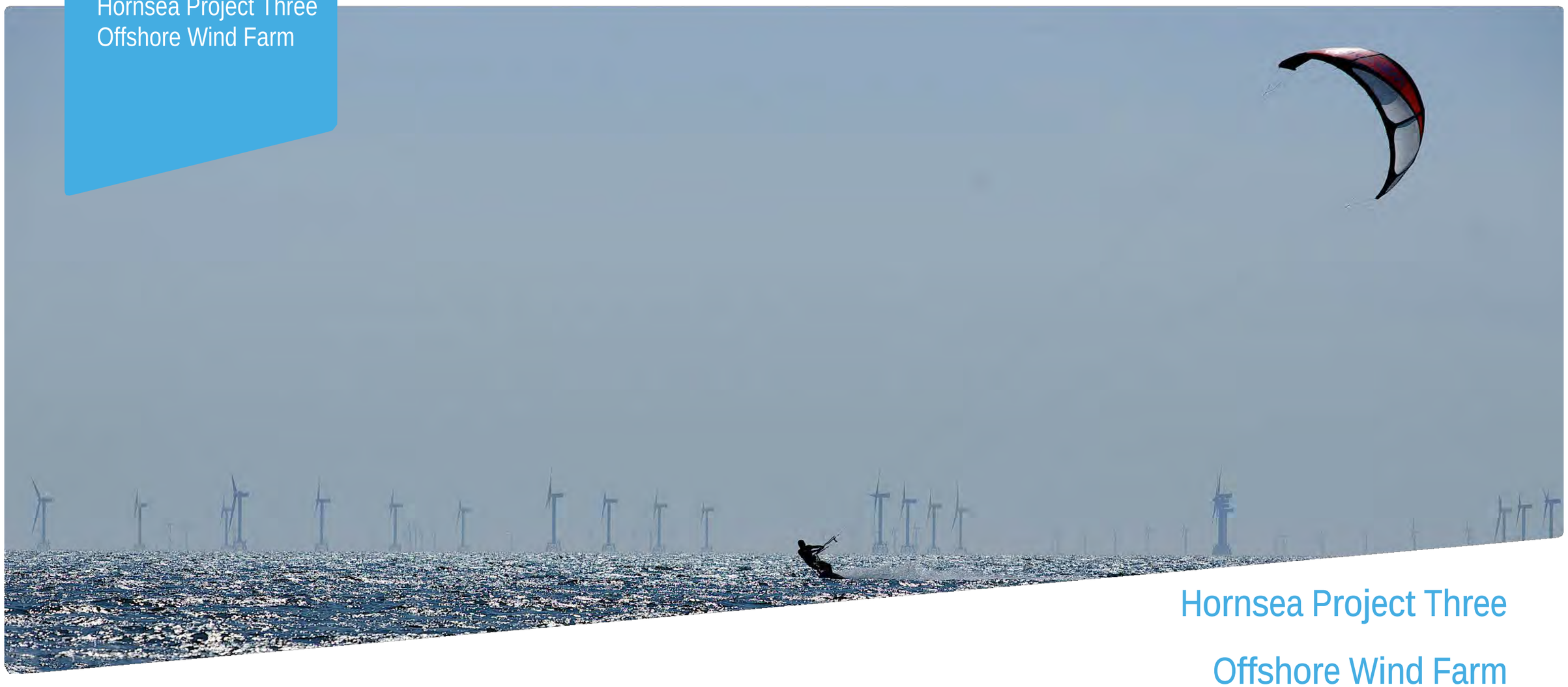
Hornsea Project Three
Offshore Wind Farm



Hornsea Project Three

Offshore Wind Farm

Preliminary Environmental Information Report:
Chapter 3 – Ecology and Nature Conservation (Part 1)

Date: July 2017

Hornsea 3
Offshore Wind Farm

DONG energy

Environmental Impact Assessment

Preliminary Environmental Information Report

Volume 3

Chapter 3: Ecology and Nature Conservation

Report Number: P6.3.3

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This report is also downloadable from the Hornsea Project Three offshore wind farm website at:
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Front cover picture: Kite surfer near one of DONG Energy's UK offshore wind farms © DONG Energy Hornsea Project Three (UK) Ltd., 2016.

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Glossary

Term	Definition
Biodiversity Action Plan (BAP)	The UK Government's response to the Convention on Biological Diversity, which the UK signed in 1992 in Rio de Janeiro and ratified in 1994. The Convention on Biological Diversity requires signatory countries to identify, develop and enforce action plans to conserve, protect and enhance biological diversity. The UK BAP addresses this requirement. Local BAPs (LBAPs) have been produced by many counties, to detail measures to conserve, protect and enhance local/county biological diversity.
Birds Directive	Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds.
BirdTrack	BirdTrack is a project, run through a partnership between the British Trust for Ornithology (BTO), the Royal Society for the Protection of Birds (RSPB), Birdwatch Ireland, the Scottish Ornithologists' Club (SOC) and the Welsh Ornithological Society (WOS), that looks at migration movements and distributions of birds throughout Britain and Ireland. BirdTrack is an online facility for observers to store and manage their own personal records as well as using these to support species conservation at local, regional, national and international scales.
Construction compound	Temporary construction compound located at appropriate location adjacent to the cable route.
Cable landfall works	The construction works occurring at the landfall.
Code of Construction Practice (CoCP)	Code to ensure that best practice construction work is undertaken with minimal impacts upon local people and the environment.
Enhancement	An ecological enhancement is the modification of a site which increases the site's capacity to support target plants or animals.
Expert Working Group	Expert Working Groups (EWGs) have been set up to discuss topic specific issues with the relevant stakeholders. The aim of the EWGs is to discuss and agree (where possible) key elements of the EIA and HRA during the pre-application period. The Onshore Ecology EWG (referred to in this report as the EWG) comprises local planning authorities, Natural England, the Environment Agency, the RPSB and Norfolk Wildlife Trust.
European Protected Species (EPS)	The animal species listed in Annex IV(a) to the Habitats Directive and the plant species listed in Annex IV(b) to the Habitats Directive.
Habitats Directive	Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora.
Intertidal area	The area between mean low water and mean high water.
Local Biodiversity Action Plan (LBAP)	Local BAPs (LBAPs) have been produced by many counties, to detail measures to conserve, protect and enhance local/county biological diversity.
Local Nature Reserve (LNR)	A local authority designation under the National Parks and Access to the Countryside Act 1949 (as amended), and in consultation with relevant statutory nature conservation agencies.
Local Wildlife Site (LWS)	Alternative title to Wildlife Site, as defined below. Defined in local and structure plans under the Town and Country Planning system. The designation is a material consideration when planning applications are being determined.
National Nature Reserve (NNR)	Designated under the National Parks and Access to the Countryside Act 1949 (as amended) and Wildlife and Countryside Act 1981 (as amended). Support examples of some of the most important natural and semi-natural ecosystems in Great Britain. Managed to conserve habitats and species within them, and to provide scientific study opportunities.
Natura 2000	A coherent European ecological network of Special Areas of Conservation (SACs) and Special Protection Areas (SPAs).
Non-statutory designated sites	Non-statutory designated sites are sites which have been designated due to their nature conservation interest, typically through the local planning process, which are usually protected by planning policies but not legally protected.
Priority Habitats	UK Biodiversity Action Plan (UK BAP) priority habitats are those identified as being the most threatened and requiring conservation action under the UK BAP.
Priority Species	UK Biodiversity Action Plan (UK BAP) priority species were those that were identified as being the most threatened and requiring conservation action under the UK BAP.
Ramsar Convention	The Convention on Wetlands of International Importance especially as Waterfowl Habitat of 2 February 1971 (as amended) which provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources.
Ramsar site	Wetlands of international importance, designated under the Ramsar Convention.
Site of Importance for Nature Conservation	Alternative title to Wildlife Site, as defined below. Defined in local and structure plans under the Town and Country Planning system. The designation is a material consideration when planning applications are being determined.
Site of Nature Conservation Importance	Alternative title to Wildlife Site, as defined below. Defined in local and structure plans under the Town and Country Planning system. The designation is a material consideration when planning applications are being determined.
Sites of Special Scientific Interest (SSSI)	Sites designated by Natural England under the Wildlife and Countryside Act 1981 (as amended) as areas of land of special interest by reason of any of their flora, fauna, or geological or physiographical features.
Special Areas of Conservation (SAC)	A site of Community importance designated under Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora through a statutory, administrative and/or contractual act where the necessary conservation measures are applied for the maintenance or restoration, at a favourable conservation status, of the natural habitats and/or the populations of the species for which the site is designated.
Special Protection Area (SPA)	An area which has been identified as being of international importance and designated under Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds for the breeding, feeding, wintering or the migration of rare and vulnerable bird species found within European Union countries.
Statutory designated sites	Sites which have been designated under UK and in some cases European or international legislation which protects areas identified as being of special nature conservation importance.
Wetland Bird Survey (WeBS)	The Wetland Bird Survey (WeBS) is the monitoring scheme for non-breeding waterbirds in the UK, which aims to provide the principal data for the conservation of their populations and wetland habitats. It involves monthly counts of birds at wetlands of all habitat types over the winter months.
Wildlife Site	Local authority designation for sites of local conservation interest. Designation criteria can vary between areas, as can titles which include Local Wildlife Site (LWS), Local Nature Conservation Site, Site of Importance for Nature Conservation or Site of Nature Conservation Importance . They are defined in local and structure plans under the Town and Country Planning system and are a material consideration when planning applications are being determined.
Woodland	As described under the Phase 1 habitat survey guidelines (JNCC, 2010); vegetation dominated by trees more than 5 m high when mature, forming a distinct, although sometimes open, canopy. In accordance with Natural England's guidelines for Environmental Stewardship (Natural England, 2010), woodland parcels should be a minimum size of 0.1 ha, and could include a young group of trees with a grassland under-storey.

Term	Definition
Works areas	The areas within which all works associated with the construction of the onshore HVDC converter/HVAC substation, or installation of the cable, and operation and decommissioning of onshore infrastructure for Project Two are undertaken, including access, drainage and landscaping.

Acronyms

Acronyms	Description
BAP	Biodiversity Action Plan
BTO	British Trust for Ornithology
CoCP	Code of Construction Practice
CWS	County Wildlife Site
DCO	Development Consent Order
DECC	Department of Energy and Climate Change
Defra	Department for Environment, Food and Rural Affairs
EA	Environment Agency
EC	European Commission
ECoW	Ecological Clerk of Works
ECR	Export Cable Route
EIA	Environmental Impact Assessment
EMP	Ecological Management Plan
EPS	European Protected Species
EWG	Expert Working Group
EU	European Union
GCN	Great crested newt
HDD	Horizontal Directional Drilling
HSI	Habitat Suitability Index
IEEM	Institute of Ecology and Environmental Management
JNCC	Joint Nature Conservation Committee
LBAP	Local Biodiversity Action Plan
LNR	Local Nature Reserve
LPA	Local Planning Authority
LWS	Local Wildlife Site

Acronyms	Description
MHWS	Mean High Water Springs
NBIS	Norfolk Biodiversity Information Service
NE	Natural England
NERC	Natural Environment and Rural Communities
NNR	National Nature Reserve
NPPF	National Planning Policy Framework
PEA	Preliminary Ecological Appraisal
PEIR	Preliminary Environmental Information Report
PINS	Planning Inspectorate
PPG	Planning Policy Guidance
PPS	Planning Policy Statements
RIAA	Report to Inform Appropriate Assessment
RPS	RPS Planning and Development Ltd
RSPB	Royal Society for Protection of Birds
SAC	Special Area of Conservation
SNCB	Statutory Nature Conservation Bodies
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
UK BAP	UK Biodiversity Action Plan
VER	Valued Ecological Receptor
WCA 1981	The Wildlife and Countryside Act 1981 (as amended)

Units

Unit	Description
ha	Hectare
km	Kilometre
m	Metre
m^2	Metres squared

3. Ecology and Nature Conservation

3.1 Introduction

3.1.1.1 This chapter of the Preliminary Environmental Information Report (PEIR) presents the preliminary results of the Environmental Impact Assessment (EIA) of the onshore elements of the Hornsea Three offshore wind farm (hereafter referred to as Hornsea Three) relevant to ecology and nature conservation, (namely the Hornsea Three landfall area, the onshore cable corridor search area, the onshore HVAC booster station, the onshore HVDC converter/HVAC substation and the interconnection with the Norwich Main Nation Grid substation), during its construction, operation and maintenance, and decommissioning.

3.1.1.2 The onshore assessment commences at Mean High Water Spring (MHWS) and does not consider the intertidal or subitidal zones, which are covered in volume 2 chapter 2: benthic ecology; chapter 3: fish and shellfish ecology; and chapter 5: offshore ornithology.

3.1.1.3 The onshore cable corridor search area comprises a 200 m wide corridor within which the refined onshore cable corridor (80 m wide) will be located. The refined onshore cable corridor will be included in the application for Development Consent. The onshore HVAC booster station is an option which would only be considered for the HVAC transmission option (see volume 1, chapter 3: Project Description).

3.1.1.4 This chapter summarises information from technical reports which are included at volume 6, annex 3.1: Preliminary Ecological Appraisal, annex 3.2: Onshore Wintering Bird Survey, annex 3.3: Interim Badger Survey, and annex 3.4: GCN and Desmoulin's Whorl Snail Habitat Suitability Index (HSI) Assessment Survey.

3.2 Purpose of this chapter

3.2.1.1 The primary purpose of the Environmental Statement is to support the Development Consent Order (DCO) application for Hornsea Three under the Planning Act 2008 (the 2008 Act). This PEIR constitutes the Preliminary Environmental Information for Hornsea Three and sets out the findings of the EIA to date to support pre-application consultation activities required under the 2008 Act. The EIA will be finalised following completion of pre-application consultation and the Environmental Statement will accompany the application to the Secretary of State for Development Consent.

3.2.1.2 The PEIR will form the basis for Phase 2 Consultation which will commence on 27 July and conclude on 20 September 2017. At this point, comments received on the PEIR will be reviewed and incorporated (where appropriate) into the Environmental Statement, which will be submitted in support of the application for Development Consent scheduled for the second quarter of 2018.

3.2.1.3 In particular, this PEIR chapter:

- Presents the existing ecology baseline established from desk studies, dedicated onshore surveys and consultation;
- Presents the potential effects on ecology and nature conservation arising from Hornsea Three, based on the information gathered and the analysis and assessments undertaken to date;
- Identifies any assumptions and limitations encountered in compiling the environmental information; and
- Highlights any necessary monitoring and/or mitigation measures which could prevent, minimise, reduce or offset the possible ecology and nature conservation effects identified at the relevant stage in the EIA process.

3.2.1.4 This chapter provides:

- A description of designated and otherwise notable sites located within the ecology and nature conservation study area;
- A description of the habitat types located within the ecology and nature conservation study area;
- An assessment of the intrinsic value, as well as the (potential) value to protected or otherwise notable species or habitats recorded;
- An assessment of features of particular ecology and nature conservation concern that might be affected by development proposals; and
- An assessment of the likely impacts of development on particular features of ecology and nature conservation concern, taking into account mitigation measures adopted as part of Hornsea Three to address these impacts.

3.2.1.5 The assessment is based on the wider 200 m wide onshore cable corridor search area which includes the proposed locations for the onshore HVAC booster station and onshore HVDC converter/HVAC substation. The final 80 m wide cable corridor construction area (which includes the 60 m wide permanent cable corridor) will continue to be refined before being confirmed in the final DCO application. It is anticipated that a number of potential impacts identified through this assessment will be mitigated, or removed, through the refinement of the onshore cable corridor, particularly where the onshore cable corridor search area currently crosses designated sites.

3.2.1.6 The majority of survey work that will be undertaken in order to provide baseline data necessary to inform this impact assessment has yet to be undertaken. Surveys will be annexed in volume 6 of the Environmental Statement, and will comprise:

- Preliminary Ecological Assessment (Phase 1 habitat survey is presented in Figure 3.3. The Preliminary Ecological Assessment report is available on request);
- Hedgerow survey;
- Desmoulin's Whorl Snail Survey (interim results presented in volume 6, annex 3.2: Great Crested Newt Habitat Suitability Index and Desmoulin's Whorl Snail Habitat Suitability Assessment surveys: Interim Report);
- White Clawed Crayfish Survey;

- Great Crested Newt (GCN) Survey (interim results presented in volume 6, annex 3.2: Great Crested Newt Habitat Suitability Index and Desmoulin's Whorl Snail Habitat Suitability Assessment surveys: Interim Report);
- Reptile Survey;
- Water Vole Survey;
- Bat Survey;
- Wintering and Migratory Bird Survey (volume 6, annex 3.1: Onshore Ornithology – Wintering Survey);
- Onshore Breeding Bird Survey;
- Confidential Otter Survey Findings; and
- Confidential Badger Survey.

3.2.1.7 A data search exercise was carried out which confirmed that there was no requirement to undertake surveys for freshwater pearl mussel, hazel dormouse and red squirrel (volume 6, annex 3.5: Hazel Dormouse, Red Squirrel and Freshwater Pearl Mussel Desk Study) and this has been discussed and agreed with Natural England, the Environment Agency, Norfolk County Council, North Norfolk District Council, the Royal Society for the Protection of Birds (RSPB), and the Norfolk Wildlife Trust via the Expert Working Group (EWG) held in April 2017.

3.3 Study area

3.3.1.1 In the Preliminary Ecological Appraisal Report prepared for Hornsea Three key habitats pertaining to the onshore environment were described over a broad study area covering approximately 1,191 ha in Norfolk (see Figure 3.3). For this chapter, the study areas over which ecology and nature conservation data are presented are set out below.

3.3.1.2 The study area for field data collection included the onshore elements of Hornsea Three (as defined in 3.1.1.1) together with the potential locations of the main compound plus a buffer of up to 250 m. The potential locations of the main compound are identified in volume 1, chapter 3: Project Description. Additional construction compounds will be required to facilitate the construction process and will be identified in the Environmental Statement. The field surveys undertaken and the associated survey areas are shown in Table 3.1. These study areas were set out in the survey methodology document issued to Natural England and other stakeholders and the EWG (see Table 3.4).

3.3.1.3 A 2 km study area (around the onshore elements and potential main compound locations) was used for the data search and desk study. The data search included ecologically designated sites and records of protected species. This study area was increased to 5 km for bats and ornithology data search area to take into account the greater mobility of these species. Buffer size was primarily to allow for variance in final location and alignments and to identify any existing features including ponds or woodland that might affect or be affected by the onshore elements of Hornsea Three. The study area was discussed and agreed with Natural England and the EWG

3.3.1.4 Field surveys undertaken and their associated survey areas are listed in Table 3.1 below.

Table 3.1: Field surveys undertaken and associated survey area.

Survey	Description of survey area
Phase 1 habitat survey	The area for the onshore elements of Hornsea Three (i.e. the onshore cable corridor search area, the onshore HVAC booster station site, the onshore HVDC converter/HVAC substation), plus a surrounding 200 m wide buffer zone.
Hedgerows	Hedgerows that would be directly affected by the proposed works (i.e. will be crossed by, or located adjacent to, the cable route corridor).
Desmoulin's whorl snail	Areas of high potential for Desmoulin's whorl snail within the onshore cable corridor search area plus a 100 m wide buffer zone.
White clawed crayfish	Watercourses of medium to high potential value to white clawed crayfish within the onshore cable corridor search area.
GCNs	All suitable ponds within the area for the onshore elements of Hornsea Three and a 250 m wide buffer zone.
Reptiles	Areas of high potential for reptiles within the area for the onshore elements of Hornsea Three and a 100 m wide buffer zone.
Birds (breeding)	Areas of high potential value to breeding birds located within the area for the onshore elements of Hornsea Three plus a 200 m wide surrounding buffer zone.
Birds (wintering and migratory)	The area for the onshore elements of Hornsea Three and a 200 m wide surrounding buffer zone.
Bats	Trees/hedgerows and buildings located within the area for the onshore elements of Hornsea Three plus 100 m wide and 35 m wide (approximately) buffer zones respectively..
Badgers	Areas of medium to high potential value to badgers located within the area for the onshore elements of Hornsea Three plus a 100 m wide buffer zone.
Otters	Watercourses of medium to high potential value to otters within the area for the onshore elements of Hornsea Three and a 250 m wide surrounding zone.
Water voles	All watercourses of medium to high potential value to water voles within the area for the onshore elements of Hornsea Three and a 250 m wide surrounding buffer zone.

3.3.1.5 The study areas for the various aspects of ecology and nature conservation considered in this chapter are shown on Figure 3.1.

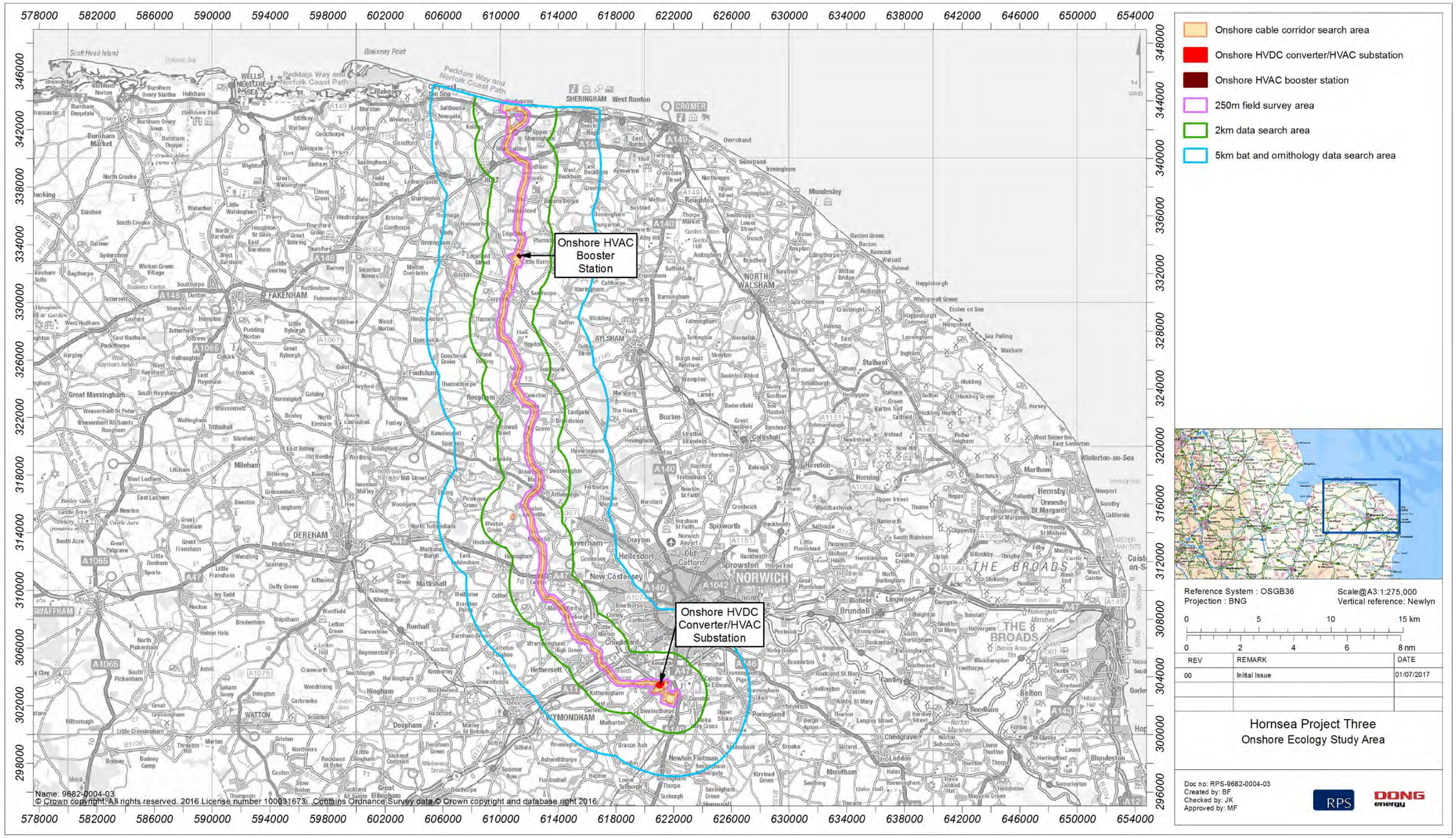

Figure 3.1: Hornsea Three ecology and nature conservation study area.

3.4 Planning policy context

3.4.1.1 Planning policy on offshore renewable energy Nationally Significant Infrastructure Projects (NSIPs), specifically in relation to ecology and nature conservation, is contained in the Overarching National Policy Statement (NPS) for Energy (EN-1) (Department of Energy and Climate Change (DECC), 2011a), and the NPS for Renewable Energy Infrastructure (EN-3)(DECC, 2011b). The NPS for Electricity Networks Infrastructure (EN-5) (DECC, 2011c) provides additional relevant information.

3.4.1.2 Specifically, the guidance provided within NPS EN-1, paragraphs 4.3.1, 5.3.3 - 5.3.11, 5.3.13-5.3.20, and NPS EN-5, paragraph 2.7.2 was considered. These state that the development should be assessed under the Conservation of Habitats and Species Regulations (2010) (the 'Habitats Regulations') and that applicants should have regard to effects of the development on sites, habitats and species, feeding and hunting grounds, migration corridors and breeding grounds.

3.4.1.3 The NPSs (paragraphs 4.3.1, 5.3.3 and 5.3.4 and 5.3.13 of NPS EN-1 and paragraph 2.7.2 of NPS EN-5) include guidance on what matters should be included in an applicant's assessment. These are summarised in Table 3.2 below. Other planning policy and guidance relevant to this chapter includes:

- National Planning Policy Framework (NPPF) (2012);
- Web based Planning Practice Guidance is provided by the Department for Communities and Local Government (DCLG);
- UK Biodiversity Action Plan (UK BAP) (1995);
- Norfolk BAP (1996);
- Habitats Directive (92/43/EEC) and Birds Directive (2009/147/EC;
- The Habitats Regulations;
- The Wildlife and Countryside Act 1981 (as amended);
- Natural Environment and Rural Communities Act 2006; and
- Hedgerow Regulations 1997.

Table 3.2: Summary of NPS EN-1 and NPS EN-5 policy relevant to ecology and nature conservation.

Summary of NPS EN-1 and NPS EN-5 provision	How and where considered in the PEIR
The development must be assessed with regard to whether or not the project would have a significant effect on a European site or any site which is provided the same protection as a matter of policy (NPS EN-1, paragraph 4.3.1).	The impact of Hornsea Three on onshore wintering and migratory birds that are designated features of the North Norfolk Coast Special Protection Area (SPA) are considered in this chapter (Section 3.11). Offshore impacts on wintering and migratory birds are assessed in volume 3, Chapter 5: Offshore ornithology: and the Report to Inform Appropriate Assessment (RIAA). The impact of Hornsea Three on component sites of the Norfolk Valley Fens Special Area of Conservation (SAC) are considered in this chapter (Section 3.11).
The ES should set out any effects on internationally, nationally, and locally designated sites of ecological conservation importance, on protected species and habitats and other species identified as being of principal importance for the conservation of biodiversity (NPS EN-1, paragraph 5.3.3).	Relevant baseline data has been collated to determine ecology features of concern, and inform the impact assessment, which sets out effects on designated sites, protected species and habitats and other species identified as being of principal importance for the conservation of biodiversity (see Section 3.7).
The applicant should show the project would take opportunities to conserve and enhance biodiversity conservation interests (NPS EN-1, paragraph 5.3.4).	Where practicable, opportunities to enhance the site for the benefit of biodiversity have been included in development proposals, and are discussed in this chapter. Full details will be included in the Outline Ecological Management Plan, to be produced in the Final Environmental Statement. These have been informed by baseline surveys.
The likely impacts on sites of regional and local biodiversity interest should be considered, although these sites would not be used in themselves to refuse development consent (NPS EN-1, paragraph 5.3.13).	Likely ecology and nature conservation impacts of Hornsea Three on all known designated sites of ecology and nature conservation interest (including those of regional and local interest or value) have been assessed (Table 3.9) and mitigation measures have been incorporated into the project to ensure that no significant adverse effect on the sites would result from the development (Table 3.14).
Particular consideration should be given to the likely impacts of on feeding and hunting grounds, migration corridors and breeding grounds (NPS EN-5 paragraph 2.7.2).	The likely impacts of proposals on all species considered in this chapter have been assessed with regard to the potential for loss, damage or disturbance of habitat of value for breeding or nesting, foraging or hunting, and commuting or migration (see Section 3.7).

3.4.1.4 The consenting process for NSIPs is administered by PINS, with the decision on the DCO being taken by the Secretary of State. NPS EN-1 highlights a number of points relating to the determination of an application and in relation to mitigation (paragraphs 5.3.5-8, 10-11, 14, 16-20); these are summarised in Table 3.3.

Table 3.3: Summary of NPS EN-1 policy on decision making with regard to ecology and nature conservation (and mitigation) and consideration in the Hornsea Three assessment.

Summary of NPS EN-1 and NPS EN-5 policy on decision making (and mitigation)	How and where considered in the PEIR
The Secretary of State should have regard to the Government's biodiversity strategy, which includes aims to ensure a halting, and if possible a reversal, of declines in priority habitats and species, with wild species and habitats as part of healthy, functioning ecosystems; and the general acceptance of biodiversity's essential role in enhancing the quality of life, with its conservation becoming a natural consideration in all relevant public, private and non-governmental decisions and policies. The Secretary of State should also take account of the challenge of climate change.	Relevant baseline data has been collated (Section 3.7) in order to determine the presence and condition of ecology features of concern (habitats and species), and inform the mitigation strategies to help protect and, where practicable, restore priority habitats and species and the conservation of biodiversity. The role of habitats and species in the ecosystem has been considered in the assessment of their value, where applicable (Section 3.7.6). Reference is made to the potential effects of climate change on biodiversity in Section 3.7.4.
The development should aim to avoid significant harm to biodiversity, including through mitigation and consideration of reasonable alternatives. (Paragraph 5.3.7.)	The location of the cable route and method of cable installation has taken into account the need to protect biodiversity and prevent significant harm. Mitigation measures described in this chapter and adopted as part of Hornsea Three include measures to protect and minimise the potential for impacts on biodiversity (Table 3.14). Reasonable alternative cable routes were considered through the assessment process (volume 1, chapter 4: Site Selection and Consideration of Alternatives).
Appropriate weight should be given to designated sites, protected species, habitats and other species of principal biodiversity conservation value. (Paragraph 5.3.8.)	The ecology and nature conservation values of sites, species and habitats identified within the study areas, have been assessed and are explained in this chapter. The value of each feature has informed the Hornsea Three impact assessment, as described in this chapter (Section 3.11).
Many individual wildlife species receive statutory protection under a range of legislative provisions. Other species and habitats have been identified as being of principal importance for the conservation of biodiversity in England and Wales and thereby requiring conservation action. The Secretary of State should ensure that these species and habitats are protected from the adverse effects of development by using requirements or planning obligations. The Secretary of State 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 Secretary of State should give substantial weight to any such harm to the detriment of biodiversity features of national or regional importance which may result from a proposed development. (Paragraphs 5.3.16 - 5.3.17.)	Natural England and other key stakeholders have been consulted as part of an Expert Working Group. Records of meetings and communications are provided in this chapter (Table 3.4). A series of species and habitat surveys have been or will be undertaken in order to inform this impact assessment (Section 3.7). A mitigation strategy has been developed in order to minimise the potential for disturbance to species and habitats and provide long-term biodiversity benefit (Table 3.14).
Appropriate mitigation measures should be included as an integral part of the development: - during construction, they will seek to ensure that activities will be confined to the minimum areas required for the works; - during construction and operation, best practice will be followed to ensure that risk of disturbance or damage to species or habitats is minimised, including as a consequence of transport access arrangements; - habitats will, where practicable, be restored after construction works have finished; and - opportunities will be taken to enhance existing habitats and, where practicable, to create new habitats of value within the site landscaping proposals. Where appropriate mitigation will be put in place the Secretary of State should consider what appropriate requirements should be attached to any consent and/or planning obligations. (Paragraphs 5.3.18-5.3.19).	Mitigation measures adopted as part of Hornsea Three to mitigate the ecology and nature conservation impact of the development are described in this chapter (see Table 3.14) and will be further developed in an outline Ecological Management Plan (EMP) (to be produced at ES stage and updated prior to construction as necessary following pre-commencement surveys). Measures include limiting the extent of works, following best practice guidelines, reinstating habitats after construction or installation and opportunities for enhancement/creation of habitats where practicable.
Mitigation measures agreed with NE and confirmation as to whether or not NE intends to grant or refuse any necessary licence applications will be taken into account during the processing of an application (paragraph 5.3.20).	Natural England has been consulted with regard to the ecological impact assessment. Records of meetings and other communications are provided in this chapter (Table 3.4). Pre-construction surveys will be required in order to update survey findings and inform any future need for a licence or licences.

3.4.1.5 Further advice in relation specifically to the Hornsea Three development has been sought through consultation with the statutory authorities and from the PINS scoping opinion (November 2016) (Table 3.4).

3.4.2 National Planning Policy Framework (2012)

3.4.2.1 The Department for Communities and Local Government published the National Planning Policy Framework (NPPF) in March 2012. The NPPF sets out the national planning policies for England and the Government's desire to enable sustainable development.

3.4.2.2 The NPPF replaces previous PPSs, including PPS9 which referred to ecology and nature conservation.

3.4.2.3 One of the overall aims of the NPPF is that the planning system should aim to conserve and enhance the natural and local environment by minimising impacts on biodiversity and providing net gains in biodiversity where possible. Principal relevant statements include the following at paragraph 118:

- *"if significant harm resulting from a development cannot be avoided (through locating on an alternative site with less harmful impacts), adequately mitigated, or, as a last resort, compensated for, then planning permission should be refused;*

- *proposed development on land within or outside a Site of Special Scientific Interest (SSSI) likely to have an adverse effect on a SSSI (either individually or in combination with other developments) should not normally be permitted. Where an adverse effect on the site's notified special interest features is likely, an exception should only be made where the benefits 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;*
- *opportunities to incorporate biodiversity in and around development should be encouraged;*
- *planning permission should be refused for development resulting in the loss or deterioration of irreplaceable habitats, including ancient woodland and the loss of aged or veteran trees found outside ancient woodland, unless the need for, and benefits of, the development in that location clearly outweigh the loss; and*
- *the following wildlife sites should be given the same protection as European sites:*
- *Potential Special Protection Areas (pSPAs) and possible Special Areas of Conservation (pSACs);*
- *listed or proposed Ramsar sites; and*
- *sites identified, or required, as compensatory measures for adverse effects on European sites, potential Special Protection Areas, possible Special Areas of Conservation, and listed or proposed Ramsar sites."*

3.4.2.4 On 6 March 2014 the Department for Communities and Local Government (DCLG) launched the National Planning Practice Guidance as a web-based resource. Section 11 sets out guidance on "Conserving and enhancing the natural environment". Paragraph 109 explains that:

"The planning system should contribute to and enhance the natural and local environment by:

- *protecting and enhancing valued landscapes, geological conservation interests and soils;*
- *recognising the wider benefits of ecosystem services;*
- *minimising impacts on biodiversity and providing net gains in biodiversity where possible, contributing to the Government's commitment to halt the overall decline in biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures;*
- *preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability; and*
- *remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate."*

3.4.3 UK Biodiversity Action Plan (UK BAP)

3.4.3.1 The UK's commitments as a signatory to the Convention on Biological Diversity are outlined in Biodiversity: the UK Action Plan (HM Government, 1994). The UK Biodiversity Steering Group report was published in 1995 and included Action Plans for the UK's most threatened and endangered species and 14 key habitats (Biodiversity Steering Group, 1995). Further species and Habitat Action Plans have subsequently been published. There are now 391 Species Action Plans and 45 priority Habitat Action Plans nationwide. At a local level Local Biodiversity Action Plans (LBAPs) have been developed which are linked to national priorities (see Norfolk Biodiversity Action Plan (BAP) below.

3.4.4 Norfolk BAP

3.4.4.1 The Norfolk BAP was established in 1996 and has 83 Action Plans for habitats and species. Each plan describes the habitat or species of concern, its status in Norfolk and current threats. Progress towards previous BAP targets and current conservation action are then outlined. Each plan details future objectives, targets and actions to be taken. Target dates for the completion of measures described in the plans are provided, along with identified delivery partners, where applicable.

3.4.5 Protected sites

3.4.5.1 Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora, known as the 'Habitats Directive', was adopted in 1992. The Directive is the means by which the European Union (EU) meets its obligations under the Council Decision 82/72/EEC of 3 December 1981 concerning the conclusion of the Convention on the conservation of European wildlife and natural habitats (Bern Convention).

3.4.5.2 The Habitats Directive requires EU Member States to maintain or restore natural habitats and wild species listed in the Annexes to the Directive to a favourable conservation status. Member States are required by the Directive to introduce a range of measures, including those listed below, as provided on the Joint Nature Conservation Committee (JNCC) website (accessed 27.1.17):

- *"Maintain or restore European protected habitats and species listed in the Annexes at a favourable conservation status as defined in Articles 1 and 2;*
- *Contribute to a coherent European ecological network of protected sites by designating Special Areas of Conservation (SACs) for habitats listed on Annex I and for species listed on Annex II. These measures are also to be applied to Special Protection Areas (SPAs) classified under Article 4 of the Birds Directive. Together SACs and SPAs make up the Natura 2000 network (Article 3);*
- *Ensure conservation measures are in place to appropriately manage SACs and ensure appropriate assessment of plans and projects likely to have a significant effect on the integrity of an SAC. Projects may still be permitted if there are no alternatives, and there are imperative reasons of overriding public interest. In such cases suitable and adequate compensatory measures are necessary (Article 6);*

- *Member states shall endeavour to encourage the management of features of the landscape that support the Natura 2000 network (Articles 3 and 10);*
- *Undertake surveillance of habitats and species (Article 11);*
- *Ensure strict protection of species listed on Annex IV (Article 12 for animals and Article 13 for plants); and*
- *Report on the implementation of the Directive every six years (Article 17), including assessment of the conservation status of species and habitats listed on the Annexes to the directive."*

3.4.5.3 The Habitats Regulations transpose the requirements of the Habitats Directive into national law. SACs are designated in recognition of their value as best representatives of the range and variety within the EU of habitats and (non-bird) species listed on Annexes I and II to the Habitats Directive.

3.4.5.4 Directive 2009/147/EC on the conservation of wild birds (the codified version of Council Directive 79/409/EEC as amended) (Birds Directive) provides a framework for the conservation and management of, and human interactions with, wild birds in Europe. Mechanisms for the achievement of the objectives of the Directive are set by each Member State (in the UK delivery is via several different statutes).

3.4.5.5 SPAs are designated under the Birds Directive due to their value as areas of the most important habitat for rare and vulnerable birds (listed on Annex I of the Directive), and for regularly occurring migratory bird species within the European Union.

3.4.5.6 Although not a European site designation, Ramsar sites were originally designated to protect sites of importance as waterfowl habitat, and were later broadened to include all aspects of wetland conservation.

3.4.5.7 Although not a statutory designation, European Marine Sites refer to management units which incorporate areas designated such as SACs or SPAs or SSSIs, which are statutory protected sites supporting the best examples of the UK's flora, fauna, geological or physiographical features.

3.4.5.8 SSSIs are designated to protect the best examples of the UK's flora, fauna, or geological or physiographical features. The designation may extend into intertidal areas out to the jurisdictional limit of local authorities, generally Mean Low Water in England. SSSIs are notified under the Wildlife and Countryside Act 1981 (as amended). National Nature Reserves (NNR) are established to conserve and enhance landscapes. They promote public enjoyment and consider the social and economic well-being of those living within them.

3.4.5.9 Local Nature Reserves (LNR) are local authority designations under the National Parks and Access to the Countryside Act 1949. They are designated in consultation with relevant statutory nature conservation agencies and are managed for nature conservation and people.

3.4.6 The Habitats Regulations

3.4.6.1 The Habitats Regulations make it an offence to deliberately disturb European Protected Species (EPS) (listed under the Habitats Directive). Under the Habitats Regulations, places of shelter are fully protected, and it is an offence to damage or destroy a breeding site or resting place of such an animal, whether deliberately or not. It is also an offence to disturb in a manner that is, or in circumstances which are, likely to significantly affect the local distribution or abundance of the species; and to disturb in a manner or circumstances which are likely to impair its ability to survive, breed or reproduce, or rear or otherwise care for its young. Any activity which is likely to affect these species requires prior consultation with the relevant statutory nature conservation organisation. In England, this means that NE should be consulted.

3.4.6.2 A licence from NE will be required to permit disturbance of EPSs or damage or destruction of a resting site as a result of work activities. Under Regulation 53(2)(e) of the Habitats Regulations, licences may be granted for:

- Preserving public health, public safety or other imperative reasons of overriding public interest, including those of a social or economic nature and beneficial consequences of primary importance for the environment.

3.4.6.3 Under Regulation 53(9), in order for a licence to be successful, two tests must be satisfied:

- There is no satisfactory alternative; and
- The action authorised will not be detrimental to the maintenance of the population of the species concerned at a favourable conservation status in their natural range.

3.4.7 The Wildlife and Countryside Act 1981 (as amended)

3.4.7.1 The Wildlife and Countryside Act (WCA) 1981 (as amended) (WCA 1981) provides protection to species and habitats. Section 9 provides protection to certain animal species listed in Schedule 5.

3.4.7.2 For those species fully protected under Section 9 it is an offence to intentionally kill, injure or take animals listed in Schedule 5. It is also an offence to intentionally or recklessly damage, destroy or obstruct access to any place used by animals listed in Schedule 5 for shelter or protection, and to disturb such an animal while it is occupying a structure or place which it uses for shelter or protection. Any works, which may potentially cause disturbance to these species, requires prior consultation with NE.

3.4.7.3 It is an offence to: intentionally kill, injure or take any wild bird; take, damage or destroy the nest of a wild bird included in Schedule ZA1; take, damage or destroy the nest of any wild bird while that nest is in use or being built; or take or destroy an egg of any wild bird. It is also an offence to intentionally or recklessly disturb any wild bird included in Schedule 1 while it is building a nest or is in, on or near a nest containing eggs or young; or to disturb dependent young of such a bird.

3.4.7.4 Section 13 provides protection to wild plants. It is an offence to intentionally pick, uproot or destroy any wild plant included in Schedule 8. It is also an offence to sell, offer or expose for sale, or possess or transport for the purpose of sale, any live or dead wild plant included in Schedule 8.

3.4.7.5 It is also an offence under Section 14 to allow certain invasive species (listed in Schedule 9) such as Japanese knotweed and giant hogweed to grow in the wild.

3.4.7.6 Part II of the WCA 1981 makes it an offence to damage any sites designated as SSSI. Any works which may potentially damage these sites requires prior consultation with NE.

3.4.8 Natural Environment and Rural Communities Act 2006

3.4.8.1 The Natural Environment and Rural Communities Act 2006 (NERC Act) provides that NE's general purpose is to ensure that the natural environment is conserved, enhanced and managed for the benefit of present and future generations, thereby contributing to sustainable development.

3.4.8.2 Section 41 of the NERC Act required the Secretary of State to publish a list of habitats and species which are of principal importance for the conservation of biodiversity in England. The Section 41 list provides guidance to decision-makers, including local and regional authorities, in implementing their duty under Section 40 of the NERC Act 2006, to have regard to biodiversity conservation in England when carrying out their functions.

3.4.9 The Hedgerow Regulations 1997

3.4.9.1 The Hedgerow Regulations 1997 protects 'important' hedgerows from removal. 'Important' hedgerows are defined in the Regulations, and the criteria followed for grading hedgerows surveyed for this Environmental Statement are based on these definitions.

3.4.9.2 The Regulations apply to any hedgerow growing in, or adjacent to, any common land, protected land (LNRs and SSSIs), or land used for agriculture, forestry or the breeding or keeping of horses, ponies or donkeys, if it: (a) has a continuous length of, or exceeding, 20 m; or (b) it has a continuous length of less than 20 m and, at each end, meets another hedgerow.

3.5 Consultation

3.5.1.1 A summary of the key issues raised during consultation specific to ecology and nature conservation is outlined below, together with how these issues have been considered in the production of this PEIR.

3.5.1.2 Table 3.4 below summarises the issues raised relevant to ecology and nature conservation which have been identified during consultation activities undertaken to date. Table 3.4 also indicates either how these issues have been addressed within this PEIR or how the Applicant has had regard to them.

3.5.1.3 A Consultation Report, outlining the consultation activities undertaken in respect of Hornsea Three will be produced for the final DCO application.

Table 3.4: Summary of key consultation issues raised during consultation activities undertaken for Hornsea Three relevant to ecology and nature conservation.

Date	Consultee and type of response	Issues raised	Response to issue raised and/or where considered in this chapter
6 December 2016	PINS, scoping opinion	Table 12.12 proposes that noise and vibration from the operation and maintenance of the landfall cable, the HVAC/HVDC substation and onshore HVAC booster station be scoped out. The Secretary of State considers that there is potential for these activities to create noise that may disturb birds using the intertidal area and therefore does not agree to this aspect being scoped out.	The potential for noise and vibration impacts associated with the operation and maintenance of Hornsea Three landfall and cable route is limited given that there would be no perceptible noise or vibration above the surface of the cable. Any maintenance requirements for the cable route and landfall would be minimal. Effects on birds are assessed in volume 2, chapter 5: Offshore Ornithology. The onshore HVAC booster station and onshore HVDC converter/HVAC substation are located some distance from landfall and therefore, activities at these locations are unlikely to disturb birds in the intertidal area.
6 December 2016	PINS, scoping opinion	The Secretary of State welcomes the Applicant's commitment to carry out the impact assessment following the most recent CIEEM guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal (2016). In addition to the criteria referred to in paragraph 11.1.11 of the Scoping Report and to be applied for the valuation of receptors, the Applicant should also consider habitats and species of principal importance as listed under Section 41 of the NERC Act 2006.	UKBAP habitats are identified in the Preliminary Environmental Appraisal (available on request) and summarised in Table 3.8. Priority species will be included in the Final Environmental Statement once the surveys are complete.
6 December 2016	PINS, scoping opinion	The Secretary of State notes that the Applicant's proposed sources for the desk based study does not include reference to the local biological record centre for Norfolk, Norfolk Biodiversity information Service (NBIS). The Applicant should consider approaching NBIS for further information on habitat, species and designated sites of relevance to the proposed development. The Applicant's attention is drawn to the comments of NE at Annex 5 to their consultation response (see Appendix 3), which advises that further information on all county wildlife sites in Norfolk can be found on the NBIS website (http://www.nbis.org.uk/CWS), and that records of protected species be sought from appropriate local biological record centres (amongst other sources). The Applicant's attention is also drawn to the comments of the Environment Agency (EA) in their consultation response (see Appendix 3), which identifies that the local Royal Society for the Protection of Birds and British Trust for Ornithology branches and local ornithological groups should also be consulted to acquire full dataset for the local areas.	NBIS has supplied data for the desk study. Several local groups were contacted for records (Table 3.5). Following consultations it was determined that Royal Society for Protection of Birds (RSPB) and British Trust for Ornithology (BTO) records would be unlikely to add significant value to the data set. Available BTO data is limited to BirdTrack (an online database of casual bird sightings which is not a systematic survey), which is not considered to be of relevance to the survey reporting or technical reporting. Also, there is no relevant Wetland Bird Survey WeBS data as this national survey of wetlands does not cover habitats within the Ecology and nature conservation study area . RSPB do not hold specific records and were consulted as part of the Expert Working Group (EWG).
6 December 2016	PINS, scoping opinion	The Scoping Report contains little to no information with regard to the proposed survey methodologies that will be followed for habitat and species surveys. However, paragraph 11.1.7 acknowledges that the scope and methodology for the Preliminary Ecological Appraisal (PEA) will be discussed and agreed with the SNCBs. The Secretary of State advises that the Applicant agree the survey methodology for the PEA, and any subsequent habitat or species-specific surveys, be discussed and agreed with NE, the EA and the county ecologist, as appropriate, in advance of the surveys being undertaken. In its consultation response NE has identified a number of ecological surveys they advise be undertaken. These surveys will particularly support assessment of impact on designated sites (see Appendix 3). The EA has also indented the potential need for species-specific surveys to be undertaken for: white clawed crayfish; freshwater fish; freshwater pearl mussel; and hazel dormouse (see Appendix 3).	Survey scope and methods discussed and agreed with stakeholders via the Expert Working Group. Desk study exercise confirmed no requirement to undertake surveys for freshwater pearl mussel, hazel dormouse and red squirrel (volume 6, annex 3.3: Hazel Dormouse, Red Squirrel and Freshwater Pearl Mussel Desk Study). White-clawed crayfish surveys will be undertaken in 2017 and reported in the Final Environmental Statement
6 December 2016	PINS, scoping opinion	Table 11.1 identifies designated sites potentially affected by the proposed development, including four European sites. The Applicant's attention is drawn to the comments of NE at Annex 5 to its consultation response, which identify a further two European sites to be considered by the Applicant: the North Norfolk Coast SAC; and The Wash and North Norfolk Coast SAC. NE has also identified a number of additional SSSIs to be considered in the impact assessment (see Appendix 3). The Applicant should consider all SSSIs along the onshore ECR route and any beyond this area where there are potential impact pathways between the proposed development and the designated site. The Applicant's attention is drawn to the comments of the EA (see Appendix 3), which notes that at present no designated sites have been identified that are not directly within the onshore ECR corridor. The EA comment that there may be a need to obtain data for an area wider than the onshore ECR corridor given that no information has been provided in the Scoping Report to confirm how close to limits of the area that works will take place.	The North Norfolk Coast SAC is sufficiently distant from the Ecology and nature conservation study area that no impacts from the project are considered likely. Effects on the offshore Wash and North Norfolk Coast SAC are considered in volume 3, chapter 2: Benthic Ecology, chapter 3: Fish and Shellfish Ecology and chapter 4: Marine Mammals. Designated sites within 2 km of the onshore cable corridor search area with identified impact pathways (Table 3.9) have been considered in the assessment. See also the Report to Inform Appropriate Assessment (RIAA) for assessment of impacts on European sites.

Date	Consultee and type of response	Issues raised	Response to issue raised and/or where considered in this chapter
6 December 2016	PINS, scoping opinion	The Secretary of State notes that a number of designated sites, including European sites, lie within the onshore ECR corridor. The Secretary of State recommends that the Applicant in developing the cable route makes effort to avoid impacts to designated sites where possible. This is an approach supported by NE and the EA (see comments at Appendix 3) and is in accordance with a recommended mitigation hierarchy. Where impacts are unavoidable, the project design, proposed surveys and mitigation should be discussed and agreed with the SNCBs and county ecologist (as appropriate). NE has suggested in its consultation response that the Evidence Plan process provides appropriate opportunity to support these discussions.	Effects on sites within the onshore cable corridor search area PEIR boundary have been assessed (Table 3.15). Final route selection will avoid direct impacts on designated sites wherever possible. Opportunities to minimise physical interface with Kelling Heath SSSI/CWS, Low Common CWS and Old Hall Meadow CWS are being considered as part of the ongoing cable route refinement process.
6 December 2016	PINS, scoping opinion	The Applicant's attention is drawn to the detailed comments of NE in its consultation response (see Appendix 3) in respect of European sites and component SSSIs, including sensitive qualifying features, potential impacts and recommended surveys. The Secretary of State strongly advises that the Applicant seeks to agree the scope of the assessment with NE. The Applicant's attention is also drawn to the comments of Barford Parish Council in respect of the River Wensum SSSI (see Appendix 3).	Scope of surveys and assessment discussed and agreed with EWG.
6 December 2016	PINS, scoping opinion	The Secretary of State notes that the Applicant has identified the Yare Valley County Wildlife Site (CWS) in Table 11.1, as a designated site to be considered in the impact assessment. The Applicant's attention is drawn to the comments of Cringleford Parish Council, which identify that the Applicant should consider the environmental and ecological sensitivities within the Yare Valley (should the cables run through this area) to ensure as little disturbance and damage to the environment and wildlife as possible.	Onshore cable corridor search area avoids Yare Valley CWSs (Figure 3.2) (. Yare Valley to be crossed using trenchless techniques to avoid impacts (volume 3, chapter 2: Hydrology and Flood risk and Section 3.11.1.212).
6 December 2016	PINS, scoping opinion	The Applicant's attention is drawn to the comments on NE and the EA in their consultation response (see Appendix 3) in respect of invasive non-native species and the need to consider these within the ES. The Secretary of State advises that the potential to spread invasive non- native species be considered in the ES, particularly where the proposed development affects aquatic habitats. NE have requested the inclusion of an invasive species protocol with the ES. The EA have also identified the need to identify biosecurity measures. The Secretary of State supports this request and advises that the Applicant discuss the content and format for such a protocol with NE and the EA prior to submission of the ES.	Biosecurity measures to be presented in the EMP and Code of Construction Practice (CoCP) when produced at Final Environmental Statement stage.
6 December 2016	PINS, scoping opinion	The Applicant's attention is drawn to the comments of the EA at Appendix 3 in respect of altered thermal and EMF impacts. The Secretary of State advises that the Applicant consider the depths at which the onshore cables would be buried beneath watercourses and the potential for impacts associated with buried cables on sensitive species. The EA have also raised the need to consider potential impacts associated with the maintenance of the buried onshore cables. The Secretary of State recommends that the Applicant consider potential impacts on species arising from potential thermal changes and EMFs during construction, operation/maintenance and decommissioning with NE, the EA and county ecologist (as appropriate). Should it subsequently be agreed that such effects are screened out of the impact assessment; the ES should provide a justification for doing so.	The thermal impacts of the underground cable are considered in chapter 1: Geology and Ground Conditions. EMF is considered in volume 4, annex 3.3: EMF Compliance Statement.
6 December 2016	PINS, scoping opinion	In respect of the data collection required for the decommissioning impacts, Table 11.8 impact 8 states that the PEA surveys will be used to inform these impacts. However, the Secretary of State believes that at the point of decommissioning these surveys will be significantly out of date and that further data collection and/or re- surveys are likely to be required prior to decommissioning to inform potential decommissioning impacts and any necessary mitigation. The Applicant is advised to include for additional surveys/resurveys for decommissioning impacts in this table.	Further surveys will be carried out prior to decommissioning (Section 3.11.3).
6 December 2016	PINS, scoping opinion	The Secretary of State also advises that the Applicant consider the use and feasibility of Horizontal Directional Drilling (HDD) techniques where significant impacts on sensitive habitats/sites/ species cannot be avoided. The Applicant's attention is directed to the comments of the EA at Appendix 3 with regard to the use of HDD.	Trenchless techniques proposed in locations identified in volume 3, chapter 2: Hydrology and Flood risk and Sections 3.11.1.200 and 3.11.1.212 for watercourses. Opportunities to minimise physical interface with Kelling Heath SSSI/CWS, Low Common CWS and Old Hall Meadow CWS are being considered as part of the ongoing cable route refinement process. Further need for trenchless techniques to be identified following completion of species surveys if required.

Date	Consultee and type of response	Issues raised	Response to issue raised and/or where considered in this chapter
6 December 2016	PINS, scoping opinion	The list of potential cumulative projects at paragraph 11.1.22 is broadly defined by type. The Applicant's attention is directed to the concerns of NE set out in its consultation response with regard to cumulative impacts (see Appendix 3). These include cumulative impacts with the onshore cable route for the proposed Norfolk Vanguard offshore wind farm, coastal protection works, and rights of access to the coastal path. The Secretary of State recommends the Applicant discuss and agree the scope of potential cumulative impacts with NE during the pre-application stage.	Cumulative effect with Norfolk Vanguard cable route is considered in Section 3.13.2.8 - 3.13.2.13 but full assessment on species to be undertaken following completion of surveys at final ES. No sites with potential for cumulative impacts identified in the coastal section.
6 December 2016	PINS, scoping opinion	The Secretary of State notes that a number of SSSIs are located close to or within the proposed development. Where there may be potential impacts on the SSSIs, the Secretary of State has duties under sections 28(G) and 28(I) of the Wildlife and Countryside Act 1981 (as amended) (the W&C Act). These are set out below for information.	Noted
6 December 2016	PINS, scoping opinion	Under s28(G), the Secretary of State has a general duty '… to take reasonable steps, consistent with the proper exercise of the authority's functions, to further the conservation and enhancement of the flora, fauna or geological or physiographical features by reason of which the site is of special scientific interest'.	Noted
6 December 2016	PINS, scoping opinion	Under s28(I), the Secretary of State must notify the relevant nature conservation body (NCB), NE in this case, before authorising the carrying out of operations likely to damage the special interest features of a SSSI. Under these circumstances 28 days must elapse before deciding whether to grant consent, and the Secretary of State must take account of any advice received from the NCB, including advice on attaching conditions to the consent. The NCB will be notified during the examination period.	Noted
6 December 2016	PINS, scoping opinion	If applicants consider it likely that notification may be necessary under s28(I), they are advised to resolve any issues with the NCB before the DCO application is submitted to the Secretary of State. If, following assessment by applicants, it is considered that operations affecting the SSSI will not lead to damage of the special interest features, applicants should make this clear in the ES. The application documents submitted in accordance with Regulation 5(2)(l) could also provide this information. Applicants should seek to agree with the NCB the DCO requirements which will provide protection for the SSSI before the DCO application is submitted.	Noted
6 December 2016	PINS, scoping opinion	Applicants should be aware that the decision maker under the Planning Act 2008 (PA 2008) has, as the CA, a duty to engage with the Habitats Directive. Where a potential risk to a European Protected Species (EPS) is identified, and before making a decision to grant development consent, the CA must, amongst other things, address the derogation tests in Regulation 53 of the Habitats Regulations. Therefore the applicant may wish to provide information which will assist the decision maker to meet this duty.	Requirements for EPS licensing to be determined following completion of surveys. Draft offshore EPS licence application(s) could be appended to the final ES if required. Consultation with NE to agree approach required to be undertaken via EWG.
6 December 2016	PINS, scoping opinion	If an applicant has concluded that an EPS licence is required the ExA will need to understand whether there is any impediment to the licence being granted. The decision to apply for a licence or not will rest with the applicant as the person responsible for commissioning the proposed activity by taking into account the advice of their consultant ecologist.	Requirements for EPS licensing to be determined following completion of surveys. Draft offshore EPS licence application(s) could be appended to the final ES if required. Consultation with NE to agree approach required to be undertaken via EWG.
6 December 2016	PINS, scoping opinion	Applicants are encouraged to consult with NE and the MMO and, where required, to agree appropriate requirements to secure necessary mitigation. It would assist the examination if applicants could provide, with the application documents, confirmation from NE and the MMO whether any issues have been identified which would prevent the EPS licence being granted.	Requirements for EPS licensing to be determined following completion of surveys. Draft offshore EPS licence application(s) could be appended to the final ES if required. Consultation with NE to agree approach required to be undertaken via EWG.
6 December 2016	PINS, scoping opinion	Generally, NE and the MMO are unable to grant an EPS licence in respect of any development until all the necessary consents required have been secured in order to proceed. For NSIPs, NE will assess a draft licence application in order to ensure that all the relevant issues have been addressed. Within 30 working days of receipt, NE will either issue 'a letter of no impediment' stating that it is satisfied, insofar as it can make a judgement, that the proposals presented comply with the regulations or will issue a letter outlining why NE consider the proposals do not meet licensing requirements and what further information is required before a 'letter of no impediment' can be issued. The applicant is responsible for ensuring draft licence applications are satisfactory for the purposes of informing formal pre- application assessment by NE.	Requirements for EPS licensing to be determined following completion of surveys. Draft offshore EPS licence application(s) could be appended to the final ES if required. Consultation with NE to agree approach required to be undertaken via EWG.

Date	Consultee and type of response	Issues raised	Response to issue raised and/or where considered in this chapter
6 December 2016	PINS, scoping opinion	Ecological conditions on the site may change over time. It will be the applicant's responsibility to ensure information is satisfactory for the purposes of informing the assessment of no detriment to the maintenance of favourable conservation status (FCS) of the population of EPS affected by the proposals. Applicants are advised that current conservation status of populations may or may not be favourable. Demonstration of no detriment to favourable populations may require further survey and/or submission of revised short or long term mitigation or compensation proposals.	Requirements for EPS licensing to be determined following completion of surveys. Draft offshore EPS licence application(s) could be appended to the final ES if required. Consultation with NE to agree approach required to be undertaken via EWG.
6 December 2016	PINS, scoping opinion	In England the focus concerns the provision of up to date survey information which is then made available to NE (along with any resulting amendments to the draft licence application). Applicants with projects in England (including activities undertaken landward of the mean low water mark) can find further information in Advice Note eleven, Annex C4. 4 Advice Note eleven, Annex C – NE and the PINS available from: http://infrastructure.planninginspectorate.gov.uk/wp- content/uploads/2015/10/PINS-Advice-Note-11_AnnexC_20150928.pdf	Requirements for EPS licensing to be determined following completion of surveys. Draft offshore EPS licence application(s) could be appended to the final ES if required. Consultation with NE to agree approach required to be undertaken via EWG.
24 November 2016	Barford and Wramplingham Parish Council	A local issue that the Council would like consideration to be given to the Wensum River being an SSSI. Any works in its vicinity would have the potential for a negative environmental impact	HDD to be employed under the River Wensum. Effects on this site are assessed in Section 3.11.1 and the RIAA.
24 November 2016	Environment Agency – Scoping Response	There is no mention of biosecurity in the Scoping Report. We regard biosecurity as very important. The proposed works will cross multiple waterbodies across Norfolk and these activities present the risk of transmission of diseases and invasive species. Specific consideration should be given to works in and around waterbodies including all animals and plants listed under Schedule 9 of the Wildlife and Countryside Act 1981 (as amended). Where machinery is to be used at several water locations bio control measures should be identified to prevent the spread of diseases such as chytridiomycosis and crayfish plague	Biosecurity measures to be presented in the EMP and CoCP when produced at final ES stage.
24 November 2016	Environment Agency – Scoping Response	Paragraph 4.2.22 States that it should avoid "areas of ancient woodland habitat or other woodland of conservation interest". It should be noted that not only woodland holds conservation interest. The NERC Act 2006 identifies priority habitats that are considered threatened and should be targeted for conservation interest. These habitats are listed within the UK BAP (Biodiversity Action Plan). In addition to this, Local Authorities publish their own LBAP for habitats considered of conservation at a local level. These should all be taken into consideration when identifying the route. Both of these points are appropriate for the scoping of all parts of this route; the landfall area, the onshore ECR corridor and the HVAC booster station.	UKBAP/LBAP habitats are considered in the assessment (Section 3.11.1)
24 November 2016	Environment Agency – Scoping Response	This scoping exercise should consider avoiding all designated sites, not just internationally designated ones. The location of the HVAC booster station should also consider proximity to watercourses, proximity to known protected species populations utilising the data from the desk study, locally designated sites and NERC UKBAP habitats. HDD should be used where sensitive habitats cannot be avoided	Trenchless techniques proposed in locations identified in volume 3, chapter 2: Hydrology and Flood risk and Sections 3.11.1.200 and 3.11.1.212 for watercourses. Opportunities to minimise physical interface with Kelling Heath SSSI/CWS, Low Common CWS and Old Hall Meadow CWS are being considered as part of the ongoing cable route refinement process. Further need for trenchless techniques to be identified following completion of species surveys if required.
24 November 2016	Environment Agency – Scoping Response	Paragraph 11.1.5 lists the data sources from which biological records have been used. In addition to these, local RSPB, BTO and local ornithological groups should be consulted to acquire full dataset for the local areas.	NBIS has supplied data for the desk study (volume 6, annex 3.1: Preliminary Ecological Assessment). Several local groups were contacted for records (Table 3.5). Following consultations it was determined that RSPB and BTO records would be unlikely to add significant value to the data set. Available BTO data is limited to BirdTrack (an online database of casual bird sightings which is not a systematic survey), which is not considered to be of relevance to the survey reporting or technical reporting. Also, there is no relevant Wetland Bird Survey WeBS data as this national survey of wetlands does not cover habitats within the Ecology and nature conservation study area . RSPB do not hold specific records and were consulted as part of the EWG.

Date	Consultee and type of response	Issues raised	Response to issue raised and/or where considered in this chapter
24 November 2016	Environment Agency – Scoping Response	Paragraph 11.1.6 details site specific surveys that are underway or proposed. In addition to those listed, the following species groups have the potential to be impacted and should be included: • White clawed crayfish • Freshwater fish • Freshwater pearl mussel • Hazel dormouse	Survey scope and methods discussed and agreed with stakeholders via the Expert Working Group. Desk study exercise confirmed no requirement to undertake surveys for freshwater pearl mussel, hazel dormouse and red squirrel (volume 6, annex 3.3: Hazel Dormouse, Red Squirrel and Freshwater Pearl Mussel Desk Study). White-clawed crayfish surveys to be undertaken in 2017 and reported in the Final Environmental Statement. At the time of writing the consultation with the EWG was underway to scope out freshwater fish surveys.
24 November 2016	Environment Agency – Scoping Response	It is not specified how close to the edge of the ECR search corridor the works may run. If within 5 km of the edge of the corridor, the corridor will need to be widened and more data must be acquired to fully assess the area. At present no designated sites have been identified that are not directly within the ECR corridor.	Designated sites within 2 km of the onshore ECR corridor with identified impact pathways (Table 3.9) have been considered in the assessment. See also RIAA for assessment of impacts on European sites.
24 November 2016	Environment Agency – Scoping Response	The report does not identify the potential of buried cables to impact on wildlife. The altered thermal and EMF (Electro-Magnetic Fields) must be investigated. This is especially important where the cable will cross watercourses.	The thermal impacts of the underground cable are considered in chapter 1: Geology and Ground Conditions. EMF is considered in volume 3, annex 3.3 EMF Compliance Statement.
24 November 2016	Environment Agency – Scoping Response	This report does not sufficiently investigate the impacts associated with the maintenance of the onshore buried cables if a fault should occur. Where works are required, ecological assessment will be required on a case by case basis to determine necessary mitigation measures to be taken for the maintenance to be completed.	Effects of operation and maintenance are assessed in Section 3.11.2.
24 November 2016	Environment Agency – Scoping Response	Utilities companies receive exemptions under numerous sections of environmental legislation, therefore prior arranged policies of no net ecological loss should be agreed	
24 November 2016	Environment Agency – Scoping Response	This should specify that these will be resurveys at the time of decommissioning. The original surveys will no longer be valid considering the lifespan of this project. Surveys generally have a shelf life of 2 years before the data is considered obsolete and must be re-surveyed.	Surveys prior to decommissioning will be undertaken.
24 November 2016	Environment Agency – Scoping Response	Decommissioning should also cover habitat loss. For example, the removal of substation buildings may represent the loss of habitat for bat species. It is also likely that vegetation will develop around structures and over the buried line that would need to be removed should any of these require removal.	Surveys prior to decommissioning will be undertaken.
25 November 2016	Natural England – Scoping Response	The onshore cable route and infrastructure has the potential to affect six internationally designated sites and several nationally designated sites. We note that North Norfolk Coast SAC and The Wash and North Norfolk Coast SAC have not been included in Table 11.1. We advise that the cable route and infrastructure should avoid all designated sites, including local designated sites, in the first instance. If it is entirely unavoidable that the cable route will cross a designated site, for example as in the case of the river Wensum SAC, we would expect potential installation options to be discussed during the Evidence Plan process and appropriate survey data and mitigation provided. Please be advised that many of the habitats and designated sites along the route are ecologically linked (this is particularly the case when considering nationally and locally designated sites and habitats near to the River Wensum and within the Norfolk Valley Fens SAC network of sites) and therefore effects on any designated sites should not be considered alone, but in the context of the wider environment.	Designated sites within 2 km of the onshore ECR corridor with identified impact pathways (Table 3.9) have been considered in the assessment. See also RIAA for assessment of impacts on European sites. Trenchless techniques proposed in locations identified in volume 3, chapter 2: Hydrology and Flood risk and Sections 3.11.1.200 and 3.11.1.212 for watercourses. Opportunities to minimise physical interface with Kelling Heath SSSI/CWS, Low Common CWS and Old Hall Meadow CWS are being considered as part of the ongoing cable route refinement process. Further need for trenchless techniques to be identified following completion of species surveys if required. Hydrological characterisation work is underway to investigate the links between hydrology and ecological habitats. A summary of the work undertaken to date is provided in chapter 2: Hydrology and Flood Risk.
25 November 2016	Natural England – Scoping Response	The River Wensum SAC: The cable route has potential to directly affect both the hydrological processes and habitats present within the River Wensum SAC. There are many springs and seepages along the length of the river which would not be detectable during a desk study, and if missed has the potential to damage the river system, resulting in changes to the direction and speed of flow of the river water supply. Furthermore there are floodplain meadows that form an integral part of the SAC that may be directly damaged by setting up the start of the underground cable within the wrong location. We therefore recommend that prior to any decisions on location a hydro-ecologist is employed to survey the area, to check for seepages/springs and to review where to place the cable to avoid damaging the habitats associated with the SAC. We would welcome placement of the cable as far away from the river as feasible, to protect the habitats and wildlife present in close proximity to the river.	Hydrological characterisation of the proposed crossing locations of the EA designated main rivers is currently underway. The work comprises a desk study and site walkover to identify the hydrological and ecological features in these locations and how they interact. Potential constraints will be mapped and which will be used inform the design of the crossing methodologies in these areas. The hydrological characterisation work will be reported in the Final Environmental Statement, following discussion of outputs with EWG once complete.

Date	Consultee and type of response	Issues raised	Response to issue raised and/or where considered in this chapter
25 November 2016	Natural England – Scoping Response	A qualifying species of the Wensum SAC is Desmoulin's whorl snail. This species is likely to be present throughout the area surrounding the Wensum, being particularly prevalent in locally designated greenspace such as Lenwade and Great Witchingham Common and ditches and wet margins nearby. A survey should therefore be carried out along the route, which should take place mid to late summer.	A habitat suitability assessment has been undertaken (see volume 6, annex 3.2: Great Crested Newt and Desmoulin's Whorl Snail Habitat Suitability Assessment Survey). A survey of Desmoulin's whorl snail is being undertaken in 2017. A discussion of the results with the EWG will be undertaken prior to the reporting of results in the Final Environmental Statement.
25 November 2016	Natural England – Scoping Response	Norfolk Valley Fens SAC and component SSSIs: The area along the cable route includes several sites that form part of the Norfolk Valley Fens SAC. These sites, along with many of the locally designated sites in the area, form a complex network of hydrologically linked sites which are very sensitive to changes in water levels, quality or flow. Some of the sites that form part of this network and may be affected by the cable route are Alderford Common, Swanningate Upgate Common, Booton Common SSSIs (though this list is not exhaustive). we recommend that a desk study is carried out to ensure that all SSSIs associated with this SAC that may be affected by the cable route are scoped into the assessment. We advise that the Environmental Statement considers in detail how the placement of the route will affect surface and ground water flow across any of the sites that are components of the Norfolk Valley Fens SAC, along with any County Wildlife sites with a hydrological focus.	Hydrological characterisation of the proposed crossing locations of the EA designated main rivers is currently underway. The work comprises a desk study and site walkover to identify the hydrological and ecological features in these locations and how they interact. Potential constraints will be mapped and which will be used inform the design of the crossing methodologies in these areas. The hydrological characterisation work will be reported in the Final Environmental Statement, following discussion of outputs with EWG once complete.
25 November 2016	Natural England – Scoping Response	North Norfolk Coast SPA, Ramsar and SAC: the proposed corridor and infrastructure sites may have a direct effect to interest features of the above designated sites, or to any of their component SSSIs. The proposal could result in loss of habitat that is functionally linked to these international sites and in disturbance to birds using this habitat during construction. It is likely that the main species of concern within the European and international sites would be Brent and Pink footed geese (although all interest features of the sites should be considered).	Scope of wintering and migratory bird surveys agreed with EWG. Results presented in volume 6, annex 3.1: Onshore Ornithology - Wintering Birds
25 November 2016	Natural England – Scoping Response	As well as all the hydrological issues outlined in the context of the European sites, the nationally designated sites along the route have separate interest features that will need to be taken into account. The river Wensum SSSI, Alderford Common SSSI and many of the other nationally and locally designated sites along the route support breeding birds including barn owl, kingfisher, warblers, nightingale and turtle doves, for example. Therefore we advise that full breeding bird surveys are undertaken along the full length of the route and mitigation provided accordingly. Also, we advise that best practice is to reinstate as much habitat along the route that supports breeding birds as possible, such as field margins, hedgerows, trees and scrub. Further sites that will need consideration along the route are Cawston and Marsham Heaths, Foxley Wood, Honeypot Wood and Beetley and Hoe Meadows SSSIs, all of which are designated as representative of rare habitats. Cawston and Marsham Heaths is the largest area of Heather-dominated heathland now remaining in east Norfolk whilst Foxley Wood (SSSI and NNR) is the largest example of ancient woodland in Norfolk. Sites designated as examples of particular habitats evidently need to be avoided and consideration should be given on how to avoid pollution of any of these sites.	Scope of breeding bird surveys has been discussed via EWG. Surveys to be carried out in 2017. Cawston and Marsham Heaths, Foxley Wood, Honeypot Wood and Beetley and Hoe Meadows SSSIs are associated with the eastern cable route option included at scoping stage but subsequently dropped, and therefore there is no requirement to assess these sites in the PEIR.
25 November 2016	Natural England – Scoping Response	We have not covered all the SSSIs that may be affected along the route here as we wish to highlight the main issues. However, we advise that all nationally designated sites within the cable route area are given consideration. Further information on SSSIs and their interest features can be found at www.magic.gov. We recommend that the Environmental Statement should include a full assessment of the direct and indirect effects of the development on the features of special interest within all designated sites that have potential to be affected by the cable route and should identify such mitigation measures as may be required in order to avoid, minimise or reduce any significant impacts.	Designated sites within 2 km of the onshore ECR corridor with identified impact pathways (Table 3.9) have been considered in the assessment.
25 November 2016	Natural England – Scoping Response	NE advises that the Environmental Statement should consider any impacts upon local wildlife or geological sites and avoid these sites where possible, or mitigate for any impacts. Note that many of these sites link directly to SSSIs along the routes, such as those adjacent to Holt Lowes, Booton Common and the River Wensum SSSIs. More information on all the county wildlife sites in Norfolk can be found here: http://www.nbis.org.uk/CWS.	Designated sites within 2 km of the onshore ECR corridor with identified impact pathways (Table 3.9) have been considered in the assessment.

Date	Consultee and type of response	Issues raised	Response to issue raised and/or where considered in this chapter
25 November 2016	Natural England – Scoping Response	We note that no consideration is given to avoiding impacts of invasive non-native species. It appears that the cable route will also need to cross several rivers and hydrological systems, such as the river Glaven. There is potential for the works to spread invasive species between the rivers and other features. For example it would be possible to contaminate the sites selected for crayfish relocations around North Norfolk, by re-introducing crayfish plague to these sites. Other species in this area that could be transmitted to other locations include the Chinese Mitten Crab and Killer Shrimp. As well as the potential to spread species and disease across waterways, whilst working on the river bank there is potential to spread invasive plant species such as Himalayan Balsam. Therefore it is very important that an invasive species protocol is included in the Environmental Statement. There is also potential to pollute the river during construction or maintenance and therefore we expect the Environmental Statement explain how it is intended to avoid these issues and to include an Environmental Construction Management Plan (CEMP) to protect the river from pollution during works.	Biosecurity measures to be presented in the EMP and CoCP when produced at final Environmental Statement stage.
25 November 2016	Natural England – Scoping Response	We recommend that the Environmental Statement should assess the impact of all phases of the proposal on protected species. The proposed cable route crosses areas known to support high numbers of GCN, bats and breeding birds. Badger, reptile, water voles, invertebrates and botanical surveys will also be necessary. We advise that records of protected species are sought from appropriate local biological record centres, nature conservation organisations, groups and individuals. 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. NE has adopted standing advice for protected species which includes links to guidance on survey and mitigation which we hope you will find helpful and can be found on our website We note that as well as the species listed above, we recommend a thorough assessment of 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 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. Further information on this duty is available in the Defra publication 'Guidance for Local Authorities on Implementing the Biodiversity Duty'.	Scope of species surveys has been discussed and agreed via EWG. Full assessment of impacts on protected and other species to be included at Final Environmental Statement stage once results of surveys are known. The results once complete will be discussed with the EWG prior to the reporting of results in the Final Environmental Statement.
17 February 20017	Onshore Ecology Expert Working Group – Natural England Norfolk County Council Norfolk Wildlife Trust RSPB Environment Agency	Overview of the Evidence Plan process and the approach for discussing onshore ecology issues of Hornsea Three. Update of the scheme since the scoping report was submitted. Identification and discussion of statutorily designated ecological sites within the 2 km data search area. NCC, NWT and RSPB identified other important areas for wildlife. Presentation of the Preliminary Ecological Appraisal and the proposed protected species surveys. Presentation and agreement of the survey methodologies for the protected species surveys. Approach and scope of hydrology characterisation report discussed.	Designated sites within 2 km of the onshore ECR corridor with identified impact pathways (Table 3.9) have been considered in the assessment. Scope of proposed surveys discussed and agreed via EWG.
28 April 2017	Onshore Ecology Expert Working Group	Presentation of the results of the wintering bird survey and habitat classification surveys. Agreement of assessment approach for surveys completed. Presentation and discussion of information to justify scoping out red squirrel, hazel dormouse and freshwater pearl mussel. Agreement that surveys of these species are not necessary. Proposed that adequate survey data available for freshwater fish and that no further surveys were required. A note to justify this approach would be prepared following the meeting. Identification and discussion of non-statutorily designated ecological sites within 2 km data search area. Update on other protected species surveys and the findings to date. Update on the work undertaken for the hydrological characterisation report.	Designated sites within 2 km of the onshore ECR corridor with identified impact pathways (Table 3.9) have been considered in the assessment.

Date	Consultee and type of response	Issues raised	Response to issue raised and/or where considered in this chapter
7 June 2017	Broadland District Council	Project progress update, providing a summary of the information contained in the PEIR, including the baseline information presented, and the approach to the assessment for onshore topics, and planned engagement activities through the PEIR process and prior to the final DCO application. Discussions about the scope of the onshore ecology and nature conservation chapter, and how ongoing route refinement, and development of the project Ecological Management Plan (EMP) would further mitigate significant effects, through avoidance of sensitive and designated sites, where possible, and securing construction phase mitigation measures, including pre-construction surveys.	N/A
7 June 2017	Norfolk County Council	Project progress update, providing a summary of the information contained in the PEIR, including the baseline information presented, and the approach to the assessment for onshore topics, and planned engagement activities through the PEIR process and prior to the final DCO application. Discussions about the scope of the onshore ecology and nature conservation chapter, and how ongoing route refinement, and development of the project Ecological Management Plan (EMP) would further mitigate significant effects, through avoidance of sensitive and designated sites, where possible, and securing construction phase mitigation measures, including pre-construction surveys.	N/A
14 June 2017	South Norfolk Council	Project progress update, providing a summary of the information contained in the PEIR, including the baseline information presented, and the approach to the assessment for onshore topics, and planned engagement activities through the PEIR process and prior to the final DCO application. Discussions about the scope of the onshore ecology and nature conservation chapter, and how ongoing route refinement, and development of the project Ecological Management Plan (EMP) would further mitigate significant effects, through avoidance of sensitive and designated sites, where possible, and securing construction phase mitigation measures, including pre-construction surveys.	N/A
14 June 2017	North Norfolk District Council	Project progress update, providing a summary of the information contained in the PEIR, including the baseline information presented, and the approach to the assessment for onshore topics, and planned engagement activities through the PEIR process and prior to the final DCO application. Discussions about the scope of the onshore ecology and nature conservation chapter, and how ongoing route refinement, and development of the project Ecological Management Plan (EMP) would further mitigate significant effects, through avoidance of sensitive and designated sites, where possible, and securing construction phase mitigation measures, including pre-construction surveys.	N/A

3.6 Methodology to inform the baseline

3.6.1 Desktop study

3.6.1.1 Ecological data for the desk study search area described in Section 3.3 were requested from several organisations. Responses received are outlined in Table 3.5 below.

Table 3.5: Desk study record requests.

Title	Month	Year	Summary of response
NBIS	July	2016	NBIS provided data on protected species and non-statutory designated sites within the search area.
	February	2017	NBIS provided data on protected species and non-statutory designated sites within the search area.
Norfolk Amphibian & Reptile Group (NARG)	July	2016	No response received.
	February	2017	Norfolk Amphibian & Reptile Group do not hold records.
Amphibian and Reptile Conservation Trust	February	2017	Only four records received, March 2017
Norfolk Badger Protection Group	February	2017	Norfolk Badger Protection Group provided data on badgers within the search area.
Norwich Bat Group	February	2017	Norwich Bat Group submits records to NBIS.
Norfolk Bat Group	February	2017	Norfolk Bat Group submits records to NBIS.
Norfolk Barbastelle Study Group	February	2017	Norfolk Barbastelle Study Group submits records to NBIS.
Norfolk Badger Trust	February	2017	Norfolk Badger Trust provided data on badgers within the search area.
County Badger Recorder	February	2017	County recorders submit records to NBIS.
County Bat Recorder	February	2017	County recorders submit records to NBIS.
Norfolk Bats In Churches	February	2017	County recorders submit records to NBIS.

3.6.1.2 In addition to the data requests listed above, datasets from the JNCC website (www.jncc.defra.gov.uk) and the Department for Environment, Food and Rural Affair's (Defra) MAGIC website (www.MAGIC.defra.gov.uk) (Defra, 2002) were consulted for information relating to designated sites including:

- Special Areas of Conservation (SACs);
- Sites of Special Scientific Interest (SSSIs); and
- LNRs.

3.6.1.3 Aerial photography and Ordnance Survey maps were also referred to in order to identify and assess areas potentially suitable for protected species and habitats.

3.6.2 Designated Sites

3.6.2.1 Statutory designated sites are sites which have been designated under UK and in some cases international legislation which protects areas identified as being of special nature conservation importance and which are thus protected under statutory provisions.

3.6.2.2 Non-statutory designated sites are sites which have been designated due to their nature conservation interest, typically though the local planning process, which are usually protected by planning policies but not legally protected.

3.6.2.3 All designated sites for ecology and nature conservation within the 2 km search area were identified. These sites are identified in Table 3.6.

3.6.3 Site specific surveys

Phase 1 habitat survey

3.6.3.1 A Phase 1 habitat survey was conducted in order to identify habitats present within the survey area and the potential value of these habitats for protected or otherwise notable species. Findings of the survey informed the need for further more detailed surveys.

3.6.3.2 The survey was carried out between July and September 2016, a suitable time of year for this type of survey as the majority of plant species are visible, enabling accurate identification of habitats. Habitats within the Ecology and nature conservation study area and a surrounding 200 m area were mapped according to the techniques and definitions described in the Handbook for Phase 1 Habitat Survey (JNCC, 2010).

Hedgerow survey

3.6.3.3 A detailed survey will be undertaken of hedgerows identified as being potentially species-rich during the Phase 1 habitat survey.

3.6.3.4 Findings of the survey will be used to assess whether surveyed hedgerows meet the definition of 'Important' under the Hedgerow Regulations 1997.

Invasive plant species subject to legal control

3.6.3.5 During the various field surveys carried out in 2016 and 2017, evidence of any invasive plant species subject to legal control was recorded, for example giant hogweed or Japanese knotweed.

Protected species surveys

3.6.3.6 Surveys for the following protected species surveys will be carried out in 2017. Methodologies for these surveys was presented and agreed with Natural England and other key stakeholders as part of the Onshore Ecology Expert Working Group in February 2017 (see Table 3.4)

- Desmoulin's Whorl Snail;
- White Clawed Crayfish;
- GCN;
- Reptiles;
- Breeding birds;
- Wintering and migratory birds;
- Water Voles;
- Otters;
- Badgers; and
- Bats including:
  - Tree roosts – daytime surveys;
  - Tree roosts – dusk emergence/dawn re-entry surveys; and
  - Commuting or foraging bat surveys (static monitoring).

Species not included in the assessment

3.6.3.7 As a result of the scoping exercise for Hornsea Three, and in agreement with Natural England, a number of species were excluded from the onshore impact assessment due to their absence from the survey areas and/or the likely absence of any effects of development proposals. These species included freshwater and terrestrial invertebrates with the exception of white-clawed crayfish and Desmoulin's whorl snail, all fish species, hazel dormouse and red squirrel.

3.6.3.8 One record of a red squirrel was obtained from the data search, from Swardeston dating from 2006. However, the note accompanying this record states that the animal was partially tame and was clearly an escaped or released animal which was not expected to survive. This species is therefore not considered to occur in Norfolk.

3.6.3.9 Hazel dormice and freshwater pearl mussel were scoped out of this assessment as their current range does not include Norfolk. A summary of the data search and review for these species is provided in volume 6, annex 3.3: Hazel Dormouse, Red Squirrel and Freshwater Pearl Mussel Desk Study.

3.7 Baseline environment

3.7.1.1 This section reviews the ecology and nature conservation at the onshore components of Hornsea Three comprising the landfall, cable route corridor, the onshore HVAC booster station, the onshore HVDC converter/HVAC substation site and the connection with the National Grid substation. The onshore assessment commences at Mean High Water Spring (MHWS) and does not consider the intertidal zone.

3.7.2 Designated sites

3.7.2.1 In total, 20 statutory designated sites and 126 non-statutory designated sites were identified within 2 km of the cable route corridor from the desk study. One of these, The Wash & North Norfolk Coast is a marine area designated as a SAC and is not considered within the onshore ecology chapter but in volume 2, chapters 2 Benthic Ecology and chapter 4: Marine Mammals.

3.7.2.2 Designated sites within 1 km of the Ecology and nature conservation study area (those considered to have potential to be affected by construction, operation or decommissioning of Hornsea Three) are summarised in Table 3.6 and their locations are shown in Figure 3.2.

3.7.2.3 Of the 20 designated statutory sites, two SACs and six SSSIs lie partially within the Phase 1 survey area. These are Norfolk Valley Fens SAC, River Wensum SAC, Weybourne Town Pit SSSI, Weybourne Cliffs SSSI, Booton Common SSSI, Kelling Heath SSSI, Alderford Common SSSI and the River Wensum SSSI. Booton Common SSSI is a component part of the Norfolk Valley Fens SAC. Weybourne Town Pit and Weybourne Cliffs SSSIs are both geological SSSIs. The North Norfolk Coast SPA is located 120 m from the northwest edge of the Phase 1 survey area.

3.7.2.4 A summary of these sites is provided below.

- North Norfolk Coast is a low-lying barrier coast of extensive intertidal sand- and mud-flats, saltmarshes, shingle and sand dunes, together with areas of freshwater grazing marsh and reedbed, designated as a SPA.
- Norfolk Valley Fens and the River Wensum are designated as SACs and Alderford Common and Booton Common are designated as SSSIs.
- Norfolk Valley Fens comprises a series of valley-head spring-fed fens.
- The River Wensum is crossed by the onshore cable route search area corridor.
- Alderford Common is designated for presence of acid and calcareous grassland species.
- Booton Common is designated for its mosaic of wet calcareous fen grassland and acid heath plant communities. This site also qualifies as Norfolk Valley Fens SAC in part for its 'alder woodland on floodplains' habitat, which is present within Phase 1 survey boundary.

3.7.2.5 The 126 non-statutory sites comprise 97 CWSs, six Roadside Nature Reserves (RNRs) and 23 Geodiversity Sites. The non-statutory sites are identified in Table 3.6. Geodiversity Sites are considered in this chapter 1: Geology and Ground Conditions.

3.7.2.6 The ecology impact assessment of Hornsea Three on habitats which form part of the Cromer Shoal Chalk Beds MCZ is detailed in the offshore ecology chapters in volume 2 (volume 2, chapter 2: Benthic Intertidal and Subtidal Ecology, and volume 2, chapter 4: Marine Mammals).

Table 3.6: Designated sites within 1 km of Hornsea Three.

Designation	Name	Distance to onshore cable corridor search area (km)
SAC	Norfolk Valley Fens	0.00
SAC	The Wash & North Norfolk Coast	0.68
SAC	River Wensum	0.00
SAC	Norfolk Valley Fens	0.00
SPA	North Norfolk Coast	0.65
Ramsar	North Norfolk Coast	0.68
SAC	North Norfolk Coast	0.68
SSSI	Weybourne Cliffs	0.00
SSSI	Kelling Heath	0.00
SSSI	Alderford Common	0.00
SSSI	Booton Common	0.00
SSSI	Edgefield Little Wood	0.45
SSSI	North Norfolk Coast	0.65
LNR	Dunston Common	0.33
CWS	Beach Lane, Weybourne	0.00
CWS	Kelling Heath Park & 100 Acre Wood	0.00
CWS	Muckleburgh Hill	0.00
CWS	Dismantled Railway	0.00
CWS	Land south of High Kelling	0.00
CWS	New Covert	0.00
CWS	Kelling Heath Park & 100 Acre Wood	0.00
CWS	Bush Meadow Plantation	0.00
CWS	Land adjoining River Tud	0.00
CWS	Low Common	0.00
CWS	Marriott's Way	0.00
CWS	Old Hall Meadow	0.00
CWS	Yare Valley (Marlingford)	0.00
CWS	Harman's Grove	0.00
CWS	Foxburrow Meadow	0.00
CWS	Harold's Grove	0.02
CWS	Melton Beck	0.02
CWS	Salle Park	0.03
CWS	The Belt	0.07
CWS	Braymeadow	0.07
CWS	Fir and Nineways Plantation	0.10
CWS	Barningham Green Plantation	0.10
CWS	Corpusty Fen	0.12
CWS	Jenni's Wood	0.18
CWS	Swardeston Common	0.21
CWS	Oak Grove	0.26
CWS	Heydon Park	0.29
CWS	Kelling Hard	0.30
CWS	Wensum Pastures at Morton Hall	0.32
CWS	Pond Hills	0.36
CWS	Pasture at Easton College	0.37
CWS	Old Decoy, Selbrigg Pond, The Lows	0.39
CWS	Church Hill Common	0.44
CWS	Old Wood	0.49
CWS	Ringland Hills	0.51
CWS	Hall Hills/Ringland Covert	0.56
CWS	Broom and Spring Hills	0.58
CWS	Tan Office Farm	0.60
CWS	Church Farm Marsh	0.63
CWS	Land south of High Kelling	0.66
CWS	Yare Valley (Bawburgh)	0.67

Designation	Name	Distance to onshore cable corridor search area (km)
CWS	Intwood Carr	0.67
CWS	Moor Hall	0.68
CWS	Caistor St. Edmund Roman Town	0.68
CWS	Newhall Wood	0.69
CWS	Salle Common and Adjacent Land	0.70
CWS	Reepham Meadows	0.80
CWS	The Carrs Woodland	0.85
CWS	Pond Hills Meadows	0.89
CWS	Ketteringham Hall Lake	0.93
CWS	Old Carr	1.00
RNR	U57217	0.01
RNR	U14319 Pond Hills	0.82
RNR	A140 (cutting)	0.95

3.7.3 Habitats and species

Protected and otherwise notable species desk study findings

Plants

3.7.3.1 The WCA 1981 (as amended) lists protected plant species under Schedule 8. Two plant species and one fungus listed on Schedule 8 were recorded within the 2 km ecology and nature conservation data search area: bluebell, holly-leaved naiad and sandy stiltball.

Invertebrates

3.7.3.2 A large number of invertebrate records were obtained within the 2 km ecology and nature conservation data search area. The invertebrate records are largely clustered around Hundred Acre Wood, Bodham Wood and Kelling Heath. Several records occur in the River Wensum SAC/SSSI and Alderford Common SSSI.

3.7.3.3 White-clawed crayfish are known to be present in the River Wensum. However, signal crayfish are also known to occur in the River Wensum, which means that white-clawed crayfish are less likely to be present.

3.7.3.4 Desmoulin's whorl snail and narrow-mouthed whorl snail is known to be present within Booton Common. Desmoulin's whorl snail is also known to be present within the Wensum River Valley SAC/SSSI.

Amphibians

3.7.3.5 GCNs and common toads have been recorded both within the Phase 1 survey boundary and in several locations within the 2 km ecology and nature conservation data search area.

3.7.3.6 GCNs have been recorded with a pond close to the onshore cable corridor search area west of Brandiston and off Reepham Road. Other records are found south of Little Melton and near Cawston. Alderford Common SSSI also supports GCNs and other amphibians.

Reptiles

3.7.3.7 Records of common lizard, grass snake and slow worm are found within the 2 km ecology and nature conservation data search area.

3.7.3.8 Slow worms and adders have been recorded near High Kelling.

Birds

3.7.3.9 Several Schedule 1 bird species have been recorded both within the onshore cable corridor and within the 5 km of the bat and ornithology data search area. These include records of black redstart, stone-curlew and barn owl.

3.7.3.10 Other schedule 1 species recorded within 5 km of the bat and ornithology data search area include peregrine, brambling, redwing, cetti's warbler, greylag goose, kingfisher, hobby, whooper swan and fieldfare.

3.7.3.11 The bird records are largely clustered around Brandiston and Marlingford.

Bats

3.7.3.12 Bat data records are clustered within three areas near the Hornsea Three landfall site at Weybourne, High Kelling and around Hundred Acre Wood. Species present in this area includes soprano pipistrelle, western barbastelle, nathusius', brown long-eared and common pipistrelle.

3.7.3.13 Bat records are clustered around Old Decoy, Selbrigg Pond, the Lows CWS, Pond Hills CWS, Little Wood, land around Alderford, Weston Longville, Marlingborough, east of Heathersett and Furze Meadow.

3.7.3.14 Other bat species records found within the cable corridor include natterer's and noctule bats.

Badger

3.7.3.15 Badgers have been recorded within the cable corridor and within the 2 km ecology and nature conservation data search area.

3.7.3.16 Badgers have been recorded on Reepham Road, north of Alderford Common, within the village of Attlebridge, and west of the study area in Weston Longville and Weston Green. Badgers have also been recorded along the A11.

Otter

3.7.3.17 Otters have been recorded off Sheringham Road near Weybourne, east of the site boundary near Saxthorpe and on the River Yare within the cable corridor.

3.7.3.18 Otters have also been recorded within the 2 km ecology and nature conservation data search area around the River Bure.

Water vole

3.7.3.19 Water voles have been recorded within the 2 km ecology and nature conservation data search area near the River Bure and on the River Wensum, both upriver and downriver from where the ECR crosses the river.

3.7.3.20 Other records are found east of the site boundary near Cawston and in Saxthorpe and the surrounding area.

Phase 1 habitat survey findings

3.7.3.21 Findings of the Phase 1 habitat survey are summarised below and shown on Figure 3.3. The Phase 1 Habitat Plan illustrates the dominant habitat types within and immediately adjacent to the onshore cable corridor search area, Hornsea Three landfall and onshore HVAC booster station and HVDC converter/HVAC substation site.

3.7.3.22 The majority of the onshore study area comprises cultivated land, much of which is under arable crops, and woodland. Weybourne Hope shingle beach runs along the north of the study area. The cable corridor crosses the rivers Wensum, Bure and Yare and numerous ponds and several streams also occur within the onshore study area.

3.7.3.23 The Phase 1 survey area intersects several villages including Kelling, High Kelling, Weybourne, Alderford, Attlebridge, Easton, Little Melton, Weston Longville, Lower East Carleton and Swardeston.

3.7.3.24 Several main arterial and private roads traverse the survey area and many mixed-use farm buildings occur on site.

3.7.3.25 Table 3.7 below lists the broad Phase 1 habitat types (as defined and described in JNCC (2010) recorded within the cable route corridor in order of approximate total area. A summary of each habitat type is provided below.

Table 3.7: Approximate habitat areas identified within the onshore cable corridor search area, onshore HVAC booster station and HVDC converter/HVAC substation sites during the Phase 1 habitat survey in Hornsea Three.

Habitat	Approximate area within onshore cable corridor search area (m^2)	% of total area within survey area
Unclassified	24.40	2.0%
Amenity grassland	3.71	0.3%
Arable	909.68	75.4%
Bare ground	14.42	1.2%
Bracken continuous	0.65	0.1%
Bracken scattered	0.00	0.0%
Broad leaved plantation woodland	4.92	0.4%
Broad leaved semi-natural woodland	34.98	2.9%
Buildings	0.23	0.0%
Coniferous plantation woodland	4.45	0.4%
Coniferous semi-natural woodland	4.91	0.4%
Dry heath/acid grassland mosaic	6.11	0.5%
Ephemeral/short perennial	5.49	0.5%
Hardsurface	16.70	1.4%
Improved grassland	80.00	6.6%
Marsh/marshy grassland	16.51	1.4%
Mixed plantation woodland	7.67	0.6%
Mixed semi-natural woodland	2.45	0.2%
Pond	1.04	0.1%
Poor semi improved grassland	51.45	4.3%
Running water	1.62	0.1%
Scrub scattered	4.15	0.3%
Shingle above high tide mark	4.94	0.4%
Standing water	0.10	0.0%

Habitat	Approximate area within onshore cable corridor search area (m²)	% of total area within survey area
Swamp	2.15	0.2%
Tall ruderal	3.15	0.3%
Total	1205.88	100.0%

3.7.3.26 The following habitats, present on or adjacent to the proposed works area, are highlighted as Priority Habitats under the UK BAP and/or Norfolk LBAP, and are listed under Section 41 of the NERC Act (Table 3.8 below).

Table 3.8: Priority Habitats under the UK BAP and Norfolk LBAP.

Priority habitats on Norfolk LBAP	Priority habitats on UK BAP	NERC Act Section 41 habitats
Lowland mixed deciduous woodland	Lowland mixed deciduous woodland	Lowland mixed deciduous woodland
Cereal field margins	Arable field margins	Arable field margins
Ponds	Ponds	Ponds
Hedgerows	Hedgerows	Hedgerows
Wet woodland	Wet woodland	Wet woodland
Traditional orchards	Traditional orchards	Traditional orchards
Lowland and calcareous grassland	Lowland calcareous grassland	Lowland calcareous grassland
Churchyards and cemeteries	Reedbeds	Reedbeds
Lowland heathland and dry acid grassland	Lowland dry acid grassland	Lowland dry acid grassland
	Lowland heathland	Lowland heathland
	Eutrophic standing waters	Eutrophic standing waters
	Rivers and streams	Rivers

Protected and otherwise notable species field study findings

3.7.3.27 The majority of field surveys have yet to be undertaken. The section below outlines any initial results obtained as part of the Phase 1 habitat surveys, plus interim results where available, and the wintering and migratory bird surveys.

3.7.3.28 A discussion of the outputs of these surveys with the EWG will be undertaken once complete, prior to reporting in the Environmental Statement. All results will be available by October 2017.

Plants

3.7.3.29 Japanese knotweed was identified immediately adjacent to Morton Lane around a building extending 10 m into an arable field. This is on the western edge of the Study area, approximately 160 m from the indicative Onshore ECR Corridor at closest approach.

Desmoulin's Whorl Snail

3.7.3.30 A Habitat Suitability Assessment of habitat with potential to support Desmoulin's Whorl Snail has been undertaken (volume 6, annex 3.2: Great Crested Newt Habitat Suitability Index and Desmoulin's Whorl Snail Habitat Suitability Assessment surveys: Interim Report).

Amphibians and reptiles

3.7.3.31 A Habitat Suitability Index assessment of waterbodies for GCN has been undertaken (volume 6, annex 3.2: Great Crested Newt Habitat Suitability Index and Desmoulin's Whorl Snail Habitat Suitability Assessment surveys: Interim Report).

3.7.3.32 In terms of sightings made during the Phase 1 habitat survey in 2016, occasional sightings were noted: a common lizard was seen in Alderford Common SSSI during the Phase 1 habitat survey. Common lizards have also been recorded near Dryhill Plantation. An adult female grass snake was found in a small patch of woodland north of Racecourse Copse. Another grass snake was found near woodland north of Marlingford.

Wintering and migratory birds

3.7.3.33 Wintering bird surveys recorded 83 species within the wintering point count surveys along the cable route. Of these species, 46 are considered to be of some conservation value. However, with the exception of pink-footed goose, none were considered to occur in particularly significant numbers.

3.7.3.34 Pink-footed geese were found to use fields within and adjacent to the cable corridor at the north end of the corridor. These birds were, in general, present from late November until late January, on sugar beet fields. The vast majority of geese were focused in the coastal area of Weybourne where almost all fields that held sugar beet crop being utilized at some point in the period. The largest field of sugar beet away from the Weybourne area was High Kelling which was utilized by 9,000 geese in early January 2017. Geese were rarely recorded any further south than Hempstead despite sugar beet being available.

3.7.3.35 The maximum count of pink-footed geese recorded during the survey was 10,000. This represents 42% of the five-year peak mean count of this species (23,802) from the North Norfolk Coast SPA citation, or 4.45% of the wintering Eastern Greenland/Iceland/UK population.

Badger

3.7.3.36 Badger surveys undertaken along the route to date have identified six badger setts within the Ecology and nature conservation study area , one of which was disused and one of which as partially disused. None of the setts were main setts.

Otter

3.7.3.37 A mink raft with otter spraint was found on the River Yare.

3.7.4 Future baseline scenario

Climate change

3.7.4.1 The Inter-Agency Climate Change Forum (Inter-Agency Climate Change Forum, 2010) has summarised the relationships between biodiversity and climate change in the UK. They report that temperatures on land in the UK have risen by as much as 1°C since 1980 and coastal sea surface temperatures by roughly 0.7°C over a similar period. Sea level around the UK has risen by 10 cm since 1990. As of 2008, the ten most warmest years on record were all between 1995 and 2006 (Jenkins *et al.,* 2008). These trends are projected to continue; at what rate and by how much primarily depends on the volume of greenhouse gases released into the atmosphere around the globe.

3.7.4.2 Climate change affects biodiversity in many ways. Impacts on species include changes in distribution and abundance, the timing of seasonal events and habitat use, and as a consequence there are likely to be changes in the composition of plant and animal communities. Habitats and ecosystems are also likely to change character.

3.7.4.3 Indirect impacts may become just as significant as a result of climate-induced changes in land use having knock-on effects on biodiversity. For example, growing new crops, increases in summer watering and geographical shifts in arable and livestock production could well occur, but how these indirect changes may affect biodiversity remains less certain.

3.7.4.4 Assessing the impacts of climate change on terrestrial and freshwater biodiversity is difficult as plants and animals are influenced by other pressures, such as atmospheric pollution and land use, and different factors can work in combination to bring about change. However, changes are beginning to be observed across a range of species and habitats in the UK that have been related to climate change.

3.7.4.5 One of the primary observed impacts of climate change upon species within the UK has been a northward movement of many warmth-loving species, and some retreat of northerly distributed species. There have also been concomitant changes in abundance observed in some cases.

3.7.4.6 There is increasing evidence for changes in the timing of many natural events which are closely correlated with changing temperature. For example, many plants are coming into leaf and flowering earlier in the year, migratory birds are arriving earlier in the UK and leaving later, butterflies are appearing earlier in the spring, and many birds are laying eggs earlier in the year. These phenological changes may mean that the life cycles of some species are no longer synchronised with those of species on which they depend (e.g. food plants and prey species) with potential changes in competitive advantage arising between species.

3.7.4.7 How these processes work is still poorly understood as an ecosystem's ability to withstand disturbance and either resist or return to its former state may also depend on other factors. The extent and rate of climatic changes are difficult to determine owing to the limitations of climate change models and the range of greenhouse gas emission projections for the future. More significant still are the uncertainties of the impacts upon species, soils and the wider ecosystem as there is much that is not known about habitats, their response to changing conditions and interactions between climate change and changes in management. Furthermore, the genetic diversity of species and their inherent ability to adapt to a changing climate are as yet largely unquantified for most species.

3.7.4.8 Thus for the purposes of this assessment no attempt has been made to predict future changes in the ecological baseline which may arise as a result of climate change.

Seasonal temporal change

3.7.4.9 Habitat conditions, and the levels and/or type of species activity vary within and between seasons. These seasonal changes should be taken into account when assessing the likely impacts of proposals, and when developing an effective mitigation strategy.

3.7.4.10 Seasonal changes which should be considered include those described for habitats and species in the relevant sections below.

Habitats

3.7.4.11 The winter dormant season for plants is typically considered to be between October/November and February/March inclusive, depending on species and local weather conditions. It is most appropriate to undertake management practices, such as planting or sowing, coppicing and uprooting during this period, when plants can benefit from the often wetter soils, and when disturbance will not impair their rate of growth and/or affect their reproductive stages.

3.7.4.12 However, it should also be noted that the cover provided by plants, and the winter forage provided by many woody plant species, are invaluable resources for a variety of species during the harsher, less productive winter months and this should also be taken into account when developing a works schedule and mitigation programme.

3.7.4.13 Waterbodies are also considered to be in their dormant stages during the winter months (October/November to February/March inclusive, depending on local weather conditions). This is again primarily due to the expected drop in temperature and impacts of this on aquatic and semi-aquatic plants and faunal species. The winter temperatures largely result in a decrease in activity levels and in the case of some semi-aquatic species, can lead to a vacation of the water for a terrestrial habitat. Therefore, it is preferable to undertake works that are likely to have a direct effect on waterbodies (including the creation of waterbodies) during these winter months.

3.7.4.14 Surveys of plants are generally completed in the summer months, when plants are in leaf and flowering or fruiting. Surveys of plant species are typically not expected to be robust enough during the winter months.

Protected or otherwise notable species

Invertebrates

3.7.4.15 The optimal survey period for Desmoulin's whorl snail is in August when the population is largely dominated by adults, vegetation is well established and snails occur high up on the vegetation.

3.7.4.16 The vegetation and maturity of individuals will have an impact on surveys as it is harder to identify snails earlier in the year snails will be lower on the vegetation and often present in very low numbers and later in the year the vegetation begins to die off.

3.7.4.17 The survey period for white clawed crayfish is after the breeding season from mid-July to mid-September. Surveys should not be carried out in late May and June when females could be carrying newly hatched young.

3.7.4.18 Should it be necessary to temporarily displace or deter white clawed crayfish, it is better to translocate crayfish early in the breeding season as newly hatched young are difficult to catch. Translocations would require a licence from NE under the WCA 1981.

Reptiles and amphibians

3.7.4.19 The survey period for GCNs, and other amphibians, is between mid-March and mid-June, when newts are likely to be active and utilising pond habitats.

3.7.4.20 Works affecting GCN that would otherwise result in an offence under the Habitats Regulations would require an EPS licence.

3.7.4.21 Pond management should be undertaken between November and February, when newts are more likely to have left the ponds and be in hibernation within suitable terrestrial habitat. If GCN are present, it is likely that methods and timing of management should be agreed with NE prior to commencement.

3.7.4.22 The reptile and amphibian hibernation periods, which fall between November and February, depending on local weather conditions, will have an impact on potential capture and translocation surveys, and the scheduling of construction works.

3.7.4.23 Measures should be set in place to prevent the disturbance of reptiles and amphibians during the hibernation period. Above ground habitat management should be undertaken during the winter months, when species are likely to be hibernating underground, for example in root networks. Reptiles and amphibians will also utilise above-ground sites as hibernacula, such as log or rubble piles which provide suitable crevices in which to hibernate. These habitat features should not be disturbed during this winter period.

3.7.4.24 Below-ground habitat disturbance should only be undertaken during the active months, between March and early October, depending on local weather conditions.

Breeding birds

3.7.4.25 The breeding bird season is typically considered to take place between mid-February and August inclusive, for most breeding birds.

3.7.4.26 The timing of breeding activity will have implications for the scheduling of surveys as well as any works that are likely to affect habitats, including buildings, which are of potential value to breeding birds.

Wintering and migratory birds

3.7.4.27 Taking into account field survey findings, the scheduling of works are not likely to have a significant impact on wintering and migratory birds of conservation concern in the HVDC converter/HVAC substation site or immediately surrounding area, largely due to its limited habitat value, the limited numbers of birds recorded in the area and the presence of alternative suitable habitat in the wider surrounding area.

Bats

3.7.4.28 Typically, and depending on local weather conditions, the bat hibernation period runs between November and January inclusive. Bats can become active as temperatures increase in February and March, and typically are fully active between April and October (Hundt, 2012)

3.7.4.29 These seasonal changes in activity have implications for surveys, scheduling of works. Works that would affect a roost would require an EPS licence. Typically works that would affect a summer bat roost should be scheduled during April or October to minimise likely impacts on bats.

Badger

3.7.4.30 Works that would result in the disturbance of or damage to an active badger sett would require a NE licence. Between July and November inclusive, badgers are less active, females can be pregnant and cubs may still be dependent on their mothers.

3.7.4.31 Therefore, typically licences for sett closures or works that would cause significant disturbance to setts are permitted only between December and June inclusive.

Otter

3.7.4.32 Otters are active throughout the year and therefore otter surveys can be carried out any time of the year.

3.7.4.33 Works that would result in an offence under the Habitats Regulations would require an EPS licence and a detailed method statement to ensure the protection of otters. Although work could also be undertaken all year round, it is likely to be restricted in locations where otters are confirmed to be breeding.

Water vole

3.7.4.34 Water voles do not hibernate but instead become less active during the winter months. This is taken into account for surveys, which as a result, should be undertaken between March and October, with March to June being the optimal time.

3.7.4.35 Works that would affect water vole habitat should be undertaken in April, August and September. The breeding season between May and July should be avoided, as should the less active period between October and March. Should it be necessary to temporarily displace or deter water voles, habitat management to achieve this should be undertaken between mid-February and early April. Translocations would require a licence from NE under the WCA 1981 and should be undertaken following habitat manipulation and by early June.

Medium and long term temporal change

3.7.4.36 Due to the mobile nature of several species of conservation concern known to be present, update surveys would in any event be necessary prior to the commencement of construction and installation works, in order to locate potential new activity on site, inform detailed works methodologies, including works scheduling, determine whether or not a Natural England protected species licence would be required for works to commence, and to assess the need for further mitigation. Species for which these update surveys would be considered necessary would include breeding birds, roosting bats, badgers, otters, water voles and GCNs.

Construction phase

3.7.4.37 As there is potential under the maximum design scenario for construction to take place in three phases over an eleven year period, some construction impacts could therefore extend into the medium to longer term. Updating surveys during the construction period may therefore be required in order to ensure that mitigation measures can be amended as appropriate to take account of changes in species distributions.

Operational phase

3.7.4.38 It is considered that general operations and necessary maintenance works would not result in significant disturbance to restored or existing habitats and/or species within the area and therefore, it is considered unlikely that further ecology surveys would be required.

Decommissioning

3.7.4.39 It is expected that reinstated, enhanced and new habitats relating to the project would be well developed by the time of decommissioning, and there would be the potential for notable species to have moved into parts of the site where they were previously unrecorded.

3.7.4.40 It is currently envisaged that the onshore underground cables would be left in situ so as to prevent the need for further disturbance of habitats and species; however, the onshore substation would be decommissioned. Should habitat damage or clearance be expected to result from decommissioning works, further ecology surveys may be required. This would need to be confirmed once detailed decommissioning proposals were confirmed.

3.7.4.41 The new EIA Directive requires that an outline of the likely evolution of the baseline, in the absence of the development (as far as this can be assessed 'with reasonable effort' on the basis of available information and scientific knowledge) is outlined within the EIA.

3.7.5 Data limitations

3.7.5.1 The baseline ecological surveys are considered to be appropriate to inform a robust impact assessment of the onshore development proposals.

3.7.5.2 All seasonally dependent surveys were undertaken at optimal times of the year and under suitable weather conditions.

3.7.5.3 Access to survey all ponds located within the GCN survey area, but outside the works area, was not obtained. These ponds should be surveyed prior to the commencement of works or if access is not permitted a precautionary approach will be adopted (i.e. GCN presence would be presumed). For example, working areas within 250 m of the ponds may be fenced with amphibian exclusion fencing.

3.7.6 Valued Ecological Receptors

3.7.6.1 Valued Ecological Receptors (VERs) are sites, habitats and species of ecological or nature conservation importance that could be significantly affected by a project.

3.7.6.2 In assigning a level of importance to a site, habitat or species population or assemblage, its distribution and status (including a consideration of trends based on available historical records) are considered. Rarity is considered because of its relationship with threat and vulnerability, and the need to conserve representative areas of habitats and genetic diversity of species populations, although rarity in itself is not necessarily an indicator of value. A species that is rare and declining is assigned a higher level of importance than one that is rare but known to be stable.

3.7.6.3 The valuation of sites also takes full account of existing value systems such as SSSIs and Local Wildlife Sites (LWSs) designations. Judgement is required for the valuation of sites of less than county importance.

3.7.6.4 In accordance with the Chartered Institute of Ecology and Environmental Management (CIEEM) guidelines the value of habitats takes into account published selection criteria. These include size (extent), diversity, naturalness, rarity, fragility, typicalness, and recorded history, position in an ecological or geographical unit, current condition and potential importance.

3.7.6.5 Criteria for the valuation of habitats and plant communities include Annex III of the Habitats Directive, guidelines for the selection of biological SSSIs and criteria used by Local Authorities and the Wildlife Trusts for the selection of local sites. Legal protection status is also a consideration for certain habitats.

3.7.6.6 Populations are valued on the basis of their size, recognised status (such as recognised through published lists of species of conservation concern, and designation of BAP status) and legal protection status. For example, bird populations exceeding 1% of published information on biogeographic populations are considered to be of international importance, those exceeding 1% of published data for national populations are considered to be of national importance, etc.

3.7.6.7 In assigning values to species populations, it is important to take into account the status of the species in terms of any legal protection to which it is subject. However, it is also important to consider other factors such as its distribution, rarity, population trends, and the size of the population which would be affected. Thus, for example, whilst the GCN is protected under the Habitats Directive, and therefore conservation of the species is of significance at the international level, this does not mean that every population of GCN is internationally important and thus of very high value. It is important to consider the particular population in its context. Thus in assigning values to species the geographic scale at which they are important has been considered. The assessments of value rely on the professional opinion and judgement of experienced ecologists.

3.7.6.8 Due regard has also been paid to the legal protection afforded to such species in the development of mitigation and compensation measures to be implemented during construction and operation of the development. For EPS there is a requirement that the scheme should not be detrimental to the maintenance of the population of the species concerned at a favourable conservation status in their natural range, i.e. to maintain favourable conservation status, the scheme should not affect the long-term availability of sufficient habitat required by the population, the long-term viability of the population, or the long-term natural range of the species.

3.7.6.9 Various criteria can be used to evaluate the importance of species assemblages such as SSSI selection criteria.

3.7.6.10 Assessing feature values requires consideration of both existing and future predicted baseline conditions, and therefore the description and valuation of ecological features takes account of any likely changes, This includes known trends in the population size or distribution of species, likely changes to the extent of habitats, and the effects of other proposed developments or land-use changes.

3.7.6.11 Taking the above into account, habitats, sites or species of less than district level importance are not considered to be VERs for the purpose of this assessment.

3.7.6.12 The VERs listed below in Table 3.9 are of at least district level importance.

3.7.6.13 Swannington Upgate SSSI is located over 1 km to the east of the onshore cable route corridor and Caistor St. Edmund Chalk Pit SSSI is located approximately 700 m to the northeast of the proposed northern permanent and temporary substations works south of Norwich. Taking these distances into account these SSSIs have not been included in Table 3.12 as it is considered that works will not have an impact on the sites. Potential airborne and run-off pollutants would not be expected to have an impact over these distances (volume 3, chapter 10: Air Quality and Health; volume 3, chapter 2: Hydrology).

3.7.6.14 Only those non-statutory designated sites identified through the desk study process that are considered potentially likely to be affected by Hornsea Three are included in Table 3.9.

Table 3.9: Summary of importance of onshore VERs identified.

VER	Covering legislation and guidance	Level of Importance
The Wash & North Norfolk Coast SAC	This site contains habitat types listed in Annex 1 of the Habitats Directive.	International
North Norfolk Coast SPA	This site supports breeding and wintering bird populations of European importance of the several species listed on Annex I of the Directive. The area qualifies under Article 4.2 of the Directive by regularly supporting at least 20,000 waterfowl.	International
North Norfolk Coast Ramsar	The site meets four criteria of Ramsar (criterion 1, 2, 5 and 6).	International
North Norfolk Coast SAC	This site contains habitat types listed in Annex 1 of the Habitats Directive.	International
Norfolk Valley Fens SAC	This site contains habitat types listed in Annex 1 of the Habitats Directive. Lowland Fens are a Priority Habitat of the UK BAP.	International
River Wensum SAC	This site contains habitat types listed in Annex 1 of the Habitats Directive. Rivers are a Priority Habitat of the UK BAP.	International
River Wensum SSSI	Rivers are a Priority Habitat of the UK BAP.	National
Edgefield Little Wood SSSI	Considered in local authority policies under the domestic planning regime with applications made to local authorities. Operations that may cause damage must be authorised by the designating body.	National
Holt Lowes SSSI		
Alderford Common SSSI		
Booton Common SSSI		
North Norfolk Coast SSSI		
Weybourne Cliffs SSSI		
Kelling Heath SSSI		
Beach Lane, Weybourne CWS	Considered in national and local authority policies under the domestic planning regime with applications made to local authorities.	County
Kelling Heath Park & 100 Acre Wood CWS		
Land south of High Kelling		
Muckleburgh Hill CWS		
Old Decoy, Selbrigg Pond, The Lows CWS		
Land south of High Kelling CWS		
Old Decoy, Selbrigg Pond, The Lows CWS		
New Covert CWS		
Pond Hills CWS		
The Belt CWS		
Dismantled Railway CWS		
Alderford Common CWS		
Marriott's Way CWS		

VER	Covering legislation and guidance	Level of Importance
Yare Valley (Marlingford) CWS		
Old Hall Meadow CWS		
Bush Meadow Plantation CWS		
Harman's Grove CWS		
Land adjoining River Tud CWS		
Low Common CWS		
Foxburrow Meadow CWS		
The Carrs Woodland CWS		
Woodland and mature broadleaved trees	Woodlands are Priority Habitats under the UK BAP. Wet woodland is a Priority Habitat of the Norfolk LBAP and is listed under Section 41 of the NERC Act.	District
Hedgerows	The Hedgerow Regulations 1997 protect "important" hedges from removal. Hedgerows are a Priority Habitat of the Norfolk LBAP.	County
Watercourses	Rivers, canals and drains are Priority Habitats of the UK BAP.	County
Ponds	Ponds are Priority Habitats of the UK BAP and Norfolk LBAP and are listed under Section 41 of the NERC Act.	County
White clawed crayfish	White clawed crayfish are protected under Schedule 5 of the WCA 1981. The species is also listed in the Norfolk LBAP.	To be confirmed
Desmoulin's whorl snail	The Desmoulin's whorl snail is listed on Annex II of the Habitats Directive. The species is also listed in the UK BAP and Norfolk LBAP.	To be confirmed
GCNs	GCNs are protected through inclusion in the Habitats Regulations. They are an EPS and as such any development works which could affect an EPS may require a licence from NE to comply with the Habitats Regulations. GCNs are also included in Schedule 5 of the WCA 1981. This species is further highlighted as a Priority Species of the UK BAP and listed in the Norfolk LBAP.	To be confirmed
Reptiles	All common UK reptile species (adder, grass snake, common lizard and slow-worm) are protected through part of Section 9 (1 and 5) of the Wildlife & Countryside Act 1981 (as amended).	To be confirmed
Breeding birds	Several breeding bird species recorded during the surveys are protected under the Habitats Regulations and/or are Priority Species of the UK BAP and are listed in the Norfolk LBAP (i.e. grey partridge, skylark, tree sparrow and song thrush.	To be confirmed
Wintering and migratory birds	Several wintering and migratory bird species recorded during the surveys are protected under the Habitats Regulations and/or are Priority Species of the UK BAP and are listed in the Norfolk LBAP (i.e. grey partridge, skylark, tree sparrow and song thrush.	International (Pink footed goose) District – wintering bird assemblage
Water voles	Water voles are protected under Schedule 5 of the WCA 1981. The species is also listed in the Norfolk LBAP.	To be confirmed
Otters	The otter is listed on Annexes II and IV of the Habitats Directive. A Species Protection Plan for otter is included in the UK BAP and it is listed in the Norfolk LBAP. Otters are protected under the Habitats Regulations.	To be confirmed
Badgers	Badgers are protected under the Protection of Badgers Act 1992.	To be confirmed
Bats	All bat species are listed in Annex II of the Habitats Directive. Noctule, soprano pipistrelle and brown long-eared bats are UK BAP Priority Species. The Norfolk LBAP also lists barbastelle bat, noctule, brown long-eared bat and soprano pipistrelle.	To be confirmed

3.8 Key parameters for assessment

3.8.1 Maximum adverse design scenario

3.8.1.1 The assessment scenarios listed in Table 3.10 have been selected as those having the potential to result in the greatest effect on an identified receptor or receptor group. These scenarios have been selected from the details provided in the project description (volume 1, chapter 3: Project Description). Effects of greater adverse significance are not predicted to arise should any other development scenario based on details within the project Design Envelope be taken forward in the final design scheme.

Table 3.10: Maximum design scenario considered for the assessment of potential impacts on ecology and nature conservation.

Potential impact	Maximum design scenario	Justification
Construction phase		
Potential for construction of landfall cable to adversely impact Weybourne Cliffs SSSI. (geological SSSI: impact assessed in Vol 3, Chapter 1: Geology and ground conditions)	Hornsea Three landfall Open cut techniques installing up to eight cables with a corridor up to 20 m either side of each cable. The width of the corridor at landfall would be up to 20 m either side of each cable. Up to eight transition joint bays of total up to 2,000 m^2 (250 m^2 x 8).	Use of open cut techniques within SSSI could cause damage to geological features. Open cut techniques are more damaging than trenchless techniques.
Potential for open cut trenching and installation of cables to cause habitat loss within designated sites	Onshore export cable corridor Temporary onshore cable corridor is 80 m wide and 55 km long (including 60 m wide permanent corridor (wider where obstacles occur)). Up to six cable trenches (each containing one circuit) each trench is 5 m wide and 2 m deep. Depth of stabilised backfill up to 1.5 m. Up to 330 junction bays and link boxes. Closest separation distance between junction bay and link box: - 750 m. Up to 74,250 m^2 area required for junction bays (based on 330 junction bays (each junction bay is 9 m x 25 m)). Up to 2,970 m^2 area required for link boxes (based on 330 link boxes (each link box: is 3 m x 3 m)). Up to two temporary haul roads 5 m wide (7 m wide at passing places). Maximum duration of works for three-phase partially parallel construction programme is c.11 years. Minor watercourses and drainage channels to be crossed via an open cut and ducting method. The open cut cable crossing methodology is described in the in volume 1, chapter 3: Project Description.	Open cut techniques represent the maximum design scenario for habitat loss as they are more damaging than trenchless techniques.. The maximum design scenario for ecology on the onshore export cable corridor is the HVAC transmission due to the greater number of cable trenches required and therefore, the greatest area of land disturbance. Maximum design scenario of three-phase cabling operation over 11 year period would delay permanent restoration of habitats and therefore represents the worst case for assessment.
Potential for open cut trenching and installation of cables to cause loss of hedgerow habitat		
Potential for open cut trenching and installation of cables to cause loss, damage to and disturbance of watercourses		
Potential for open cut trenching and installation of cables to cause loss, damage to and disturbance of ponds		
Potential for open cut trenching and installation of cables to cause damage to designated sites from airborne pollutants		
Potential for open cut trenching and installation of cables to cause damage to habitats from airborne pollutants		
Potential for open cut trenching and installation of cables to cause damage to designated sites from run-off pollutants		
Potential for open cut trenching and installation of cables to cause damage to habitats from run-off pollutants		
Potential for open cut trenching and installation of cables leading to habitat loss and/or severance for a number of species		Open cut techniques represent the maximum design scenario for habitat loss as they are more damaging than trenchless techniques. This is likely to result in loss of habitat for protected or other species (such as GCN, reptiles, breeding birds, bats, water voles, badgers) and severance of hedgerows could affect foraging and commuting behaviour for mobile species such as bats. The maximum design scenario for ecology on the onshore export cable corridor is the HVAC transmission due to the greater number of cable trenches required and therefore, the greatest area of land disturbance. Maximum design scenario of three-phase cabling operation over 11 year period would delay permanent restoration of habitats and therefore represents the worst case for assessment.
Potential for open cut trenching and installation of cables to cause habitat loss and disturbance to badgers		Open cut trenching could result in loss or damage of habitat. Open cut techniques are more damaging than trenchless techniques. The maximum design scenario for ecology on the onshore export cable corridor is the HVAC transmission due to the greater number of cable trenches required and therefore, the greatest area of land disturbance. Maximum design scenario of three-phase cabling operation over 11 year period would delay permanent restoration of habitats and therefore represents the worst case for assessment.

Potential impact	Maximum design scenario	Justification
Potential for open cut trenching and installation of cables to cause disturbance to birds that are designated features of the North Norfolk Coast SPA/Ramsar		SPA species potentially disturbed by noise, lighting, visual disturbance both within SPA and outside if present in functionally linked habitats in and around location of onshore connection. The maximum design scenario for ecology on the onshore export cable corridor is the HVAC transmission due to the greater number of cable trenches required and therefore, the greatest area of land disturbance. Maximum design scenario of three-phase cabling operation over 11 year period would delay permanent restoration of habitats and therefore represents the worst case for assessment.
Potential for open cut trenching and installation of cables to cause habitat loss and disturbance to other wintering birds		Wintering bird species potentially disturbed by noise, lighting and visual disturbance. The maximum design scenario for ecology on the onshore export cable corridor is the HVAC transmission due to the greater number of cable trenches required and therefore, the greatest area of land disturbance. Maximum design scenario of three-phase cabling operation over 11 year period would delay permanent restoration of habitats and therefore represents the worst case for assessment.
Potential for permanent habitat loss from construction of onshore infrastructure have adverse impacts on habitats Potential for permanent habitat loss from construction of onshore infrastructure to have adverse impacts on species Potential for permanent habitat loss from construction of onshore infrastructure to have adverse impacts on wintering birds	<u>Onshore HVDC converter/HVAC substation</u> Permanent area of site is 128,000 m^2 (including an area which may be used for landscaping) plus a temporary works area of 100,000 m^2. The transmission option with the greatest number of buildings and largest footprint is the HVDC converter station – up to five buildings. The main building (single building scenario) for the HVDC converter station will have a footprint of 11,250 m^2 (75 m x 150 m). Dimensions for the multiple building scenario would be reduced proportionately but the overall footprint would be the same. <u>Onshore HVAC booster station</u> Permanent area of site is 25,000 m^2 plus a temporary works area up to 25,000 m^2. Building scenario with the largest footprint - single building with area of 4,500 m^2 (150 m length and 30 m width) and height up to 12.5 m. HVAC booster station and onshore HVDC converter/HVAC substation structures as described in volume 1, chapter 3 Project Description.	The maximum design scenario in terms of the onshore HVAC booster station is associated with the HVAC transmission as the booster station is not required for the HVDC transmission. The maximum design scenario at the onshore HVDC converter/HVAC substation is the HVDC transmission as it requires the largest footprint for single and multiple building options resulting in the largest possible area of disturbance.
Potential for trenchless duct installation and cable pulling beneath watercourses to cause damage and disturbance to designated sites Potential for trenchless duct installation and cable pulling beneath watercourses to cause damage and disturbance to other watercourses and habitats	Up to 50 HDD crossings across surface watercourses and key infrastructure. A HDD compound would be located at both ends of the HDD crossing each with a footprint of up to 4,900 m^2 (70 m x 70 m) with permeable surfacing. Contamination via run-off from works as a result of spillages at trenchless technique works; and indicative onshore construction programme (including all phases and gaps between phases) of up to 11 years during which the period of excavating trenches and installing cable duct will be up to 24 months.	The maximum design scenario effects on designated sites and habitats would result from the use of trenchless techniques (e.g. HDD). Trenchless crossing techniques present a risk of indirectly contaminating surface watercourses where they are hydraulically connected with surface runoff caused by spillages and the movement of sediment.
Potential for trenchless duct installation and cable pulling beneath watercourses to cause habitat loss and disturbance to protected species	Up to 50 HDD crossings across surface watercourses. A HDD compound would be located at both ends of the HDD crossing each with a footprint of up to 4,900 m^2 (70 m x 70 m) with permeable surfacing. Indicative onshore construction programme (including all phases and gaps between phases) of up to 11 years during which the period of excavating trenches and installing cable duct will be up to 24 months	The maximum design scenario effects on designated sites and habitats would result from the use of trenchless techniques (e.g. HDD). Trenchless crossing techniques present a risk of indirectly contaminating surface watercourses where they are hydraulically connected with surface runoff caused by spillages and the movement of sediment. Maximum adverse scenario of three-phase cabling operation over 11 year period would delay permanent restoration of habitats and therefore represents the worst case for assessment.

Potential impact	Maximum design scenario	Justification
Potential for construction of onshore infrastructure to have adverse impacts on designated sites from airborne pollutants Potential for construction of onshore infrastructure to cause damage to designated sites from run-off pollutants Potential for construction of onshore infrastructure to have adverse impacts on habitats from airborne pollutants Potential for construction of onshore infrastructure to cause damage to habitats from run-off pollutants	<u>Onshore HVDC converter/HVAC substation</u> Permanent area of site is 128,000 m^2 (including an area which may be used for landscaping) plus a temporary works area of 100,000 m^2. The transmission option with the greatest number of buildings and largest footprint is the HVDC converter station – up to five buildings. The main building (single building scenario) for the HVDC converter station will have a footprint of 11,250 m^2 (75 m x 150 m). Dimensions for the multiple building scenario would be reduced proportionately but the overall footprint would be the same. <u>Onshore HVAC booster station</u> Permanent area of site is 25,000 m^2 plus a temporary works area up to 25,000 m^2. Building scenario with the largest footprint - single building with area of 4,500 m^2 (150 m length and 30 m width) and height up to 12.5 m. HVAC booster station and onshore HVDC converter/HVAC substation structures as described in volume 1, chapter 3 Project Description	The maximum design scenario in terms of the onshore HVAC booster station is associated with the HVAC transmission as the booster station is not required for the HVDC transmission. The maximum design scenario at the onshore HVDC converter/HVAC substation is the HVDC transmission as it requires the largest footprint for single and multiple building options resulting in the largest possible area of disturbance.
Potential for temporary habitat loss from construction of temporary works compounds to have adverse impacts on habitats Potential for construction of temporary works compounds to have adverse impacts on designated sites from airborne pollutants Potential for construction of temporary compounds to cause damage to designated sites from run-off pollutants Potential for construction of works compounds to have adverse impacts on habitats from airborne pollutants Potential for construction of temporary compounds to cause damage to habitats from run-off pollutants Potential for temporary habitat loss from construction of works compounds to have adverse impacts on species Potential for temporary habitat loss from construction of works compounds to have adverse impacts on wintering birds	Construction compounds up to 33,000 m^2 (average area 17,000 m^2). Number of HDD crossings: up to 50 (to inform PEIR). A HDD compound would be provided at both ends of the HDD crossing each with a minimum area of 4,900 m^2 (70 m x 70 m). Area required for junction bay compounds – 40 m x 40 m (minimum). Temporary compounds in locations as described in volume 1, chapter 3 Project Description	The maximum design scenario in terms of the onshore HVAC booster station is associated with the HVAC transmission as the booster station is not required for the HVDC transmission. The maximum design scenario at the onshore HVDC converter/HVAC substation is the HVDC transmission as it requires the largest footprint for single and multiple building options resulting in the largest possible area of disturbance.
Potential for temporary habitat loss from construction of access tracks to have adverse impacts on designated sites Potential for temporary habitat loss from construction of access tracks to have adverse impacts on habitats Potential for construction and use of access tracks to have adverse impacts on designated sites from airborne pollutants Potential for construction and use of access tracks to cause damage to designated sites from run-off pollutants Potential for construction and use of access tracks to have adverse impacts on habitats from airborne pollutants	Two temporary roadways (haul road): Roadway width: 5 m (7 m at passing places) Roadway construction soil stabilisation Dimensions of temporary culvert/bridge crossings for the haul road/access track. up to 4 m x 5 m wide	The maximum design scenario in terms of the construction of haul roads would be the use of soil stabilisation techniques as this would effect the soil physical and chemical properties (therefore affecting soil habitats) and it would be more difficult to remove and restore habitat post construction. The use of soil stabilisation also represents the maximum design scenario as it has the greatest potential for pollutants in runoff and airborne pollutants during the soil mixing process.

Potential impact	Maximum design scenario	Justification
Potential for construction and use of access tracks to cause damage to habitats from run-off pollutants		
Potential for temporary habitat loss from construction of access tracks to have adverse impacts on species		
Potential for temporary habitat loss and disturbance from construction and use of access tracks to have adverse impacts on wintering pink-footed goose		
Potential for temporary habitat loss and disturbance from construction and use of access tracks to have adverse impacts on wintering birds		
Operation phase		
Potential for operation to result in low-level visual disturbance, and noise and vibration disturbance of habitats and species during routine maintenance operations	Inspections of HVAC booster station or onshore HVDC converter/HVAC substation: Weekly. Light vehicles; HVAC booster station may be less frequent Preventative Maintenance (routine service): Up to quarterly. Light vehicles; Typically annually for main servicing, however servicing may be divided in to separate campaigns Corrective Maintenance: As required. Component driven; Major repairs could require outsize loads	An onshore HVAC booster station would also be required for the HVAC transmission in addition to a HVAC substation and therefore, represents the maximum design scenario Routine maintenance of the onshore HVDC converter/HVAC substation and HVAC booster station may involve the use of oils, greases and other substances with associated potential for accidental spillages. Oils/chemical spills to ground are worst case condition.
Potential for operation to result in potential contamination of habitats and watercourses through accidental spillage of chemicals or fuels during routine maintenance operations, and/or increased sedimentation as a result of physical disturbance of soils	Inspections of HVAC booster station or onshore HVDC converter/HVAC substation: Weekly. Light vehicles; HVAC booster station may be less frequent Preventative Maintenance (routine service): Up to quarterly. Light vehicles; Typically annually for main servicing, however servicing may be divided in to separate campaigns Corrective Maintenance: As required. Component driven; Major repairs could require outsize loads	The maximum design scenario for potential contamination of habitats and watercourses during operation is that chemicals and oils would be used in the routine maintenance of the onshore HVDC converter/HVAC substation. An onshore HVAC booster station would also potentially be required for the HVAC transmission (in addition to a HVAC substation) which would also require maintenance and therefore, represents the maximum design scenario
Decommissioning phase		
Potential for decommissioning of cables to affect designated sites	Depending on landowner requirements, the onshore HVDC converter/HVAC substation and HVAC booster station hardstanding would be removed as part of a decommissioning process to a desired depth that would allow a return to grazing if required. The future use of the land would be agreed with the local planning authority (LPA) or relevant authority at that time. Buried cables would be de-energized with the ends sealed and left in place to avoid ground disturbance unless removal is required by the landowner.	The maximum design scenario condition assumed is cables left in situ, de-energised and capped with an appropriate material and therefore would involve minimal habitat loss within designated sites.
Potential for decommissioning of cables to affect habitats		The maximum design scenario condition assumed is cables left in situ, de-energised and capped with an appropriate material and would therefore involve minimal habitat loss for decommissioning..
Potential for decommissioning of cables to affect species		The maximum design scenario condition assumed is cables left in situ, de-energised and capped with an appropriate material and would therefore result in low levels of disturbance during decommissioning.
Potential for decommissioning of HVAC booster station and onshore HVDC converter/HVAC substation to affect designated sites		Decommissioning of HVAC booster station has some potential to affect New Covert CWS due to its close proximity to the facility.
Potential for decommissioning of HVAC booster station and onshore HVDC converter/HVAC substation to affect habitats		Decommissioning of HVAC booster station has some potential to affect sensitive habitats due to its close proximity to New Covert CWS. Decommissioning the HVAC booster station and onshore HVDC converter/HVAC substation has potential to affect hedgerows.
Potential for decommissioning of onshore HVDC converter/HVAC substation and HVAC booster station to affect species		Decommissioning the HVAC booster station and onshore HVDC converter/HVAC substation has potential to cause disturbance to species in adjacent habitats.

3.9 Impact assessment criteria

3.9.1.1 The EIA methodology for Hornsea Three is defined in volume 1, chapter 5: Environmental Impact Assessment Methodology.

3.9.1.2 The ecology and nature conservation assessment process is based on best practice guidelines produced by IEEM (2006).

3.9.1.3 The approach to determining the nature conservation value and/or sensitivity of each VER is outlined in Table 3.11 below.

Table 3.11: Definition of terms relating to the sensitivity of the receptor.

Sensitivity	Definition used in this chapter
Very High	Habitats or species that form part of the cited interest within an internationally protected site, such as those designated under the Habitats Directive (e.g. SACs) or other international convention (e.g. Ramsar site). 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).
High	Habitats or species that form part of the cited interest within a nationally designated site, such as an SSSI or a NNR. 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.
Medium	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.
Low (or lower)	Including 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.
Negligible	Including 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.

3.9.2 Determining the magnitude of impact

3.9.2.1 The likely impacts of Hornsea Three are determined through understanding how each VER would be affected by the onshore elements of Hornsea Three. The terms used to define the magnitude of the impact of proposals are set out in volume 1, chapter 5: Environmental Impact Assessment Methodology. In this section the following have also been taken into account:

- Type of impact – positive or negative;
- Extent or spatial scope of the impact;
- Reversibility of impact – whether the impact is naturally reversible or reversible through mitigation measures;
- Timing and frequency of the impact, in relation to ecological changes; and
- Likely duration of the impact - short-term (< 1 year), medium-term (< 5 years) or long-term (5 or more years).

3.9.2.2 The approach to determining the magnitude of impacts is outlined in Table 3.12 below. The magnitude of impacts are assessed according to the following scale:

- No change;
- Negligible;
- Minor;
- Moderate; and
- Major.

Table 3.12: Definition of terms relating to the magnitude of an impact.

Magnitude of impact	Definition used in this chapter
Major	The impact is likely to have an adverse effect on the integrity of a VER
Moderate	The impact adversely affects a VER but will probably not adversely affect its integrity
Minor	The impact adversely affects a VER but would not adversely affect its integrity
Negligible	There would be minimal effect on the VER
No change	There would be no significant change from the baseline condition of the VER

3.9.2.3 The significance of the effect upon ecology and nature conservation is determined by correlating the magnitude of the impact and the sensitivity of the receptor. The particular method employed for this assessment is presented in Table 3.13. Where a range of significance of effect is presented in Table 3.13, the final assessment for each effect is based upon expert judgement.

3.9.2.4 For the purposes of this assessment, any effects with a significance level of minor or less have been concluded to be not significant in terms of the EIA Regulations.

Table 3.13: Matrix used for the assessment of the significance of the effect.

	Magnitude of impact					
Sensitivity of receptor		*No change*	*Negligible*	*Minor*	*Moderate*	*Major*
	Negligible	Negligible	Negligible	Negligible or minor	Negligible or minor	Minor
	Low	Negligible	Negligible or minor	Negligible or minor	Minor	Minor or moderate
	Medium	Negligible	Negligible or minor	Minor	Moderate	Moderate or major
	High	Negligible	Minor	Minor or moderate	Moderate or major	Major or substantial
	Very high	Negligible	Minor	Moderate or major	Major or substantial	Substantial

3.9.2.5 Where Natura 2000 sites (i.e. internationally designated sites) are considered, this chapter summarises the assessments made on the interest features of internationally designated sites as described within section 3.6.1 of this chapter (with the assessment on the site itself deferred to the RIAA for Hornsea Three).

3.9.2.6 With respect to nationally and locally designated sites, where these sites fall within the boundaries of an internationally designated site (e.g. SSSIs which have not been assessed within the RIAA for Hornsea Three), only the international site has been taken forward for assessment. This is because potential effects on the integrity and conservation status of the nationally designated site are assumed to be inherent within the assessment of the internationally designated site (i.e. a separate assessment for the national site is not undertaken). However, where a nationally designated site falls outside the boundaries of an international site, but within the study area, an assessment of the impacts on the overall site is made in this chapter using the EIA methodology.

3.9.2.7 The RIAA is currently being prepared in accordance with Advice Note Ten: Habitats Regulations Assessment Relevant to Nationally Significant Infrastructure Projects (PINS, 2016) and will be submitted as part of the Application for Development Consent.

3.10 Measures adopted as part of Hornsea Three

3.10.1.1 As part of the project design process a number of potential designed-in mitigation measures have been proposed to reduce the potential for impacts on ecology and nature conservation, set out in Table 3.14. This approach has been employed in order to demonstrate commitment to measures by including them in the design of Hornsea Three and have therefore, been considered in the assessment presented in section 3.11. These measures are considered standard industry practice for this type of development. Assessment of sensitivity, magnitude and therefore, significance includes the implementation of these measures.

3.10.1.2 In addition to the measures set out in Table 3.14 it is also noted that some potential impacts on designated sites, reported in the PEIR assessment, may not occur once the onshore cable corridor has been refined. The PEIR assessment has been carried out on the basis that the onshore cable route could be constructed in any location within the 200 m wide onshore cable corridor search area, whereas the final onshore cable corridor which will be presented in the final DCO application will be 80 m wide, made up of a permanent 60 m wide cable corridor and an additional 20 m construction working area.

3.10.1.3 The onshore cable corridor refinement process will have regard to sensitive and designated sites and, where possible, such sites will be avoided either physically, or through selection of cable installation methodologies in those locations to minimise any potential impacts upon them, for example, using trenchless technologies to cross such locations. Hornsea Three will continue to consult with key stakeholders as the corridor refinement work progresses, including Natural England, the County Council and the local planning authorities. This consultation will take place directly and through the forum of the Onshore Ecology Expert Working group.

Table 3.14: Designed-in measures adopted as part of Hornsea Three with respect to ecology and nature conservation.

Measures adopted as part of Hornsea Three	Justification
Design measures	
Consideration of use of trenchless installation method beneath major watercourses and designated sites, as detailed below (under Construction measures), including the River Wensum SAC.	To minimise the impact of construction on features of ecology and nature conservation value.
Where practicable, existing highways or tracks will be used for access to the construction site.	To minimise loss and disturbance of species and habitats.
The cable route corridor has been developed to avoid areas of woodland and other ecologically sensitive habitats wherever practicable.	To minimise loss of habitats of conservation interest
Other VER features such as ponds and LWSs have been avoided in the selection of the cable route alignment and local features such as standard trees have been avoided where it has been practicable to do so.	
Where practicable, areas identified as containing protected species, including badgers and roosting bats, have been protected by siting the cable route alignment to provide an appropriate buffer from construction and operational works. The width of these buffer zones will be developed in accordance with standard industry requirement and best practice guidance, and is expected to be applied for nesting birds, roosting bats, for active badger setts, for otter holts and resting places and for water vole colonies.	To reduce impacts on protected or otherwise notable species.
Pre-construction measures	
Pre-construction surveys, informed by existing data for protected species, will be carried out to identify potential changes in baseline conditions. These surveys will be undertaken within twelve months prior to the commencement of works. Surveys may need to be undertaken over several months in order to collate sufficient data to inform a licence application and any associated mitigation strategy. As the construction of the cable route will be undertaken as a phased programme, surveys will be completed during the appropriate survey season (according to relevant guidance) and in accordance with the construction programme prior to construction. Should the six month survey/activity period lapse between pre-construction surveys and the commencement of works, the need to repeat surveys will be assessed by an appropriately experienced ecologist. Should surveys confirm a change in baseline conditions, which result in the need for an EPS licence, a licence will be obtained prior to the commencement of licensable works. NE typically requires up to 30 working days to process and consider a licence application and potential amendment requests may result in a longer processing period. Any licenced works will be supervised and/or carried out by an appropriately qualified, experienced and, where necessary, licensed ecologist, in accordance with the licence requirements.	To enable refinements to be made to the construction programme to take into account any changes in the distribution or presence of notable species.
Surveys will include pre-construction surveys of ponds that were not surveyed during 2017 and any ponds surveyed more than two years prior to construction that are located up to 250 m from the works area, subject to land access agreements, to establish presence/likely absence of GCN. The survey will include an initial HSI assessment to determine the need for presence/absence surveys. If GCN are present, these ponds will be included in the mitigation strategy and if necessary, an EPS licence will be obtained for works to commence. If access to survey is not granted, a worst case scenario will be assumed (i.e. that GCN are present) and these inaccessible ponds will be included in the mitigation plan.	To minimise the potential impacts on GCN.
Where reptile habitat is required to be cleared for construction, a detailed method statement will be developed in order to help ensure the protection of these species. The method statement will include detailed pre-construction measures designed to ensure that impacts on reptiles are minimised, through relocation of animals from the works corridor and an adjacent buffer zone and post-construction habitat reinstatement. The method statement will include post-construction habitat restoration and management requirements.	To help ensure the protection of reptiles.
Where trenchless installation will be undertaken across a watercourse where water voles, Desmoulin's whorl snail, white-clawed crayfish and/or otters have been recorded, a detailed method statement will be developed in order to help ensure the protection of these species. The method statement will be agreed with NE prior to the commencement of works. The method statement will include detailed pre-construction measures designed to ensure that impacts on these species are minimised (e.g. through relocation of animals from the works corridor and an adjacent buffer zone). The method statement will include post-construction habitat restoration and management requirements.	To help ensure the protection of water voles, Desmoulin's whorl snail, white-clawed crayfish and/or otters during construction and minimise the impacts of construction on the long-term viability of populations.
Where trees, hedgerows or scrub, of potential value to nesting birds, are required to be cleared for construction, clearance will be undertaken outside of the bird–breeding season (14 February to 31 August inclusive) to prevent disturbance to nesting birds where possible. However, if this is not practicable, habitat will be surveyed prior to clearance. No habitat containing an active nest will be removed or disturbed, and measures will be set in place to protect the nest until young have fully fledged and left the nest. Measures may include the establishment of 5 m wide buffer zones in which heavy vehicles will not be tracked and the storage of vehicles, equipment, machinery and soil storage will be prohibited. Works in the buffer zone will be delayed until the Ecological Clerk of Works (ECoW) has confirmed young have fully fledged and left the nest. Ground-nesting birds may be deterred from suitable fields (> 5 ha, open fields) where trenchless installation launch pits will be located, using bird scarers.	To help ensure the protection of breeding birds and their young.
A pre-construction badger survey of the works area and 30 m buffer zone, or 100 m where trenchless installation is to be undertaken, will be undertaken in order to locate any potential new active setts that could cause a constraint to construction. If mitigation cannot be carried out to protect the sett as required under legislation, then an NE licence to close or disturb the sett may be required and will be obtained prior to the commencement of works as necessary. Surveys will also be carried out in order to identify signs of high levels of activity, to inform the need for measures described under Construction measures below to be carried out to protect foraging badgers.	To help ensure the protection of badgers.

Measures adopted as part of Hornsea Three	Justification
A pre-felling check of mature trees will be undertaken to confirm the absence of roosting bats, or a bat roost. Removal or pruning of a tree containing a bat roost, or significant disturbance or obstruction to bats or their roost will require an EPS licence for bats from NE, which will be obtained prior to the commencement/continuance of works that could affect the roost.	To help ensure the protection of bats.
Pre-construction studies will be carried out to identify sensitive habitats in the vicinity of large/sensitive watercourse crossing locations and plans developed for the establishment of associated construction compounds and works sites, to minimise potential impacts.	To minimise the likely impacts on ecology and nature conservation features of interest.
Construction measures	
All relevant mitigation measures will be implemented through an outline CoCP, which will be pre-approved by the LPAs. The CoCP will be prepared at the Final Environmental Statement stage.	To minimise the likely impacts on ecology and nature conservation features of interest.
Site induction and toolbox talks will include mitigation requirements included in this chapter and the outline EMP.	To help ensure adherence to the ecology mitigation strategy and protection of habitats and species of nature conservation interest.
All works will be carried out taking full account of legislative requirements and EA guidance.	To minimise the likely impacts on ecology and nature conservation features of interest.
Appropriate and adequate measures will be set in place to ensure appropriate levels of dust control so no significant off-site dust effects will occur.	
Vehicle speeds will be restricted within the working corridor.	To minimise the risk of collision with animals.
Heavy machinery will not be tracked on waterlogged soils or over stored soils. Soil storage areas will be located at adequate distances so as to ensure the protection of the retained soils.	To minimise impacts on soil structure and ecology.
At the landfall, cable installation will be by trenchless method beneath Weybourne Cliffs SSSI.	To minimise impacts on feature of geological interest
Night working will be avoided where practicable. However it may be necessary to carry out works during night time hours, such as during trenchless installation operations and cable pulling, or in order to fill transformers with oil and undertake oil processing procedures at the onshore HVDC converter/HVAC substation. Where night working is unavoidable, light fixtures will be directed away from habitat of value to protected or otherwise notable species including badgers, birds and bats, in order to minimise likely disturbance effects of light spillage. Lighting will be kept to an absolute practicable minimum where located nearby to any active badger setts.	To minimise the disturbance impacts of light spill on protected or otherwise notable species.
Where individual mature trees are to be felled, sections of dead or decaying wood will be soft-felled (felled in sections) and, where practicable, will be relocated to suitable locations as near to the source tree as practicable, as instructed by the ECoW (i.e. within areas of similar environmental conditions, particularly with regard to shade and ground water-levels, and in locations that will not obstruct the reinstatement of previous land management practices).	To retain habitat of value to specialist invertebrate species.
An ECoW will be present on site to oversee enabling works and construction where necessary. The ECoW will be a suitably experienced professional ecologist. The ECoW will review results of protected species surveys prior to the commencement of works in different areas and will contribute to all relevant construction method statements.	To ensure works are carried out in accordance with the CoCP and comply with international and national legislation.
Further details of measures relating to pollution prevention will be described in the outline CoCP Measures will include the provision of a pollution incident response plan and a drainage management plan to minimise potential pollution effects.	To minimise the potential for pollution incidents to effect habitats.
The length of individual hedgerow sections to be removed will be reduced as far as reasonably practicable according to construction methods. A works-free buffer zone will be established around mature trees, or at least equivalent to the root protection zone calculated on a tree-by-tree basis by an appropriately qualified surveyor, and the adjacent cable trench will be set in place where practicable. All sections of hedgerow removed to enable construction of the cable route corridor, will be replanted as soon as practicable after cable installation, with regard to appropriate planting months. Replacement planting will comprise native shallow-rooting hedgerow species typical of the area. To prevent future root damage to cables, no hedgerow trees will be planted along the onshore cable route. In addition, enhancement planting to improve connectivity and/or native species diversity will be considered on a case by case basis. along the onshore cable route. Enhancement planting will include the planting of native hedgerow trees, typical of the area, at a suitable distance from the cable route. A replanting programme to compensate for habitat lost and provide screening will be considered at the proposed HVAC booster station and onshore HVDC converter/HVAC substation sites in conjunction with mitigation measures considered as part of the landcape and visual impact assessment.. Planting and management of any reinstated areas will be undertaken in accordance with an outline EMP. Detailed landscaping proposals will be developed in an outline Landscape Scheme and Management Plan. Planting will be undertaken as soon as practicable and once it could be confirmed that works will not significantly and adversely affect new planting. Where required, newly planted hedgerows will be protected by adequate fencing until the hedgerow has become established.	To minimise the likely impacts on habitats. To mitigate the effects of the temporary loss of hedgerow habitat on species such as bats.

Measures adopted as part of Hornsea Three	Justification
Where considered necessary by the ECoW, or required under an EPS licence obtained from NE, amphibian exclusion and drift fencing will be installed along the outer edges of works areas within proximity of a GCN pond. In addition, to take account of the metapopulation dynamics of the species, the exclusion fencing will be extended to segregate any other nearby ponds which are located within 250 m of a GCN pond and which also fall within 250 m of the working corridor, provided there are no significant barriers to dispersal between these ponds and the working corridor (e.g. major roads or rivers).	To minimise the potential impacts on GCN.
Progressive and careful habitat clearance works such as the gradual strimming of above-ground vegetation such as brambles, rough grass and scrub, will be undertaken in select areas prior to construction, to deter reptiles from the working area where alternative habitat is available to them. Uprooting of vegetation of potential value to hibernating reptiles will be undertaken prior to the commencement of the hibernation period (November to March) to deter reptiles from hibernating in the area.	To minimise the potential impacts on reptiles.
In addition to measures to minimise the potential for pollution incidents, options for trenchless installation will be considered at: • Blackwater Drain - Booton Common SSSI/Norfolk Valley Fens SAC; • River Wensum SSSI/SAC; • River Tud - Land Adjacent to River Tud CWS; • River Bure; • Swannington Beck; • River Yare; and • Intwood Stream. Other locations for trenchless installation are being considered and may be identified following the completion of species surveys. Locations being considered include: • Kelling Heath SSSI; • Low Common CWS; • Old Hall Meadow CWS; and • River Glaven headwaters and tributaries. Where trenchless installation is to be undertaken beneath watercourses supporting water voles or otters, consideration will be given to the location of launch pits and their relationship to watercourses. Works-free buffer zones will be established around sections of the watercourses that support water voles or otters. Buffer zones will prohibit the tracking of heavy vehicles and storage of vehicles, machinery, equipment and soils. Drilling is expected to achieve at least 1.5 m beneath any watercourses. Open cut trenching across watercourses known to support water voles (if required) will be undertaken in accordance with the NE approved method statement. Where considered necessary by the ECoW, high visibility fencing will be erected between the drains and the works areas to prevent access by workers and heavy machinery, and also to prevent storage of equipment or materials within this zone. To prevent water voles from becoming trapped in the trenchless installation pits, exclusion fencing will be installed around trenchless installation pits where considered necessary by the ECoW.	To minimise the potential impacts on water voles and otters.
Taking into account the mobile nature of water voles, pre-construction surveys will be undertaken to confirm the presence/absence of water voles along all watercourses of potential value to water voles. Where water vole activity has been/is recorded along watercourses to be crossed by open cut installation, construction and installation works will be carried out in accordance with a detailed method statement developed so as to protect water voles against injury, death and significant disturbance. Method statements will include pre-construction measures to deter water voles from the working corridor and an adequate buffer zone (i.e. up to 15 m where favourable habitat is present). Measures could potentially include: • Removal of vegetation from channel and bank-side vegetative cover, up to a minimum of 1.5 m inland from the top of the bank between mid-February and early April; • The potential capture and translocation of water voles from working areas by an appropriately qualified and experienced ecologist; • A destructive search of water vole burrows within the working corridor under the watching brief of an appropriately qualified and experienced ecologist; and • Measures to protect adjacent sections of the watercourse, which will not be directly impacted by trenching, such as marking out on the ground the boundary of the cable route corridor, to control the movement of personnel and vehicles. Works will be conducted in accordance with NE guidance, which states that "for summer works, vegetation removal should be carried out for a two week period prior to development. Winter works should either carry out the mitigation in September and maintain unsuitable habitat until the works commence, or in the event of an emergency, trapping and vole proof fencing may have to be employed" (English Nature, 2001) Works will also take into account best practice guidelines published in Strachan et al.(2011).	To minimise the potential impacts on water voles.

Measures adopted as part of Hornsea Three	Justification
In addition to measures to minimise the potential for pollution incidents, cable installation by trenchless installation beneath watercourses of value to otters, if identified during surveys, will be considered. Trenchless installation pits, other excavations and ducts will be covered overnight to prevent otters entering the areas, or a method of escape (such as a plank to act as a ladder) will be provided where such excavations cannot be covered or filled on a nightly basis. Trenchless installation launch pits will be located at a minimum distance from known otter holts, and construction compounds and storage areas will be located a minimum distance from any otter holts. Works-free buffer zones will be set up around the holt and any other identified resting place, within which no tracking of heavy machinery, or storage of equipment, machinery or soils will be permitted. If night time works take place, lighting will be focussed on the works areas and away from watercourses of potential value to otters. Lighting will be kept to aminimum where it might affect holts or other identified resting places. Vehicle speeds will be limited whilst on site so as to minimise the potential for animals to be injured by vehicles. Where considered necessary by the ECoW, high visibility fencing will be erected around works-free zones. No below-ground destructive works, or tracking of heavy machinery will be undertaken a minimum distance from known otter holts. If pre-construction otter surveys report the presence of a previously unidentified otter holt or resting place within the cable route corridor or works areas, or close enough to result in the potential disturbance of otters and if re-routing or amendments to the location of working areas are not practicable, it may be necessary to remove a holt or resting site or exclude otters from works areas using temporary otter fencing. An EPS licence for otters obtained from NE will be required to remove an otter holt or resting place, and may be required if works will result in disturbance and/or displacement. Advice will be sought from an experienced otter ecologist and NE as to the requirement for an EPS licence, prior to the commencement of works.	To minimise the potential impacts on otters.
In addition to the above-mentioned measures, including those to control vehicle speeds and minimise the likely impacts of light spillage: • No construction works will be carried out within minimum distances an active sett entrance. Works within 30 m of a badger sett entrance may require an NE licence for badgers. Protection zones will be marked out on site, such as with high-visibility fencing or coloured tape; • Areas of high badger activity will be cordoned off to ensure these are kept fully intact and with minimal interference from construction; • Excavations more than 0.5 m deep will be fenced or covered overnight where practicable, or if this is not practicable, a method of escape (e.g. a plank to act as a ladder) will be provided; and • Large diameter pipes will be capped at the end of each working day to reduce the potential for badgers and other animals to enter them and become trapped.	To minimise the potential impacts on badgers.
If work within minimum distances of a sett and therefore, sett closure or disturbance cannot be avoided, this will need to be carried out outside the badger breeding season (defined as 30 November to 1st July) and in accordance with an NE approved method statement and where relevant an NE licence for badgers. Trenchless installation launch pits will be located minimum distances from active badger setts, or an NE licence for badgers may be required prior to the commencement of works, as considered necessary by an experienced badger ecologist. Toolbox talks on badgers will be provided by the ECoW to all construction staff on site and an emergency procedure protocol will be given to contractors in the event of encountering a badger or discovering a sett. If new setts are identified within minimum distances of the cable route corridor, or in the areas around the trenchless installation launch sites, micrositing away from the setts will be undertaken where practicable within the consented boundary of development, or an NE licence for badgers may be required before works continue.	To minimise the potential impacts on badgers.
In addition to measures described above to minimise the impacts of pollutants, including airborne pollutants and light spillage, additional measures to ensure works do not result in the killing, injury or disturbance of bats will be included in the outline CoCP. These measures will include: • The creation of a minimum buffer zone between cable trenches and any bat roosts identified during surveys; • If the surveys, or subsequent surveys identify the presence of additional bat tree roosts which will require removal to enable installation of the cable, this will be carried out under an EPS licence for bats obtained from NE; and • Use of temporary 'artificial bridges' to provide a link between severed edges of hedgerows and other habitat crossed by the cable route corridor, which have been identified as key commuting/foraging routes. The artificial bridges will be retained in situ throughout the construction period and until replacement planting has established and developed sufficiently to create a continuous connecting habitat. The bridges will be put into place at the end of each working day and will be retained in situ during the day when not working in the area.	To minimise the potential impact on bats.

Measures adopted as part of Hornsea Three	Justification
Post-construction measures	
Reinstatement of damaged or cleared terrestrial habitat will be carried out as soon as practicable. Habitat reinstatement will involve the replacement of stripped soils and the planting of native hedgerows, shrubs and trees, typical of the local area and of local provenance where possible. The construction of buildings and planting of trees with deep roots will not be permitted above the cable route to prevent potential damage to cabling. Habitat reinstatement will be undertaken in accordance with a pre-approved Landscape Scheme and Management Plan. The scheme will include the retention and/or replacement of habitats of nature conservation value wherever practicable.	To minimise the period of time that habitats and species will be affected.
Bat habitat and bat roost creation, restoration or enhancement, with the aim of providing proportionate replacement for habitat lost or damaged, for example: • Erection of long-lasting Schwegler bat boxes on nearby retained mature trees to provide immediate potential roost sites as mitigation for lost tree holes of potential value to roosting bats; • Replacement hedgerow planting, or 'gapping up' of hedgerows along the route, including the planting of scattered native hedgerow trees where practicable; hedges with trees are greatly preferred by bats. Tree planting will provide potential long-term roosting opportunities; and • Securing the long-term establishment and maintenance of replacement habitat in accordance with the landscape mitigation measures.	To minimise the potential impact on bats.
Post-construction restoration on affected watercourses will be carried out to reinstate banks to their previous condition, and ensure suitable for water voles.	To minimise the potential impacts on water voles.
Operational phase measures	
The measures to be adopted for the avoidance of pollution of the environment during the operation of the onshore infrastructure are set out in volume 3, chapter 2: Hydrology and Flood Risk.	To protect retained habitats and species.
Habitats will be managed in accordance with the outline EMP and the outline Landscape Scheme and Management Plan.	To ensure the success of habitat/landscaping proposals.
Decommissioning phase measures	
Measures to be adopted during decommissioning will be similar to those adopted during construction and will incorporate best practice guidance available at that time.	To minimise likely impacts on habitats and species of ecological or conservation interest.