report have identified specific receptors, but the majority of the Scoping Report identifies broad categories of receptors only. Specific receptors should be clearly identified within the ES, alongside a categorisation of their sensitivity and value. Section 1.6.4.1 of the Scoping Report explains that receptor sensitivity would be identified in order to assess the potential impacts upon each receptor and discusses considerations that will be taken into account in doing so. The Inspectorate expects a transparent and reasoned approach to be applied to</p>	<p>Specific receptors are identified along with a categorisation of their sensitivity and value.</p> <p>The assigning of receptor sensitivity is set out in this report for each receptor (see Section 22.3.2. Impact Assessment Methodology).</p>

Consultee	Date/ Document	Comment	Project Response
		assigning receptor sensitivity and that this will be clearly set out in the ES.	
PINS	November 2019 Scoping Opinion comment 18	The ES should include details of difficulties (for example technical deficiencies or lack of knowledge) encountered compiling the required information and the main uncertainties involved.	Constraints and limitations encountered during the baseline ecological surveys undertaken to date are acknowledged and presented in the accompanying Technical Appendices. Any uncertainties within the EclA are outlined in this report for each receptor (see Section 22.3.2).
PINS	November 2019 Scoping Opinion comment 41	The Applicant is strongly encouraged to agree the methods used to collect baseline data, the likely effects of the project and to determine significance of effect with NE, representatives of the local authorities and any other relevant stakeholders.	The approach and methodology for obtaining baseline data for DEP and SEP was presented to all stakeholders at the onshore ecology ETG meeting held on the 28 th January 2020. The presented approach and methodology was agreed and presented in Appendix 22.7 (see Section 22.3.2).
PINS	November 2019 Scoping Opinion comment 189	The Scoping Report states that European designated sites within 20km of the scoping area and nationally designated sites within 3km will be considered. However it is not clear why these distances have been used. The ES should make it clear how the zone of influence for the project has been defined and how this has been used to identify the ecological receptors likely to be affected by the proposals.	The potential for DEP and SEP to impact designated sites is provided in this report (see Section 22.3.2), along with explanations as to the anticipated mechanism of the impact and its extent.
PINS	November 2019 Scoping	The Applicant is advised to contact local wildlife groups for local records which could be used to inform the baseline.	The Norfolk Biodiversity Information Service (NBIS) has been consulted to obtain biological records and information on non-statutory designated nature

Consultee	Date/ Document	Comment	Project Response
	Opinion comment 192		conservation sites for the PEIR boundary and surrounding 2km. There are no discernible data gaps in the records provided by NBIS, and NBIS did not advise of any gaps (or of any requirement to contact specific groups for species records they do not hold), therefore the NBIS data is considered to be a comprehensive biological records data set. Relevant records are provided in the Technical Appendices, and are summarised in Section 22.3.2 .
PINS	November 2019 Scoping Opinion comment 193	Any likely significant effects associated with the potential for breakout of bentonite drilling fluid should be assessed in the ES.	Consideration of a potential bentonite breakout is presented in Section 22.6.1 .
PINS	November 2019 Scoping Opinion comment 194	The ES should assess any likely significant effects to non-seabird migrants from the construction and operation of the offshore elements of the Proposed Development.	The 2020-21 over-wintering bird surveys and breeding bird surveys will identify any non-seabird migrants within the PEIR boundary. More information can be found in Appendix 22.4 .
PINS	November 2019 Scoping Opinion comment 195	The Applicant should ensure that all mitigation measures proposed within the ES are secured. The Inspectorate welcomes the proposal to include drafts of the Landscape and Ecological Management Strategy with the DCO application. The methods to be	An Outline Landscape and Ecological Management Strategy that will be submitted as part of the final DCO application. This will include proposals to reinstate and where possible enhance habitats such as hedgerows and grassland areas impacted by DEP and SEP. Appropriate mitigation measures identified at PEIR

Consultee	Date/ Document	Comment	Project Response
		used to reinstate habitats lost or harmed during the construction of the Proposed Development should be set out in the ES.	stage (such as best-practice mitigation measures during construction, proposals for reinstatement of habitats etc.) are provided in Section 22.3.2 .
PINS	November 2019 Scoping Opinion comment 196	Whilst aquatic invertebrate surveys have been proposed in Table 3-13, it is unclear whether consideration has been given to potential impacts on other aquatic species such as fish, for example from watercourse crossings. Any likely significant effects to protected species should be assessed in the ES.	Potential impacts and mitigation measures regarding fish and any other relevant aquatic species that will be adhered to by DEP and SEP are included within Section 22.5 and further discussed in Chapter 20 Water Resources and Flood Risk .
PINS	November 2019 Scoping Opinion comment 197	In addition to the potential risk of invasive species during construction, any likely significant effects from the spread of disease carried by invasive species that endanger protected species should be assessed, with appropriate control measures set out in the ES.	The risk of the spread of diseases associated with Invasive Non-Native Species (INNS) (such as crayfish plague) will be considered within the ES once the scope of construction works (specifically watercourse crossings) is finalised and the white clawed-crayfish survey data are available. Initial assessment of the risks relating to INNS is provided in Section 22.3.2..
PINS	November 2019 Scoping Opinion comment 198	The Applicant should assess any likely significant effects to wildlife through altered thermal and EMF [Electro-Magnetic Fields] from buried cables.	A project-specific National Grid EMF study has concluded that <i>“All of the proposed technology options for the DEP and SEP export cables and third-party crossing points would be fully compliant with the Government policy. Specifically, all the [EMFs] produced would be below the relevant exposure limits. Therefore, there would be no significant EMF effects resulting from this proposed development.”</i> There are, therefore, considered to be no discernible EMF related

Consultee	Date/ Document	Comment	Project Response
			impacts on valued ecological receptors. The study can be found in Appendix 30.1 .
Barford and Wramplingham Parish Councils	November 2019 Scoping Opinion comment 260	<p>Barford and Wramplingham Parish Council would like the following information to be provided within the Environmental Statement:</p> <ul style="list-style-type: none"> ... Consideration to the environmental impact of potentially multiple cable lines on... ancient woodlands. 	Impacts on relevant ancient woodlands are assessed in this report (see Section 22.3.2) and will be assessed in more detail within the ES once the preferred alignment of the cable route is confirmed.
Hansells Solicitors and Financial Advisors for Brandiston Parish	November 2019 Scoping Opinion comment 270	The short-term and [long] term likely effects and impacts on the biodiversity ecology and habitats of the land through which the trenching will be routed.	The short-term and long-term effects and impacts of SEP and DEP on valued ecological receptors is assessed in Section 22.3.2 and will be further assessed within the ES once the final route of the onshore cable corridor has been confirmed.
Environment Agency	November 2019 Scoping Opinion comment 286	<p>Biodiversity Net Gain: The Scoping Report mentions Biodiversity Net Gain at paragraph 183 stating that it will be sought through the mitigation hierarchy. By this we assume that it proposes the sequential process of: avoid, minimise remediate and compensate. We consider that although linked, Biodiversity Net Gain is not embedded in mitigation but sits above it. As such it should not be addressed as a mitigation process but should be informed by the mitigation required. Whilst Biodiversity</p>	Biodiversity Net Gain (BNG) will be considered separately as a stand-alone evaluation of the overall biodiversity impact of SEP and DEP, using the defined BNG metric and incorporating BNG specific compensation and enhancement measures. DEP and SEP are committed to achieving a 10% gain in biodiversity as measured using the BNG metric. Appendix 22.6 contains Outline Biodiversity Net Gain Strategy.

Consultee	Date/ Document	Comment	Project Response
		<p>Net Gain is not mentioned in National Policy Statements EN1 and EN3 the requirement to ‘pursue opportunities for securing measurable net gains for biodiversity’ is specifically mentioned in the more recently updated NPPF (para 174). Most recently, the Environment Bill 2019 –2020 proposed a requirement for 10% biodiversity net gain and confirmed a mechanism for measuring this using the metric developed by Defra. Although these proposals are not currently enshrined in law, we consider that the principles proposed reflect the spirit of the NPPF requirements and recommend that this methodology is adopted.</p>	
<p>Environment Agency</p>	<p>November 2019 Scoping Opinion comment 287</p>	<p>Biosecurity: We welcome that the potential risk of spreading invasive species is recognised as a potential impact at paragraph 663. However, the potential to spread disease that endangers protected species should also be addressed. For example, the invasive signal crayfish can carry crayfish plague which threatens the native white-clawed crayfish. It is therefore, important that the need for biosecurity is addressed and control measures adopted. We would expect that a check, clean, dry regime is adopted</p>	<p>The risk of the spread of diseases associated with INNS (such as crayfish plague) will be considered in full within the ES once the scope of construction works is finalised and and the white-clawed crayfish survedata are available. A preliminary EclA is presented in Section 22.3.2.</p>

Consultee	Date/ Document	Comment	Project Response
		together with appropriate disinfection using VIRKON.	
Environment Agency	November 2019 Scoping Opinion comment 288	The report does not identify the potential of buried cables to impact on wildlife. The altered thermal and EMF (Electro-Magnetic Fields) should be considered making the case for scoping in, or out of the assessment. This is especially important where the cable will cross watercourses.	A project-specific National Grid EMF study has concluded that “ <i>All of the proposed technology options for the SEP and DEP export cables and third-party crossing points would be fully compliant with the Government policy. Specifically, all the [EMFs] produced would be below the relevant exposure limits. Therefore, there would be no significant EMF effects resulting from this proposed development.</i> ” There are, therefore, considered to be no discernible EMF related impacts on valued ecological receptors. The study can be found in Appendix 30.1 .
Itteringham Parish Council	November 2019 Scoping Opinion comment 322	The environmental and ecological damage needs to be clearly detailed together with the effect on the... entire environment including waterways.	The ecological impact assessment provided at PEIR stage provides detail on ecological impacts (see Section 22.3.2), including on waterways. This assessment will be expanded upon as part of the DCO application.
Natural England	November 2019 Scoping Opinion comment 409	In accordance with the 2017 Habitats Regulations 63 (2) and 2017 Offshore Habitat Regulations (as amended) anyone applying for development consent for an NSIP must provide the competent authority with such information as may reasonably be required “for the purposes of the assessment” or “to enable them to determine	Information on proximity to, and potential for impacts upon, statutory designated nature conservation sites is included within this report (see Section 22.3.2 and Habitat Regulation Assessment).

Consultee	Date/ Document	Comment	Project Response
		<p>whether an appropriate assessment is required”. Natural England advises that this information should therefore be provided and appraised as part of the EIA process.</p>	
<p>Natural England</p>	<p>November 2019 Scoping Opinion comment 411</p>	<p>... key concerns are as follows:... The potential for impacts on designated sites from offshore and onshore cable installation – both at a project level and cumulatively.</p>	<p>The ecological impact assessment includes consideration of potential impacts on designated sites at a project level (see Section 22.3.2) and cumulatively (see Section 22.3.2)</p>
<p>Natural England</p>	<p>November 2019 Scoping Opinion comment 412</p>	<p>Schedule 4 of the Town & Country Planning (Environmental Impact Assessment) Regulations 2017 sets out the necessary information to assess impacts on the natural environment to be included in an Environmental Statement (ES), specifically:...</p> <ul style="list-style-type: none"> • A description of the aspects of the environment likely to be significantly affected by the development, including, in particular... fauna, flora, soil, water, air... and the interrelationship between the above factors. • A description of the likely significant effects of the development on the environment – this should cover direct effects but also any indirect, secondary, cumulative, short, medium and long term, permanent and temporary, positive and negative effects. Effects should relate to the 	<p>The requested information is provided in this report (see Section 22.3.2 and 22.3.2) and will be expanded upon within the DCO application once full details of SEP and DEP are finalised, and all relevant and necessary ecological information has been collected.</p>

Consultee	Date/ Document	Comment	Project Response
		<p>existence of the development, the use of natural resources and the emissions from pollutants. This should also include a description of the forecasting methods to predict the likely effects on the environment.</p> <ul style="list-style-type: none"> • A description of the measures envisaged to prevent, reduce and where possible offset any significant adverse effects on the environment. • A non-technical summary of the information. <p>It will be important for any assessment to consider the potential cumulative effects of this proposal, including all supporting infrastructure, with other similar proposals and a thorough assessment of the ‘in combination’ effects of the proposed development with any existing developments and current applications. A full consideration of the implications of the whole scheme should be included in the ES. All supporting infrastructure should be included within the assessment.</p>	
Natural England	November 2019 Scoping Opinion	Natural England advises that the potential impact of the proposal upon features of nature conservation interest and opportunities for habitat creation/enhancement should be included	This assessment report considers potential impacts upon features of nature conservation interest, and opportunities for habitat creation/ enhancement are considered based on information available at this time (see Section 22.3.2). This information will be reviewed

Consultee	Date/ Document	Comment	Project Response
	comment 413	within this assessment in accordance with appropriate guidance on such matters. Guidelines for Ecological Impact Assessment (EclA) have been developed by the Chartered Institute of Ecology and Environmental Management (CIEEM) and are available on their website.	and, if necessary, updated once further information becomes available. CIEEM EclA guidelines are used to complete the assessment presented in Section 22.6 .
Natural England	November 2019 Scoping Opinion comment 416	The ES should thoroughly assess the potential for the proposal to affect designated sites. Internationally designated sites (e.g. designated Special Areas of Conservation (SAC) and Special Protection Areas (SPA)) fall within the scope of the Conservation of Habitats and Species Regulations 2017 (as amended) and the Offshore Conservation of Habitats and Species Regulations 2017 (as amended). In addition paragraph 176 of the National Planning Policy Framework requires that potential Special Protection Areas, possible Special Areas of Conservation, listed or proposed Ramsar sites, and any site identified as being necessary to compensate for adverse impacts on classified, potential or possible SPAs, SACs and Ramsar sites be treated in the same way as classified sites.	Potential impacts on designated sites are included in this assessment report (see Section 22.3.2).
Natural England	November 2019 Scoping	Under Regulation 63 of the Conservation of Habitats and Species Regulations 2017 (as amended) and 28 of the Offshore	Potential impacts on designated sites are included in this assessment report (see Section 22.3.2 and Habitat Regulation Assessment).

Consultee	Date/ Document	Comment	Project Response
	Opinion comment 417	<p>Conservation of Habitats and Species Regulations 2017 (as amended), an appropriate assessment needs to be undertaken in respect of any plan or project which is (a) likely to have a significant effect on a European site (either alone or in combination with other plans or projects) and (b) not directly connected with or necessary to the management of the site.</p> <p>The ES should include a full assessment of the direct and indirect effects of the development on the features of special interest within these sites and should identify such mitigation measures as may be required in order to avoid, minimise or reduce any adverse significant effects. Further information on the location of SPAs, SACS and Ramsar sites and their special interest features can be found at www.magic.gov.uk. Further information on the special interest features, their conservation objectives, and any relevant conservation advice packages for designated sites is available on our website https://designatedsites.naturalengland.org.uk /</p>	

Consultee	Date/ Document	Comment	Project Response
Natural England	November 2019 Scoping Opinion comment 425	The EIA will need to consider any impacts upon local wildlife and geological sites. Local Sites are identified by the local wildlife trust, geoconservation group or a local forum established for the purposes of identifying and selecting local sites. They are of county importance for wildlife or geodiversity. The ES should therefore include an assessment of the likely impacts on the wildlife and geodiversity interests of such sites. The assessment should include proposals for mitigation of any impacts and if appropriate, compensation measures	Potential impacts on local wildlife sites are considered in this report (see Section 22.3.2). Potential impacts on geological sites are considered in Chapter 19 Ground Conditions and Contamination .
Natural England	November 2019 Scoping Opinion comment 426	The ES should assess the impact of all phases of the proposal on protected species (including... terrestrial invertebrates, bats, great crested newts, reptiles, water voles, and badgers etc.). ... Records of protected species should be sought from appropriate local biological record centres, nature conservation organisations, NBN Atlas, groups and individuals; and consideration should be given to the wider context of the site for example in terms of habitat linkages and protected species populations in the wider area, to assist in the impact assessment.	Potential impacts on protected species are assessed in this report (see Section 22.3.2), and will be expanded upon once SEP and DEP scope of construction works is finalised, and all necessary protected species surveys have been completed (further to those which have already been undertaken). Ecological surveys have been completed by suitably qualified and, where necessary, licensed ecologists and, in general, at the appropriate times of year. Where surveys have not been completed at the appropriate times of year, explanations and the potential implications for the impact assessment are listed in the Constraints sections of the Technical Appendices. A biological records search with NBIS has been

Consultee	Date/ Document	Comment	Project Response
		<p>The area likely to be affected by the proposal should be thoroughly surveyed by competent ecologists at appropriate times of year for relevant species and the survey results, impact assessments and appropriate accompanying mitigation strategies included as part of the ES.</p> <p>In order to provide this information, there may be a requirement for a survey at a particular time of year. Surveys should always be carried out in optimal survey time periods and to current guidance by suitably qualified and where necessary, licensed, consultants. Natural England has adopted standing advice for terrestrial protected species which includes links to guidance on survey and mitigation. Information on the relevant legislation protecting marine species can be reviewed on the following link https://www.gov.uk/government/publications/protected-marine-species.</p>	<p>completed, covering the PEIR boundary and surrounding 2km area.</p>
<p>Natural England</p>	<p>November 2019 Scoping Opinion comment 427</p>	<p>The cable routes proposed will result in the loss, severance or potential degradation of various habitats and severance between these. These impacts, together with potential pollution risks, have the potential to affect various protected species. An assessment of</p>	<p>Potential impacts relating to habitat degradation and severance are considered in this assessment report (see Section 22.3.2) and will be expanded upon once the precise construction scope is finalised.</p>

Consultee	Date/ Document	Comment	Project Response
		the impact of all phases of the proposal on protected species should be undertaken	
Natural England	November 2019 Scoping Opinion comment 428	<p>The ES should thoroughly assess the impact of the proposals on habitats and/or species listed as 'Habitats and Species of Principal Importance' within the England Biodiversity List, published under the requirements of S41 of the Natural Environment and Rural Communities (NERC) Act 2006. Section 40 of the NERC Act 2006 places a general duty on all public authorities, including local planning authorities, to conserve and enhance biodiversity... Government Circular 06/2005 states that Biodiversity Action Plan (BAP) species and habitats, 'are capable of being a material consideration...in the making of planning decisions'. Natural England therefore advises that survey, impact assessment and mitigation proposals for Habitats and Species of Principal Importance should be included in the ES. Consideration should also be given to those species and habitats included in the relevant Local BAP. Natural England advises that a habitat survey (equivalent to Phase 2) is carried out on the site, in order to identify any important habitats present. In addition, ornithological,</p>	<p>The EclA includes consideration of impacts on Habitat and Species of Principal Importance and those included in the local BAP (see Section 22.3.2). Where important/ valued habitats warrant further detailed survey (beyond Phase 1 Habitat Survey), further surveys (such as National Vegetation Classification [NVC]) surveys will be completed at the appropriate time of year. This assessment report includes all requested information where this has been obtainable (such as historical data for affected sites, habitats and species present, the status of the habitats/ species, mitigation and compensation requirements etc.).</p>

Consultee	Date/ Document	Comment	Project Response
		<p>botanical and invertebrate surveys should be carried out at appropriate times in the year, to establish whether any scarce or priority species are present. The Environmental Statement should include details of:</p> <ul style="list-style-type: none"> • Any historical data for the site affected by the proposal (e.g. from previous surveys); • Additional surveys carried out as part of this proposal; • The habitats and species present; • The status of these habitats and species (e.g. whether priority species or habitat); • The direct and indirect effects of the development upon those habitats and species; • Full details of any mitigation or compensation that might be required. <p>The development should seek if possible to avoid adverse impact on sensitive areas for wildlife within the site, and if possible provide opportunities for overall biodiversity (or wildlife) net gain.</p> <p>The record centre for the relevant Local Authorities should be able to provide the relevant information on the location and type of priority habitat for the area under consideration.</p>	

Consultee	Date/ Document	Comment	Project Response
Natural England	November 2019 Scoping Opinion comment 447	<p>A full consideration of the implications of the whole scheme should be included in the ES. All supporting infrastructure should be included within the assessment. The ES should include an impact assessment to identify, describe and evaluate the effects that are likely to result from the project in combination with other projects and activities that are being, have been or will be carried out. The following types of projects should be included in such an assessment, (subject to available information):</p> <ol style="list-style-type: none"> a. existing completed projects; b. approved but uncompleted projects; c. ongoing activities; d. plans or projects for which an application has been made and which are under consideration by the consenting authorities; and e. plans and projects which are reasonably foreseeable, i.e. projects for which an application has not yet been submitted, but which are likely to progress before completion of the development and for which sufficient information is available to assess the likelihood of cumulative and in-combination effects 	The CIA (see Section 22.3.2) considers all the types of project as listed.

Consultee	Date/ Document	Comment	Project Response
Natural England	November 2019 Scoping Opinion comment 494	Consideration should also be given within the ES to the possible requirement for a European Protected Species licence.	The potential requirement for European Protected Species (EPS) mitigation licensing is considered for bats and great crested newts (GCN) within this assessment report (see Section 22.3.2) and relevant Technical Appendices. The potential requirement for otter EPS licensing will be considered following finalisation of the DCO boundary and completion (if necessary) of an otter survey. The requirements for any EPS mitigation licensing will be determined once all aspects of SEP and DEP are finalised, and all relevant ecological data has been collated.
Natural England	November 2019 Scoping Opinion comment 513	We advise that the closest distance to any proposed development is used. The Broads is SAC only, while Broadland is an SPA as well as a Ramsar site. Mundesley Cliffs SSSI should be included... Sand martins nest in the cliffs although they are not listed as a designated feature. Weybourne Town Pit SSSI should be included as it occurs within the onshore scoping area.	These designated sites and sand martins are considered where relevant (see Section 22.3.2) and the assessment uses the closest Euclidian distance from the designated site to the PEIR boundary. It is considered that the comment regarding The Broads SAC, Broadland SPA/Ramsar and Mundesley Cliffs SSSI relates to the previously proposed eastern route to Bacton, which no longer forms part of SEP and DEP proposal.
Natural England	November 2019 Scoping Opinion comment 514	Functional Linked Land: Functional habitat is an undesignated area beyond the boundary of a protected site which is used by designated bird populations. A typical bird requires a secure roost and / or nest site, and sufficient food, all encompassed within a home range. Where an essential ecological	This issue is considered within this assessment (see Section 22.3.2) and has been incorporated into the survey design, such as for over-wintering birds which have focused on potential bird foraging habitats within 10km of SPAs (see Over-Wintering Birds Technical Appendix).

Consultee	Date/ Document	Comment	Project Response
		<p>function, such as foraging, occurs beyond a site boundary, then the area within which this occurs is termed functionally linked land, or is known as functional habitat. As the presence of this land is essential in meeting a species' needs, damage or deterioration of this habitat could in turn impact upon the designated population.</p> <p>The development may result in the removal of functional habitat or the disturbance of interest features, the relevant surveys should be completed to ascertain if designated species utilise the site and if the proposal is likely to significantly affect those species</p>	
<p>Natural England</p>	<p>November 2019 Scoping Opinion comment 519</p>	<p>A wide range of mitigation and compensation measures will be required for the environmental impacts. At this early stage, we encourage the adoption of a landscape scale approach with a clear vision and coherent strategy of how measures can be delivered across a wider area beyond the compulsory purchase corridor of any route, cannot only provide mitigation and compensation but deliver a net gain for biodiversity and people. To achieve this will mean looking well beyond the footprint of any chosen route. Measures to create new, restore existing and link severed or isolated</p>	<p>Once the precise details of SEP and DEP are finalised (and all relevant ecological data has been collated), detailed mitigation proposals will be provided, including a commitment to achieve a 10% net gain using the BNG metric.</p>

Consultee	Date/ Document	Comment	Project Response
		habitats across the wider area should be incorporated, with the focus on wetland and woodland habitats. This approach should also secure a net gain for biodiversity in line with government policy.	
Norfolk County Council	November 2019 Scoping Opinion comment 528	The EIA will be supported by information to support an HRA and the applicant intends to undertake the Ecological Impact Assessment (EclA) in accordance with guidelines published by the Chartered Institute of Ecology and Environmental Management (CIEEM) – Please note that EclA guidelines were updated in 2019 and that the new guidelines should be followed.	A HRA is provided separately (see Habitat Regulation Assessment). Relevant, updated CIEEM guidelines are followed in completing the EclA.
Norfolk County Council	November 2019 Scoping Opinion comment 530	<ul style="list-style-type: none"> • Wintering bird surveys <p>3.6. Ecological surveys will need to be undertaken at the appropriate time of year in accordance with best practice guidelines (outlined in paragraph 677) and by suitably qualified and experienced surveyors (please state surveyor name, licence numbers and experience where applicable);</p> <p>We would encourage the applicant to undertake reptile surveys on all land that has potential to support this species rather than</p>	<p>Ecological surveys have been completed by suitably qualified and, where relevant, licensed ecologists and mostly at the appropriate times of year. Where any surveys have been completed outside of the optimal seasonal windows, this is listed as in the Constraints sections of the Technical Appendices and is summarised in this report.</p> <p>Any suitable reptile habitat within the refined PEIR/DCO boundary will be surveyed for reptiles.</p> <p>Key stakeholders have been consulted, such as through the ETG meeting (see below) on the scope of ecological surveys.</p>

Consultee	Date/ Document	Comment	Project Response
		<p>concentrating on 'on habitats that may support significant populations' ;</p> <p>The scope of ecological surveys, which will be refined following the Phase 1 survey, needs to consider species for which sites are designated e.g. the White clawed Crayfish;</p> <p>Important hedgerows, as defined by the Hedgerows Act 1997 will need to be identified;</p> <p>Complete baseline data should support the EIA to ensure certainty in the conclusions, beyond reasonable doubt, that no Adverse Effects will result from the proposed proposals alone, and in combination with other proposals;</p> <p>We welcome the proposal for liaison with the applicant as to the approach and methodology for data collection. The survey methodology for the PEA, and any subsequent habitat or species-specific surveys should be agreed with Natural England, the EA and the county ecologist, as appropriate, in advance of the surveys being undertaken;</p>	<p>All ecological data collected will be passed to the local records centre.</p> <p>The comments relating to Paston Great Barn SAC relate to the eastern Bacton route which is no longer part of SEP and DEP proposal. However, further consultations for information on barbastelle bats within the refined PEIR boundary are ongoing.</p> <p>This report includes preliminary mitigation advice applicable to statutory and non-statutory designated sites (see Section 22.3.2).</p>

Consultee	Date/ Document	Comment	Project Response
		<p>All ecological data (including that from pre-construction and post construction monitoring) should be submitted to the Local Records Centre, in a timely manner and in a form that is readily accessible;</p> <p>Table 3.9 European designated sites within 20km - Paston Great Barn SAC is not the only known barbastelle maternity roost in Norfolk. It was when the site was designated. The Norfolk Barbastelle Study Group be approached for data.;</p> <p>Specialist local wildlife groups could be approached for local records, including Norfolk Barbastelle Study Group;</p> <p>When selecting the onshore cable route, significant impacts on statutory and non-statutory designated sites should be avoided wherever possible, and where impacts cannot be avoided, appropriate mitigation or compensation put in place;</p> <p>Consideration should also be given to securing biodiversity net gain</p>	
<p>South Norfolk District Council</p>	<p>November 2019 Scoping Opinion comment 604</p>	<p>The Council would respectfully request that the Environmental Impact Assessment includes a full tree survey and Arboricultural Impact Assessment of all trees effected by the proposal and an assessment of all</p>	<p>A pre-construction arboricultural survey will be undertaken by an appropriately experienced arboriculturalist. This survey will define specific mitigation measures to protect trees situated adjacent to the working corridor, including defining root protection areas. The arboricultural report will be</p>

Consultee	Date/ Document	Comment	Project Response
		hedgerows using the 'importance' criteria set by the Hedgerows Regulations 1997	submitted to and agreed with the local authority prior to the commencement of any construction works.
Weybourne Parish Council	November 2019 Scoping Opinion comment 608	<p>Environmental and Ecological Impact Weybourne Parish Council are deeply concerned about the impact these proposals would have on the ecology and biodiversity of the Weybourne area including, but not limited to:</p> <ul style="list-style-type: none"> • Impact on wildlife and biodiversity through the disruption and destruction of key habitats • Impact on bird populations, including residential and wintering birds, but also migrating birds, an area that is not addressed in the scoping document • The impact of light pollution on the dark skies • The impact on the SSSI 	The EclA considers potential impacts on biodiversity through disruption and destruction of key habitats, including on residential and wintering bird populations, impacts from lighting pollution on sensitive ecological receptors and on designated sites such as SSSIs (see Section 22.3.2).
Natural England, Environment Agency, Broadland District Council, North Norfolk District Council, South	ETG meeting on 28/01/20	Meeting agreed the general scope of ecological surveys for 2020 for Extended Phase 1 Habitat Surveys, breeding birds, over-wintering birds and great crested newts. Agreed survey scopes were to ensure all parts of the onshore cable corridor were surveyed (where landowner access was permitted) in accordance with industry standard guidelines. For great crested newts	Comments were incorporated into the design of the 2020 ecological survey methodologies, as shown in the associated Technical Appendices.

Consultee	Date/ Document	Comment	Project Response
Norfolk District Council, Norfolk County Council		the survey would cover the onshore cable corridor plus a 250 metre surrounding buffer. Norfolk County Council highlighted concerns over barbastelle bat in the general area of the River Wensum and areas of suitable habitat nearby to the north.	

22.3 Scope

22.3.1 Study Area

7. The study area (i.e. the area being considered for the EclA) for the majority of the valued ecological receptors considered in this EclA is the PEIR boundary, within which relevant impacts would be concentrated. Different study areas have been used for different receptors depending on their sensitivity and their habitat preferences. These study areas were selected according to standard industry guidance (CIEEM 2018) as well as using professional judgement and experience. These study areas were agreed with stakeholders during the EPP.
8. For example, the study area extends beyond this for receptors which are realistically likely to experience impacts beyond the confines of the PEIR boundary. This includes GCN for which the study area is the PEIR boundary and any designated sites which are outside the boundary but could be impacted by proximity impacts, such as construction-related disturbance. For designated sites, the study area does not have a defined or fixed distance from the PEIR boundary because it depends on the ecological connections between the designated site and PEIR boundary, and the ecological features for which it is designated; accordingly, the study area for designated sites is assigned on the basis of the individual designated site (see [Figure 22.1](#) and [Figure 22.2](#)).
9. The survey areas (i.e. the areas where field surveys have been undertaken) have not always directly corresponded with the study area. This is mainly due to the PEIR boundary being refined during the course of the ecological surveys and engineering feasibility studies, and in addition due to landowner access being limited at the time of the surveys. Refinements of the PEIR boundary during the course of the ecological field surveys has resulted in some surveys being undertaken within areas that are now excluded from the PEIR boundary, and a small number of areas have either not been surveyed or have not been fully surveyed. The survey areas for each receptor, as agreed through consultation with the ETG, are as follows:
 - **Extended Phase 1 Habitat Survey:** all accessible areas within the PEIR boundary as of spring/summer 2020 (see [Appendix 22.1](#));
 - **Bats activity surveys:** focussed on key linear features (e.g. hedgerows) within accessible areas of the PEIR boundary as of spring/summer 2020 (see [Appendix 22.3](#));
 - **Great crested newt eDNA surveys:** all ponds where landowner access was granted within and up to 250m from the PEIR boundary (see [Appendix 22.2](#));
 - **Over-wintering bird (2019-20) surveys:** publicly accessible parts (e.g. areas accessible or visible from roads or public footpaths) of former iterations of the study area, parts of which overlap with the later refined PEIR boundary (see [Appendix 22.4](#));

- **Breeding bird surveys:** from March to early May the survey area comprised publicly accessible parts (e.g. areas accessible or visible from roads or public footpaths) of former iterations of the study area, much of which overlaps the refined PEIR boundary. The PEIR boundary was refined in May 2020, meaning the latter breeding bird surveys from May to July were able to cover more of the relevant study area (although surveys were still restricted to roads and public footpaths). Further detail is provided in [Appendix 22.5](#).

22.3.2 Realistic Worst-Case Scenario

22.3.2.1 General Approach

10. The final design of DEP and SEP will be confirmed through detailed engineering design studies that will be undertaken post-consent to enable the commencement of construction. In order to provide a precautionary but robust impact assessment at this stage of the development process, RWCS have been defined in terms of the potential effects that may arise. This approach to EIA, referred to as the Rochdale Envelope, is common practice for developments of this nature, as set out in Planning Inspectorate Advice Note Nine (2018). The Rochdale Envelope for a project outlines the RWCS for each individual impact, so that it can be safely assumed that all lesser options will have less impact. Further details are provided in [Chapter 6 EIA Methodology](#).
11. The RWCS for the ecological assessment are summarised in [Table 22-2](#). These are based on the parameters of DEP and SEP described in [Chapter 5 Project Description](#), which provides further details regarding specific activities and their durations. In addition to the design parameters set out in [Table 22-2](#), consideration is also given to how DEP and SEP will be built out as described in [Section 22.3.2.2](#) to [Section 22.3.2.4](#) below. This accounts for the fact that whilst DEP and SEP are the subject of one DCO application, it is possible that either one or both DEP and SEP will be developed, and if both are developed, that construction may be undertaken either concurrently or sequentially.

Table 22-2: Realistic Worst Case Scenarios.

Impact	Parameter DEP or SEP in isolation	DEP and SEP concurrently	DEP and SEP sequentially	Notes and Rationale
Construction				
Impacts relating to the landfall	<u>Temporary HDD works</u> <ul style="list-style-type: none"> HDD temporary works compound area = 5,750m² Transition joint bay size = 10 x 15m. Total construction space required = 30,000m² 	<u>Temporary HDD works</u> <ul style="list-style-type: none"> HDD temporary works compound area = 5,750m² Transition joint bay size = 15 x 15m. Total construction space required = 30,000m² 	<u>Temporary HDD works</u> <ul style="list-style-type: none"> HDD temporary works compound area = 5,750m² for each project (overlapping) Transition joint bay size = 10 x 15m for each project Total construction space required for each project = 30,000m² (overlapping) 	The HDD works should not require any prolonged periods of restrictions or closures to the beach for public access, although it is possible that some work activities will be required to be performed on the beach that may require short periods of restricted access.
	<u>Temporary access</u> <ul style="list-style-type: none"> Route from the existing road system 	<u>Temporary access</u> <ul style="list-style-type: none"> Route from the existing road system 	<u>Temporary access</u> <ul style="list-style-type: none"> Route from the existing road system 	
Impacts relating to the onshore cable corridor	<u>Temporary access</u> <ul style="list-style-type: none"> Various from public highway (6m wide) to single tracks (3m wide). Access haul road dimensions = 60km long by 6m wide. 	<u>Temporary access</u> <ul style="list-style-type: none"> Various from public highway (6m wide) to single tracks (3m wide). Access haul road dimensions = 60km long by 6m wide. 	<u>Temporary access</u> <ul style="list-style-type: none"> Various from public highway (6m wide) to single tracks (3m wide). Access haul road dimensions = 60km long by 6m wide. 	The onshore cable duct will be installed in sections of up to 1km at a time, with a typical construction presence of up to four weeks along each 1km section.

Impact	Parameter DEP or SEP in isolation	DEP and SEP concurrently	DEP and SEP sequentially	Notes and Rationale
	<u>Duration</u> <ul style="list-style-type: none"> • 24 months in total 	<u>Duration</u> <ul style="list-style-type: none"> • 24 months in total 	<u>Duration</u> <ul style="list-style-type: none"> • 24 months in total 	
	<u>Material volumes</u> <ul style="list-style-type: none"> • Width of top soil storage = 6m • Quantity of material excavated for cable trench = 180,000m³ of which 36,000m³ to be disposed of 	<u>Material volumes</u> <ul style="list-style-type: none"> • Width of top soil storage = 6m • Quantity of material excavated for cable trench = 360,000m³ of which 72,000m³ to be disposed of 	<u>Material volumes</u> <ul style="list-style-type: none"> • Width of top soil storage = 6m • Quantity of material excavated for cable trench = 360,000m³ of which 72,000m³ to be disposed of 	
	<u>Construction corridor</u> <ul style="list-style-type: none"> • Total width = 45m • Jointing bays = 120 (approximately every 500m) buried below ground • Jointing bay dimensions = 12m long by 4m wide by 2m deep within the working corridor • One trench, 1m wide by 1.75m deep. • Minimum cable burial depth at 1.2m 	<u>Construction corridor</u> <ul style="list-style-type: none"> • Total width = 60m • Approximately 120 jointing bays (one every 500m) buried below ground • Jointing bay dimensions = 12m long by 4m wide by 2m deep within the working corridor. • Two trenches, each 1m wide by 1.75m deep. • Minimum cable burial depth at 1.2m 	<u>Construction corridor</u> <ul style="list-style-type: none"> • Total width = 60m • Approximately 240 jointing bays (one every 500m) buried below ground along each cable trench • Jointing bay dimensions of 12m long by 4m wide by 2m deep within the working corridor. • Two trenches, each 1m wide by 1.75m deep. • Minimum cable burial depth at 1.2m 	

Impact	Parameter DEP or SEP in isolation	DEP and SEP concurrently	DEP and SEP sequentially	Notes and Rationale
	<u>Construction compounds</u> <ul style="list-style-type: none"> Up to 2 main compounds of 60,000m² each 8 secondary compounds of 2,500m² each HDD compounds = 1,500m² - 4,500m² 	<u>Construction compounds</u> <ul style="list-style-type: none"> Up to 2 main compounds of 60,000m² each 8 secondary compounds of 2,500m² each HDD compounds = 1,500m² - 4,500m² 	<u>Construction compounds</u> <ul style="list-style-type: none"> Up to 2 main compounds for each project of 60,000m² each 8 secondary compounds for each project of 2,500m² each HDD compounds = 1,500m² - 4,500m² 	
Impacts relating to the onshore substation	<u>Substation footprint</u> <ul style="list-style-type: none"> Permanent area = 3.25ha. Temporary construction area = 1ha Total construction area = 4.25ha 	<u>Substation footprint</u> <ul style="list-style-type: none"> Permanent area = 6.0ha Additional construction area = 1ha Total construction area = 7.0ha. 	<u>Substation footprint</u> <ul style="list-style-type: none"> Permanent area = 6.25ha Additional construction area = 1ha Total construction area = 7.25ha. 	
Operation				
Impacts relating to the onshore cable route	<u>Link boxes</u> <ul style="list-style-type: none"> Below ground = 120 (up to 2m x 2m x 1.5m) plus an above ground marker post at each location Above ground = 120 (up to 1.5m x 1m x 1.5m) 	<u>Link boxes</u> <ul style="list-style-type: none"> Below ground = 120 (up to 2m x 2m x 1.5m) plus an above ground marker post at each location Above ground = 120 (up to 1.5m x 1m x 1.5m) 	<u>Link boxes</u> <ul style="list-style-type: none"> Below ground = 120 for each project (up to 2m x 2m x 1.5m) plus an above ground marker post at each location 	Link boxes are expected to be below ground. Alternatively link boxes may be above ground in cabinets.

Impact	Parameter DEP or SEP in isolation	DEP and SEP concurrently	DEP and SEP sequentially	Notes and Rationale
			<ul style="list-style-type: none"> Above ground = 120 for each project (up to 1.5m x 1m x 1.5m) 	
Impacts relating to the onshore substation	<u>Substation footprint</u> <ul style="list-style-type: none"> Operational area = 3.25ha 	<u>Substation footprint</u> <ul style="list-style-type: none"> Operational area = 6.0ha 	<u>Substation footprint</u> <ul style="list-style-type: none"> Operational area = 6.25ha 	
	<u>Substation buildings</u> <ul style="list-style-type: none"> Max building height = 15m Oily water sump to provide secondary containment to oil from transformers in the event of a spillage. 	<u>Substation buildings</u> <ul style="list-style-type: none"> Max building height = 15m Oily water sump to provide secondary containment to oil from transformers in the event of a spillage. 	<u>Substation buildings</u> <ul style="list-style-type: none"> Max building height = 15m Oily water sump to provide secondary containment to oil from transformers in the event of a spillage. 	
	<u>Duration</u> <ul style="list-style-type: none"> 36 months in total 	<u>Duration</u> <ul style="list-style-type: none"> 36 months in total 	<u>Duration</u> <ul style="list-style-type: none"> 36 months in total for each project 	

Decommissioning

No final decision has yet been made regarding the final decommissioning policy for the onshore project infrastructure including landfall, onshore cable route and onshore substation. It is also recognised that legislation and industry best practice change over time. However, it is likely that the onshore project equipment, including the cable, will be removed, reused or recycled where possible and the transition bays and cable ducts being left in place. The detail and scope of the decommissioning works will be determined by the relevant legislation and guidance at the time of decommissioning and will be agreed with the regulator. It is anticipated that for the purposes of a worst case scenario, the impacts will be no greater than those identified for the construction phase.

22.3.2.2 Construction Scenarios

12. The following principles set out the framework for how DEP and SEP may be constructed:
 - DEP and SEP may be constructed at the same time, or at different times;
 - If built at the same time both Projects could be constructed in four years;
 - If built at different times, either Project could be built first;
 - If built at different times the first Project would require a four-year period of construction including a three year onshore construction period. The second Project would require a three-year period of construction;
 - If built at different times, the duration of the gap between end of onshore construction of the first Project, and the start of onshore construction of the second Project may vary from 0 to 1 year;
 - Assuming maximum construction periods, and taking the above into account, the maximum period over which the construction of both Projects could take place is 7 years; and
 - The earliest construction start date is 2024 and the latest is 2028.
13. In order to determine which construction scenario presents the realistic worst case for each receptor and impact, the assessment considers both maximum duration effects and maximum peak effects, in addition to each Project being developed in isolation, drawing out any differences between each of DEP and SEP.
14. The three construction scenarios considered by the ecological assessment are therefore:
 - Scenario 1: Build DEP or build SEP in isolation;
 - Scenario 2: Build DEP and SEP concurrently – reflecting the maximum peak effects; and
 - Scenario 3: Build one project followed by the other with a gap of up to one year (sequential) – reflecting the maximum duration of effects.
15. Any differences between DEP and SEP, or differences that could result from the manner in which the first and the second projects are built (concurrent or sequential and the length of any gap) are identified and discussed where relevant in the impact assessment section of this chapter ([Section 22.6](#)). For each potential impact only the worst-case construction scenario for two Projects is presented, i.e. either concurrent or sequential. The justification for what constitutes the worst case is provided, where necessary, in [Section 22.6](#).

22.3.2.3 Operation Scenarios

16. Operation scenarios are described in detail in [Chapter 5 Project Description](#). The assessment considers the following three scenarios:
 - Only DEP in operation;
 - Only SEP in operation; and

- The two projects operating at the same time, with a gap of up to 4 years between each project commencing operation.

17. The operational lifetime of each project is expected to be 35 years.

22.3.2.4 Decommissioning Scenarios

18. Decommissioning scenarios are described in detail in **Chapter 5 Project Description**. Decommissioning arrangements will be agreed through the submission of a Decommissioning Plan prior to construction; however, for the purpose of this assessment it is assumed that decommissioning of DEP and SEP could be conducted separately, or at the same time.

22.3.3 Summary of Mitigation Embedded in the Design

19. This section outlines the embedded mitigation relevant to the ecological assessment, which has been incorporated into the design of the Project (**Table 22-3**). Where other mitigation measures are proposed, these are detailed in the impact assessment (**Section 22.6**).

Table 22-3: Embedded Mitigation Measures

Parameter	Mitigation Measures Embedded into the Design of DEP and SEP
Valued Habitats	
Designated nature conservation sites	DEP and SEP has undergone an extensive site selection process which has involved incorporating environmental considerations in collaboration with the engineering design requirements. The onshore cable corridor has been routed to avoid designated nature conservation sites (e.g. SPA, SSSI etc.) where possible. Trenchless installation methods for the export cables and micro-siting of construction activities (i.e. compounds and lay-down areas, link boxes) are proposed to avoid direct impacts to any designated sites that currently fall within the PEIR boundary. Further details is provided in Section 22.3.2.2 .
Woodland and Hedgerows	Where the onshore cable corridor crosses through woodland and hedgerows, the working corridor width would be reduced to a typical working width of 20m. This is on the basis that a large part of the 45m (for a single project) or 60m (for both DEP and SEP) corridor is for soil storage/management, and trees and hedgerows would not be removed for this purpose, and would be retained outside the 20m working corridor. The reduced 20m working width at woodland and hedgerow crossing applies to all scenarios; in reality, it is likely to be less for a single project but not for the purposes of the assessment. Hedgerows would be replanted. Trees and woodland would be replanted within the construction corridor but outside the final cable easement of 20m width if both DEP and SEP are constructed and 12m if only DEP or SEP is constructed, where tree planting would be prohibited. Planting would be implemented during the first planting season following completion of construction of either DEP or SEP (subject to landowner agreements), whether constructed together or

Parameter	Mitigation Measures Embedded into the Design of DEP and SEP
	<p>sequentially. Further work will be carried out prior to the full DCO submission to identify further measures to minimise tree, woodland and hedgerow removal. Further details on hedgerow and tree removal, retention, replacement and management will be presented in an Outline Landscape and Ecological Management Strategy submitted with the DCO.</p> <p>The PEIR boundary has been routed to avoid woodland habitat wherever possible, as demonstrated by the boundary alignment around woodlands such as Mossymere Wood (in the Civil Parishes of Itteringham and Corpusty and Saxthorpe), Colton Wood (in the Civil Parish of Marlingford and Colton) and Smeeth Wood (in the Civil Parish of Ketteringham). Colton Wood and Smeeth Wood are the only Ancient Woodlands in close proximity to the PEIR boundary.</p>
Watercourse crossings	
Cable crossings over watercourses	All Main Rivers and Internal Drainage Board (IDB) maintained Ordinary Watercourses will be crossed using trenchless techniques such as HDD to avoid direct interaction with these watercourses. The cable entry and exit pits will be at least 9m from the banks of the watercourse, and the cable will be at least 2m below the channel bed.
Temporary access across watercourse	Temporary bridges (Bailey bridges) or similar may be used as options to traverse Main Rivers and IDB-maintained Ordinary Watercourses where direct access is not readily available from both sides. Selection of crossing technique for all other Ordinary Watercourses will be dependent on local site conditions and may include the use of temporary culverts.

22.4 Impact Assessment Methodology

22.4.1 Policy, Legislation and Guidance

22.4.1.1 National Policy Statements

20. The assessment of potential impacts upon valued ecological receptors has been made with specific reference to the relevant National Policy Statements (NPS). These are the principal decision-making documents for Nationally Significant Infrastructure Projects (NSIPs). Those relevant to the Project are:
- Overarching NPS for Energy (EN-1) (Department of Energy and Climate Change (DECC) 2011a);
 - NPS for Renewable Energy Infrastructure (EN-3) (DECC 2011b); and
 - NPS for Electricity Networks Infrastructure (EN-5) (DECC 2011c).
21. The specific assessment requirements for ecology, as detailed in the NPS, are summarised in **Table 22-4** together with an indication of the section of the PEIR chapter where each is addressed.

Table 22-4: NPS Assessment Requirements.

NPS Requirement	NPS Reference	Section Reference
EN-1 NPS for Energy (EN-1)		
<p>‘Where the development is subject to EIA [Environmental Impact Assessment] the applicant should ensure that the ES [Environmental Statement] clearly sets out any effects on internationally, nationally and locally designated sites of ecological or geological conservation importance, on protected species and on habitats and other species identified as being of principal importance for the conservation of biodiversity. The applicant should provide environmental information proportionate to the infrastructure where EIA is not required to help the Infrastructure Planning Commission (IPC) consider thoroughly the potential effects of a proposed project.’</p>	<p>Section 5.3.3</p>	<p>Potential impacts on internationally, national and locally designated sites of ecological conservation importance, on protected species and on habitats and other species identified as being of principal importance for the conservation of biodiversity are considered in Section 22.6.</p>
<p>‘The applicant should show how the project has taken advantage of opportunities to conserve and enhance biodiversity and geological conservation interests.’</p>	<p>Section 5.3.4</p>	<p>Embedded mitigation measures are provided in Section 22.3.3 and where applicable, further mitigation measures are outlined in Section 22.6.</p>
<p>‘When considering the application, the IPC will have regard to the Government’s biodiversity strategy as (sic) set out in ‘Working with the grain of nature’, which aims to halt or reverse declines in priority habitats and species; accept the importance of biodiversity to quality of life. The IPC will consider this in relation to the context of climate change.</p> <p>As a general principle, and subject to the specific policies below, development should aim to avoid significant harm to biodiversity and geological conservation interests, including through mitigation and</p>	<p>Section 5.3.5 – Section 5.3.8</p>	<p>Site selection decisions and embedded mitigation measures have sought to minimise impacts to features of biodiversity and geological interest.</p>

NPS Requirement	NPS Reference	Section Reference
<p>consideration of reasonable alternatives (as set out in section 4.4 above); where significant harm cannot be avoided, then appropriate compensation measures should be sought.</p> <p>In taking decisions, the IPC should ensure that appropriate weight is attached to designated sites of international, national and local importance; protected species; habitats and other species of principal importance for the conservation of biodiversity; and to biodiversity and geological interests within the wider environment.'</p>		<p>Embedded mitigation measures are provided in Section 22.3.3 and where applicable, further mitigation measures are outlined in Section 22.6.</p>
<p>'For the purposes of considering development proposals affecting them, as a matter of policy the Government wishes pSPAs to be considered in the same way as if they had already been classified. Listed Ramsar sites should, also as a matter of policy, receive the same protection'.</p>	<p>Section 5.3.9</p>	<p>Designated sites are presented in Section 22.5.1.</p> <p>Site selection decisions will be made to minimise impacts to interest features within designated sites.</p>
<p>'Many SSSIs are also designated as sites of international importance and will be protected accordingly. Those that are not, or those features of SSSIs not covered by an international designation, should be given a high degree of protection.'</p>	<p>Section 5.3.10</p>	<p>Designated sites are presented in Section 22.5.1.</p> <p>Site selection decisions will be made to minimise impacts to interest features within designated sites.</p>

NPS Requirement	NPS Reference	Section Reference
<p>‘Where a proposed development on land within or outside a Site of Special Scientific Interest (SSSI) is likely to have an adverse effect on a SSSI (either individually or in combination with other developments), development consent should not normally be granted. Where an adverse effect, after mitigation, on the site’s notified special interest features is likely, an exception should only be made where the benefits (including need) of the development at this site clearly outweigh both the impacts that it is likely to have on the features of the site that make it of special scientific interest and any broader impacts on the national network of SSSIs.’</p>	<p>Section 5.3</p>	<p>DEP and SEP only have the potential to affect a single watercourse designated as a SSSI - the River Wensum. Potential impacts to the River Wensum SSSI are considered in Section 22.6.</p>
<p>“Sites of regional and local biodiversity and geological interest, which include Regionally Important Geological Sites, Local Nature Reserves and Local Sites, have a fundamental role to play in meeting overall national biodiversity targets; contributing to the quality of life and the well-being of the community; and in supporting research and education. The IPC should give due consideration to such regional or local designations. However, given the need for new infrastructure, these designations should not be used in themselves to refuse development consent.”</p>	<p>Section 5.3.13</p>	<p>Designated sites are presented in Section 22.5.1.</p> <p>Site selection decisions will be made to minimise impacts to interest features within designated sites.</p>
<p>‘Ancient woodland is a valuable biodiversity resource both for its diversity of species and for its longevity as woodland. Once lost it cannot be recreated.</p> <p>The IPC should not grant development consent for any development that would result in its loss or deterioration unless the benefits (including need) of the development, in that location outweigh the loss of the woodland habitat.</p>	<p>Section 5.3.14</p>	<p>The onshore cable corridor does not cross areas of ancient woodland. However, ancient woodland is present within the PEIR boundary and information relating to this is presented in Section 22.5.1.</p>

NPS Requirement	NPS Reference	Section Reference
<p>Aged or ‘veteran’ trees found outside ancient woodland are also particularly valuable for biodiversity and their loss should be avoided.</p> <p>Where such trees would be affected by development proposals the applicant should set out proposals for their conservation or, where their loss is unavoidable, the reasons why.’</p>		
<p>The IPC will aim to maximise opportunities to build in beneficial biodiversity features when considering proposals as part of good design.</p>	<p>Section 5.3.15</p>	<p>Enhancement measures will be considered and discussed with stakeholders through the development of DEP and SEP.</p>
<p>The IPC shall have regard to the protection of legally protected species and habitats and species of principal importance for nature conservation.</p> <p>‘The IPC should refuse consent where harm to the habitats or species and their habitats would result, unless the benefits (including need) of the development outweigh that harm. In this context, the IPC should give substantial weight to any such harm to the detriment of biodiversity features of national or regional importance which it considers may result from a proposed development.’</p>	<p>Sections 5.3.16 – 5.3.17</p>	<p>Information on protected species and habitats is provided in Section 22.5.2 and Section 22.5.3 and the outcome of the assessment process is provided in Section 22.6.</p>
<p>The applicant should include appropriate mitigation measures as an integral part of the proposed development and demonstrate that:</p> <p>During construction, they will seek to ensure that activities will be confined to the minimum areas required for the works;</p>	<p>Section 5.3.18</p>	<p>Embedded mitigation measures are presented in Section 22.3.3. Mitigation measures associated with potential impacts are presented in Section 22.6.</p>

NPS Requirement	NPS Reference	Section Reference
<p>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;</p> <p>Habitats will, where practicable, be restored after construction works have finished; and</p> <p>Opportunities will be taken to enhance existing habitats and, where practicable, to create new habitats of value within the site landscaping proposals.</p>		
<p>‘The IPC will need to take account of what mitigation measures may have been agreed between the applicant and whether Natural England has granted or refused or intends to grant or refuse, any relevant licences, including protected species mitigation licences.’</p>	<p>Section 5.3.20</p>	<p>Embedded mitigation measures are presented in Section 22.3.3. Mitigation measures associated with potential impacts are presented in Section 22.6.</p>
<p>EN-3 NPS for Renewable Energy Infrastructure</p>		
<p>‘Proposals for renewable energy infrastructure should demonstrate good design in respect of landscape and visual amenity, and in the design of the project to mitigate impacts such as noise and effects on ecology.’</p>	<p>Section 2.4.2</p>	<p>Project design has avoided sensitive features where possible. Embedded mitigation measures are presented in Section 22.3.3 and further mitigation measures are set out in Section 22.6.</p>
<p>‘Ecological monitoring is likely to be appropriate during the construction and operational phases to identify the actual impact so that, where appropriate, adverse effects can then be mitigated and to enable further useful information to be published relevant to future projects.’</p>	<p>Section 2.6.70</p>	<p>Monitoring is discussed in mitigation and is set out in Sections 22.6 and 22.11.</p>

NPS Requirement	NPS Reference	Section Reference
<p>‘There may be some instances where it would be more harmful to the ecology of the site to remove elements of the development, such as the access tracks or underground cabling, than to retain them.’</p>	<p>Section 2.6.15</p>	<p>Decommissioning is discussed in Section 22.6.3 and will be expanded upon at DCO application stage.</p>
<p>EN-5 NPS for Electricity Networks Infrastructure</p>		
<p>The applicant will need to consider whether the proposed line will cause such problems at any point along its length and take this into consideration in the preparation of the EIA and ES (see Section 4.2 of EN-1). Particular consideration should be given to feeding and hunting grounds, migration corridors and breeding grounds.’</p> <p>‘The IPC should ensure that this issue has been considered in the ES and that appropriate mitigation measures will be taken where necessary.’</p>	<p>Section 2.7.2 - 2.7.3.</p>	<p>Embedded mitigation measures are presented in Section 22.3.3. Mitigation measures associated with potential impacts are presented in Section 22.6.</p>

22.4.1.2 Other

22. In addition to the NPS, there are a number of pieces of legislation, policy and guidance applicable to the assessment of ecological impacts on designated sites, protected species and habitats.

22.4.1.2.1 International Site Designations

23. EU laws supporting designated sites and species protection, from 31st January 2021, are transposed into UK law and are referred to as The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations Act 2019. The Act keeps in place all EU-derived domestic legislation (such as the many statutory instruments that implement EU environmental directions) (clause 2) and incorporates direct EU legislation (such as EU environmental regulations) into UK domestic law (clause 3).

24. The European Council Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (92/43/EEC) as amended directs the designation of important wildlife sites through the EU as Special Areas of Conservation (SACs), and gives statutory protection to habitats and species listed in the Directive as being threatened or of community interest. Sites identified as candidate SAC (cSAC) are provided with the same level of protection as SAC.

25. Annex I of 92/43/EEC as amended lists habitat types which are regarded as being of European importance. Included within these are a number of 'priority habitat types' which are habitats regarded as being in danger of disappearance and whose natural range falls broadly within the EU. This European law had been transposed into UK legislation by The Conservation (Natural Habitats & c.) Regulations 1994, later replaced by The Conservation of Habitats and Species Regulations (Amendment) (EU Exit) 2019.
26. Habitats of European-wide importance for birds are listed under the European Community Wild Birds Directive (79/409/EEC) as amended. Habitats designated under this Directive are notified as Special Protection Areas (SPAs) and are identified for holding populations > 1% of the reference population as defined in Appendix 4 of the SPA review of bird species listed in Annex 1 of the same Council Directive. Sites identified as potential SPA (pSPA) are provided with the same level of protection as SPA.
27. Wetlands of international importance (especially as waterfowl habitat) are designated under the Ramsar convention, an intergovernmental treaty adopted in 1971 which provides a framework for 'the conservation and wise use of wetlands and their resources.'

22.4.1.2.2 *National (UK) Site Designations*

28. National ecological designations, such as Sites of Special Scientific Interest (SSSIs) and National Nature Reserves (NNRs) are also afforded statutory protection. SSSIs are notified and protected under the jurisdiction of the Wildlife and Countryside Act 1981 (WCA) as amended. SSSIs are notified based on specific criteria, including the general condition and rarity of the site and of the species or habitats supported by it.

22.4.1.2.3 *Non Statutory (County) Site Designations*

29. Local authorities may designate certain areas as being of local conservation interest. The criteria for inclusion may vary between areas. Most individual counties have a similar scheme; within Norfolk such sites are designated as County Wildlife Sites (CWS). Designation of such sites does not itself confer statutory protection, but they are a material consideration when planning applications are being determined.

22.4.1.2.4 *Species Designation and Protection*

30. The Protection of Badgers Act 1992 makes it unlawful to knowingly kill, capture, disturb or injure an individual badger *Meles meles*, or to intentionally damage, destroy or obstruct an area used for breeding, resting or sheltering by badgers (i.e. a sett).
31. All bat species are listed under Annex IV (and certain species also under Annex II) of the European Union's Council Directive 92/43/EEC (The Habitats Directive) and are given UK protected status by Schedule 2 of the Conservation of Habitats and Species Regulations (Amendment) (EU Exit) 2019. Bats and their roosts also receive protection from disturbance from by the WCA (as amended by the Countryside and Rights of Way Act 2000). This protection extends to both the species and roost sites. It is an offence to kill, injure, capture, possess or otherwise disturb bats. Bat roosts are protected at all times of the year (making it an offence to damage, destroy or obstruct access to bat roosts), regardless of whether bats are present at the time.

32. All bird species are protected under the WCA. This prevents killing or injuring any bird or damaging or destroying nests and eggs. Certain species (including barn owl *Tyto alba*) are also listed under Schedule 1 of the WCA, which prohibits intentionally or recklessly disturbing the species at, on or near an 'active' nest.
33. All native reptiles are listed on Schedule 5 of the WCA and are afforded protection under Sections 9(1) and 9(5). For the reptile species occurring in East Anglia, adder *Vipera berus*, grass snake *Natrix helvetica*, slow-worm *Anguis fragilis* and common lizard *Zootoca vivipara*, this protection prohibits deliberate or reckless killing and injury but does not include habitat protection.
34. The GCN *Triturus cristatus* is fully protected in accordance with both national and international legislation. The species is listed under Annexes IV and II of European Directive 92/43/EEC, and Schedule 2 of The Conservation of Habitats and Species Regulations (Amendment) (EU Exit) 2019. The species is also protected by Sections 9(4) and 9(5) of the WCA. It is an offence to knowingly or recklessly kill, injure, disturb, handle or sell the animal, and this protection is afforded to all life stages. It is unlawful to deliberately or recklessly damage, destroy, or obstruct the access to any structure or place used for shelter or protection; this includes both the terrestrial and aquatic components of its habitat.
35. Otters *Lutra lutra* are protected in accordance with Schedule 5 of the WCA. The otter is also a protected species included in Annex II of 92/43/EEC and is protected under Schedule 2 of the Conservation of Habitats and Species Regulations (Amendment) (EU Exit) 2019. It is an offence to intentionally kill, injure or take an otter from the wild, or to intentionally or recklessly damage, destroy or obstruct access to any habitat used by otters or to disturb the otters which make use of those habitats.
36. The water vole *Arvicola amphibius* is protected in accordance with Schedule 5 of the WCA. It is an offence to intentionally damage, destroy or obstruct access to any structure or place which water voles use for shelter or protection, or to disturb water voles whilst they are using such a place. It is also an offence to kill, injure, capture or possess water voles.
37. The white-clawed crayfish *Austropotamobius pallipes* is listed on Schedule 5 of the WCA but only receives protection under Sections 9(1) and 9(5). This makes it an offence to take or sell white-clawed crayfish. Section 9 applies to all stages in their life cycle.
38. Schedule 8 of the WCA lists plant species which are afforded special protection. It is an offence to pick, uproot or destroy any species listed on Schedule 8 without prior authorisation, and all plants are protected from unauthorised uprooting (i.e. without the landowner's permission) under Schedule 13 of the WCA.
39. A Vascular Plant Red List for England provides a measure of the current state of England's flora measured against standardised International Union for Conservation of Nature (IUCN) criteria. Any taxon that is threatened (Critically Endangered [CR], Endangered [EN], Vulnerable [VU]) or Near Threatened (NT) does not have statutory protection but should be regarded as a priority for conservation in England. It should be noted that 'threat' is not synonymous with 'rarity'; some of the species concerned are relatively common and widespread.

22.4.1.2.5 *Priority Species and Habitats*

40. Other priority species and habitats are a consideration under the National Planning Policy Framework (NPPF) 2019, placing responsibility on Local Planning Authorities to aim to conserve and enhance biodiversity and to encourage biodiversity in and around developments. There is a general biodiversity duty in the Natural Environment and Rural Communities (NERC) Act 2006 (Section 40) which requires every public body in the exercising of its functions to ‘have regard, so far as is consistent with the proper exercise of those functions, to the purpose of conserving biodiversity’. Biodiversity, as covered by the Section 40 duty, includes all biodiversity, not just the Habitats and Species of Principal Importance (commonly referred to as Priority Habitats and Species).
41. Section 41 of the NERC Act lists a number of species and habitats as being Species/Habitats of Principal Importance (commonly known as Priority Habitats/Species). These are species/habitats in England which had been identified as requiring action under the UK Biodiversity Action Plan (BAP), and which continue to be regarded as conservation priorities under the UK Post-2010 Biodiversity Framework. The protection of either Priority Species or Habitats is not statutory, but “specific consideration” should be afforded by Local Planning Authorities when dealing with them in relation to planning and development control. Also, there is an expectation that public bodies would refer to the Section 41 list when complying with the Section 40 duty.
42. Widespread Priority Habitats in East Anglia include:
 - Arable field margins
 - Traditional orchards
 - Hedgerows
 - Eutrophic standing waters
 - Ponds
 - Rivers
 - Lowland calcareous grassland
 - Lowland dry acid grassland
 - Lowland fen
 - Lowland meadows
 - Coastal and floodplain grazing marsh
 - Reedbeds
 - Lowland mixed deciduous woodland
 - Wet woodland
 - Wood-pasture and parkland
43. Widespread Priority Habitats in East Anglia (which have no specific legal protection) include:
 - Hedgehog *Erinaceus europaeus*
 - Polecat *Mustela putorius*

- Brown hare *Lepus europaeus*
- Harvest mouse *Micromys minutus*
- Multiple Birds of Conservation Concern Red-listed species (e.g. skylark *Alauda arvensis*, spotted flycatcher *Muscicapa striata*)
- Common toad *Bufo bufo*
- European eel *Anguilla anguilla*
- Multiple invertebrate species (e.g. cinnabar moth *Tyria jacobaeae*, small heath butterfly *Coenonympha pamphilus*)
- Multiple plant species

22.4.1.2.6 Biodiversity Policy Guidance

44. The overarching policy guidance for biodiversity is included within the National Planning Policy Framework (NPPF). Section 15 of the NPPF (Conserving and Enhancing the Natural Environment) outlines the approach that Local Authorities should adopt when considering ecological issues within the planning framework, including the principles of the Mitigation Hierarchy. This espouses that in addressing impacts on valued features, avoidance should be the first option considered, followed by mitigation (minimising negative impacts). Where avoidance and mitigation are not possible, compensation for loss of features can be used as a last resort.
45. The NPPF also states that development plans should “promote the conservation, restoration and enhancement of priority habitats, ecological networks and the protection and recovery of priority species; and identify and pursue opportunities for securing measurable net gains for biodiversity”, and “...opportunities to incorporate biodiversity improvements in and around developments should be encouraged, especially where this can secure measurable net gains for biodiversity.”
46. Further detail is provided in **Chapter 3 Policy and Legislative Context**.

22.4.1.2.7 Guidance

47. The impact assessment has been based upon the following guidance and standards:
 - Chartered Institute of Ecology and Environmental Management (CIEEM) (CIEEM, 2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal;
 - British Standard 42020:2013 – Biodiversity. Code of Practice for planning and development;
 - Construction Industry Research and Information Association (CIRIA) C648 (2006) Control of water pollution from linear construction projects (CIRIA, 2006); and
 - CIRIA Guidance note C692 Environmental Good Practice on Site Guide (3rd Edition – CIRIA, 2010).
48. The following species-specific guidance and standards have been used during the assessment process:

- Standing advice on protected species (bats (all species), great crested newts *Triturus cristatus*, badgers, water voles *Arvicola amphibius*, otters *Lutra lutra*, reptiles, protected plants, invertebrates, white-clawed crayfish *Austropotamobius pallipes*, ancient woodlands and veteran trees) (Natural England, 2015);
- British Standard 5837: 2012 – Trees in relation to design, demolition and construction;
- Bat Conservation Trust and Institute of Lighting Engineers (2018) Bats and Artificial Lighting in the UK (ILE, 2018);
- The Water Vole Mitigation Handbook (The Mammal Society Guidance Series) (Dean et al, 2016);
- Reptile Habitat Management Handbook (Edgar et al, 2010);
- Great Crested Newt Mitigation Guidelines (English Nature, 2001);
- Herpetofauna Worker’s Manual (Joint Nature Conservation Committee (JNCC), 2003);
- Otters: surveys and mitigation for development projects. Natural England Standing Advice (Natural England, 2014);
- Badgers: surveys and mitigation for development projects. Natural England Standing Advice (Natural England, 2015);
- Bats: surveys and mitigation for development projects. Natural England Standing Advice (Natural England, 2015);
- Great crested newts: surveys and mitigation for development projects. Natural England Standing Advice (Natural England, 2015);
- Invertebrates: surveys and mitigation for development projects. Natural England Standing Advice (Natural England, 2015);
- Reptiles: surveys and mitigation for development projects. Natural England Standing Advice (Natural England, 2015);
- Water voles: surveys and mitigation for development projects. Natural England Standing Advice (Natural England, 2015);
- Water Vole Conservation Handbook, 3rd Edition (Strachan and Moorhouse, 2011); and
- Great Britain (GB) Non-native Species Information (GB Non-native secretariat, 2015).

22.4.2 Data and Information Sources

22.4.2.1 Desk Study

49. Information on statutory designated nature conservation sites within and up to 2km from the PEIR boundary has been obtained using the Natural England Multi-Agency Geographic Information for the Countryside (MAGIC) website. Citations for any designated nature conservation sites identified were obtained from the websites of Natural England and the Joint Nature Conservation Committee (JNCC).
50. A data search with NBIS was completed in January 2021, which obtained all biological records and records of any non-statutory designated nature conservation sites (such as County Wildlife Sites (CWS)) within and up to 2km from the PEIR boundary. The data set provided by NBIS did not include any discernible omissions (such as records of individual species which may be held by a different organisation/body such as a county recorder), and NBIS did not advise that there were any such gaps. The data set is therefore considered to be a comprehensive search of biological records for the study area.
51. In order to address restricted survey coverage for the Extended Phase 1 Habitat Surveys (EP1HS) due to withheld landowner access, NBIS was also asked to provide all “Norfolk Living Map” data held for the PEIR boundary. This data set provides a broad classification of habitats across Norfolk, so has been used as an alternate data source for classifying habitats within parts of the PEIR boundary that were not accessible for the EP1HS.
52. Results of the desk study are presented in [Appendix 22.7](#).

22.4.2.2 Site specific surveys

53. In order to provide site specific and up to date ecological information on which to base the impact assessment, the surveys listed below were undertaken. The surveys will be ongoing up to the DCO submission, however for purpose of this PEIR results of the surveys undertaken between November 2019 and January 2021 are presented.

22.4.2.2.1 Extended Phase 1 Habitat Survey

54. An EP1HS was undertaken of all accessible areas within the PEIR boundary by WFE ecologists (see [Appendix 22.1](#)). Surveys were completed between March and September 2020, with the majority completed in July, August and September 2020. A small number of additional landholdings were surveyed in January 2021, as access to them had become available since September 2020. Accessible landholdings within the PEIR boundary were surveyed by a team of two WFE ecologists, and all habitats were recorded and classified to JNCC Phase 1 Habitat categories, photographed and subsequently mapped. The survey was extended to include a preliminary assessment of the suitability of habitats for protected species, and a preliminary check for signs of such species (for example, noting badger setts or trees with features suitable for use by roosting bats).
55. The EP1HS was further extended to include collection of data which will feed into Biodiversity Net Gain (BNG) calculations once the details of the construction footprint, methods and impacts are defined. The baseline data collected will be used to complete BNG calculations, using the relevant DEFRA metric and with a commitment to achieve a minimum 10% gain in biodiversity.

56. Further EP1HS are scheduled for May to September 2021 and these surveys will cover any areas within the PEIR boundary which have not yet been surveyed but to which landowner access has been subsequently obtained.

57. Further detail on the EP1HS methodology is provided in [Appendix 22.1](#).

22.4.2.2.2 *Breeding Bird Survey*

58. Surveys were completed from publicly accessible areas (roads and footpaths) within the PEIR boundary over the course of six survey visits between March and July 2020 (see [Appendix 22.5](#)). Surveys focussed on areas within 10km of the landfall location on the North Norfolk Coast, the PEIR boundary crossings of the Rivers Wensum and Yare and the onshore substation zone (which is also the only part of the PEIR boundary within 10km of Broadland SPA). These areas were selected because of the potential for impacts on important bird areas, and because of the potentially sensitive habitats present.

59. However, the PEIR boundary was refined during the course of the survey, meaning a number of surveyed areas are now outside the PEIR boundary, and a number of new areas brought within it were either not surveyed or were not surveyed in full.

60. The surveys focussed on recording birds of conservation concern exhibiting breeding behaviour wholly or partially within the PEIR boundary. Bird species with a Birds of Conservation Concern (BoCC) Red or Amber listing were recorded, as were species listed on Schedule 1 of the WCA. Data from the six survey visits was compiled and locations of breeding bird activity were plotted on a single map for each species, from which an ornithologist was able to determine the overall number of breeding territories for that species.

61. Bird species with a BoCC Green listing (indicating a lower conservation priority) were recorded where observed but territories were not mapped.

62. Further detail on the breeding bird survey methodology is provided in [Appendix 22.5](#).

22.4.2.2.3 *Over-Wintering Bird Survey*

63. Surveys were completed from publicly accessible areas (roads and footpaths) within the PEIR boundary at the time of the surveys and across the five survey visits (one per month) between November 2019 and March 2020. Surveys focussed on areas within 10km of the landfall location on the north Norfolk coast, the crossings of the Rivers Wensum and Yare and the onshore substation zone (which is also the only part of the PEIR boundary within 10km of Broadland SPA). However, due to subsequent refinements to the PEIR boundary, some parts of it were not surveyed as they were brought inside the boundary after the surveys had finished. Maps showing the areas covered by the surveys are provided in [Appendix 22.4](#).

64. The PEIR boundary was subject to ongoing refinement during the course of the survey, meaning a number of surveyed areas are now outside the boundary, and a number of new areas brought within it were either not surveyed or were not surveyed in full. Further detail is provided in the Over-Wintering Birds Technical Appendix.

65. Surveys focussed on habitats likely to support activity (roosting, feeding/foraging) by over-wintering birds, such as arable fields with stubble (unploughed harvested cereal crops) or sugar beet crops.

66. Surveys recorded species, flock size and activity of observed wintering birds. The output of the survey is a list of wintering bird species and activity within the PEIR boundary, and maps of the locations of these records.

22.4.2.2.4 *Great Crested Newt Survey*

67. The survey for GCN involved Habitat Suitability Index (HSI) appraisal of the suitability of ponds for use by breeding GCN, and environmental DNA (eDNA) surveys of ponds to determine presence or likely absence of the species. All ponds which were accessible and within the PEIR boundary plus the surrounding 250m area, were surveyed between March and June 2020. A total of 290 ponds were identified on maps and aerial photographs within the survey area (the PEIR boundary and the surrounding 250m buffer as of April/May/June 2020). Of these, 161 were accessible for HSI and eDNA surveys.
68. The remaining 129 ponds were not surveyed either because landowner access was not granted (65 ponds) or because the ponds were found to be dry, removed or otherwise not able to be surveyed (64 ponds). Four of the 64 non-surveyable ponds could be remotely HSI appraised from a distance, but it was not possible for surveyors to safely or physically access the pond to collect water samples for the eDNA survey.
69. Therefore, a total of 165 ponds were HSI appraised and 161 of these were eDNA surveyed in 2020. Maps showing the distributions of ponds and the extents of the survey area are provided in [Appendix 22.2](#).
70. Subsequent refinement of the PEIR boundary in 2021 has excluded 111 of the originally identified ponds. There are now 179 ponds within the refined PEIR boundary and its surrounding 250m buffer, 98 of which were HSI appraised and eDNA surveyed (and an additional two ponds which were visible for HSI appraised but could not be directly accessed for eDNA surveys).
71. There are also an additional 52 ponds which have been brought inside the survey area following the refinements to the PEIR boundary; these are due to be eDNA surveyed in 2021 (pending landowner access). Attempts will also be made to eDNA survey ponds which were not accessible in 2020 (as some landowners have subsequently granted survey access) and those which were found to be dry in 2020. Further detail is provided in the Great Crested Newt Survey Technical Appendix.

22.4.2.2.5 *Bat Activity Surveys*

72. The bat activity surveys aimed to record overall bat activity in general areas of the PEIR boundary, targeting areas considered likely to be of relatively high sensitivity for bats. The surveys therefore focussed on the area of woodland at Weybourne Wood/ Hundred Acre Wood/ Bodham Wood (between Bodham and Kelling/ Weybourne, near the landfall location), the River Bure, the River Wensum (including nearby tributaries at Swannington), the River Yare and the River Tiffey, as shown in Figure 1 in [Appendix 22.3: Bat Activity Survey Appendix](#).
73. It was acknowledged that the survey would not be able to provide sufficient detail on specific features which might be impacted, but rather it would provide an indication as to which bat species are present in general areas of the PEIR boundary with perceived likely high sensitivity for bats. Furthermore, the data would provide a useable baseline which could be supplemented with more detailed, targeted surveys in the future once the precise DCO boundary has been finalised.

74. Surveys involved the deployment of four automated static bat detectors (SongMeter SM2+) at selected locations in the aforementioned areas over four separate deployments. Most deployments ran for over 10 days, although in some cases the detectors ceased recording (likely due to technical issues such as loss of battery power) after a shorter period. The survey commenced in late June 2020, and so surveys were completed across the ends and starts of the summer and early autumn months, between late June to early July, late July to early August, late August to early September and late September to early October.
75. Surveys were not completed in April or May partly because of limited landowner access and public health restrictions which required formulation and implementation of new safe practices of working by the ecological surveyors. Sufficient landowner access had been obtained and safe working practices had been put in place by June 2020 which allowed the bat surveys to commence.
76. Data from the deployed bat detectors was downloaded and the sonograms were analysed. The analysis involved attributing each bat registration to a bat species, wherever possible. Further detail is provided in [Appendix 22.3](#).

22.4.2.3 Other available sources

77. A desk study including a data search with the local biological records centre, the Norfolk Biodiversity Information Service (NBIS), was completed in January 2021. NBIS holds biological records and information on non-statutory designated nature conservation sites such as County Wildlife Sites (CWS) and Roadside Nature Reserves (RNR) within Norfolk.
78. Other sources that have been used to inform the assessment are listed in [Table 22-5](#).

Table 22-5: Other available data and information sources.

Data set	Spatial coverage	Year	Notes
Ecological data from Dr. Carl Sayer	Ponds between Baconsthorpe and Bodham in the north of the PEIR boundary.	2011-2019	The data includes records of GCN presence at six ponds within the GCN survey area.
Norfolk Crayfish Group Actions 2020 Report	Selected rivers in Norfolk, including Glaven, Bure and Yare.	2020	Report provides records of white-clawed crayfish and the invasive signal crayfish in selected watercourses.

22.4.3 Impact Assessment Methodology

79. Chapter 6 EIA Methodology details the general impact assessment method. The following sections describe more specifically the EclA methodology that has been applied in relation to onshore ecology that is based on the Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine (CIEEM, 2018). This methodology was consulted on and agreed with stakeholders through the ETG process.

80. The CIEEM guidelines aim to predict the residual impacts on important ecological features affected, either directly or indirectly by a development, once all the appropriate mitigation has been implemented.
81. The approach to determining the significance of an impact follows a systematic process for all impacts. This involves identifying, qualifying and, where possible, quantifying the sensitivity, value and magnitude of all ecological receptors which have been scoped into this assessment. Using this information, a significance of each potential impact has been determined. Each of these steps is set out in the remainder of this section.
82. The EclA has used professional judgement to ensure the assessed significance level is appropriate for each individual receptor, taking account of local values for biodiversity to avoid a subjective assessment wherever possible as per the CIEEM guidelines. As a result, the assessed significance level may not always be directly attributed to the guidance matrix detailed below.

22.4.3.1 Importance

83. The first stage of an EclA is determining the 'importance' of ecological features or 'receptors'. CIEEM identifies the important ecological features as those key sites, habitats and species which have been identified by European, national and local Governments and specialist organisations as a key focus for biodiversity conservation in the UK. These include:
 - Statutory and non-statutory designated sites for nature conservation;
 - Species occurring on national biodiversity lists;
 - UK Habitats of Principal Importance; and
 - Red listed, rare or legally protected species.
84. Importance is also qualified by the geographic context of an ecological receptor, i.e. a species which may be not recognised on a national biodiversity list may be locally in decline, and therefore its local importance is greater than its national importance.
85. For this EclA, the guidelines outlined in **Table 22-6** have been followed to provide the relative importance of different ecological features.

Table 22-6: Definitions of importance levels for onshore ecology

Importance	Definition
High	<p>Habitats or species that form part of the cited interest within an internationally or nationally protected site, such as those designated under the Habitats Directive (e.g. SACs) or other international convention (e.g. Ramsar site).</p> <p>A feature (e.g. habitat or population) which is either unique or sufficiently unusual to be considered as being one of the highest quality examples in an international/national context, such that the site is likely to be designated as a site of European importance (e.g. SAC).</p> <p>Habitats or species that form part of the cited interest within a nationally designated site, such as an SSSI or a NNR.</p> <p>A feature (e.g. habitat or population) which is either unique or sufficiently unusual to be considered as being one of the highest quality examples in a national context for which the site could potentially be designated as a SSSI. Presence of UKBAP habitats or species, where the action plan states that all areas of representative habitat or individuals of the species should be protected.</p>
Medium	<p>A feature (e.g. habitat or population), which is either unique or sufficiently unusual to be considered as being of nature conservation value from a county to regional level. Habitats or species that form part of the cited interest of an LNR, or some local-level designated sites, such as a LWS, also referred to as a non-statutory Site of Importance for Nature Conservation or the equivalent, e.g. Ancient Woodland designation. Presence of LBAP habitats or species, where the action plan states that all areas of representative habitat or individuals of the species should be protected.</p>
Low	<p>A feature of importance at district level. A feature (e.g. habitat or population) that is of nature conservation value in a local context only, with insufficient value to merit a formal nature conservation designation.</p>
Negligible	<p>A feature of importance at local level. Commonplace feature of little or no habitat/historical significance. Loss of such a feature would not be seen as detrimental to the ecology of the area.</p>

86. In addition to the features listed in **Table 22-6**, ecological features which play a key functional role in the landscape or are locally rare have been considered. The importance of such features has been determined by professional judgement.
87. CIEEM places the emphasis on using professional judgement when considering importance of ecological receptors, based on available guidance, information and expert advice (CIEEM 2016). Various aspects of ecological importance should be considered, including designations, biodiversity value, potential value, secondary or supporting value, social value, economic value, legal protection and multi-functional features.

22.4.3.2 Magnitude

88. The magnitude of the impact is assessed according to:
- The extent of the area subject to a predicted impact;
 - The duration the impact is expected to last prior to recovery or replacement of the resource or feature;
 - Whether the impact is reversible, with recovery through natural or spontaneous regeneration, or through the implementation of mitigation measures or irreversible, when no recovery is possible within a reasonable timescale or there is no intention to reverse the impact; and
 - The timing and frequency of the impact, i.e. conflicting with critical seasons or increasing impact through repetition.
89. **Table 22-7** summaries the definitions of magnitude that have been used for the onshore ecology receptors.

Table 22-7: Definitions of magnitude for onshore ecology

Magnitude	Definition
Major	The impact is likely to have an adverse effect on the integrity of a site or the conservation status of a species or species assemblage.
Moderate	The impact adversely affects an ecological receptor but is unlikely to adversely affect its integrity or conservation status.
Minor	The impact adversely affects an ecological receptor but would not adversely affect its integrity or conservation status.
Negligible	There would be minimal effect on the ecological receptor.
No change	There would be no detectable change from the baseline condition of the ecological receptor.

22.4.3.3 Duration

90. The definitions of duration used within this EclA are dependent on the individual ecological receptor, and how sensitive it is to effects over different timescales. However, in general terms the following definitions have been used:
- **Short term** – effects which at most occur over a part of – or over a part of a key period of – a species’ active season or a habitat’s growing season, i.e. typically impacts which occur over a matter of days or weeks;
 - **Medium term** – effects which occur over the full duration of a species’ active season or a habitat’s growing season, i.e. typically impacts which occur over a matter of months or one year; and
 - **Long term** – effects which occur over the multiple active or growing seasons, i.e. typically impacts which occur over more than one year.

22.4.3.4 Impact Significance

91. Following the identification of receptor importance and magnitude of the effect, it is possible to determine the significance of the impact.
92. Ecologically significant impacts are defined as:
'...impacts on structure and function of defined sites, habitats or ecosystems and the conservation status of habitats and species (including extent, abundance and distribution)' (CIEEM 2016a).
93. Impacts are unlikely to be significant where features of low importance are subject to small scale or short-term effects. If an impact is not significant at the level at which the resource or feature has been valued, it may be significant at a more local level.
94. CIEEM recommend that the following factors are considered when determining significance for selected ecological receptors:
 - Designated sites – is the project and associated activities likely to undermine the site's conservation objectives, or positively or negatively affect the conservation status of species or habitats for which the site is designated, or may it have positive or negative effects on the condition of the site or its interest/qualifying features.
 - Ecosystems – is the project likely to result in a change in ecosystem structure and function.
 - Habitats – conservation status is determined by the sum of the influences acting on the habitat that may affect its extent, structure and functions as well as its distribution and its typical species within a given geographical area.
 - Species – conservation status is determined by the sum of influences acting on the species concerned that may affect its abundance and distribution within a given geographical area (CIEEM 2016a).
95. Following the identification of receptor importance and magnitude of effect, the significance of the impact has been considered using the matrix presented in **Table 22-8** below and knowledge of the ecological features affected.
96. The assessment of potential impacts has been undertaken assuming implementation of embedded mitigation and project commitments made as part of the design process. Where, following this assessment, significant impacts (moderate or major) are identified, additional mitigation measures are then proposed. A final assessment of the residual impacts remaining following implementation of these additional mitigation measures is then made.

Table 22-8: Impact Significance Matrix

		<i>Negative Magnitude</i>				<i>Beneficial Magnitude</i>			
		High	Medium	Low	Negligible	Negligible	Low	Medium	High
Importance	High	Major	Major	Moderate	Minor	Minor	Moderate	Major	Major
	Medium	Major	Moderate	Minor	Minor	Minor	Minor	Moderate	Major
	Low	Moderate	Minor	Minor	Negligible	Negligible	Minor	Minor	Moderate
	Negligible	Minor	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Minor

22.4.4 Cumulative Impact Assessment Methodology

97. The CIA considers other plans, projects and activities that may impact cumulatively with DEP and SEP. As part of this process, the assessment considers which of the residual impacts assessed for DEP and/or SEP on their own have the potential to contribute to a cumulative impact, the data and information available to inform the cumulative assessment and the resulting confidence in any assessment that is undertaken. **Chapter 6 EIA Methodology** provides further details of the general framework and approach to the CIA.
98. For onshore ecology, these activities include other OWF cable routes, agricultural development within or near the PEIR boundary, transport and other infrastructure schemes within or in close proximity to the PEIR boundary and occasionally to small-scale (e.g. householder) developments where the scope of ecological impacts is relevant to those considered in the EclA. Given the temporary nature of the onshore grid connection for DEP and SEP, only those plans or projects which would be active at the same time as (or have overlapping impact timeframes with) the onshore works associated with DEP and SEP are considered within the CIA.

22.4.5 Transboundary Impact Assessment Methodology

99. For onshore ecology and ornithology, the potential for transboundary impacts has been scoped out as the onshore study area is not adjacent to any international boundaries.

22.4.6 Assumptions and Limitations

100. Ecological data collection carried out in 2020 to inform this assessment was constrained by limited land access for surveys. In addition to limited access, constraints associated with the public health restrictions during the COVID-19 lockdown period were also a limitation on the 2020 survey effort. Whilst this has impacted on survey coverage for the PEIR boundary, data collected in the field has been supplemented using NBIS biological records where appropriate. Furthermore, as a precaution and to address this constraint, the assessment considers RWCS for receptors wherever there is uncertainty surrounding impact potentials (such as for receptors for which surveys have not yet been completed, or for parts of the PEIR boundary which have, to date, been inaccessible for surveys).

101. The refinement of the PEIR boundary during the course of some surveys also constrained the effectiveness and coverage of ecological surveys in 2020.
102. Some of the individual survey efforts experienced specific constraints, all of which are outlined in the respective technical appendices.
103. Where routine assumptions have been made in the course of undertaking the assessment, these are noted in **Sections 22.6** to **Section 22.8**.

22.5 Existing Environment

22.5.1 Designated Nature Conservation Sites

104. Designated sites that are located within the PEIR boundary are presented in **Table 22-9** and shown in **Figure 22.1** and **Figure 22.2**. **Table 22-9** also provides a summary of the qualifying features/reasons for notification of these designated sites.

Table 22-9: Designated Nature Conservation Sites Summary

Designated Site Name and NBIS Reference Number (for CWSs only)	Location and Proximity to/Relationship with PEIR Boundary	Summary of Reasons for Site Designation
River Wensum SAC/SSSI	The River Wensum SAC/SSSI follows the course of the river from its headwaters south-west of Fakenham to where the river flows into the west side of Norwich. This designated site passes through the PEIR boundary south of Attlebridge, where a 200m length (approximately) of the river is within the PEIR boundary.	<p><u>Annex I habitats that are a primary reason for selection of this site:</u> 3260: watercourses of plane to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitricho-Batrachion</i> vegetation.</p> <p><u>Annex II species that are a primary reason for selection of this site:</u> 1092 White-clawed crayfish <i>Austropotamobius pallipes</i></p> <p><u>Annex II species present as a qualifying feature, but not a primary reason for site selection:</u> 1061 Desmoulin’s whorl snail <i>Vertigo moulinsiana</i> 1096 Brook lamprey <i>Lampetra planeri</i> 1163 Bullhead <i>Cottus gobio</i></p>
Weybourne Cliffs SSSI	The PEIR boundary overlaps the westernmost extents of this SSSI at the landfall	This SSSI is designated principally for its geological and paleontological interest. Ecological interest is provided by colonies of sand martins <i>Riparia riparia</i> in the cliff face and

Designated Site Name and NBIS Reference Number (for CWSs only)	Location and Proximity to/Relationship with PEIR Boundary	Summary of Reasons for Site Designation
	location, directly on the coastline.	fulmars <i>Fulmaris glacialis</i> on the cliff ledges (based on 1980s data).
The Carrs Woodland CWS no. 196	The PEIR boundary overlaps a small part of the northern edge of this CWS, which is located between Swardeston and East Carleton.	A large semi-natural woodland containing ponds, fen areas, grassland, streams and dykes.
Yare Valley (Marlingford Hall) CWS no. 229	PEIR boundary overlaps the western part of this CWS at the PEIR boundary's crossing point of the River Tiffey near Barford. The river flows in an easterly direction, so flows from the PEIR boundary crossing point into the CWS.	An area of woodland, marshy (mostly neutral) grassland and fen bordering the River Yare.
Yare Valley (Colton Woods) CWS no. 228	PEIR boundary crosses the eastern arm of this CWS south-east of Colton.	An area of low-lying marshy grassland and tall fen bordering the River Yare. The site also supports areas of wet semi-natural woodland and scrub.
River Tud at Easton and Honingham: 250	Part of the western section of this CWS is within the PEIR boundary, near Easton	An area of species-rich aquatic, marginal and emergent riverine flora. The site also supports otter and water vole.
Hall Hills/Ringland Covert CWS no. 2105	PEIR boundary crosses the northern part of this CWS south-west of Ringland.	An area of woodland listed as an Ancient Woodland, with widespread replanting.
Wensum Pastures at Morton Hall CWS no. 2070	PEIR boundary crosses the northern part of this CWS south of Attlebridge.	An area of predominantly improved cattle-grazed pasture within the floodplain of the River Wensum and crossed by a network of drains supporting diverse aquatic flora. The site is subject to periodic flooding. There are small areas of neutral and damp grassland.

Designated Site Name and NBIS Reference Number (for CWSs only)	Location and Proximity to/Relationship with PEIR Boundary	Summary of Reasons for Site Designation
Marriott's Way CWS no. 2176	The PEIR boundary crosses this linear CWS (which follows the course of a disused railway line) in two locations; north of Attlebridge and north-east of Cawston.	A disused railway line with ecological interest in the linear cuttings and embankments which are mostly dominated by woodland or scrub habitats.
Kelling Heath Park and 100 Acre Wood CWS no. 1150	The PEIR boundary overlaps the western edge of this CWS south of Weybourne.	A semi-natural broadleaved woodland with dry heath and associated scrub.
Beach Lane, Weybourne CWS no. 1156	This CWS is entirely within the PEIR boundary at the landfall location north of Weybourne.	An area of reed-bed within a shallow pool just inland of the shingle sea defences. It is fed by a stream so is part freshwater and part brackish,
Kelling Hard CWS no. 1107	The PEIR boundary overlaps the central and eastern part of the CWS at the landfall location north-west of Weybourne.	A mosaic of unimproved, calcareous, neutral and marshy grasslands with some swamp vegetation, which are influenced by the site's proximity to the coast.
Brook House Marshes: 2315	The eastern part of this CWS is within the PEIR	This site comprises three fields of relatively species-poor grassland lying in the floodplain of the River Tud.

105. All statutory designated sites for nature conservation are considered to be of high importance, in accordance with the criteria set out in [Table 22-6](#).
106. All non-statutory designated sites are considered to be of medium importance, in accordance with the criteria set out in [Table 22-6](#).

22.5.2 Habitats

107. The baseline information presented in this section has been informed from the findings of the 2019 and 2020 EP1HS. Where habitats were not recorded during these survey efforts, due to landowner access restrictions, the habitat descriptions have been informed using the information obtained from the Norfolk 'Living Map'. Full details of the habitats present are provided in [Appendix 22.1](#).

108. The EP1HS recorded that the PEIR boundary runs through a predominantly arable landscape with most field boundaries marked by hedgerows. Some boundaries are marked by ditches (dry/seasonal and wet), verges/field margins, fences and tree-lines/shelter-belts.
109. Arable fields are typically of low value and are suboptimal for use by protected and notable species. However, for ground-nesting birds such as skylark *Alauda arvensis*, arable fields do provide nesting habitat. Terrestrial mammals such as brown hares *Lepus europaeus* also use arable fields for foraging and shelter.
110. Water bodies, predominantly ponds, are widespread throughout much of the PEIR boundary, particularly in the south and far north where there are high densities of ponds. Many of these ponds are located within or around the edges of arable fields and have associated scrub or trees around them.
111. The PEIR boundary also passes through a number of woodlands, most of which are either semi-natural or plantation broad-leaved woodland. There are also some mixed (broad-leaved and conifer) or conifer woodlands. However, in general, the PEIR boundary avoids woodland, with the boundary bypassing woodlands such as Mossymere Wood near Saxthorpe, Colton Wood (near Colton) and Smeeth Wood near Ketteringham.
112. There are occasional grasslands along the PEIR boundary, most of which are classified as improved or poor semi-improved grasslands and are mostly used for grazing livestock. There are a small number of semi-improved neutral and acid grasslands.
113. The PEIR boundary passes through the river corridors of the Rivers Yare, Tiffey, Tud, Wensum and Bure, including tributaries and drainage ditches associated with them. These river corridors are amongst the more diverse mosaics of habitat within the PEIR boundary, with various grasslands, woodlands, scrub, hedgerows, ditches and ponds (amongst other habitats) often recorded within close proximity to river channels and floodplains. All these rivers are either classified as chalk streams or are tributaries of/part of the same river systems as rivers which are classified as such. The PEIR boundary also runs adjacent to the source/headwaters of the River Glaven (also a chalk stream) near Bodham.
114. There is an assortment of other habitat types along the PEIR boundary, typically occupying small, linear and disused parcels of land such as along roadsides, beside railways (including disused railways) and within and around villages. These disused areas of land support a range of habitat classifications including scrub, tall herb and ruderal, bare ground and poor semi-improved grassland.
115. The presence of Himalayan balsam was recorded during the EP1HS and predominately located along watercourses such as tributaries of the Wensum at Swannington and on the Rivers Tud and Bure.
116. The Norfolk Living Map data provided by NBIS reflects the mosaic of habitat identified by the EP1HS, with arable farmland the dominant habitat type and small areas of various other habitats such as woodland and grassland.

22.5.3 Protected and Notable Species

22.5.3.1 Breeding Birds

117. The results of the breeding bird survey are provided in full in [Appendix 22.5](#).

118. The 2020 breeding bird survey recorded breeding activity by 10 BoCC Red listed species, nine Amber listed species and two species listed on Schedule 1 of the WCA. These are summarised in [Table 22-10](#).

Table 22-10: Breeding Bird Survey Results Summary

Species Common Name	Species Latin Name	Conservation Status	Number of Breeding Territories Wholly or Partly Within the PEIR Boundary
Skylark	<i>Alauda arvensis</i>	Red listed	c.80 – 115
Dunnock	<i>Prunella modularis</i>	Amber listed	41
Yellowhammer	<i>Emberiza citrinella</i>	Red listed	26
Linnet	<i>Linaria cannabina</i>	Red listed	11
Firecrest	<i>Regulus ignicapilla</i>	Schedule 1 listed	9
Song thrush	<i>Turdus philomelos</i>	Red listed	7
Bullfinch	<i>Pyrrhula pyrrhula</i>	Amber listed	4
Kestrel	<i>Falco tinnunculus</i>	Amber listed	4
Stock dove	<i>Columba oenas</i>	Amber listed	4
House sparrow	<i>Passer domesticus</i>	Red listed	3
Reed bunting	<i>Emberiza schoeniclus</i>	Amber listed	3
Cetti's warbler	<i>Cettia cetti</i>	Schedule 1 listed	1
Grey wagtail	<i>Motacilla cinerea</i>	Red listed	1
Marsh tit	<i>Poecile palustris</i>	Red listed	1
Tawny owl	<i>Strix aluco</i>	Amber listed	1
Yellow wagtail	<i>Motacilla flava</i>	Red listed	1

119. The vast majority of breeding bird activity relates to farmland birds, namely skylark, dunnock, yellowhammer and linnet. This reflects the predominance of arable habitat throughout the onshore cable corridor.

120. Numbers of skylark territories has been estimated because the species' nests are inconspicuous and nesting territories are difficult to define within arable landscapes.
121. Cetti's warbler was recorded in scrub near the landfall location. Firecrests were recorded exhibiting breeding behaviour with Weybourne Wood, also near the landfall location.
122. Sand martin *Riparia riparia* (a Green listed species) was recorded breeding in cliffs near the landfall location.
123. The NBIS data search returned thousands of records relating to dozens of bird species which could feasibly breed within the PEIR boundary; the records themselves do not specifically state whether breeding activity was recorded, only that the bird itself was observed/heard.

22.5.3.2 Over-Wintering Birds

124. The results of the over-wintering bird survey are provided in full in [Appendix 22.4](#).
125. The 2019/2020 over-wintering bird survey recorded no notable flocks of wintering waders and wildfowl within the PEIR boundary.
126. Peak counts recorded were of farmland bird species such as fieldfare *Turdus pilaris* (70 birds), meadow pipit *Anthus pratensis* (50 birds) and starling *Sturnus vulgaris* (18 birds).
127. The presence of suitable feeding/foraging habitat, namely harvested sugar beet fields or fields with stubble (harvested but not ploughed-in cereal crops), was closely associated with the presence of over-wintering bird activity. Peak-counts of flocks of geese and waders were recorded at a sugar beet field which has been excluded from the refined PEIR boundary, so these records are not relevant to this assessment.
128. The NBIS data search returned thousands of records relating to dozens of bird species which could feasibly over-winter within the PEIR boundary; the records themselves do not all state the time of year the bird was recorded so it is not known if they were over-wintering.

22.5.3.3 Great Crested Newt

129. A total of 100 water bodies (ponds) were identified as being of optimal habitat to support GCN within the PEIR boundary and the required 250m buffer. These were identified during the desk-based review and/or during the EP1HS.
130. All of these 100 ponds were assessed for their potential to support GCN using the HSI assessment. Suitable terrestrial habitat for supporting foraging and hibernating GCN was observed throughout the PEIR boundary. Part of the HSI assessment includes an assessment of the habitat surrounding a potential breeding pond for its suitability to support foraging and hibernating newts. Full details of the HSI are provided in [Appendix 22.2](#).
131. Of the 100 ponds subject to the HSI assessment, 20 scored an Excellent classification, 26 were within the Good classification, 19 were Average, 24 were Below Average and 11 were Poor.

132. An eDNA survey of which was undertaken in accordance with approved field and laboratory protocols (Briggs et al. 2014), in May and June 2020. This is an approved valid method for GCN presence/absence survey and this approach was agreed with stakeholders at the ETG meeting in January 2019. Fourteen of the ponds surveyed returned a positive result and the remaining 86 ponds returned a negative result. Full details of these eDNA surveys is provided in **Appendix 22.2**. All but one of these positive ponds are within geographical clusters, which are considered to represent the locations of metapopulations of GCN. The clusters are as follows:
- Swardeston/Ketteringham/Hethersett area (six positive ponds);
 - Marlingford/Colton area (three positive ponds); and
 - Bodham area (four positive ponds).
133. One isolated positive result was located at Oulton.
134. Data obtained from the desk study includes records of GCN presence at some of the same ponds as had positive eDNA records. Additional records of GCN were provided for other ponds (ponds which were either not surveyed or which had negative eDNA results), most of which are in the same metapopulation areas listed above.
135. Population size assessment surveys will be undertaken for all water bodies prior to the commencement of construction works and once the DCO boundary has been defined. The findings of which will be used to inform and develop any appropriate mitigation measures where required. Further details of these pre-construction surveys will be provided in the Outline Landscape and Ecological Management Strategy that will be submitted with the DCO application.
136. GCN are a European Protected Species (EPS) and therefore are considered to be of high importance.

22.5.3.4 Badgers

137. Approximately 70% of the EP1HS survey area was assessed for signs of badger activity, due to landowner restrictions during the EP1HS survey. Further presence/absence surveys will be undertaken in 2021 (subject to landowner agreement), the findings of which will be reported within the ES.
138. As a regularly occurring population of a nationally important species which is not threatened or rare in the Norfolk county, badgers are considered to be of low importance.

22.5.3.5 Water voles and otters

139. All watercourses within the PEIR boundary were noted during the EP1HS and subsequently assessed for their suitability to support water voles and/or otters. Presence/absence surveys for these species will be undertaken in 2021 and therefore more detailed information regarding the presence of these species is unknown. The phase 2 water vole and otter surveys will be provided within the ES and with the DCO application.
140. Water voles and otters are an EPS species and therefore are considered to be of high importance.

22.5.3.6 Fish

141. The Environment Agency National Fish Population Database returned records of bullhead, brook lamprey, brown trout and European eels *Anguilla anguilla*. These species have been recorded within the water bodies present within the PEIR boundary (refer to Chapter 20 Water Resources and Flood Risk for further information).
142. No baseline data has been collected to identify the presence/likely absence of fish species in watercourses within the PEIR boundary.
143. Bullhead and brook lamprey, as qualifying features of the River Wensum SAC, are considered to be of high importance.
144. As a nationally important species which is uncommon in the region, brown trout is considered to be of medium importance.

22.5.3.7 Bats

145. All features (i.e. trees, buildings, structures) noted during the EP1HS were assessed in accordance with Bat Conservation Trust (BCT) guidance (Collins, 2016), from ground level and using binoculars, for their suitability to support roosting bats. Each feature where present was assessed for their suitability to support roosting bats and assigned the following category:
 - Negligible;
 - Low;
 - Moderate; and
 - High.
146. Emergence/re-entry surveys will be undertaken in 2021 and until they are completed, in combination with further refinement of the DCO boundary, more detailed information regarding the roosting bat resource is unknown at this stage. The bat roost survey baseline and associated impact assessment will be provided within the ES as part of the full DCO application.
147. In addition to trees and structures, all linear features (e.g. watercourses, hedgerows) were assessed in terms of their suitability to support commuting or foraging bats, in accordance with the BCT guidance. This categorisation was based on the habitat type, qualified by how well connected to surrounding habitat feature was. The categorisation used was as follows:
 - Defunct hedgerows and field drains typically provided low suitability for commuting and foraging bats;
 - Intact species-rich hedgerows, areas of scrub and small watercourses typically provided moderate suitability for commuting and foraging bats; and
 - Species-rich hedgerows with trees and large watercourses well connected to the wider landscape typically provided high suitability for commuting and foraging bats.
148. The full results from the bat activity surveys completed to date are provided in [Appendix 22.3](#).

149. The majority of bat activity recorded during surveys related to soprano pipistrelle *Pipistrellus pygmaeus*, with over 61% of all recorded bat echolocation registrations attributed to this species. Common pipistrelle *P. pipistrellus* was the second most frequently recorded bat in terms of total number of echolocation registrations, with over 25% of all activity related to this species.
150. Noctule *Nyctalus noctula* was the most commonly recorded non-pipistrelle species, accounting for approximately 4.8% of all recorded echolocation registrations. A similar level of activity (4.7% of all registrations) is attributed to *Myotis* species of bats. The echolocation calls of *Myotis* species do not allow accurate species classification, although given the aquatic/semi-aquatic nature of many of the habitats which the surveys focussed on, it is speculated that a notable proportion (or possibly all) *Myotis* sp. records relate to Daubenton's bat *Myotis daubentonii*.
151. While the majority of bat records could be classified to a species (or genus in the case of *Myotis* sp. bats), 3.9% of all recorded echolocations could not be confidently assigned to a species. Mostly, this is because the records are too faint or incomplete to assign to a particular species.
152. The survey recorded small numbers of echolocation registrations attributable to barbastelle *Barbastella barbastellus* (0.29% of all recorded activity), brown long-eared bat *Plecotus auritus* (0.11%), Nathusius' pipistrelle *Pipistrellus nathusii* (0.01%) and serotine *Eptesicus serotinus* (<0.01%).
153. Records are summarised for each general survey location in **Table 22-11**.

Table 22-11 Bat Activity Survey Results Summary

Survey Location	Species Recorded	Average Number of Registrations Per Night of Detector Deployment			
		Jun-Jul	Jul-Aug	Aug-Sep	Sep-Oct
Hundred Acre Wood / Weybourne Wood / Bodham Wood	Common pipistrelle	0.19	4.6	57	24
	Soprano pipistrelle	-	1.2	30	35
	Noctule	0.06	-	2	-
	<i>Myotis</i> sp.	-	0.08	1.7	-
	Barbastelle	-	-	0.46	-
River Bure	Common pipistrelle	ND	ND	5.3	22
	Soprano pipistrelle	ND	ND	1.3	7.8
	Noctule	ND	ND	2.7	7.8
	<i>Myotis</i> sp.	ND	ND	0.8	1.9
	Barbastelle	ND	ND	0.2	2.5

Survey Location	Species Recorded	Average Number of Registrations Per Night of Detector Deployment			
		Jun-Jul	Jul-Aug	Aug-Sep	Sep-Oct
	Brown long-eared bat	ND	ND	0.07	0.45
Swannington (tributaries of the River Wensum)	Common pipistrelle	ND	72	102	ND
	Soprano pipistrelle	ND	20	25	ND
	Noctule	ND	5.1	5.5	ND
	<i>Myotis</i> sp.	ND	0.3	0.27	ND
	Barbastelle	ND	-	1.07	ND
	Brown long-eared bat	ND	-	0.07	ND
River Wensum and surrounding floodplain	Soprano pipistrelle	708	180	294	3.4
	Common pipistrelle	133	23	80	4.4
	Noctule	42	14	0.2	9.4
	<i>Myotis</i> sp.	38	4.3	0.8	70
	Brown long-eared bat	1.6	0.33	-	-
	Barbastelle	1.3	2	-	0.18
	Serotine	0.13	-	-	-
	Nathusius' pipistrelle	-	-	0.8	-
River Yare	Soprano pipistrelle	ND	74	ND	ND
	Common pipistrelle	ND	42	ND	ND
	Noctule	ND	1.7	ND	ND
	<i>Myotis</i> sp.	ND	1.5	ND	ND
River Tiffey	Soprano pipistrelle	197	ND	ND	17
	Common pipistrelle	97	ND	ND	3.7
	Noctule	23	ND	ND	0.45

Survey Location	Species Recorded	Average Number of Registrations Per Night of Detector Deployment			
		Jun-Jul	Jul-Aug	Aug-Sep	Sep-Oct
	<i>Myotis</i> sp.	2.1	ND	ND	0.81
	Barbastelle	-	ND	ND	0.09

Note: ND is where No Deployment of a static bat detector was made in this location for the specified monitoring period.

154. Records which could not be attributed to a particular species (i.e. indeterminate records) are not listed above. These accounted for approximately 3.9% of all recorded registrations.
155. The results indicate that the River Wensum and surrounding floodplains had the highest levels of bat activity of all surveyed locations and supported the highest diversity of bats (most species). The River Wensum is the only survey location where serotine and Nathusius' pipistrelle were recorded.
156. Moderate to low levels of activity by *Myotis* species was recorded at all survey locations. By far, the highest levels of activity by *Myotis* species were recorded at the River Wensum during the first and fourth deployments (an average of 38 and 70 registrations per night of detector deployment, respectively).
157. Low levels of barbastelle activity were recorded at all survey locations other than the River Yare (although this location was only surveyed once due to landowner constraints).
158. Confirmed records of brown long-eared bat were recorded in very low numbers at half of the survey locations. Given this species typically has very quiet echolocation calls, it is likely that the average number of registrations per night listed in the above table, is an underestimation of actual activity by this species.
159. The NBIS data search returned over 3,500 records relating to at least 15 bat species within the PEIR boundary and surrounding 2km area. In addition to the above listed species recorded during the 2020 bat surveys, biological records were also returned for Brandt's bat *Myotis brandtii*, Daubenton's bat *M. daubentonii*, whiskered bat *M. mystanicus*, Natterer's bat *M. nattereri*, Leisler's bat *Nyctalus leisleri* and parti-coloured bat *Vespertilio murinus* (a single record from Kelling Heath, likely of an off-course migrating bat as this is not a species native to the UK).
160. All bats are EPS and therefore are of high importance.

22.5.4 Climate Change and Natural Trends

161. In general, most species of conservation concern which have been subject of targeted ecological surveys in relation to this onshore ecology EclA are experiencing negative trends in the form of population declines, shifts or contractions in range, habitat loss, fragmentation of habitats and species populations, and from the spread of diseases and non-native species. These long-term trends are associated with myriad factors including climate change, alterations to land-uses (particularly intensification of farming and increased built development), increased human disturbance and anthropogenic pollution of waters, land and air.

162. However, measures such as legislation regarding protection of species and habitats, changing farming practices and nature conservation efforts are limiting the magnitude of these negative trends (or in some cases, reversing them), particularly at specific scales relevant to the onshore cable corridor (e.g. county/district scale). Where a valued ecological receptor is known to be experiencing baseline natural trends that are relevant to this impact assessment, this is noted in the individual receptor's assessment below.

22.6 Potential Impacts

163. This impact assessment is completed with reference to the CIEEM EclA Guidelines (CIEEM 2018). Throughout, technical assessment terminology is taken from definitions within the CIEEM guidance. This refers to the contexts of the impact in terms of its geographical scale, magnitude, reversibility, permanence and significance.

22.6.1 Potential Impacts during Construction

22.6.1.1 Impact 1: Construction Disturbance to Statutory Designated Nature Conservation Sites

164. There is one statutory designated site overlapping with part of the coastline where landfall works are expected, namely Weybourne Cliffs SSSI. This SSSI is notified primarily for its geological interest associated with the exposed cliff faces, but nesting birds (sand martins and fulmars) provide ecological interest.
165. The landfall works comprise HDD drilling activities that will launch from an onshore HDD entry pit temporary working area (located outside the Weybourne Cliffs SSSI) to an exit point approximately 1000m from the coastline (refer to [Chapter 5 Project Description](#)). DEP and SEP have committed to HDD at the landfall, which avoids any interaction with Weybourne Cliffs SSSI. As such, the features of this SSSI would not be directly affected by landfall construction. Consequently, no change to Weybourne Cliffs SSSI is predicted during the landfall construction works.
166. The River Wensum SSSI and SAC is also present within the PEIR boundary. At the proposed crossing point, the habitat of this site consists of river channel and associated banks. However, ecologically, the associated area of floodplain and ditches are important functionally linked habitats even though they are beyond the SSSI and SAC designated site boundaries.
167. The onshore cable corridor will cross the River Wensum SSSI and SAC. Where the onshore cable corridor crosses this designated site, HDD will be employed. The HDD works at the River Wensum SSSI and SAC will launch (and re-enter) from entry and exit pit temporary working areas (located outside of the River Wensum SSSI and SAC) (refer to [Chapter 5 Project Description](#)). Through this commitment, the use of HDD will avoid any interaction with the River Wensum SSSI and SAC. As such, the features of this SSSI and SAC will not be directly affected by the proposed crossing works. Consequently, no change to River Wensum SSSI and SAC is predicted.

168. The use of HDD is embedded within the scheme design to avoid direct impacts, however during the drilling process there is the potential for the release/breakout of inert drilling fluids which may impact the watercourse and in turn result in impacts to the designated sites. Therefore, the HDD design will be designed appropriate to the ground conditions to minimise the risk of a breakout where possible.

22.6.1.1.1 Magnitude of effect (all construction scenarios)

169. Without mitigation, a temporary, low negative impact to the high sensitivity statutory designated sites is possible as a result of a potential breakout of inert drilling fluids associated with the implementation of a HDD technique.

22.6.1.1.2 Impact Significance (all construction scenarios)

170. Unmitigated, the impact would be of up to moderate adverse significance to these sites which are designated at national and international levels of importance. The significance would apply at a level of at least county.

22.6.1.1.3 Mitigation

171. HDD has been embedded into the scheme design for both the landfall works and for crossing the River Wensum. Therefore, there is no mechanism for direct impacts to occur to the designated sites (namely Weybourne Cliffs SSSI and the River Wensum SSSI and SAC) at these locations and as such no further mitigation is proposed at the HDD locations at these points.

172. Furthermore, in relation to the risk of drilling fluid breakout, DEP and SEP have committed to a minimum cover of 2m below the bed level of watercourses at trenchless crossings, and a deeper installation may be suggested during detailed design to minimise the risk further. Furthermore, the adherence to industry practice during construction will help to minimise the likelihood of a breakout. This will include ensuring effective removal of the cuttings from the borehole which is a key component of avoiding breakouts.

173. In addition, the refinement of the DCO boundary will seek to maximise the distance between physical works and designated sites, including siting features such as compounds and temporary access routes as far from site boundaries as possible.

174. There will be other mitigation measures that can be adopted to mitigate specific impacts once such impacts are discernible following finalisation of the onshore cable corridor and working practices. For the River Wensum SSSI/SAC and Weybourne Cliffs SSSI this will include minimising any artificial lighting requirements of the nearby parts of the construction site, and/or careful design of any essential lighting nearby. Appropriate hydrological pollution prevention measures will also be adopted (as outlined in [Chapter 20 Water Resources and Flood Risk](#)).

22.6.1.1.4 Residual Impacts (all construction scenarios)

175. Following the implementation of the mitigation measures considered necessary (as outlined above), there will be a reduction in the magnitude of effect from temporary low negative to negligible on a high importance receptor, representing a temporary residual impact of **minor adverse** significance.

22.6.1.2 Impact 2: Habitat Destruction or Damage, or Construction Disturbance to Non-Statutory Designated Nature Conservation Sites

176. There are nine non-statutory designated nature conservation sites wholly or partially within the PEIR boundary, as presented in **Table 22-12**, listed from south to north. Their locations are shown on **Figure 22.1** and **Figure 22.2**.
177. Only those non-statutory designated sites which are partially or wholly within the PEIR boundary have been considered in this EclA.

Table 22-12 Summary of CWS' within the PEIR boundary

Designated Site Name and NBIS Reference Number	Proximity to/relationship with PEIR boundary and potential for impacts
The Carrs Woodland CWS no. 196	The PEIR boundary (a temporary access route) overlaps a small part of the northern edge of this CWS. No excavation works are planned for within the CWS, but it may be impacted by some localised vegetation removal to facilitate access to the onshore cable corridor. As part of the DCO boundary refinement, construction areas will be refined to avoid direct impacts to this CWS.
Yare Valley (Marlingford Hall) CWS no. 229	PEIR boundary overlaps the western part of this CWS at the PEIR boundary's crossing point of the River Tiffey. The river flows in an easterly direction, so flows from the PEIR boundary crossing point into the CWS. Direct impacts are to be avoided by aligning the final cable corridor outside of the CWS boundary, or by adopting HDD installation beneath the CWS.
Yare Valley (Colton Woods) CWS no. 228	PEIR boundary crosses the eastern arm of this CWS. Direct impacts are to be avoided by adopting HDD installation beneath the CWS.
River Tud at Easton and Honingham: 250	Part of the western section of this CWS is within the PEIR boundary, near Easton. No excavation works are planned for within the CWS, but it may be impacted by disturbance from construction activity at the landfall location. As part of the DCO boundary refinement, construction areas will be refined to avoid direct impacts to this CWS.
Hall Hills/Ringland Covert CWS no. 2105	PEIR boundary crosses the northern part of this CWS. Direct impacts are to be avoided by adopting HDD installation beneath the CWS.
Wensum Pastures at Morton Hall CWS no. 2070	PEIR boundary crosses the northern part of this CWS. Direct impacts are to be avoided by adopting HDD installation beneath this CWS (and the adjacent River Wensum SSSI/SAC)
Marriott's Way CWS no. 2176	The PEIR boundary crosses this linear CWS (which follows the course of a disused railway line) in two locations; north of Attlebridge and north-east of Cawston. Direct impacts are to be avoided by adopting HDD installation beneath this CWS.

Designated Site Name and NBIS Reference Number	Proximity to/relationship with PEIR boundary and potential for impacts
Kelling Heath Park and 100 Acre Wood CWS no. 1150	The PEIR boundary overlaps the western edge of this CWS. Direct impacts are to be avoided by aligning the final cable corridor outside of the CWS boundary, or by adopting HDD installation beneath the CWS.
Beach Lane, Weybourne CWS no. 1156	This CWS is entirely within the PEIR boundary at the landfall location. No excavation works are planned for within the CWS, but it may be impacted by disturbance from construction activity at the landfall location. As part of the DCO boundary refinement, construction areas will be refined to avoid direct impacts to this CWS.
Kelling Hard CWS no. 1107	The PEIR boundary overlaps the central and eastern part of the CWS at the landfall location. No excavation works are planned for within the CWS, but it may be impacted by disturbance from construction activity at the landfall location. As part of the DCO boundary refinement, construction areas will be refined to avoid direct impacts to this CWS.
Brook House Marshes: 2315	The eastern part of this CWS overlaps with the PEIR boundary near Euston. No excavation works are planned for within the CWS, but it may be impacted by disturbance from construction activity at the landfall location. As part of the DCO boundary refinement, construction areas will be refined to avoid direct impacts to this CWS.

178. All CWSs are considered to be of high sensitivity given their likely recovery time from impacts in a realistic worst-case scenario.
179. There are expected to be no direct land-take impacts within CWSs and therefore neutral direct impacts to those CWS' identified in the table above are anticipated. This will be achieved through the implementation of an HDD crossing technique for those sites which completely cross/overlap the PEIR boundary. Where a designated site overlaps part of the PEIR boundary only, it may be possible to micro-site the construction footprint so as to avoid the designated site entirely; if not, then HDD will be adopted.
180. In addition, the refinement of the DCO boundary will seek to maximise the distance between physical works and the designated sites, including siting features such as construction compounds and temporary access routes as far from the site boundaries as possible.
181. Despite the commitment to the embedded mitigation measures of avoidance, there would remain a risk of temporary indirect disturbance impacts (e.g. from noise and lighting) to habitats and wildlife associated with these CWSs which likely includes valued and protected species, such as nesting birds (possibly including Schedule 1 species such as kingfisher and barn owl), bats, reptiles, otters, water voles and white-clawed crayfish; impacts to these protected species are assessed below, as they are for all other designated sites in which such species may be present.

22.6.1.2.1 *Magnitude of effect (all construction scenarios)*

182. Without mitigation, temporary, low negative impacts to high sensitivity CWSs habitats and species are likely as a result of construction related disturbance. The effect of this is expected to be of no more than minor adverse significance at the local level.

22.6.1.2.2 *Impact Significance (all construction scenarios)*

183. The effect of the unmitigated magnitude of effects on CWSs would be of minor adverse levels of significance at the local level.

22.6.1.2.3 *Mitigation*

184. The principal mitigation measure for addressing impacts to designated sites will be the embedded commitment for construction impacts to avoid these sites through HDD installation or micro-siting of the construction footprint.

185. There will be other mitigation measures that can be adopted to mitigate specific impacts once such impacts are discernible following finalisation of the onshore cable corridor and working practices. For CWSs this will include minimising any artificial lighting requirements of the nearby parts of the construction site, and/or careful design of any essential lighting nearby. Appropriate hydrological pollution prevention measures will also be adopted (as outlined in **Chapter 20 Water Resources and Flood Risk**).

22.6.1.2.4 *Residual Impacts (all construction scenarios)*

186. Depending on the precise construction programme in close proximity to CWSs, these measures will be likely to reduce the magnitude of effect in a RWCS from temporary, low negative to negligible, thereby reducing the significance of the impact to **minor adverse** or **negligible** significance at the local level. This assessment applies to all CWSs, with exceptions listed below:

- Beach Lane, Weybourne CWS: a temporary, low negative magnitude impact remains possible due to disturbance from the close proximity of the landfall construction works. The significance of this impact would be of **minor adverse** significance at the local level. This particular CWS was found to support breeding Cetti's warbler, a Schedule 1 species meaning it has enhanced legal protection; specific assessment of the potential impact to this species which uses this CWS is provided in **Section 22.5.1**.
- Kelling Hard CWS: a temporary, low negative magnitude impact remains possible due to disturbance from the close proximity of the landfall construction works. The significance of this impact would be of **minor adverse** significance at the local level.

22.6.1.3 Impact 3: Loss of or Damage to Arable Habitat

187. The vast majority of construction related activities associated with the onshore elements of DEP and SEP are located within arable habitat. Arable fields are of low sensitivity and are not an ecologically valued habitat due to their high levels of disturbance/management, monoculture vegetation and homogenous vegetation structure. However, they do support some wildlife including ground-nesting birds such as skylark and some terrestrial animals such as brown hare. Arable habitat is by far the most widespread and abundant habitat type in Norfolk, so even at the maximum extent of the construction footprint, a negligible proportion of arable habitat at the county scale would be impacted.
188. Arable habitat soils are heavily disturbed through ploughing and application of fertilisers, herbicides and other ground treatments, so disturbance to the soils is expected to be less ecologically impactful than at other habitats where soils have been less disturbed.
189. Arable field margins are listed as a Priority Habitat where they are specifically being managed for wildlife. The PEIR boundary passes through a number of these areas; however the exact number is difficult to predict at this stage as the exact locations of infrastructure (i.e. haul road, jointing bays) is not known at this time as well as the temporary, rotational nature of this habitat, with farmers sometimes altering the distribution and extent of field margins on an annual basis is unknown.
190. Arable field margins are strips of grassland which can support a diverse range of grasses and forbs. They are a component of field boundaries which provide ecologically important linear features (typically in combination with features such as hedgerows, trees and ditches) within arable landscapes. This habitat is considered to be of medium or low sensitivity; any better-established, larger, more florally diverse and better ecologically connected margins are considered to be of medium sensitivity, whereas more ephemeral, smaller, less florally diverse and ecologically isolated margins are considered to be of low sensitivity.
191. The Phase 1 Habitat Survey does not include a habitat classification for field margins so these are not mapped and cannot be quantified using this survey approach. However, estimates of the prevalence of field margins have been made in completing this impact assessment, based on knowledge of the surveyors who completed the EP1HS, and the typical abundance of this habitat type within arable landscapes.
192. Per the embedded mitigation commitments, the width of the working corridor at field boundary crossing points will be reduced to a typical working width of 20m. This commitment will apply to field margins as well as to hedgerows, ditches and other boundary features.

22.6.1.3.1 Magnitude of effect (all construction scenarios)

193. Overall, the temporary loss of arable habitat to accommodate the working corridor would be expected to have a temporary, low negative impact to the county resource, and this would be considered to be of negligible significance.
194. It is expected that (without additional mitigation) field margin habitat would experience a temporary, medium negative impact on multiple local resources as a result of construction impacts.

22.6.1.3.2 *Impact Significance (all construction scenarios)*

195. The effect of the above impact on arable habitat would be of negligible significance, both from temporary construction impacts and from permanent onshore substation impacts.
196. The effect of the above impacts on arable margin habitat would likely be of minor adverse significance at multiple local scales.

22.6.1.3.3 *Mitigation*

197. Arable field margins will be reinstated, either by retaining stripped turfs and reinstating them after construction, or by re-sowing with a suitable grassland or possibly wildflower mix.
198. An Outline Landscape and Ecological Management Strategy will be submitted as part of the final DCO application. This will include proposals to reinstate and where possible enhance habitats such as arable field margins impacted by DEP and SEP.
199. No other mitigation for impacts to arable habitats are considered necessary.

22.6.1.3.4 *Residual Impacts (all construction scenarios)*

200. Depending on the precise construction footprints, these measures will not be likely to reduce the magnitude below the pre-mitigation estimate of temporary, low negative, and the significance of the impact would be expected to remain at being of **negligible** significance given the low sensitivity of this habitat.
201. Regarding arable field margins, the mitigation measures would be likely to reduce the magnitude of effect from temporary medium negative to temporary low negative thereby reducing the significance of the impact to **negligible** significance.

22.6.1.4 *Impact 4: Loss of or Damage to Grassland Habitats*

202. The footprint of the PEIR boundary passes through a number of grasslands, the majority of which have been recorded as improved or poor semi-improved grasslands. Construction impacts to these grasslands will be temporary and therefore reversible in the medium-term as the working areas within this habitat will be reinstated to their baseline conditions on completion of works.
203. Although the reinstatement of habitat to its baseline condition will not result in substantial changes as a result of the proposed works, it is possible that disturbance to grassland soils could result in some germination of plant species other than those which dominate the baseline condition; this could improve structural and/or floral diversity. Once management of the grassland (such as grazing) recommences following completion of installation and reinstatement of the soils, the grasslands would be expected to return to baseline conditions within no more than a few years. Improved grasslands are therefore considered to be of low sensitivity. This process could take longer for poor semi-improved grasslands as these typically have a botanically and structurally more varied sward, so these grasslands are considered to be of medium sensitivity.

204. There are a small number of semi-improved neutral grasslands within the PEIR boundary and specifically within the landfall area. These grassland habitats are far rarer than more improved grasslands. These habitats are more vulnerable to damage from groundworks because they will have a well-defined sward which historically has not been substantively impacted by management such as ploughing or fertilizing. Any ground disturbance therefore risks disturbing and destroying the grassland habitat by altering the seed bank, species, structure and soil nutrients. Such grasslands are therefore considered to be of high sensitivity.

22.6.1.4.1 *Magnitude of effect (all construction scenarios)*

205. Given the low number and small scale of these semi-improved grasslands within the PEIR boundary, the possibility of wholesale avoidance of this habitat will be considered during the subsequent refinement process. Where this may not be possible, the adoption of trenchless installation in these areas will be considered.

206. A temporary, low negative impact to multiple district resources of improved grasslands is predicted as a result of habitat loss and damage due to construction activities within these grasslands.

207. A temporary, medium negative impact to multiple district resources of poor semi-improved grasslands would be predicted (without mitigation) as a result of habitat loss and damage due to construction activities within these grasslands.

208. Without mitigation, a temporary high negative magnitude of effect is predicted for semi-improved grasslands as a result of habitat loss and damage due to construction activities within these grasslands. Although these grasslands occupy a small proportion of land within the PEIR boundary, they are uncommon at district levels, and they are more sensitive, with longer recover periods, than more improved grasslands.

22.6.1.4.2 *Impact Significance (all construction scenarios)*

209. The effect of the above impact would be of minor adverse significance for improved grasslands at multiple district scales.

210. The effect of the above impact would be of moderate adverse significance for poor semi-improved grasslands at multiple district scales.

211. The effect of the impact would be of moderate adverse significance for semi-improved grasslands at multiple district scales.

22.6.1.4.3 *Mitigation*

212. As with all other valued habitats, the footprint of works within grasslands, particularly those which are not improved grasslands, will be minimised and the duration of works within these habitats kept as short as possible.

213. In areas comprising well-established and ecologically valued grassland swards that cannot be avoided by the footprint of the works, seeds or green hay from the existing and surrounding vegetation will be collected and spread once the works are complete. This is expected to be the best solution to reinstate affected areas of grassland, particularly at the landfall area where the coastal grassland generally consists of open, short turf. In other areas the transplanting of grassland followed by reinstatement post construction may be appropriate, however this will be confirmed at the ES stage once the full extent of impacts to semi-improved neutral grasslands is known.

22.6.1.4.4 *Residual Impacts (all construction scenarios)*

214. Depending on the precise construction footprints and programme relevant to improved grassland, these measures will be likely to result in a small reduction in the magnitude of effect, but it would still be classified (after mitigation) as temporary low negative. The significance of the impact would remain as being of **minor adverse** significance to multiple district scales.

215. For poor semi-improved grasslands the mitigation measures set out above will reduce the magnitude of effect from temporary medium negative to temporary low negative thereby reducing the significance of the impact to **minor adverse** significance at multiple district scales.

216. For semi-improved grasslands the mitigation measures set out above will reduce the magnitude of the effect from temporary high negative to neutral, thereby reducing the significance of the impact to **no change**.

22.6.1.5 **Impact 5: Loss of or Damage to Woodland Habitats**

217. The PEIR boundary passes through a number of woodland habitats including semi-natural broad-leaved woodland and mixed woodland, both of which qualify as the Priority Habitat lowland mixed deciduous woodland. However, the onshore cable corridor route does not pass directly through any Ancient Woodland.

218. Woodland is an ecologically valued habitat of high sensitivity which has a long recovery period (in some cases hundreds of years) following any damage or destruction. The proposed construction works has the potential to involve clearance of swathes of woodland habitat within the PEIR boundary to accommodate the construction works. In addition, reinstatement of the soils may unavoidably cause soil compaction, rendering the ground suboptimal for re-establishment of trees. In any case, the ground directly above the cable must be kept clear of trees due to the potential for damage to the cable from tree roots.

219. Therefore, DEP and SEP will require retained non-wooded sections within areas of woodland within the final DCO boundary, in perpetuity (or until decommissioning).

220. Furthermore, while most of the construction footprint could be reinstated as woodland, there would be a permanent loss (or a loss lasting for the lifespan of DEP and SEP) of woodland habitat directly overhead of the onshore export cables, meaning part of this impact to this habitat would be permanent. This impact will be quantified and presented in the ES once the DCO boundary has been finalised. The primary (embedded) mitigation measure for avoiding direct impacts to woodland habitats will be the refinement of the DCO boundary to avoid woodland habitat wherever possible.

22.6.1.5.1 *Magnitude of effect (all construction scenarios)*

221. Without mitigation, a permanent, medium negative impact to multiple district resources of woodland habitats is predicted due to construction related impacts, namely habitat loss and damage. The impact is judged as being permanent even though much of the woodland will be reinstated. This is because the recovery/reversibility of the impact in woodland habitat would be longer than for any other habitat type within the PEIR boundary; it is likely that recovery back to baseline condition would take decades or, in the case of semi-natural broad-leaved woodland, full recovery may take over a century.

22.6.1.5.2 *Impact Significance (all construction scenarios)*

222. The effect of the above impact would be of major adverse significance at multiple district scales.

22.6.1.5.3 *Mitigation*

223. As described above, the primary (embedded) mitigation measure for avoiding direct impacts to woodland habitats will be the refinement of the DCO boundary to avoid woodland habitat wherever possible. This will include ensuring that the width of the working corridor is reduced as far as practical where woodland areas cannot be avoided. Where woodland habitat cannot be avoided, trenchless techniques (i.e. HDD) will also be considered to avoid the loss of woodland habitat. An Outline Landscape and Ecological Management Strategy will be submitted as part of the final DCO application. This plan will outline the ecologically preferred approach to clearance of each section of woodland and propose appropriate measures for reinstatement of woodland habitat. There will be options for enhancement of woodlands, especially plantations which can often have limited structural and species diversity that could be ecologically enhanced after the works.

224. A pre-construction walkover survey will be undertaken by an appropriately qualified arboriculturalist. This survey will define specific mitigation measures that will be implemented to protect trees that are located adjacent to the working areas. This will include the identification of root protection areas. The arboricultural report will be submitted to and agreed with the Local Planning Authority prior to the commencement of any construction works. In addition, the following mitigation measures will also be undertaken:

- The roots of retained trees along the edge of the working width will be protected from soil compaction by the enforcement of Root Protection Areas that will be fenced off from the construction (the extent of which will be calculated using guidance from BS5837:2012); and
- Facilitation pruning may be recommended where tree crowns are at risk from impact by machinery or high sided vehicles.

22.6.1.5.4 *Residual Impacts – DEP or SEP in Isolation*

225. Depending on the precise construction footprints, the mitigation measures outlined above will reduce the magnitude of effect from permanent medium negative to permanent low negative, thereby reducing the significance of the impact to **moderate adverse** significance at multiple district scales. However, mitigation, compensation and enhancement will further reduce the significance of this impact, and for individual woodlands, mitigation, compensation and enhancement could achieve low or medium positive magnitude impacts of up to moderate positive significance at multiple district scales. However, the extent of enhancements will largely rely on agreements with landowners so definitive commitments to woodland enhancement are not known at this stage.

22.6.1.6 **Impact 6: Loss of or Damage to Scrub Habitats**

226. Installation of the onshore export cables may also require the clearance of pockets of dense and scattered scrub, which are low to medium sensitivity valued habitats. This habitat is capable of full recovery over a few years or possibly decades following reinstatement of the soil. In some cases, clearance of a linear path through pockets of dense scrub could enhance structural and possibly species diversity, so habitat clearance does not necessarily equate to a negative impact.

227. Any immediate loss of habitat impacts in the short-term, as a result of ground clearance and construction activities, would therefore likely be offset by medium-term gains in the structural diversity of scrub habitat, as it recovers.

22.6.1.6.1 *Magnitude of effect (all construction scenarios)*

228. Without mitigation, a temporary, low negative impact to multiple local resources of scrub habitat would be expected.

22.6.1.6.2 *Impact Significance (all construction scenarios)*

229. The effect of the above impact would be of negligible significance in the medium- and long-terms.

22.6.1.6.3 *Mitigation*

230. Further refinement of the exact alignment of the cable route will be undertaken prior to the DCO application, which will allow a quantification of areas of habitat loss and more detailed mitigation proposals to be defined. These more detailed assessments and mitigation proposals will be included in the EclA accompanying the DCO application.

231. There will likely be options for enhancement of scrub which can be explored further once the construction parameters are finalised and precise impacts to particular areas of scrub can be determined.

22.6.1.6.4 *Residual Impacts (all construction scenarios)*

232. Depending on the precise construction footprints and programme relevant to this habitat, the mitigation measures will be likely to reduce the magnitude of effect but it would still be classified (after mitigation) as temporary low negative and the significance of this would remain as being of **negligible** significance.

22.6.1.7 Impact 7: Loss of or Damage to Hedgerow Habitats

233. Hedgerows are a Priority Habitat, reflecting their ecological importance. In general, they are considered to be of medium sensitivity, but some well-established hedgerows with trees are of high sensitivity whereas some recently planted, small and botanically homogeneous hedgerows are of low sensitivity.
234. The PEIR boundary crosses in excess of 100 hedgerows, however an exact number of hedgerow crossing is not currently known as the final onshore cable corridor route is yet to be defined. As part of the DCO boundary refinement, the onshore cable corridor will be refined to avoid hedgerows where possible. Where the onshore cable corridor crosses through woodland and hedgerows, the working corridor width will be reduced to a typical working width of 20m. This is on the basis that a large part of the 45m (for DEP or SEP in isolation) or 60m (for DEP and SEP together) corridor is for soil storage/management, and hedgerows would not be removed for this purpose.
235. The precise number and sensitivity of hedgerows to be crossed, and their characteristics at the proposed crossing points (such as percentage gaps/without woody vegetation, the species richness and whether trees are present), will be defined and reported within the ES accompanying the DCO application. Impacts to hedgerow habitat are anticipated to be one of the more substantial ecological impacts associated with DEP and SEP construction works.
236. Removal of hedgerow habitat to accommodate the DEP and SEP onshore cable corridor will result in a temporary loss of the habitat itself but will also temporarily reduce the ecological function of hedgerows, which provide ecologically important linear connections within the landscape. The significance of this impact including proposed mitigation (namely reinstatement of hedgerows post-construction) is considered further below.

22.6.1.7.1 Magnitude of effect (all construction scenarios)

237. Without mitigation (namely, reinstatement of hedgerows post-construction), a permanent, medium negative impact to multiple district resources of hedgerow habitat would be expected. The unmitigated impact to hedgerows would be considered permanent rather than temporary because hedgerows would not necessarily grow back without a targeted replanting and management effort. This point also applies to hedgerow trees.

22.6.1.7.2 Impact Significance (all construction scenarios)

238. The effect of this impact would be of major adverse significance at multiple district scales.

22.6.1.7.3 Mitigation

239. As described above, the primary (embedded) mitigation measure for avoiding direct impacts to hedgerow habitat will be the refinement of the DCO boundary to avoid hedgerow habitat wherever possible. This will include aligning the working corridor far as reasonably possible with existing hedgerow gaps, or failing that, with sections of hedgerows with relatively limited ecological value (such as section of a mon-species or sections with small plants or those in poor condition). As previously mentioned, the width of the working corridor will also be reduced as far as practicable where hedgerows cannot be avoided.

240. Following construction, all hedgerows that have been removed as a result of the works corridor will be reinstated by planting with suitable native hedgerow species. The aim of the mitigation approach is to ensure that for every length of hedgerow removed at least an equivalent length is reinstated. The same principles and approach will apply to hedgerow trees, in that for every tree that is removed at least one will be replanted. This will ensure no overall net loss in hedgerow and tree habitat.
241. A suitable list for planting will be provided for each section of hedgerow or hedgerow tree to be reinstated, to ensure continuity and suitability. In general, hedgerow planting will use native hedgerow species such as hawthorn *Crataegus monogyna*, blackthorn *Prunus spinosa*, field maple *Acer campestre*, dog-rose *Rosa canina*, hazel *Corpus avellane*, dogwood *Cornus sanguinea*, crab apple *Malus Sylvestris* and holly *ilex aquifolium*. It is likely that most replanting of hedgerow trees will use pedunculate oak *Quercus robur*, although the species selected will depend in part on the species of tree being removed, with like for like replacement considered where ecologically suitable.
242. Ecological enhancements and opportunities for BNG associated with DEP and SEP will focus in part on hedgerow habitat. Where landowners are agreeable and once ecological benefits are clearly established (once the onshore cable corridor is refined) existing gaps in hedgerows will be in-filled and new hedgerows will be planted along currently un-hedged boundaries. This planting will use a range of suitable native species such as those listed above. Further details on hedgerow and tree removal, retention, replacement and management will be presented in an Outline Landscape and Ecological Management Strategy submitted with the DCO.

22.6.1.7.4 Residual Impacts (all construction scenarios)

243. The mitigation measures outlined above will reduce the magnitude of effect from permanent medium negative to temporary medium negative thereby reducing the significance of the impact to **moderate adverse** significance at multiple district scales.
244. Hedgerow replanting and associated enhancement of hedgerow habitat will in the long term (i.e. once the replaced hedgerows have established) have a permanent medium beneficial impact of **moderate positive** significance at multiple district scales.

22.6.1.8 Impact 8: Loss of, or Damage to, Pond Habitats

245. The final application boundary will seek to avoid all ponds, although this is yet to be confirmed as the precise onshore cable corridor route is yet to be finalised. A detailed assessment of potential impacts on ponds is therefore not yet possible but will be provided at DCO application stage.
246. Aside from the possibility of ponds being permanently removed to accommodate the construction works, it is also feasible that ponds could be damaged by them. This could include damage to pond margin habitats, which, for ponds within the PEIR boundary, typically includes a band of grassland and scrub, often with trees. Potential pond damage could also include hydrological impacts, such as from increased input of sediment-laden or otherwise polluted water into the pond. In all but extreme cases of damage, ponds would be expected to be able to recover from these impacts, typically within no more than 10 years.

22.6.1.8.1 *Magnitude of effect (all construction scenarios)*

247. As an estimated RWCS, (in which up to 10 of ponds were permanently removed and/or extensively damaged to accommodate installation of the cable), this would be expected to have a permanent, medium negative impact on high sensitivity pond habitat at the relevant district scales (in which these ponds were lost).

22.6.1.8.2 *Impact Significance (all construction scenarios)*

248. The effect of this impact would be of moderate adverse significance at multiple district scales.

22.6.1.8.3 *Mitigation*

249. As with other valued habitats, the construction footprint will avoid ponds as far as reasonably practical.

250. If any ponds are removed, they will be reinstated, and this will be done in such a way as to provide relatively enhanced pond habitat, such as by reducing shading or providing more semi-natural terrestrial habitat around or in close proximity to ponds.

251. Appropriate water pollution prevention measures (which will be outlined in the draft Outline Code of Construction Practice submitted with the DCO application) are to be adopted throughout the construction works area. This will mitigate the potential for impacts to pond-water.

22.6.1.8.4 *Residual Impacts (all construction scenarios)*

252. Depending on the precise construction footprints and programme relevant to ponds, these measures will be likely to reduce the magnitude of effect from permanent medium negative to negligible (assuming all ponds can be avoided), thereby reducing the significance of the impact to **no change**.

22.6.1.9 *Impact 9: Loss of or Damage to Watercourse Habitats*

253. The proposed onshore cable infrastructure and associated temporary haul road will directly cross Main Rivers and ordinary watercourses (including IDB maintained drains) within the PEIR boundary.

254. Trenchless crossing techniques such as HDD are embedded in the scheme design for Main Rivers (**Section 22.3.3**). The cable would be installed at least 2m below the bed of the watercourse and, although ground disturbance will occur at the HDD entry and exit points (which could potentially be located on the floodplain), there would be no direct disturbance to the watercourses crossed using a trenchless technique. Therefore, there is no direct mechanism for impacts to occur to the geomorphology, hydrology, and physical habitats of these watercourses.

255. Trenched crossings would be carried out on the majority of the ordinary watercourses (including some IDB-maintained watercourses, depending upon their width, depth, and environmental sensitivity) which intersect with DEP and SEP. This method has the potential to directly alter the habitats of the watercourses. Trenched crossings of watercourses involve installing temporary dams (composed of sandbags, straw bales and ditching clay, or another suitable technique) upstream and downstream of the crossing point. The cable trench is then excavated in the dry area of riverbed between the two dams with the river flow maintained using a temporary pump or flume.

256. In addition to the cable infrastructure itself, it may also be necessary to install temporary structures to allow access across watercourses where direct access is not readily available from both sides. This will comprise temporary bridges (such as Bailey bridges) at Main Rivers. Depending on local site conditions, ordinary watercourses are likely to be crossed using temporary culverts.
257. Further information is provided in **Chapter 20 Water Resources and Flood Risk**.
258. The watercourses within the PEIR boundary (other than those which are assessed above as a designated site, such as the River Wensum) are considered to be of medium to high sensitivity.

22.6.1.9.1 *Magnitude of effect (all construction scenarios)*

259. Where watercourses are crossed using trenchless installation techniques, negligible impacts are anticipated as all watercourses will be reinstated to their former condition following completion of the construction works.
260. If cables are to be installed using other techniques such as temporary-divert-and-dam or culverting, greater impacts to these habitats would be expected. A RWCS for watercourse crossings throughout the PEIR boundary would be temporary medium negative impacts at multiple local scales.

22.6.1.9.2 *Impact Significance (all construction scenarios)*

261. The effect of the impact would be of negligible significance as all Main Rivers will be crossed using trenchless techniques (e.g. HDD) and therefore direct impacts will be avoided and/or impacts to surrounding habitats minimised.
262. The effect of the impact on ordinary watercourses through the implementation of trenched crossed techniques would be of minor adverse significance at multiple local scales. However, these crossings will be reinstated following completion of trenching works and will therefore cause only temporary disturbance..

22.6.1.9.3 *Mitigation*

263. Trenchless crossing techniques (e.g. HDD) are embedded into the scheme design for Main Rivers and there is therefore no mechanism for direct impacts to occur to these water bodies or their surrounding habitats. Therefore, no further mitigation is proposed at trenchless crossing locations.
264. Where temporary dams are required during the trenched crossing works, the length of time that these will be in place will be kept to a minimum. Furthermore and prior to dewatering the area between the temporary dams, a fish rescue will be undertaken. Flumes or pumps will be adequately sized to ensure that flows downstream are maintained whilst minimising upstream impoundment. Scour protection will also be used to protect the riverbed (and its associated habitats) downstream of the dam from high energy flow at the outlets of flumes and pumps.
265. The cable ducts will typically be installed 2m below the bed of the water body (dependent on local geology and geomorphological risks) to avoid exposure during periods of higher energy flow when the bed could be mobilised. This depth takes into consideration anticipated climate-change related changes in fluvial flows and erosion that will occur over time. In addition, vegetation would not be removed from the banks unless necessary to undertake the works, in which case removal would be restricted to the smallest practicable footprint.

22.6.1.9.4 *Residual Impacts (all construction scenarios)*

266. Following the implementation of the agreed mitigation measures, the impacts to watercourses and their associated habitats in which trenched crossings are proposed would be reduced, thereby reducing the significance of the impact to **minor adverse** at relevant district scales in which watercourses would be impacted.

22.6.1.10 *Impact 10: Loss of or Damage to Other Valued Habitats*

267. There are small areas of other Phase 1 Habitat classifications within the PEIR boundary, including a caravan site, amenity grassland, tall herb and ruderal, ephemeral/short perennial, scattered broad-leaved trees and hard standing/buildings. These habitats range from negligible to high sensitivity.
268. As described in **Table 22-3**, there is a commitment to avoid all valued habitats as far as is practicable. This measure will apply to the assorted valued habitats relevant to this section of the assessment.

22.6.1.11 *Impact 11: Potential Spread of Invasive, Non-Native Species*

269. The EP1HS recorded occasional occurrences of Himalayan balsam along certain rivers and streams within and around the PEIR boundary. This is not a valued ecological receptor but nonetheless requires consideration within this PEIR because the onshore export cable works risk furthering the spread of this species (which would represent a negative ecological impact).
270. Himalayan balsam has been recorded along the banks of streams and rivers within the PEIR boundary. These features (i.e. rivers and streams) are considered to be of high sensitivity, whereas other watercourses such as agricultural ditches (the banks of which Himalayan balsam could also colonise) are generally considered to be of low sensitivity.
271. INNS such as Himalayan balsam can outcompete native vegetation, thereby reducing species diversity of plants and animals where it becomes established. As a result, when Himalayan balsam dies back over winter, it can leave the banks of watercourses largely un-vegetated and therefore more vulnerable to erosion. Removal of the species can be difficult, expensive and time-consuming, typically requiring a persistent approach over 5-10 years. Consequently, the establishing of this species can result in extensive and long-lasting adverse ecological impacts.
272. It is also possible that there are other INNS within the PEIR boundary, including aquatic INNS such as signal crayfish or crayfish plague which affect the native white-clawed crayfish. Further ecological surveys are programmed in 2021 and may establish the presence of other INNS within the PEIR boundary. Specific surveys are scheduled for signal crayfish and crayfish plague. Any such other occurrences will be assessed at the ES stage, if identified.

22.6.1.11.1 *Magnitude of effect (all construction scenarios)*

273. Without the adoption of careful control/prevention measures, as a RWCS (such as if machinery or equipment transported INNS to multiple new sites), this could have a permanent, high negative impact on affected habitats and native species where it becomes newly established, which is likely to comprise valued habitats such as rivers and could impact protected species such as white-clawed crayfish (if present).

22.6.1.11.2 *Impact Significance (all construction scenarios)*

274. The long-term effect of this impact could, at worst, be of major adverse significance at the county level if it impacts multiple major river catchments (although it is not known if INNS are already present in other river catchments).

22.6.1.11.3 *Mitigation*

275. Measures to prevent the spread of INNS including Himalayan balsam will form part of the draft CoCP provided with the DCO application. Prior to the commencement of construction works, an INNS Management Plan will be developed for approval by the relevant stakeholders. This plan will likely include the following measures:

- A plan of all INNS locations and extents;
- A protocol for removing INNS and for managing the waste generated;
- Good site practice measures for managing the spread of INNS during works at watercourses; and
- A requirement for an Ecological Clerk of Works (ECoW) and details of their responsibilities with respect to INNS.

22.6.1.11.4 *Residual Impacts (all construction scenarios)*

276. Depending on the precise construction footprints in areas affected by INNS, the mitigation measure will be likely to reduce the magnitude of effect from a RWCS of permanent high negative to negligible thereby reducing the significance of the impact to **negligible**.

22.6.1.12 **Impact 12: Potential Mortality, Harm or Disturbance to Badgers, or Destruction, Damage or Disturbance of Badger Habitat**

277. Evidence of badgers within the PEIR boundary has been recorded during the surveys undertaken to date. Active setts and other signs of activity have been recorded and due to the sensitivity of this species, the specific locations have not been listed here.

278. Approximately 70% of the PEIR boundary was accessed for signs of badger activity, due to landowner restrictions during the EP1HS. Therefore, a further badger presence/absence survey will be undertaken in 2021 (subject to landowner access agreement). The findings of which will be reported within the ES.

279. Whilst it is anticipated that the refinement of the DCO boundary will avoid known badger setts, it is possible that in some instances this may not be possible. Therefore, the construction of the onshore cable corridor may result in the destruction of or damage to known badger setts, loss of foraging habitat or severance of badger territories, mortality or injury of badgers from excavation equipment and activity by other machinery/vehicles, or disturbance to badgers from noise, ground vibration and other forms of pollution emanating from the works area.

280. The sensitivity of badgers, as with some other receptors, is dependent on the magnitude of impact; badgers will be of low sensitivity to low or negligible impacts from, for example, minor losses of foraging habitats. However, badger populations would be highly sensitive to high magnitude impacts such as destruction of main setts or mortality of badgers.

22.6.1.12.1 *Magnitude of effect (all construction scenarios)*

281. Without mitigation, a permanent, medium negative impact to multiple local badger populations is possible (as a RWCS) due to impacts such as destruction of setts, loss of foraging habitat and mortality of multiple individual badgers.

22.6.1.12.2 *Impact Significance (all construction scenarios)*

282. At most, the effect of the above impact would be of major adverse significance at multiple local levels.

22.6.1.12.3 *Mitigation*

283. During the further refinement of the DCO boundary, all known active badger setts will be avoided where feasible to do so. Other areas of known importance for badgers such as foraging areas or territorial boundaries will also be avoided where possible. In general, this will reduce the magnitude of impacts on habitats in which setts or important areas for badgers are located, which often includes valued habitats such as woodland and hedgerows.

284. Pre-construction surveys will be undertaken to confirm the presence of badgers. The following mitigation measures will be employed:

- Sett closure (under licence) for setts identified within the onshore cable corridor, and creation of artificial setts as required;
- Protection buffer zone of 30m around all setts outside of the onshore cable corridor infrastructure (including appropriate noise, vibration and lighting minimisation such as directional task lighting, low vibration plant, acoustic panels and, where possible, working outside of the buffer zone to ensure decreased impact upon badgers); and
- Precautionary methods of working to minimise harm to badgers during construction, including trenches deeper than 1m must be covered at the end of each working day.

22.6.1.12.4 *Residual Impacts (all construction scenarios)*

285. Depending on the precise construction footprints in areas with badgers present, these measures will be likely to reduce the magnitude of effect from permanent medium negative to no more than temporary low negative, thereby reducing the significance of the impact to no more than **minor adverse** significance at multiple local scales.

22.6.1.13 *Impact 13: Potential Mortality, Harm or Disturbance to Roosting Bats, or Destruction, Damage or Disturbance to Bat Roosts*

286. Bat roost surveys (emergence/re-entry) surveys will be undertaken in 2021 for some of features identified during the EP1HS. Those features assessed as having either moderate or high potential will be subject to these further surveys, the findings of which will be presented in the ES. The 2021 survey results will also be used to inform any EPS licence applications that may be required, should a confirmed bat roost(s) be identified during the 2021 survey effort.

287. The EP1HS undertaken to date has, in accordance with Bat Conservation Trust guidelines, identified in excess of 100 trees and one building within the PEIR boundary with high, moderate or low bat roost potential (indicating the realistic possibility of the presence of roosting bats within these trees/building). The evolving DCO boundary will consider these features, with the aim of avoiding/retaining them wherever possible. At this stage it has been assumed as a RWCS that a number of trees with bat roost potential may be felled or otherwise impacted by construction works.
288. The risks posed by the onshore cable corridor works to tree-roosting bats include potential destruction of or damage to roosts in trees, and disturbance of roosting bats in trees such as from noise, lighting or vibration. It is also possible that the works could cause long-term damage to trees, such as from root damage during soil excavation, which would shorten the lifespan of trees and thereby result in eventual loss of or degradation to bat roosts in a shorter timeframe than would naturally have occurred.
289. Roosting bats are of high sensitivity due to bats' fairly low reproductive rate and their longevity relative to other small mammals. These characteristics mean any losses to a bat population of individual bats or roosting sites can have long-term effects from which recovery can take many years. Certain types of bat roosts, such as maternity roosts, can be extremely important and of very high sensitivity for bat populations. Such roosts are particularly important and therefore highly sensitive for rarer species, which often have specific roost requirements relating to factors such as the size of the roost feature, its thermal properties and its proximity to feeding grounds.
290. The construction works may require the removal of a number of mature trees which either have bat roost potential (and may be found to support roosting bats during forthcoming surveys) or may develop features with bat roost in following years. The ongoing creation of opportunities for roosting bats within trees is a natural cyclical process, often associated with trees maturing and developing features such as rot-holes, tear-outs and hazard beams which are usually absent from younger trees. The removal of a number of trees could therefore interrupt this cycle, leading to a potential future reduction in the availability of bat roosting habitat as trees which would have developed into suitable bat roost trees are instead removed.

22.6.1.13.1 *Magnitude of effect (all construction scenarios)*

291. Without mitigation, a permanent, medium negative impact to multiple district populations of roosting bats is possible due to lost, damaged or disturbed bat roosts resulting from construction activities. Impacts could be permanent due to irreversible damage to bat populations which could feasibly arise due to loss of important roosts (such as maternity or hibernation roosts) or substantial mortality of individual animals, particularly where this relates to rarer species such as barbastelle, *Myotis* species or serotine.

22.6.1.13.2 *Impact Significance (all construction scenarios)*

292. For most species, the effect of the RWCS impact will be major adverse significant at multiple district levels, but it is conceivable this could extend to a county or regional level of significance where rarer bat species are concerned. Mitigation will be necessary and although this will be informed by further survey results; the key mitigation measures that will be adopted are presented below.

22.6.1.13.3 *Mitigation*

293. The primary (embedded) mitigation measures for avoiding direct impacts to bats will be the refinement of the DCO boundary to avoid woodland habitat and trees with bat roost potential wherever possible. This will include ensuring that the width of the working corridor is reduced as far as practical where woodland areas cannot be avoided. Where woodland habitat cannot be avoided, trenchless techniques (i.e. HDD) will also be considered to avoid the loss of woodland habitat. However, at this stage it is assumed as a RWCS it is likely that a number of trees with bat roosting potential may be felled or otherwise impacted by construction works.

294. Forthcoming surveys will confirm the presence or absence of roosting bats in relevant trees. Where roosting bats are present in trees due to be impacted, an EPS Mitigation Licence from Natural England will be required to legally permit destruction of the roost. The exact mitigation measures to be permitted under an EPS licence are not yet known because it will depend on the nature (e.g. species, size and type) of any affected roosts. However, in general, mitigation typically involves installation of compensatory bat roost boxes nearby to ensure there is no overall loss in roosting capacity. It will also require careful, surgical felling of the tree to ensure bats are not harmed or killed.

295. Depending on the extent of bat roosting within a tree, this may involve 'soft-felling' whereby a tree is cut into sections which are then gently lowered to the ground using ropes. This approach will also ensure that no bat roost features such as niches or crevices are destroyed by felling works; the tree surgeon will need to retain any such features intact within the cut section which is then lowered to the ground. Any such cut sections will then be left on the ground near the tree's original position, overnight and with the feature (the niche or crevice, for example) facing upwards or to the side. This will allow any bats within the feature to vacate it at night.

296. In order to mitigate the potential impact from a loss of maturing trees (which could provide future roosting features in the years after DEP and SEP onshore construction works) and fill this potential time gap, a number of bat roost boxes will be installed in areas close to where substantial tree removal works are proposed. Boxes will likely need to be tree-mounted although could be installed on buildings or mounted on poles if these options are available and feasible. These boxes will be able to accommodate roosting bats in the period that newly planted trees begin to mature and develop suitable roosting features.

297. The precise number, location and specification of bat roost boxes to be used will depend on the results of the forthcoming bat surveys and the nature of impacts to trees. Further advice can therefore be provided within the ES accompanying the DCO application and refined after targeted bat roost surveys have been completed.

22.6.1.13.4 *Residual Impacts (all construction scenarios)*

298. The residual impacts to roosting bats will be identified within the ES as part of the DCO application once the bat roost surveys are complete and the exact alignment of the construction footprint is defined. However, given the legal protection afforded to bats, mitigation measures will be implemented to ensure the magnitude of effects are reduced from permanent medium negative and of major adverse significance, to a magnitude of temporary low negative or possibly negligible and therefore a significance of **negligible** or **no change**.

22.6.1.14 *Impact 14: Potential Mortality, Harm or Disturbance to Non-Roosting Bats, or Destruction, Damage or Disturbance to Non-Roosting Bat Habitats (Foraging or Commuting Habitats)*

299. Bat activity surveys of selected areas have confirmed the presence of multiple species in these general parts of the PEIR boundary, including relatively rare species such as barbastelle, *Myotis* species, Nathusius' pipistrelle and serotine. It is reasonable to expect that bats will be active to some degree across the entire PEIR boundary. Further surveys are programmed for 2021 and will inform the impact assessment and mitigation requirements for bat activity within the ES which will accompany the DCO application. The proposed works will require the removal of hedgerows that may be used by foraging/commuting (or otherwise active) bats, which in turn will result in the temporary loss of foraging habitat, severance of commuting features, and disturbance from lighting, noise or airborne pollution emanating from the works area.

300. The level of sensitivity of bats within the PEIR boundary is largely dependent on the species and magnitude of impact; rarer and more specialist bats (such as those generally restricted to particular habitats such as woodlands and wetlands) would be highly sensitive to high magnitude impacts to their habitats. More widespread bat species would be considered to be of low sensitivity to low or negligible magnitude impacts to relevant habitats. Specific degrees of sensitivity will be applied to each bat species following more detailed bat surveys in 2021 and finalisation of the works program.

22.6.1.14.1 *Magnitude of effect (all construction scenarios)*

301. Without mitigation, a temporary, medium negative impact to multiple local populations of bats is possible (as a RWCS) due to impacts such as loss of foraging habitats, severance of commuting features, direct harm/mortality to individual bats and disturbance from construction activities. Mitigation will be necessary and will be informed by further survey results; basic mitigation measures which are likely to be adopted are outlined below.

22.6.1.14.2 *Impact Significance (all construction scenarios)*

302. The effect of the above impact would be of up to moderate adverse significance at multiple local levels.

22.6.1.14.3 Mitigation

303. The key measure to mitigate impacts on bat activity will be to minimise night time working within areas where high level of foraging/commuting bat activity is recorded, particularly during the central season of bat activity from April to October inclusive. Construction activities during this period will therefore be restricted to daylight hours only where possible.
304. Bat activity can also be secondarily impacted by reduction in the quantity and quality of key foraging habitats. This typically will include habitats such as woodland, grasslands, hedgerows, waterbodies, scrub and trees. By limiting impacts to such habitats (as is already proposed as an embedded mitigation commitment, and further proposed under the habitat mitigation measures outlined above), secondary impacts to species which use these habitats, including bats, will also be mitigated.

22.6.1.14.4 Residual Impacts (all construction scenarios)

305. Depending on the precise construction footprints, the mitigation measures outlined above will reduce the magnitude of the effect from temporary medium negative to no more than temporary low negative, thereby reducing the significance of the impact to **minor adverse** or **negligible** significance.

22.6.1.15 Impact 15: Potential Mortality, Harm or Disturbance to Breeding Birds, or Destruction, Damage or Disturbance of Active Birds' Nests or Other Breeding Bird Habitat

306. DEP and SEP have the potential to impact breeding birds (e.g. skylark, yellowhammer, linnet, Cetti's warbler and firecrest) due to habitat loss, and predominately relating to ground-nesting farmland birds which have been recorded to use the arable and/or areas of grassland within the PEIR boundary, as well as hedgerows. The aforementioned species may be highly sensitive to impacts based on anticipated, RWCS for construction works. Other species which are widespread and occur at low levels within the PEIR boundary are considered to be of low sensitivity.
307. All areas of temporary works associated with the onshore cable corridor, i.e. arable fields and hedgerows, will be reinstated following installation of the onshore export cables. Therefore, the potential impact would be temporary on birds using these areas. However, given the amount of arable habitat within the wider area, it is considered that birds will be displaced into adjacent areas and therefore significant impacts (i.e. reduced numbers) are unlikely to occur.
308. In addition to direct impacts on habitat loss, the activities associated with the construction of DEP and SEP are likely to deter birds from breeding within the PEIR boundary. The distance of this disturbance would be dependent on the species involved.
309. Further surveys are scheduled in 2021, covering the DCO boundary. The findings of which will be presented in the ES.

22.6.1.15.1 *Magnitude of effect (all construction scenarios)*

310. As a RWCS, without mitigation, construction activities could be expected to have a temporary, medium negative impact on multiple district populations of certain bird species (those most abundant within the PEIR boundary and therefore most sensitive) such as skylark, yellowhammer, linnnet, dunnock and meadow pipit.
311. Species with elevated conservation statuses such as Cetti's warbler and firecrest (but which are present at low levels) could experience high negative impacts and these could be permanent if habitat loss leads to these birds abandoning their few particular breeding sites.
312. For more common species and/or those which are breeding within the PEIR boundary at low levels or only in certain areas, temporary, low negative impacts to local or district populations are predicted as a RWCS.

22.6.1.15.2 *Impact Significance (all construction scenarios)*

313. The effect of the impact on bird species of elevated conservation concern which are most abundant within the PEIR boundary (such as skylark and yellowhammer) would be of major adverse significance at multiple local or district scales.
314. The effect of the impact on rarer bird species of conservation concern which are more vulnerable to permanent displacement would be, at worst, of major adverse significance at district scale/s. For Cetti's warbler and firecrest, the impact significance would be restricted to North Norfolk District as this is the only district within the PEIR boundary which supports breeding activity by these species.
315. The effect of the impact on more common bird species and/or those occurring at lower levels within the PEIR boundary would be of minor adverse significance at local levels.

22.6.1.15.3 *Mitigation*

316. The key measure to avoid impacts to nesting will involve the removal of vegetation such as hedgerows and scrub outside of the main bird nesting season which runs from 1st March to 31st August. In locations where this measure cannot be accommodated, certain habitats (such as hedgerows and small amounts of scrub) will be checked by an ecologist for the presence of active birds' nests. Where this check confirms the absence of active nests, clearance works can proceed shortly after, within no more than a few days of the check. If active birds' nests are found, these will be retained in-situ and allowed to reach their natural conclusion without being disturbed or damaged.
317. In addition to the above, the following mitigation measures will be employed:
 - A Breeding Bird Protection Plan (BBPP) will highlight the risks to breeding birds and detail measures to ensure the protection of their nests;
 - Pre-construction bird surveys will be undertaken to establish the presence of breeding birds;
 - Measures will be adopted to minimise noise, light and disturbance on identified breeding birds, such as visual screening (e.g. opaque fencing) where necessary;

- Construction activities would be monitored by an ECoW or suitably qualified ornithologist, who would seek to ensure compliance with the Wildlife and Countryside Act 1981 by avoiding destruction of nests, eggs or young, and affording increased protection from disturbance to Schedule 1 species breeding birds; and
- Where breeding bird activity is recorded, such construction works (excluding vehicle and personnel movements) may be halted immediately until a disturbance risk assessment is undertaken by a suitably qualified ecologist. The risk assessment would consider the nature of construction activity, likelihood of disturbance, and possible implications of the construction activities on the breeding attempt and set out measures to ensure that no disturbance occurs. Where it is determined that breeding birds are not likely to be affected, construction works will continue. Where it is determined that breeding birds may be affected, additional mitigation works will be implemented to prevent disturbance. Where, in the opinion of the suitably qualified ecologist, disturbance cannot be avoided by mitigation, construction works within the area of disturbance will be suspended until chicks have fledged.

22.6.1.15.4 *Residual Impacts (all construction scenarios)*

318. Depending on the precise construction footprints and programme the mitigation measures would likely reduce the magnitude of the effect for birds of elevated conservation concern which are widespread throughout the PEIR boundary from temporary medium negative to temporary low negative, thereby reducing the significance of the impact to **minor adverse** significance at multiple local or district scales.
319. For rarer bird species which are more vulnerable to permanent displacement, the mitigation measures would be likely to reduce the magnitude of the effect from permanent high negative to temporary low negative or negligible, thereby reducing the significance of the impact to **minor adverse** significance at multiple local or district scales.
320. For more common bird species and/or those occurring at low levels within the PEIR boundary, the mitigation measures would be likely to reduce the magnitude of the effect from temporary low negative to negligible, thereby reducing the significance of the impact to **negligible**.

22.6.1.16 Impact 16: Potential Mortality, Harm or Disturbance to Over-Wintering Birds, or Destruction, Damage or Disturbance of Over-Wintering Bird Habitats.

321. The over-wintering bird surveys completed to date have recorded the presence of over-wintering birds in selected parts of the PEIR boundary. The distribution of over-wintering bird activity is closely linked with the presence of suitable habitat, namely arable fields with ground cover of stubble or sugar beet crop. The impact of construction activities on over-wintering birds is therefore intrinsically linked with the impact on this specific type of habitat. Arable farming practices and cropping rotations are the decisions of farmers and landowners, and typically will change on an annual basis. The quantity and distribution of arable habitat at the time construction works cannot be predicted, which is a notable constraint to the impact assessment on over-wintering birds.
322. Given the extensive, wide ranges of most over-wintering wildfowl and waders, and the relatively concentrated land-take impacts within the DCO boundary, species such as pink-footed geese are considered to be of low sensitivity. However, following completion of surveys in winter 2020-21 and finalisation of the DCO boundary and works program, it will become possible to assign species-specific degrees of sensitivity for over-wintering birds.
323. Further surveys are currently underway and will help inform mitigation requirements. The mitigation approach will also factor in farming patterns in the specific years construction activities would take place in relevant fields. Basic mitigation measures which are likely to be adopted are outlined below.

22.6.1.16.1 Magnitude of effect (all construction scenarios)

324. If the construction works were completed insensitively and without mitigation, a RWCS could involve the destruction of suitable habitat (i.e. stubble or sugar beet fields in which wintering birds had not exploited the feeding resources) in dozens of fields throughout the DCO boundary, including in areas close to over-wintering bird roosts such as at the landfall location, and potentially across multiple winters. In this scenario, a temporary low negative impact to some international populations of over-wintering birds (such as pink-footed goose) would be possible.
325. For other species such as lapwing and thrushes, temporary low negative impacts would be expected to relate to county or even district/local bird populations.
326. Realistically, this impact will be of a lower magnitude than this because there is extremely unlikely to be a substantially increased quantity of over-wintering bird habitat within the PEIR boundary than was available during the 2019-20 surveys (or the currently underway 2020-21 surveys).

22.6.1.16.2 Impact Significance (in all installation scenarios)

327. This effect of the impact on over-wintering birds is anticipated to be of negligible significance because there is typically an abundant supply of suitable fields for foraging over-wintering birds throughout Norfolk and surrounding counties, which would be expected to be able to support any displaced foraging demands. The low negative impact would arise from increased energy expenditure of birds having to search for alternative foraging grounds due to the losses of those within the PEIR boundary, especially those close to the coast.

22.6.1.16.3 *Mitigation*

328. Alternatively, where construction delays must be avoided due to project time constraints, it may be appropriate to agree farming rotations with the relevant landowners / occupiers to ensure that ground conditions in fields within the DCO boundary (or certain sections of it) are not suitable for wintering birds at the key times when construction works are scheduled.
329. This approach would be most appropriate for particular areas which are found by surveys to be regularly used by wintering birds in successive winters.

22.6.1.16.4 *Residual Impacts (all construction scenarios)*

330. Depending on the precise construction footprints and programme the mitigation measures would be likely to reduce the magnitude of the effect on over-wintering bird species from temporary low negative to negligible and would maintain the significance of the impact as being of **negligible** significance.

22.6.1.17 *Impact 17: Potential Mortality, Harm or Disturbance to Great Crested Newts, or Destruction, Damage or Disturbance of Great Crested Newt Habitat*

331. Surveys have confirmed that GCN are present in localised parts of the PEIR boundary. The results indicate the likely presence of metapopulations of the species, centred on the clusters of ponds in which GCN have been confirmed present. The precise route of the onshore cable corridor has not yet been finalised, meaning a comprehensive impact assessment is not yet feasible, as it is not known, for example, whether any ponds or nearby areas of suitable terrestrial habitat would be removed or damaged. However, the anticipated construction works do pose risks to GCN due to possible destruction of suitable aquatic and/or terrestrial habitat, direct harm or mortality to individual GCN from excavation work, habitat clearance or movement/operation of machinery and vehicles, severance of connective/commuting routes, entrapment of GCN within excavations and disturbance due to noise, light, air pollution and ground vibration.
332. The degree to which GCN are sensitive to impacts depends partly on the magnitude of the impact; if multiple ponds and areas of suitable terrestrial habitat were impacted, the species would be highly sensitive. Alternatively, if impacts to GCN habitats can be largely avoided, the species would be considered to have low or negligible sensitivity to the construction works.
333. A detailed assessment and the identification of specific mitigation measures will be presented within the ES once the exact alignment of the application boundary is confirmed.

22.6.1.17.1 *Magnitude of effect (all construction scenarios)*

334. As a RWCS, without mitigation, construction activities associated with installation of the onshore export cables would be expected to have a permanent, medium negative impact to the multiple local populations of GCN.

22.6.1.17.2 *Impact Significance (all construction scenarios)*

335. The effect of this impact would be of major adverse significance at multiple local scales.

22.6.1.17.3 Mitigation

336. It is anticipated that some construction works will affect suitable GCN habitat, be it aquatic (ponds) or terrestrial. Where suitable habitats are due to be removed in areas known to support GCN, such as in the areas of the confirmed metapopulations, the risk to GCN will be assessed against the detailed construction proposals (at DCO application stage). Where this assessment concludes that the risks posed by the works to GCN are unacceptably high (in accordance with Natural England guidelines), an EPS Mitigation Licence will become necessary.
337. The precise details of any EPS licence/s will depend on the nature of the impact. However, typically EPS-licensed mitigation will involve fencing-off areas of suitable GCN habitat and translocating any GCN (with the use of pit-fall traps) from the fenced enclosed to a suitable receptor site outside the impact zone. Further detail will be able to be provided once the onshore cable corridor, working methods and timeframe are finalised.
338. A number of the standard best-practice mitigation measures outlined above (relating the badger mitigation) will also help mitigate risks to amphibians. These measures may be sufficient on their own where there is a low risk of encountering GCN, but where the risks are elevated (such as if works would take place in areas of suitable habitat in close proximity to known GCN ponds), the additional mitigation under EPS-licensed conditions will be required.
339. In areas where GCN are present but the precise works footprint would envelop low suitability terrestrial habitat, such as arable fields, it may be possible to mitigate impacts to GCN by adopting seasonal restrictions to the works. This will typically involve working in such areas between November and February (the time of year when GCN will be hibernating and therefore absent from habitats such as arable fields which do not provide suitable hibernation opportunities) without needing to adopt the above mitigation measures.

22.6.1.17.4 Residual Impacts (all construction scenarios)

340. Depending on the precise construction footprints and programme, mitigation measures for GCN would be expected to reduce the magnitude of effect from permanent medium negative to negligible (indeed, this reduction in impact would be compelled under the EPS licensing process) thereby reducing the significance of the impact to **negligible** significance.

22.6.1.18 Impact 18: Potential Mortality of Rare Invertebrates/Fish or Destruction of or Damage to Rare Invertebrate/Fish Habitats

341. Whilst no baseline fish surveys are planned to be undertaken, fish species are known to use a number of the watercourses within the PEIR boundary. However, the watercourses for which fish are likely to be use (such as Main Rivers) will be avoided through the implementation of trenchless crossing techniques (e.g. HDD). Therefore, no direct impacts on fish populations or their habitats will occur. This conclusion also applies to terrestrial and/or aquatic invertebrates that may be present within Main Rivers.
342. Invertebrates and/or fish may experience indirect impacts from construction related activities; however, it is anticipated that these would be short term and localised.

22.6.1.18.1 *Magnitude of effect (all construction scenarios)*

343. As a RWCS in which extensive areas of value to invertebrates (particularly rarer species of restricted distribution and with specialist habitat requirements) and/or fish are impacted, a short term temporary and localised negative impact would be predicted.

22.6.1.18.2 *Impact Significance (all construction scenarios)*

344. The effect of the above impact would be of minor adverse significance at multiple local or possibly district/county scales, depending on the species concerned.

22.6.1.18.3 *Mitigation*

345. The following mitigation measures will be employed at those locations which are identified as being suitable for invertebrates and/or fish:

- In order to ensure that there are no adverse impacts resulting from the installation of temporary dams, the amount of time that temporary dams are in place would be restricted to a reduced programme where possible, and flumes or pumps would be adequately sized to maintain flows downstream of the obstruction whilst minimising upstream impoundment. Furthermore, a fish rescue would be undertaken in the area between the temporary dams prior to dewatering; and
- Bed and bank habitats will be reinstated and where possible improved following the completion of the works.

22.6.1.18.4 *Residual Impacts (all construction scenarios)*

346. Following implementation of these mitigation measures, the risk of direct and indirect effects on invertebrates and fish, will be reduced to a negligible magnitude. As a consequence, a residual impact of **minor adverse** significance at multiple local or possibly district/county scales.

22.6.1.19 **Impact 19: Potential Mortality, Harm or Disturbance of Reptiles, or Destruction, Damage or Disturbance of Reptile Habitats**

347. Suitable habitats for supporting common reptile species have been identified during the EP1HS completed to date. Targeted reptile presence/absence surveys will be undertaken in 2021 and the findings will be used to inform the EclA and any necessary mitigation measures; these will be presented in the full ES.

348. However, and in the absence of these survey findings, the key mitigation measures that will be adopted for common reptile species, are outlined below.

22.6.1.19.1 *Magnitude of effect (all construction scenarios)*

349. As a RWCS in which reptiles are present in the multiple areas of suitable habitat within the PEIR boundary and construction works in these areas are completed insensitively, a permanent medium negative to multiple district reptile populations is possible.

22.6.1.19.2 *Impact Significance (all construction scenarios)*

350. Whilst unlikely, the effect of the above impact could be of major adverse significance, because if reptiles are killed and habitats destroyed, reptile populations could be permanently lost from multiple sites.

22.6.1.19.3 *Mitigation*

351. In general, likely risks to these species can be addressed by the best-practice measures outlined under the badger mitigation section (see [Section 22.6.1.12.3](#)).
352. If reptiles are confirmed present in areas due to be impacted by construction works, mitigation will involve habitat management to temporarily displace reptiles from the proposed construction footprint. Alternatively, where this would not sufficiently mitigate risks, a reptile translocation exercise will be undertaken. Reptile exclusion fencing may need to be installed around areas of suitable habitat to ensure reptiles do not re-enter these areas during and after the translocation effort. This will involve capture of reptiles from within the area of works and translocation of any captured animals will be moved by a suitably qualified ecologist to a pre-identified area of suitable habitat (i.e. receptor site) that is located outwith the working area. On completion of the works, the reptile exclusion fencing will be removed and reptiles allowed to naturally return to the area.

22.6.1.19.4 *Residual Impacts (all construction scenarios)*

353. Following the implementation of the agreed mitigation measures, the impacts to common reptile species will be reduced to temporary low negative thereby reducing the significance of the impact to **minor adverse** or **negligible** significance.

22.6.1.20 *Impact 20: Potential Mortality, Harm or Disturbance to Riparian Mammals (Otters and Water Voles), or Destruction, Damage or Disturbance of Riparian Mammal Habitats*

354. Targeted surveys for otter and water vole will be undertaken in 2021 of suitable habitat that has been recorded during the EP1HS undertaken to date. The findings of which will inform the EclA and any necessary mitigation measures; these will be presented in the full ES accompanying the DCO application.
355. Water voles and otters are known to be present along the River Wensum. However, this river will be subject to trenchless crossing techniques (i.e. HDD) as part of embedded mitigation to avoid potential direct impacts on this river, its associated habitats, and the species it is known to support.
356. In a RWCS, assuming riparian mammals are present within the ordinary watercourses (including IDB-maintained drains) that will be crossed using trenched techniques, these species would be at risk of harm or mortality from construction activity, and the riparian habitats on which they rely could be damaged or destroyed. Construction works could also impact watercourses beyond the working area (such as from pollution of the water or alteration of water levels), thereby extending impacts to wider watercourses and likely larger populations of riparian mammals.

22.6.1.20.1 *Magnitude of effect (all construction scenarios)*

357. In a RWCS in which multiple crossing points of watercourses which support riparian mammals are impacted by open-trench installation works and nearby construction activity, a temporary medium negative impact is possible.
358. A temporary medium negative magnitude of impact is possible.

22.6.1.20.2 *Impact Significance (all construction scenarios)*

359. The effect of this impact would be of moderate or possibly major adverse significance at multiple district scales.

22.6.1.20.3 *Mitigation*

360. In order to minimise direct effects on water voles during construction works, the following mitigation measures will be implemented in locations known to support water voles:

- A pre-construction survey will be undertaken prior to works commencing to confirm the current distribution of water voles within the proposed working areas;
- Displacement of water voles under licence for the width of the onshore cable corridor will be conducted prior to works commencing. Displacement will follow the protocol set out in Appendix 1 of the Water Vole Mitigation Handbook (2016). Details of this protocol will be agreed with Natural England in advance of the commencement of any works;
- Post-construction water vole monitoring surveys during the breeding season one year after completion of the construction works will be undertaken to determine the status of the water vole population; and
- Habitats will be fully reinstated following works, completion in accordance with the guidance set out in the Water Vole Mitigation Handbook (2016).

361. To minimise indirect impacts on otters during the construction phase, the following mitigation measures will be implemented:

- Wherever possible, night-time working near watercourses will be avoided or else minimised as much as possible; and
- Exit ramps from excavations will be provided at night near watercourses with confirmed presence, so to provide otters with an escape route and to avoid entrapment.

362. If impacts to riparian mammal habitats cannot be avoided, destruction of these habitats (such as water vole burrows or otter holts) will require Natural England licences.

22.6.1.20.4 *Residual Impacts (all construction scenarios)*

363. Following implementation of the appropriate mitigation measures, the magnitude of effect on water voles and/or otters will reduce from temporary medium negative to temporary low negative or negligible, thereby reducing the significance of the impact to **minor adverse** or **negligible** significance.

22.6.1.21 Impact 21: Potential Mortality, Harm or Disturbance of White-Clawed Crayfish, or Destruction, Damage or Disturbance to White-Clawed Crayfish Habitat

364. Targeted surveys for white-clawed crayfish will be undertaken in 2021 where suitable habitat for this species has been recorded within the PEIR boundary. These surveys will focus on those watercourses that will not be crossed using trenchless techniques (i.e. ordinary watercourses, including some IDB maintained drains)
365. White-clawed crayfish is noted as a qualifying feature of the River Wensum SAC, which is crossed by the PEIR boundary. However, this watercourse will be subject to trenchless crossing technique (i.e. HDD) as part of embedded mitigation to avoid potential impacts at this location. As such there will be no impact on white-clawed crayfish associated with the onshore cable route at this location.
366. In a RWCS, ordinary watercourses (including some IDB maintained drains) used by white-clawed crayfish could be impacted by construction works if they are not crossed using trenchless techniques, and in turn could be exposed to the accidental introduction of the non-native American signal crayfish *Pacifastacus leniusculus* or crayfish plague *Aphanomyces astaci*. There could also be damage to watercourse habitats, including crucially the gravelly substrates of rivers and streams which white-clawed crayfish rely on. Construction works within rivers and streams could conceivably result in the mortality or injury of individual white-clawed crayfish.

22.6.1.21.1 Magnitude of effect (all construction scenarios)

367. In a RWCS, in which multiple watercourses supporting white-clawed crayfish are detrimentally impacted, be it through habitat damage, mortality or harm of individual white-clawed crayfish or introduction of INNS or disease, a permanent high negative magnitude of effect is possible.

22.6.1.21.2 Impact Significance (all construction scenarios)

368. The effect of this impact could be of major adverse significance at district/county, or possibly up to regional/national level depending on the extent of the impact.

22.6.1.21.3 Mitigation

369. Trenchless crossing techniques are embedded into the scheme design for Main Rivers and there is therefore no mechanism for direct impacts to occur to these water bodies or the species they support. Therefore, no further mitigation is proposed at trenchless crossing locations.
370. Assuming the species is confirmed present within ordinary watercourses (including some IDB maintained drains), mitigation measures that will be adopted will involve ensuring all equipment used within or in proximity to the watercourse is disinfected to ensure it does not accidentally contaminate the watercourse with American signal crayfish or crayfish plague.
371. If works are required within sections of river channel supporting white-clawed crayfish, a Natural England licence will need to be obtained to permit capture and translocation of animals from the relevant section of the river. White-clawed crayfish can be moved to an area of suitable habitat elsewhere within the same river channel (i.e. upstream or downstream), provided it is sufficiently separated from the construction area.

22.6.1.21.4 *Residual Impacts (all construction scenarios)*

372. Following the implementation of the agreed mitigation measures, the impacts to white-clawed crayfish would be expected to reduce the magnitude of effect from permanent high negative to temporary low negative (resulting from disturbance and temporary displacement only), thereby reducing the significance of the impact to **minor adverse** or **negligible** significance.

22.6.1.22 **Impact 22: Potential Mortality, Harm or Disturbance to Other Priority Species, or Destruction, Damage or Disturbance of Habitats Supporting Other Priority Species**

373. Priority species such as hedgehog, common toad and brown hare are known to be present within the PEIR boundary, based on occasional observations during various field surveys. Targeted surveys for these species are not justified given the relatively limited legal protection and conservation statuses of these species compared to those assessed above. However, they warrant consideration because they are Priority Species, reflecting more conservation importance than other widespread animal species.

374. The construction works associated with installation of the onshore export cables risk impacting these species through direct harm and mortality from the operation of excavating/other machinery, destruction of or damage to key habitats, severance of connective features, entrapment within excavations and disturbance from noise, light, air pollution and ground vibration.

22.6.1.22.1 *Magnitude of effect (all construction scenarios)*

375. If works were completed insensitively and without mitigation, works associated with the installation of the onshore export cables could (in a RWCS) have permanent medium negative impacts to county populations of these species. Realistically, a lower magnitude and geographical scale of impact is likely because the installation works are unlikely to proceed in a manner which would create such an impact; for example, the RWCS for these species would be if installation works took place largely overnight when these species are more active, but in reality installation works are more likely to be confined to daylight hours.

22.6.1.22.2 *Impact Significance (all construction scenarios)*

376. The effect of this impact could be of moderate adverse significance at up to the county scale.

22.6.1.22.3 *Mitigation*

377. In general, likely risks to these species can be addressed, at least in part, by adopting the above mitigation measures, particularly the best-practice measures outlined under the badger mitigation section (see **Section 22.6.1.12.3**).

22.6.1.22.4 *Residual Impacts (all construction scenarios)*

378. The implementation of the identified mitigation measures will reduce the magnitude of effect from permanent medium negative to temporary low negative thereby reducing the significance of the impact to **negligible** significance.

22.6.2 Potential Impacts during Operation

379. Once installed, there is no requirement for ongoing maintenance of the operational onshore export cables. In-use/ operation impacts are therefore expected to be negligible for all valued ecological receptors, and are not assessed any further. The impacts associated with EMF are assessed within **Chapter 21 Land use and Recreation** as well as **Chapter 30 Health** and **Appendix 30.1 EMF study**.
380. The potential for soil heating emanating from the operational, buried onshore export cables is assessed in **Chapter 21 Land use and Recreation**. In summary, topsoil temperatures are not predicted to be significantly impacted.

22.6.3 Potential Impacts during Decommissioning

381. No decision has yet been made regarding the final decommissioning policies for either DEP or SEP as it is recognised that industry best practice, rules and legislation change over time. The detail and scope of decommissioning works will be determined by the relevant legislation and guidance at the time of decommissioning and will be agreed with the regulator with decommissioning plan provided.
382. However, it is considered likely that the proposed onshore substation would be removed and will be reused or recycled and that the onshore cables would also be removed and recycled, with the transition bays and cable ducts (where used) left in situ. For the purposes of a worst-case scenario, it is considered that impacts associated with the decommissioning phase would be no greater than those identified for the construction phase.

22.7 Cumulative Impacts

22.7.1 Identification of Potential Cumulative Impacts

383. The first step in the cumulative assessment is the identification of which residual impacts assessed for DEP and/or SEP on their own have the potential for a cumulative impact with other plans, projects and activities (described as 'impact screening'). This information is set out in **Table 22-13**: below, together with a consideration of the confidence in the data that is available to inform a detailed assessment and the associated rationale. Only potential impacts assessed in **Section 22.6** as negligible or above are included in the CIA (i.e. those assessed as 'no impact' are not taken forward as there is no potential for them to contribute to a cumulative impact).
384. **Table 22-13**: concludes that in relation to onshore ecology receptors, based on the limited information currently available, there may be potential for cumulative impacts on such receptors to occur. This includes designated nature conservation sites and protected, and notable species as identified in **Section 22.6**.

Table 22-13: Potential Cumulative Impacts (impact screening)

Impact	Potential for Cumulative Impact	Rationale
Construction		
Disturbance to River Wensum SAC/SSSI and Weybourne Cliffs SSSI	Yes	Impacts to these designated sites could act cumulatively with other plans or projects in the nearby areas if they also cause impacts to these sites, particularly if they are completed contemporaneously. The likelihood of a temporal overlap may increase with the sequential scenario where construction would take place over a longer period.
Disturbance to multiple CWSs within or close to the PEIR boundary	Yes	Impacts to this CWS could act cumulatively with other plans or projects in the nearby area if these also cause impacts to it, particularly if they are completed contemporaneously. The likelihood of a temporal overlap may increase with the sequential scenario where construction would take place over a longer period.
Destruction/damage of habitats	Yes	Impacts to this habitat could act cumulatively with other plans or projects in the same area if these also cause impacts to it, particularly if they are completed contemporaneously. The likelihood of a temporal overlap may increase with the sequential scenario where construction would take place over a longer period.
Destruction/damage of watercourse habitats	Yes	Impacts to this habitat could act cumulatively with other plans or projects in the same area if these also cause impacts to it, particularly if they are completed contemporaneously. The likelihood of a temporal overlap may increase with the sequential scenario where construction would take place over a longer period.

Impact	Potential for Cumulative Impact	Rationale
Mortality, harm or disturbance to legally protected and/or notable species and/or their habitat	Yes	Impacts to this species could act cumulatively with other plans or projects in the same area if these also impact badgers, particularly if they are completed contemporaneously. The likelihood of a temporal overlap may increase with the sequential scenario where construction would take place over a longer period.
Mortality, harm or disturbance to other priority species (such as hedgehog, brown hare and common toad) and/or their habitats	Yes	Impacts to these species could act cumulatively with other plans or projects in the same area if these also impact such species, particularly if they are completed contemporaneously. The likelihood of a temporal overlap may increase with the sequential scenario where construction would take place over a longer period.

22.7.2 Other Plans, Projects and Activities

385. The second step in the cumulative assessment is the identification of the other plans, projects and activities that may result in cumulative impacts for inclusion in the CIA (described as ‘project screening’). This information is set out in **Table 22-14** below, together with a consideration of the relevant details of each, including current status (e.g. under construction), planned construction period, closest distance to DEP and SEP, status of available data and rationale for including or excluding from the assessment.
386. The project screening has been informed by the development of a CIA Project List which forms an exhaustive list of plans, projects and activities in a very large study area relevant to DEP and SEP. The list has been appraised (including by relevant councils), based on the confidence in being able to undertake an assessment from the information and data available, enabling individual plans, projects and activities to be screened in or out.

Table 22-14: Summary of projects considered for the CIA in relation to valued ecological receptors (project screening)

Project	Status	Construction Period	Closest Distance from the PEIR boundary (km)	Included in the CIA (Y/N)	Rationale
Norfolk Vanguard Offshore Wind Farm	DCO consented ¹	2022-2027	0 – cable intersects DEP and SEP	Y	The onshore cable route for the Norfolk Vanguard offshore wind farm will also pass through DEP and SEP PEIR boundary. There may be concurrent construction. There may, therefore, be cumulative impacts and effects on valued ecological receptors such as designated nature conservation site and protected/valued species.
Hornsea Project Three Offshore Wind Farm	DCO consented	2021-2025 (single phase) 2021-2031 (two phase)	0 – cable intersects DEP and SEP 0.8 between onshore substations	Y	There is potential that this project could be constructed in two phases meaning that the entire construction period could be either ten years or six years. Therefore, there could be temporal overlap of construction with DEP and SEP which could lead to cumulative impacts to multiple valued ecological receptors included designated nature conservation sites and

¹ Following completion of this CIA, the ruling of a Judicial Review brought against the Secretary of State for Business Energy and Industrial Strategy's (BEIS) decision to award a DCO for NV has been handed down. The decision to grant the order has been submitted to the Secretary of State for redetermination. BEIS will be considering its options, namely appeal or redetermination. Until such time as this process reached a conclusion it has been decided to maintain the NV/ NB cumulative assessment for stakeholder review.

Project	Status	Construction Period	Closest Distance from the PEIR boundary (km)	Included in the CIA (Y/N)	Rationale
					protected/valued species. The onshore infrastructure for this project follows a very similar route to that of DEP and SEP; therefore, there is high potential the same receptors would be cumulatively impacted.
Norfolk Boreas Offshore Wind Farm	DCO examination	2023-2028	0 – cable intersects DEP and SEP	Y	The onshore cable route for the Norfolk Boreas offshore wind farm will also pass through DEP and SEP PEIR boundary. There may be concurrent construction. There may, therefore, be cumulative impacts and effects on valued ecological receptors such as designated nature conservation site and protected/valued species.
Norwich Northern Distributor Road (NDR) (A1067 between Taverham and Attlebridge to A47 at Postwick)	Construction completed	N/A	1.8km from PEIR boundary	Y	Operational impacts of the NDR, such as on foraging bats, would overlap with the construction period of DEP and SEP. There may, therefore, be cumulative impacts and effects on certain valued ecological receptors.

Project	Status	Construction Period	Closest Distance from the PEIR boundary (km)	Included in the CIA (Y/N)	Rationale
A47 Blofield to North Burlingham: dualling this section of currently single carriageway road.	Pre-application DCO	Unknown – estimated duration is 16 months	14km from PEIR boundary	N	The relatively localised nature of impacts likely to be associated with this project and the distance from the onshore substation area for DEP and SEP mean that cumulative impacts are very unlikely.
A47 North Tuddenham to Easton RIS	Pre-application (application due Q1 2021)	Expected construction 2023 to 2024/5	0 – A47 intersects PEIR boundary	Y	There is a possibility that there will be temporal overlap in the construction of this project and DEP and SEP. There may, therefore, be cumulative impacts and effects on valued ecological receptors such as nearby designated nature conservation sites and any protected and notable species occurring in this area.
A47/A11 Thickthorn Junction RIS	Pre-application (application due Q1 2021)	Expected construction 2023 to 2024/5	2.2	Y	There is a possibility that there will be temporal overlap in the construction of this project and DEP and SEP. There may, therefore, be cumulative impacts and effects on valued ecological receptors such as nearby designated nature conservation sites and any protected and notable species occurring in this area.

Project	Status	Construction Period	Closest Distance from the PEIR boundary (km)	Included in the CIA (Y/N)	Rationale
Construction of permeable surfaced footpath and access road for pedestrians and emergency and maintenance vehicles at Mulbarton County First School	Approved	Unknown	1km	N	This project comprises only 263 m ² of permeable footpath, approximately 1km from the nearest part of the PEIR boundary. There is no realistic potential for discernible overlapping ecological impacts.
Change of use from warehousing to use for waste processing and production of waste derived fuel at SPC Atlas Works.	Approved	Unknown	1.13km	N	The project is well separated from the nearest part of the PEIR boundary by over 1km and is closely bordered by other industrial land-uses and activities. The EclA for the project predicts residual neutral impacts on most valued ecological receptors, with reptiles the only unknown. Therefore, there is no realistic potential for discernible overlapping ecological impacts.

Project	Status	Construction Period	Closest Distance from the PEIR boundary (km)	Included in the CIA (Y/N)	Rationale
Demolition of four existing dwellings and development of 10 residential units south of Swannington.	Approved (reserved matters application)	Unknown	0.04km from PEIR boundary	N	There are no anticipated cumulative impacts on ecological receptors with this project and DEP and SEP.
EIA Screening Opinion request for the proposed development of a ground mounted solar farm and associated infrastructure, occupying approx. 35 ha of land north of the Street, Cawston	Screening decision – EIA not required	Unknown	0km from PEIR boundary – entire proposed development area contained within the PEIR boundary.	Y	The project has potential to impact valued habitats and protected species such as roosting bats, badgers, nesting birds and brown hare. These receptors are all also vulnerable to impacts associated with DEP and SEP.
Beerhouse Farm, Oulton Street, Cawston – prior notification:	No prior approval required	Unknown	0.4km from PEIR boundary	N	Ecological impacts relating to this project are unknown as the approved notification includes no ecological assessment or other information.

Project	Status	Construction Period	Closest Distance from the PEIR boundary (km)	Included in the CIA (Y/N)	Rationale
agricultural building					
Infiltration lagoon to serve Food Enterprise Park 2 north of Colton	Approved	Unknown	0.5km from PEIR boundary	N	Although no ecological information is provided alongside the planning application documents, this attenuation lagoon provides sustainable drainage for the development. As such no ecological impacts are anticipated as it is unlikely that there will be any temporal overlap and therefore no mechanism for cumulative impact.
Erection of agricultural building and shed at the Old Hall, Colton	Approved	Exact period unknown but must start by 2021.	0km – directly borders PEIR boundary	N	There is unlikely to be a temporal overlap in construction, meaning no realistic potential for discernible cumulative ecological impacts.
Change of use from potato shed to agricultural chemical storage at Honingham	Approved	Unknown	1.6km from the PEIR boundary	N	Given the limited scope for ecological impact from a change of use of an agricultural building within an industrial farm complex, there is no realistic potential for discernible cumulative ecological impacts.

Project	Status	Construction Period	Closest Distance from the PEIR boundary (km)	Included in the CIA (Y/N)	Rationale
Thorpe Farm, Norwich Road, Honingham					
Erection of agricultural building and shed at The Old Hall, The Street, Colton	Approved with conditions	Unknown	0.9km from the PEIR boundary	N	No ecological information has been submitted with the approved planning application, meaning the planning authority will have concluded there is no realistic potential for impacts to valued ecological receptors. Therefore, there is no realistic potential for cumulative ecological impacts with DEP and SEP.
Demolition of a garage and outbuilding, erection of detached garage and single storey side extension at Greenacres, Cromer Road, Bodham.	Approved	Unknown	0.3km from PEIR boundary	N	This proposal has a very small footprint in comparison to DEP and SEP. Detail has been removed from planning website so project may have been completed or expired/withdrawn. There is considered to be no realistic potential for cumulative ecological impacts from this project in combination with DEP and SEP.

Project	Status	Construction Period	Closest Distance from the PEIR boundary (km)	Included in the CIA (Y/N)	Rationale
Demolition of garages, and replacement with wheelchair adaptable bungalow.	Pre-application advice given	Unknown	0.3km from PEIR boundary	N	This proposal has a very small footprint in comparison to DEP and SEP. Detail has been removed from planning website so project may have been completed or expired/withdrawn. There is considered to be no realistic potential for cumulative ecological impacts from this project in combination with DEP and SEP.
Erection of detached double garage and detached outbuilding to provide two self-contained holiday lets at Greenacres, Cromer Road, Bodham.	Pre-application advice given	Unknown	0.3km from PEIR boundary	N	This proposal has a very small footprint in comparison to DEP and SEP. Detail has been removed from planning website so project may have been completed or expired/withdrawn. There is considered to be no realistic potential for cumulative ecological impacts from this project in combination with DEP and SEP.
Demolition of former school and construction of	Pre-application advice given	Unknown	0.5km from PEIR boundary	N	This proposal has a very small footprint in comparison to DEP and SEP and is located on the opposite side of the village of Bodham. Detail has been removed from planning website

Project	Status	Construction Period	Closest Distance from the PEIR boundary (km)	Included in the CIA (Y/N)	Rationale
four dwelling houses.					so project may have been completed or expired/withdrawn. Ecological impacts are therefore unknown so it cannot be included in the CIA.
Affordable housing development in the field adjacent to Sheringham Road, Weybourne.	Pre-application advice given	Unknown	0.5km from PEIR boundary	N	This proposal is located on the opposite side of the village of Weybourne relative to the PEIR boundary. Detail has been removed from planning website so project may have been completed or expired/withdrawn. Ecological impacts are therefore unknown so it cannot be included in the CIA.
Prior notification to erect replacement agricultural storage building at Breck Farm, Weybourne Road, Weybourne	Permission not required	Unknown	0.1km from PEIR boundary	N	This proposal is likely to have a very small footprint in comparison to the DEP or SEP, and it would be focused within the existing Breck Farm farmyard. Detail has been removed from planning website so project may have been completed or expired/withdrawn. Ecological impacts are therefore unknown so it cannot be included in the CIA.

22.7.3 Assessment of Cumulative Impacts

387. Having established the residual impacts from DEP and/or SEP with the potential for a cumulative impact, along with the other relevant plans, projects and activities, the following sections provide a preliminary assessment of the level of impact that may arise. It should be noted that as baseline data collection is still ongoing at present, a full cumulative assessment has not been undertaken at this time. This will be reported fully once baseline data has been fully obtained and presented in the ES.

22.7.3.1 Cumulative Impacts on Designated Nature Conservation Sites

388. The only statutory designated nature conservation site that overlaps with the PEIR boundary is the River Wensum SAC/SSSI. HDD has been embedded into the scheme design to cross this feature and direct impacts would be avoided and overall residual impacts are assessed as minor adverse. Hornsea Project Three also crosses the River Wensum approximately 600m further upstream of the DEP and SEP crossing. Hornsea Project Three has similarly committed to use HDD at this crossing to avoid direct impacts. Residual impacts relate to the potential for bentonite (an inert clay based material used during drilling works) to breakout into the river channel and potentially smother habitats. The effects of this would be extremely localised and given the distance of separation between the DEP/SEP crossing and the Hornsea Project Three crossing no cumulative impacts are predicted.
389. The DEP and SEP PEIR boundary also overlaps with a number of CWSs. The final alignment of the cable corridor will be defined post-PEIR and will seek to avoid as many of the sites as practicable. However, given the spatially and potentially temporally overlapping impacts arising from a number of the above listed projects, there is potential for cumulative impacts.
390. All residual impacts to CWSs from DEP and SEP are predicted to be temporary and of medium, low or negligible magnitudes. The effects of these impacts are anticipated to be of no greater than negligible or minor adverse significance for all but one designated site; Hall Hills/Ringland Covert CWS may experience a moderate adverse level of significance, but a residual effect of minor positive significance is possible depending on the level of post-construction enhancement that can be agreed with the landowner. There are no CWSs within the DEP and SEP PEIR boundary that are also crossed by any of the other identified projects and so there is no mechanism for direct cumulative impacts.
391. It is conceivable that the magnitude and significance of indirect impacts for some of these sites could be elevated due to cumulative impacts. The potential for such impacts will be assessed once the final alignment of the DEP and SEP cable corridor has been defined and will be reported within the ES as part of the DCO application. However, given the overall predicted low magnitudes and significances of residual impacts for DEP and SEP on these CWSs, there is limited likelihood of cumulative impacts being

22.7.3.2 Cumulative Impacts on Habitats

392. Given the spatially and potentially temporally overlapping impacts arising from a number of the above listed projects, there is potential for cumulative impacts on multiple habitat types. In particular, there is potential for cumulative impacts on those habitats which are widespread within the PEIR boundary and elsewhere in the surrounding landscape, such as arable fields and margins, hedgerows, woodland and watercourses.
393. Residual impacts to most habitats from DEP and SEP are predicted to be temporary and of medium, low or negligible magnitudes, and the effects of these impacts are anticipated to be of no greater than minor adverse significance.
394. Most of the DEP and SEP construction footprint is located within habitats which are replaceable or recoverable, such as arable farmland, scrub and improved grasslands. Any other plans or projects impacting these types of habitats are unlikely to lead to cumulative impacts in combination with DEP and SEP because it is generally possible for residual impacts to be avoided or comprehensively mitigated at an individual project level.
395. Habitats which are less able to recover or be quickly replaced, such as woodlands and hedgerows, are predicted to experience permanent low negative and temporary medium negative residual impacts as a result of DEP and SEP, and the effects of these would be of moderate adverse significance for both habitat types. There is, therefore, potential for cumulative impacts to these specific habitat types at a district or county level that would be exacerbated by other plans and projects, especially given the common occurrence of these habitat types throughout the PEIR boundary and within the surrounding landscape.
396. Hedgerow replacement/reinstatement is considered best-practice and following a review of the available documents associated with all of the projects screened into this CIA has confirmed that this is a commitment, in a similar approach to that outlined above. There could still be temporary cumulative impacts due to the lag-time between established hedgerows being removed and newly planted hedgerows maturing and beginning to provide the same ecological functions as the removed hedgerows. Such impacts would be expected to be comprehensively mitigated within around 10-20 years; within which time any replanted hedgerows should begin functioning as well-established hedgerow habitat. Permanent cumulative impacts to hedgerow habitat are therefore considered extremely unlikely. Furthermore, the proposed ecological mitigation and enhancement package for DEP and SEP is anticipated to lead to long-term positive effects on hedgerow habitat as a result of hedgerow creation (such as by infilling existing hedgerow gaps and replacing sections of poor quality removed hedgerows with higher quality hedgerows, for example); this would negate any potential for cumulative impacts.

397. Impacts to woodland from DEP and SEP have been and will be further minimised by cable corridor refinement undertaken post-PEIR. The only other plans or projects (from those listed in **Table 22-14**) realistically likely to impact woodland habitat would be the offshore wind farm grid connection proposals. Those plans also aim to minimise impacts to woodland habitat (through careful routing of their construction footprints), and comprehensive mitigation (i.e. habitat reinstatement, compensation and/or enhancement) is proposed wherever impacts have not been avoided. Overall, therefore, the risk of cumulative residual long-term impacts to woodland habitat is predicted to be very low.
398. The potential for such impacts will be assessed once the final alignment of the DEP and SEP cable corridor has been defined and will be reported within the ES as part of the DCO application. There may also be opportunities for ecological enhancement to habitats such as hedgerows and woodlands to be amalgamated with other plans' or projects' enhancement proposals. There is increased scope for more substantial and beneficial ecological enhancements to be secured if a combined package of enhancement can be provided. The possibilities of this will also be considered in detail and presented in the ES as part of the DCO application.

22.7.3.3 Cumulative Impacts on Protected and Other Priority Species

399. Given the spatially and potentially temporally overlapping impacts arising from a number of the above listed projects, there is potential for cumulative impacts on multiple protected and other priority species. In particular, there is potential for cumulative impacts on those species which are widespread within the PEIR boundary and elsewhere in the surrounding landscape, which may include badgers, bats (roosting and non-roosting), breeding birds, over-wintering birds, GCN, reptiles, riparian mammals, white-clawed crayfish and other priority species such as hedgehog, brown hare and common toad.
400. The potential for such impacts will be assessed once the final alignment of the DEP and SEP cable corridor has been defined and will be reported within the ES as part of the DCO application. There may be opportunities for ecological enhancement aimed at benefitting protected and other priority species (such as breeding birds, roosting bats, GCN and reptiles, amongst others) to be amalgamated with other plans' or projects' enhancement proposals. There is increased scope for more substantial and beneficial ecological enhancements to be secured if a combined package of enhancement can be provided; for animal species these enhancements will likely be closely related to habitat enhancements.

22.8 Transboundary Impacts

401. There are no transboundary impacts with regard to onshore ecology as the onshore project area would not be sited in proximity to any international boundaries. Transboundary impacts are therefore scoped out of this assessment and are not considered further.

22.9 Inter-relationships

402. Most valued onshore ecological receptors are intrinsically linked to hydrology, soils and air quality. Noise, lighting, ground vibration and traffic movements can also impact protected and notable species.

403. A summary of the potential inter-relationships between onshore valued ecological receptors and hydrology, air quality, noise and other relevant aspects of DEP and SEP are listed in **Table 22-15**:

Table 22-15: Onshore Ecology and Ornithology Inter-Relationships

Topic and description	Related chapter	Where addressed in this chapter	Rationale
Construction			
Impacts on water-dependent habitats and designated sites	Chapter 20 Water Resources and Flood Risk	Section 22.6.1.1	Potential changes to ground conditions (including chemical quality and physical properties) during construction could affect the quality and quantity of groundwater and hydrologically-connected surface water receptors which could in turn affect valued ecological receptors which rely on these water sources. This could include valued habitats (e.g. grasslands, rivers and woodland) and protected and valued species (such as birds, bats, riparian mammals, GCN and white-clawed crayfish).
Impacts on habitats through increased acid and nitrogen deposition from machinery during the construction phase	Chapter 24 Air Quality	Section 22.6.1.2	Potential changes to air quality (e.g. from fumes emanating from operating construction machinery) could affect nearby habitats. Animals which are not mobile could also be temporarily affected (whereas mobile animals would be expected to move away), including invertebrates, nesting birds, roosting bats and other small terrestrial animals.

Topic and description	Related chapter	Where addressed in this chapter	Rationale
			The results of the impact assessment on designated ecological sites will be presented in the onshore ecology ES chapter.
Impacts on protected and/or notable species from changes in noise, lighting, ground vibration and traffic movements during construction	Chapter 25 Noise and Vibration	Section 22.6.1.14, 22.6.1.15, 22.6.1.16, 22.6.1.17, 22.6.1.18, 22.6.1.19, 22.6.1.20, 22.6.1.21, and 22.6.1.22	Construction activities will inevitably result in new sources of noise, lighting, ground vibration and traffic movements. These have the potential to impact nearby wildlife such as breeding birds, bats (roosting and non-roosting), amphibians, riparian mammals, badgers, invertebrates and other terrestrial wildlife. Further considerations of the impacts of noise on legally protected and notable species will be presented in the onshore ecology ES chapter.
Operation			
Impacts on water-dependent habitats and designated sites	Chapter 20 Water Resources and Flood Risk	Section 22.6.1.9	Potential changes to the hydrology and water quality of the River Wensum SAC and SSSI during construction could impact on the onshore ecological receptors (habitats and species) known to be present (including the designated interest features).
Decommissioning			
Impacts associated with the decommissioning phase would be no greater than those identified for the construction phase.			

22.10 Interactions

404. The impacts identified and assessed in this chapter have the potential to interact with each other. The areas of potential interaction between impacts are presented in **Table 22-15**. This provides a screening tool for which impacts have the potential to interact. **Table 22-16** provides an assessment for each receptor (or receptor group) as related to these impacts.
405. Within **Table 22-16**: the impacts are assessed relative to each development phase (Phase assessment, i.e. construction, operation or decommissioning) to see if (for example) multiple construction impacts affecting the same receptor could increase the level of impact upon that receptor. Following this, a lifetime assessment is undertaken which considers the potential for impacts to affect receptors across all development phases.
406. The significance of each individual impact is determined by the sensitivity of the receptor and the magnitude of effect; the sensitivity is constant whereas the magnitude may differ. Therefore, when considering the potential for impacts to be additive it is the magnitude of effect which is important – the magnitudes of the different effects are combined upon the same sensitivity receptor.

Table 22-16: Interaction between impacts - screening

Potential Interaction between Impacts					
Construction					
	Impact 1: Construction disturbance to statutory designated nature conservation sites	Impact 2: Habitat destruction or damage, or construction disturbance to non-statutory designated nature conservation sites	Impacts 3-10: Loss of or damage to valued habitats	Impact 11: Potential spread of INNS	Impacts 12-22: Potential mortality, harm or disturbance to protected species, or destruction, damage or disturbance to protected species' habitat
Impact 1: Construction disturbance to statutory designated nature conservation sites	-	Yes – there are multiple ecological connections between statutory and non-statutory designated nature conservation sites, particularly where sites are in close proximity to each other.	Yes – there are multiple ecological connections between statutory designated sites and nearby valued habitats (e.g. hedgerows and watercourses connected to a SSSI)	Yes – there is potential for the spread of INNS such as Himalayan balsam or crayfish plague to statutory designated sites (namely the River Wensum SAC/SSSI).	Yes – many statutory designated nature conservation sites will support a range of protected and valued species, so impacts to the designated site will likely impact protected and valued species present here.

Potential Interaction between Impacts					
Impact 2: Habitat destruction or damage, or construction disturbance to non-statutory designated nature conservation sites	Yes – there are multiple ecological connections between statutory and non-statutory designated nature conservation sites, particularly where sites are in close proximity to each other.	-	Yes – there are multiple ecological connections between non-statutory designated sites and nearby valued habitats (e.g. hedgerows and watercourses connected to a CWS).	Yes – there is potential for the spread of INNS such as Himalayan balsam or crayfish plague to non-statutory designated sites, particularly those with aquatic or semi-aquatic habitats.	Yes – many non-statutory designated nature conservation sites will support a range of protected and valued species, so impacts to the designated site will likely impact protected and valued species present here.
Impacts 3-10: Loss of or damage to valued habitats	Yes – there are multiple ecological connections between statutory designated sites and nearby valued habitats (e.g. hedgerows and watercourses connected to a SSSI).	Yes – there are multiple ecological connections between non-statutory designated sites and nearby valued habitats (e.g. hedgerows and watercourses connected to a CWS).	-	Yes – there is potential for the spread of INNS such as Himalayan balsam or crayfish plague to valued habitats, particularly aquatic or semi-aquatic habitats.	Yes – all protected and valued species are reliant on various habitat so impacts to the habitat will impact the species present here.

Potential Interaction between Impacts					
Impact 11: Potential spread of INNS	Yes – there is potential for the spread of INNS such as Himalayan balsam or crayfish plague to statutory designated sites (namely the River Wensum SAC/SSSI).	Yes – there is potential for the spread of INNS such as Himalayan balsam or crayfish plague to non-statutory designated sites, particularly those with aquatic or semi-aquatic habitats.	Yes – there is potential for the spread of INNS such as Himalayan balsam or crayfish plague to valued habitats, particularly aquatic or semi-aquatic habitats.	-	Yes – some native protected and valued species could be negatively impacted by the spread of INNS.
Impacts 12-21: Potential mortality, harm or disturbance to protected species, or destruction, damage or disturbance to protected species' habitat	Yes – many statutory designated nature conservation sites will support a range of protected and valued species, so impacts to the designated site will likely impact protected and valued species present here.	Yes – many non-statutory designated nature conservation sites will support a range of protected and valued species, so impacts to the designated site will likely impact protected and valued species present here.	Yes – all protected and valued species are reliant on various habitat so impacts to the habitat will impact the species present here.	Yes – some native protected and valued species could be negatively impacted by the spread of INNS.	-

Table 22-20 Interaction between impacts – phase and lifetime assessment

Receptor	Highest significance level				
	Construction	Operation	Decommissioning	Phase assessment	Lifetime assessment
Designated Nature Conservation sites (statutory and non-statutory)	Minor adverse	Negligible	TBC	<p>No greater than individually assessed impact</p> <p>The impacts are considered to have no to minor magnitudes of effects on designated sites, with impact significances judged at no more than minor adverse during construction only. Given the low magnitudes and significances of the predicted impacts and effects, coupled with the avoidance/ mitigation measures due to be adopted, and the anticipated absence of/limited potential for impacts during operation or decommissioning, it is considered that there would either be no interactions between the phases, or that these would not result in greater impacts than are assessed individually.</p>	<p>No greater than individually assessed impact</p> <p>Impacts to designated nature conservation sites during operation are expected to be negligible, and during decommissioning impacts are expected to be equivalent or less than those predicted/ assessed during construction. It is therefore considered that impacts to designated sites would not combine over the lifetime of DEP and SEP to increase the significance level of any impacts.</p>

Highest significance level					
Valued habitats	Major adverse (pre-mitigation for woodland and hedgerows)	Negligible	TBC	<p>No greater than individually assessed impact</p> <p>Notable impacts to valued habitats are only predicted during the construction and possibly during the decommissioning phases; during operation valued habitats are expected to experience negligible impacts. During decommissioning, any impacts to valued habitats are likely to be of no more than equivalent significances for valued habitats because the decommissioning footprint will likely be smaller, timeframes will likely be shorter, and impacts would be focused on those habitats which had previously been impacted during construction. It is possible that habitats which become established within the PEIR boundary between construction and decommissioning (e.g. scrub which grows up overhead of the installed export cables) would need to be cleared to</p>	<p>No greater than individually assessed impact</p> <p>Notable impacts to valued habitats are only predicted during the construction and possibly during the decommissioning phases. Given the time delay between these two phases and the fact that the most valued/sensitive habitats are due to be avoided by decommissioning, there is no realistic potential for impacts to combine over the lifetime of the project and lead to levels of significance which would be greater than those assessed at individual (i.e. construction) phases. It is possible that some quickly regenerating habitats such as scrub could experience cumulative impacts over the course of DEP and SEP (if such a habitat becomes established within the</p>

Highest significance level					
				<p>accommodate decommissioning works, but the types of habitats which would become established between construction and decommissioning are, by their nature, quick to establish and therefore would be quick to recover post-decommissioning. The most ecologically valued habitats (woodlands, hedgerows, grasslands and wetlands/ watercourses, for example) are not expected to be impacted by decommissioning works because cabling/ducting is due to be extracted from in-situ jointing bays/ inspection pits, rather than require extensive open-trench removal. Impacts significances during decommissioning are therefore judged to be of lower (or certainly of no greater) significances than are predicted during the construction phase. Given the likely time delay between these two phases, no interactions resulting in greater</p>	<p>decommissioning footprint), but the overall impact during the lifetime of DEP and SEP would not be considered any more significant than during individual phases because these types of habitat would recover similarly quickly post-decommissioning.</p> <p>The most ecologically valued habitats (woodlands, hedgerows, grasslands and wetlands/ watercourses, for example) are not expected to be impacted by decommissioning works because cabling/ducting is due to be extracted from in-situ jointing bays/ inspection pits, rather than require extensive open-trench removal.</p> <p>Impacts significances throughout the lifetime of DEP and SEP are therefore judged to be of no greater</p>

Highest significance level					
				impacts than are assessed individually are expected.	significances than are predicted during any one phase.
INNS (potential spread of)	Major adverse	No effect	TBC	<p>No greater than individually assessed impact</p> <p>The same preventative measures relating to INNS would need to be taken at decommissioning stage as will be adopted during construction. Decommissioning works are expected to involve relatively minor works compared with construction meaning the risk of spreading INNS should also be lower. However, it is possible that INNS will have spread or become more established relative to their status at construction phase, in which case the pre-mitigation impact during decommissioning could increase. However, assuming appropriate mitigation measures are adopted (in line with measures due to be adopted at the construction phase) there would be no realistic potential for</p>	<p>No greater than individually assessed impact</p> <p>The same preventative measures relating to INNS would need to be taken at decommissioning stage as will be adopted during construction. Decommissioning works are expected to involve relatively minor works compared with construction meaning the risk of spreading INNS should also be lower. However, it is possible that INNS will have spread or become more established relative to their status at construction phase, in which case the pre-mitigation impact during decommissioning could increase. However, assuming appropriate</p>

Highest significance level					
				interaction between impacts in various stages of DEP and SEP.	mitigation measures are adopted (in line with measures due to be adopted at the construction phase) there would be no realistic potential for cumulative impacts through the lifetime of DEP and SEP.
Protected and valued species	Major adverse (for multiple protected and valued species assuming an unmitigated RWCS)	Negligible	TBC	<p>No greater than individually assessed impact</p> <p>The construction phase is expected to have the most significant impacts and effects on protected and valued species due to the larger footprint and longer timeframes than other phases. In contrast, operational impacts are expected to have negligible impacts on protected and valued species, and decommissioning works (which would be of a smaller scale and shorter timeframe than construction) would not be expected to have impacts of greater magnitudes or effects of greater significance than construction. Furthermore, it is</p>	<p>No greater than individually assessed impact</p> <p>Given the anticipated small footprint and short timeframe of decommissioning works relative to construction, there is considered to be no realistic potential for impacts to protected and valued species to cumulate over the lifetime of DEP and SEP. It is conceivable that some of the same populations (e.g. of nesting birds, GCN or badgers, for example) could be impacted both during construction and again during decommissioning, but given the long period</p>

Highest significance level					
				<p>anticipated that relevant mitigation measures will be adopted during decommissioning (e.g. clearance of woody vegetation outside of the main nesting bird season), which further reduces the potential for inter-related impacted across multiple phases of DEP and SEP.</p>	<p>between these events, any combined impacts would be no greater than those assessed at individual phases. It is also anticipated that relevant mitigation measures for protected and valued species (in particular, measures which ensure legal offences are avoided, such as destruction of birds' nests, GCN habitat or badger setts, for example) would be adopted during decommissioning in the same manner they will be adopted during construction.</p>

22.11 Potential Monitoring Requirements

407. Monitoring requirements will be described in the Outline Landscape and Ecological Management Strategy submitted alongside the DCO application and further developed and agreed with stakeholders prior to construction and taking account of the final detailed design of DEP and SEP.
408. The potential for the spread of INNS may need to be monitored, depending on whether works take place (and how they take place) in areas currently affected by INNS. If DEP and SEP are concluded to have resulted in the spread of INNS (e.g. of Himalayan balsam to previously unaffected watercourses), remedial action will be required in the form of an eradication effort.
409. Monitoring for bats and GCN might be necessary as part of any EPS Mitigation Licences. This will be determined as part of the licensing process. If any such monitoring is required, it will likely be very focussed, such as to the relevant trees (in the case of roosting bats) or ponds (in the case of GCN).
410. There may also be monitoring requirements associated with other licensed mitigation such as for badgers, water voles or white-clawed crayfish. Again, this would be determined as part of the licensing process.
411. Depending on the anticipated impact to skylarks and possibly some other breeding birds, which can be clarified once detailed surveys have been completed and a precise construction programme (incorporating mitigation measures) has been finalised, monitoring for breeding birds may be required. The purpose of any such monitoring would likely be to inform a review of the efficacy of the adopted mitigation, and/or allow the post-construction mitigation to be refined.
412. Depending on precise working practices within sensitive habitats such as the River Wensum SAC/SSSI, CWSs, woodlands, grasslands and river corridors, and the proposed mitigation measures for these individual sites, monitoring may be required to ensure the adopted mitigation is having the desired effect, and if not, to inform any necessary adjustments.
413. Any monitoring requirements for other ecological receptors such as over-wintering birds, reptiles or invertebrates, will be determined following a precise impact assessment, once exact working practices and mitigation approaches are decided in specific areas of relevance to these receptors.

22.12 Assessment Summary

414. This chapter has provided a characterisation of the existing environment for onshore ecology based on both existing (e.g. MAGIC and NBIS datasets) and site-specific survey data (e.g. Extended Phase 1 Habitat Survey and species-specific surveys).
415. The EclA has established that onshore ecological receptors could be affected as a result of direct and indirect impacts during the construction and decommissioning phases. The residual impacts on the majority of receptors during these phases would be negligible or minor adverse. However, it should be noted that not all onshore ecological surveys have been completed to date and therefore there is an inherent level of uncertainty within much of the ecological assessment presented in this chapter. These potential impacts as identified in this PEIR are summarised below.

416. Where there are multiple possible outcomes depending on, for example, whether construction works would involve trenchless or open-trench installation in a relevant area, the worst-case scenario (which involves the greater magnitude of impact) is listed in the summary table, below.

Table 22-17: Summary of potential impacts on onshore ecology and ornithology

Potential impact	Receptor	Sensitivity	Magnitude	Pre-mitigation impact	Mitigation measures proposed	Residual impact
Construction						
Damage to statutory designated sites	River Wensum SAC/SSSI and Weybourne Cliffs SSSI	High	Temporary low negative	Moderate or major adverse significance (up to national/ international level)	Avoidance of SSSI/SAC, sensitive working methods within and nearby the SAC/SSSI.	Negligible. Minor adverse significance (up to national/ international scale)
Damage to non-statutory designated site	The Carr Woodland CWS	High	Temporary low negative	Minor adverse significance (local level)	Avoidance of CWS, sensitive working methods nearby.	Temporary low negative or negligible. Minor adverse or negligible significance (local level)
Damage to non-statutory designated site	Yare Valley (Marlingford Hall) CWS	High	Temporary medium negative	Moderate adverse significance (local level)	Avoidance of CWS, sensitive working methods nearby.	Negligible. Negligible significance.

Potential impact	Receptor	Sensitivity	Magnitude	Pre-mitigation impact	Mitigation measures proposed	Residual impact
Damage to non-statutory designated site	Yare Valley (Colton Woods) CWS	High	Temporary medium negative	Moderate adverse significance (local level)	Avoidance of CWS, sensitive working methods within and nearby the CWS.	Negligible. Negligible significance.
Damage to non-statutory designated site	Hall Hills/ Ringland Covert CWS	High	Permanent high negative	Moderate adverse significance (local level)	Avoidance of CWS, sensitive working methods within and nearby the CWS, reinstatement (and possible enhancement) of habitat post-construction	Temporary low negative or permanent low beneficial (depending on extent of mitigation/ enhancement planting). Minor adverse or minor positive (depending on extent of mitigation/ enhancement planting) significance (local level)

Potential impact	Receptor	Sensitivity	Magnitude	Pre-mitigation impact	Mitigation measures proposed	Residual impact
Damage to non-statutory designated site	Wensum Pastures at Morton Hall CWS	High	Temporary high negative	Moderate adverse significance (local level)	Avoidance of CWS, sensitive working methods within and nearby the CWS.	Negligible. Negligible significance.
Damage to non-statutory designated site	Marriott's Way CWS	High	Temporary medium negative	Moderate adverse (district level)	Avoidance of CWS, sensitive working methods within and nearby the CWS.	Negligible. Negligible significance.
Damage to non-statutory designated site	Kelling Heath Park and 100 Acre Wood CWS	High	Temporary medium negative	Moderate or major (depending on route through CWS) adverse significance (district level)	Avoidance of CWS, sensitive working methods within and nearby the CWS.	Negligible. Negligible significance.

Potential impact	Receptor	Sensitivity	Magnitude	Pre-mitigation impact	Mitigation measures proposed	Residual impact
Damage to non-statutory designated site	Beach Lane, Weybourne CWS	High	Temporary low negative	Moderate adverse significance (district level)	Minimisation or complete avoidance of works footprint within CWS, sensitive working methods within and nearby the CWS.	Temporary low negative or negligible. Minor adverse or negligible significance (local level).
Damage to non-statutory designated site	Kelling Hard CWS	High	Temporary low negative	Moderate adverse significance (district level)	Minimisation or complete avoidance of works footprint within CWS, sensitive working methods within and nearby the CWS, reinstatement post-construction.	Temporary low negative or negligible. Minor adverse or negligible significance (local level).

Potential impact	Receptor	Sensitivity	Magnitude	Pre-mitigation impact	Mitigation measures proposed	Residual impact
Destruction, damage or disturbance of habitat	Arable habitat	Low	Temporary low negative	Negligible significance (county level)	None	Temporary low negative. Negligible significance (county).
Destruction, damage or disturbance of habitat	Arable field margins	Low	Temporary medium negative	Minor adverse significance (multiple local levels)	Minimisation of construction footprint within habitat, reinstatement post-construction.	Temporary low negative. Negligible significance (multiple local levels).
Destruction, damage or disturbance of habitat	Improved grasslands	High	Temporary low negative	Minor adverse significance (multiple district levels)	Minimisation of construction footprint within habitat, reinstatement post-construction.	Temporary low negative. Minor adverse significance (multiple district levels)

Potential impact	Receptor	Sensitivity	Magnitude	Pre-mitigation impact	Mitigation measures proposed	Residual impact
Destruction, damage or disturbance of habitat	Poor semi-improved grasslands	High	Temporary medium negative	Moderate adverse significance (multiple district levels)	Minimisation of construction footprint within habitat, reinstatement post-construction.	Temporary low negative. Minor adverse significance (multiple district levels)
Destruction, damage or disturbance of habitat	Semi-improved grasslands	High	Temporary high negative	Moderate adverse significance (multiple district levels)	Avoidance of habitat	Negligible. No change.
Destruction, damage or disturbance of habitat	Woodland	High	Permanent medium negative	Major adverse significance (multiple district levels)	Minimisation of construction footprint within habitat, reinstatement post-construction.	Permanent low negative or low or medium beneficial (depending on extent of habitat mitigation/compensation/enhancement).

Potential impact	Receptor	Sensitivity	Magnitude	Pre-mitigation impact	Mitigation measures proposed	Residual impact
						Moderate adverse significance or moderate positive significance (depending on extent of habitat mitigation/ compensation/ enhancement) (multiple district levels)
Destruction, damage or disturbance of habitat	Scrub	Low-medium	Temporary low negative	Negligible significance (multiple local levels)	Minimisation of works footprint within habitat.	Temporary low negative. Negligible significance (multiple local levels)

Potential impact	Receptor	Sensitivity	Magnitude	Pre-mitigation impact	Mitigation measures proposed	Residual impact
Destruction, damage or disturbance of habitat	Hedgerows	Medium	Permanent medium negative	Major adverse significance (multiple district levels)	Minimisation of works footprint within habitat. Extensive habitat reinstatement and enhancement post-construction.	Temporary low negative or permanent medium beneficial (depending on extent of mitigation/compensation/enhancement). Moderate adverse or moderate positive significance (depending on extent of mitigation/compensation/enhancement) (multiple district levels).

Potential impact	Receptor	Sensitivity	Magnitude	Pre-mitigation impact	Mitigation measures proposed	Residual impact
Destruction, damage or disturbance of habitat	Ponds	High	Permanent medium negative	Moderate adverse significance (multiple district levels)	Avoidance of habitat	Negligible. No change.
Destruction, damage or disturbance of habitat	Watercourses	Medium-high	Temporary medium negative	Moderate adverse significance (multiple local levels)	Avoidance of habitat or minimisation of works footprint within and nearby to habitat. Sensitive working methods within and nearby watercourses.	Temporary low negative. Minor adverse significance (multiple district levels).

Potential impact	Receptor	Sensitivity	Magnitude	Pre-mitigation impact	Mitigation measures proposed	Residual impact
Destruction, damage or disturbance of habitat	Other habitats	Negligible-high	Permanent low negative	Moderate adverse significance (multiple local or multiple district levels, depending on habitat)	Avoidance of valued habitats. Reinstatement of habitats where avoidance is not possible.	Temporary low negative. Minor adverse or negligible significance (some local or some district levels, depending on habitat).
Spread of INNS	Himalayan balsam (and possibly other INNS)	N/A	Permanent high negative	Major adverse significance (county level)	Implementation of an INNS spread prevention policy during construction	Negligible. Negligible significance.

Potential impact	Receptor	Sensitivity	Magnitude	Pre-mitigation impact	Mitigation measures proposed	Residual impact
Mortality, harm, disturbance to protected species and/or their habitat	Badger	Low-high	Permanent medium negative	Major adverse significance (multiple local levels)	Avoidance and retention of setts and important habitats, best-practice during construction, licensed mitigation where necessary.	Temporary low negative. Minor adverse significance (multiple local levels).
Mortality, harm, disturbance to protected species and/or their habitat	Roosting bats	High	Permanent medium negative	Major adverse significance (multiple district, or possibly county or regional, depending on species)	Avoidance and retention of roosts and important habitats, best-practice during construction, licensed mitigation where necessary.	Temporary low negative or negligible. Negligible significance or no change (depending on extent of roost retention).

Potential impact	Receptor	Sensitivity	Magnitude	Pre-mitigation impact	Mitigation measures proposed	Residual impact
Mortality, harm, disturbance to protected species and/or their habitat	Bats (non-roosting)	Low-high	Temporary medium negative	Moderate adverse significance (multiple local levels)	Avoidance of important habitats, best-practice during construction.	Temporary low negative. Minor adverse or negligible significance.
Mortality, harm, disturbance to protected species and/or their habitat	Breeding birds of conservation concern present at high/moderate levels such as skylark	High	Temporary medium negative	Major adverse significance (multiple local or district levels)	Sensitive timing of works, avoidance of key habitats, retention of nests, creation of compensatory nesting habitat during construction.	Temporary low negative. Minor adverse significance (multiple local or district levels).
Mortality, harm, disturbance to protected species and/or their habitat	Breeding birds of high conservation concern and especially vulnerable to impacts such as firecrest	High	Permanent high negative	Major adverse significance (district level)	Sensitive timing of works, avoidance of key habitats, retention of nests.	Temporary low negative or negligible. Minor adverse significance (multiple local or district levels)

Potential impact	Receptor	Sensitivity	Magnitude	Pre-mitigation impact	Mitigation measures proposed	Residual impact
Mortality, harm, disturbance to protected species and/or their habitat	Breeding birds of lower conservation concern and/or present at low levels such as stock dove	Low-medium	Temporary low negative	Minor adverse significance (multiple local levels)	Sensitive timing of works, avoidance of key habitats, retention of nests.	Negligible. Negligible significance.
Mortality, harm, disturbance to protected species and/or their habitat	Over-wintering birds (pink-footed goose)	Low	Temporary low negative	Minor adverse significance (international level)	Sensitive timing of works, avoidance of key habitats.	Negligible. Negligible significance.
Mortality, harm, disturbance to protected species and/or their habitat	Over-wintering birds (other species)	Low	Temporary low negative	Negligible significance (at multiple local or district levels, or county level)	Sensitive timing of works, avoidance of key habitats.	Negligible. Negligible significance.
Mortality, harm, disturbance to protected species and/or their habitat	Great crested newts	Low-high	Permanent medium negative	Major adverse significance (multiple local levels)	Avoidance of key habitats, licensed mitigation where necessary	Negligible. Negligible significance

Potential impact	Receptor	Sensitivity	Magnitude	Pre-mitigation impact	Mitigation measures proposed	Residual impact
Mortality, harm, disturbance to protected/valued species and/or their habitat	Invertebrates	Low-high	Permanent medium negative	Minor adverse significance (multiple local or district levels or possibly county, depending on species and extent of impact).	Avoidance of key habitats, minimisation of works footprint and duration within key habitats, reinstatement of habitats post-construction.	Temporary medium negative. Minor adverse significance (multiple local or district levels or possibly county depending on species and extent of impact).

Potential impact	Receptor	Sensitivity	Magnitude	Pre-mitigation impact	Mitigation measures proposed	Residual impact
Mortality, harm, disturbance to protected species and/or their habitat	Reptiles	Low-high	Permanent medium negative	Major adverse significance (multiple district levels)	Avoidance of key habitats, minimisation of works footprint and duration within key habitats, best-practice during construction, translocation (where necessary), reinstatement of habitats post-construction.	Temporary minor negative. Minor adverse or negligible significance.

Potential impact	Receptor	Sensitivity	Magnitude	Pre-mitigation impact	Mitigation measures proposed	Residual impact
Mortality, harm, disturbance to protected species and/or their habitat	Riparian mammals	Low-high	Temporary medium negative	Moderate or major adverse significance (multiple district levels)	Avoidance of key habitats, minimisation of works footprint and duration within key habitats, best-practice during construction, licensed mitigation where necessary, reinstatement of habitats post-construction.	Temporary low negative. Minor adverse or negligible significance.

Potential impact	Receptor	Sensitivity	Magnitude	Pre-mitigation impact	Mitigation measures proposed	Residual impact
Mortality, harm, disturbance to protected species and/or their habitat	White-clawed crayfish	Low-high	Permanent high negative	Major adverse significance (district/county levels or possibly regional/national depending on extent of impacts)	Avoidance of key habitats, minimisation of works footprint and duration within key habitats, best-practice during construction, licensed mitigation where necessary, reinstatement of habitats post-construction.	Temporary low negative. Minor adverse or negligible significance.
Mortality, harm, disturbance to valued species and/or their habitat	Other priority species such as hedgehog and brown hare	Low-high	Permanent medium negative	Moderate adverse significance (up to county level).	Best-practice during construction, reinstatement of habitats post-construction.	Temporary low negative. Negligible significance.
Operation						

Potential impact	Receptor	Sensitivity	Magnitude	Pre-mitigation impact	Mitigation measures proposed	Residual impact
Negligible operational impacts	All receptors	Various	Negligible	Negligible significance.	None	Negligible. No change.
Decommissioning						
Unknown de-commissioning impacts. Likely to be of lower magnitudes and significances than construction related impacts	All receptors	Various	Negligible	Negligible significance	None	Negligible. No change

22.13 References

Bat Conservation Trust and Institute of Lighting Engineers, (2018) Bats and Artificial Lighting in the UK: Bats and the Built Environment Series
Bat Conservation Trust, (2012) Professional Training Standards for Ecological Consultants.
Bat Conservation Trust, (2016) Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd ed.).
Chartered Institute of Ecology and Environmental Management, (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. Chartered Institute of Ecology and Environmental Management, Winchester.
Dean, M., Strachan R., Gow, D. and Andrews, R. (2016) The Water Vole Mitigation handbook (the mammal Society Mitigation Guidance Series. Eds Fiona Matthews and Paul Chanin. The Mammal Society, London.
Eaton M.A., Aebischer N.J., Brown A.F., Hearn R.D., Lock L., Musgrove A.J., Noble D.G., Stroud D.A. and Gregory R.D. (2015) Birds of Conservation Concern 4: the population status of birds in the United Kingdom, Channel Islands and Isle of Man. British Birds 108, pp. 708–746
Edgar, P., Foster, J. and Baker, J. (2010) Reptile Habitat Management Handbook. Amphibian and Reptile Conservation, Bournemouth.
English Nature, (2001) Great Crested Newt Mitigation Guidelines.
Joint Nature Conservation Committee, (2003) Herpetofauna Worker’s Manual.
JNCC (2010) Handbook for Phase 1 Habitat Survey - A Technique for Environmental Audit. JNCC
JNCC (2015) UK BAP priority species and habitats
JNCC (2019). The UK Biodiversity Action Plan (UK BAP) 1992-2012. Available at <jncc.gov.uk/our-work/uk-bap>. Accessed 18/03/21.
MHCLG (2019). National Planning Policy Framework. UK Government.
Natural England, (2014) Otters: surveys and mitigation for development projects. Natural England Standing Advice.
Natural England, (2015) Great crested newts: surveys and mitigation for development projects. Natural England Standing Advice.
Natural England (2019). The Biodiversity Metric 2.0. Available at: http://publications.naturalengland.org.uk/publication/5850908674228224 Accessed 18/03/21.
Norfolk Rivers Trust (2021). Norfolk’s Waterways. Available at < https://norfolkriverstrust.org/rivers/ > . Accessed 18/03/21.
Oldham R.S., Keeble J., Swan M.J.S. and Jeffcote M. (2000) Evaluating the suitability of habitat for the Great Crested Newt (<i>Triturus cristatus</i>). Herpetological Journal 10 (4), 143-155.
PINS (2018). Planning Inspectorate Advice Note Nine: Rochdale Envelope.
Strachan, Moorhouse and Gelling. (2011) Water Vole Conservation Handbook 3rd Edition. Wildlife Conservation Unit, University of Oxford.
Stroh P.A. et al. (2014). A Vascular Plant Red List for England. Botanical Society of Britain and Ireland, Bristol.
The Ramsar Convention Secretariat (2014). Ramsar: The Convention on Wetlands and its Mission. Available at < https://www.ramsar.org/about-the-convention-on-wetlands-and-its-mission >. Accessed 18/03/21.

